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State Specific Action Plan for Water Sector (SSAP-WS)

Union Territory of Jammu & Kashmir

Aimed at comprehensive policy for integrated water resource management of Jammu & Kashmir

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Executive Summary

The National Water Mission, launched by the Ministry of Water Resources within the Government of India, is a pivotal component of the National Action Plan for Climate Change (NAPCC), which comprises eight National Missions. The central objective of the National Water Mission is to promote water conservation, minimize wastage, and ensure a fairer distribution of water resources, both among states and within them. This is to be achieved through the implementation of integrated strategies for the development and management of water resources.

The State Specific Action Plan (SSAP) for the water sector is a comprehensive document designed to provide insights into the current water scenario within a specific state / UT, including an assessment of supply and demand across various sectors. The SSAP identifies critical issues and proposes potential solutions, ultimately leading to the formulation of a detailed action plan for the water sector.

To effectively develop the action plan for the water sector, it is crucial to gain a deep understanding of the water situation within the UT/state. This necessitates the establishment of a robust database encompassing various water sources, their current utilization, ongoing development initiatives, and strategies for future water resource management. This report offers an overview of the Water Budget for the UT of Jammu and Kashmir.

The report is structured in a systematic way to the best possible extent defined as per the SSAP report template given by the National Water Mission. In this report, the initial chapter introduces the State-Specific Action Plan. The subsequent chapter provides an analytical perspective on the state's attributes and resources, particularly from the water perspective. Moving forward, the third chapter delineates the State/UT's development vision, emphasizing water-related opportunities and challenges. Chapter four conducts an in-depth analysis of water resources, encompassing their sources, demand dynamics, and quality aspects. The fifth chapter explores sustainable and efficient water technologies, along with exemplary practices employed at community level. Chapter six scrutinizes the governance and management frameworks of water resources. The seventh chapter delves into the financial and economic dimensions of water management. Following this, the eighth chapter critically evaluates the prevailing governance of water resources by highlighting the challenges observed by the stakholders. Chapter nine formulates the status of water resource for prospective planning and development formulating water demand scenarios. Finally, the tenth chapter presents the State/UT's water budget and balance in a comprehensive manner with a scenario-based water budgeting at a decadal scale to 2052.This draft report was compiled by assimilating information from diverse sources, including state government departments, officials, publications from the various stakeholders of the UT, various central government organization, data from autonomous institutions, and data products generate by us using freely available remote sensing data. The primary data used for water budgeting is based on the Indian Land Data Assimilation System (ILDAS). ILDAS integrates a land surface and hydrological model to produce a high-resolution hydro-meteorological reanalysis dataset for the entire geographical extent of India. The ILDAS system and its utilization is discussed in detail in Chapter-9. In computations of the water budget, the ILDAS products were calibrated using statistical methods based on ground information available from Central Ground Water Board (CGWB) spanning 2014-2022, and the discharge data available from Central Water Commission (CWC) ground stations spanning 2000-2020. Further technical details are discussed in Chapter-9. These calibrated products were used to simulate the district-wise total water storage, while the demand data was assimilated from the stakeholders for the computation of the water budget, as delineated in Chapter-10.

For 2022, the Kishtwar district showed the highest water availability of approximately 9.60 BCM, and the Shopian district showed the least water availability of 1.30 BCM amongst the 20 districts of the UT of Jammu and Kashmir. We considered specific scenarios to observe the potential water availability at various intervals (per decade) till 2052 by selecting growth factors for the various sections of the water demand side, as detailed Chapter-9. The total water storage from the 2022 was used to derive inferences on the water budget at district levels. The district-wise water budget shows significant differences in the UT of Jammu and Kashmir, owing to the varying geography, rainfall patterns, and water availability from snow-glaciers. The highly water surplus districts of UT of Jammu and Kashmir are observed to be Kishtwar, Poonch, and Kupwara, while districts with deficient states observed to be Baramulla, and Ganderbal. By the end of this Century several other districts such as Srinagar, Badgam etc. are also expected to undergo a water deficient status.

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Abbreviation

ADB	:	Asian Development Bank
AIBP	:	Accelerated Irrigation Benefit Program
AIIMS	:	All India Institute of Medical Sciences
AMRUT	:	Atal Mission for Rejuvenation and Urban Transformation
APHA	:	American Public Health Association
ARG	:	Automatic Raingauge
ATDP	:	Aspirational Towns Development Programme
ATMA	:	Agricultural Technology Management Agency
AWS	:	Automatic Weather stations
BCM	:	Billion Cubic Meters
bgl	:	below ground level
BIS	:	Bureau of Indian Standards
BMTPC	:	Building Materials Technology Promotion Council
°C	:	Degrees Celsius
CAD	:	Command Area Development
CADA	:	Command Area Development Authority
CAGR	:	Compounded Annual Growth Rate
CCA	:	Cultivable Command Area
CGWB	:	Central Ground Water Board
CHC	:	Chlorinated Hydrocarbons
CLU	:	Change of Land Use
CPCB	:	Central Pollution Control Board
CPSUs	:	Central Public Sector Undertakings
CPWD	:	Central Public Works Board
CTR	:	Catch the Rain
CWAP	:	City Water Action Plans
CWBP	:	City Water Balance Plans
CWC	:	Central Water Commission
CWC	:	Central Water Commission
CWRA	:	Central Wetland Regulatory Authority
DADP	:	Drought Prone Area Development Programme
DPR	:	Detailed Project Report
EC	:	Electrical Conductivity
EMC	:	Environmental Management Classification
ERF	:	Environmental Flow Requirement
ETP	:	Effluent Treatment Plant
FAO	:	Food and Agriculture Organization
FY	:	Financial year
GDP	:	Gross Domestic Product
GEC	:	Groundwater Estimation Committee
GI	:	Geographical Indication
GIS	:	Geographic Information System
GLIMS	:	Global Land Ice Measurements from Space

GLOF	:	Glacial Lake Outburst Flood
GSI	:	Geological Survey of India
GST	:	Goods and Services Tax
GSVA	:	Gross State Value Added
GVA	:	Gross Value Added
ICC	:	Insurance Certificate of Compliance
ICID	:	International Commission on Irrigation and Drainage
IDTR	:	Institute of Driving Training and Research
IEC	:	International Electro-technical Commission
IEC	:	Information, Education, and Communication
IEC	:	Information, Education, and Communication
ILDAS	:	Indian Land Data Assimilation System
IMD	:	India Meteorological Department
IPP	:	Independent Power Producers
IPP	:	Independent Power Producer
IRBM	:	Integrated river basin management
ISRO		Indian Space Research Organisation
IUCN	:	International Union for Conservation of Nature
IWMP	:	Integrated Watershed Management Programme
IWMP	:	Integrated Watershed Management Programme
IWQI	:	Irrigation Water Quality Index
JJM	:	Jal Jeevan Mission
JKAS	:	Jammu and Kashmir Administrative Service
JSA	:	Jal Shakti Abhiyan
KM	:	Kilometre
KWHr	:	Kilowatt-hour
LAR	:	Least Absolute Residuals
LC	:	Land Cover
LCA	:	Lake Conservation Authority
LDA	:	Lake Development Authority
LU	:	Land Use
LULC	:	Land Use Land Cover
MAF	:	Mean Annual Flow
MAF	:	Million acre-feet
MCM	:	Million Cubic Meters
MHA	:	Ministry of Home Affairs
MLD	:	Million Liters per Day
MNREGP	:	Mahatma Gandhi National Rural Employment Guarantee Program
MOU	:	Memorandum of Understanding
MSME	:	Micro, Small, and Medium Enterprises
MT	:	Metric Ton
MTS	:	Thousand metric tons
MW	:	Mega Watt
NABARD	:	National Bank for Agriculture and Rural Development
NAPCC	:	National Action Plan on Climate Change

NBCC	:	National Buildings Construction Corporation
NCAE	:	National Committee on Aquatic Ecosystems
NCSS	:	New Central Sector Scheme
NGO	:	Non-Governmental Organization
NIFT	:	National Institute of Fashion Technology
NPCA	:	National Plan for Conservation of Aquatic Ecosystems
NRSC	:	National Remote Sensing Centre
NSO	:	National Statistical office
NULM	:	National Urban Livelihood Mission
NVA	:	Net Value Added
NWC	:	National Wetlands Committee
NWM	:	National Water Mission
NWP	:	National Water Policy
pH	:	potential of Hydrogen
PHE	:	Public Health Engineering
PIM	:	Participatory Irrigation Management
PLFS	:	Periodic Labour Force Survey
PMEGP	:	Prime Minister's Employment Generation Programme
PMKSY	:	Pradhan Mantri Krishi Sinchayee Yojana
PPP	:	Public-Private Partnership
PRI	:	Panchayati Raj Institutions
PWD	:	Persons with Disabilities
QR	:	Quick Response
RAFTAAR	:	Remunerative Approaches for Agriculture and Allied Sector Rejuvenation
RFA	:	Recorded Forest Area
RKVY	:	Rashtriya Krishi Vikas Yojana
RMSE	:	Root Mean Square Error
ROI	:	Return on investment
RSC	:	Residual Sodium Carbonate
SAR	:	Sodium Adsorption Ratio
SARTHI	:	System for Automation and Registration, Transport and Highways Information
SC	:	Scheduled Castes
SHG	:	Self-Help Groups
SKIMS	:	Sher-i-Kashmir Institute of Medical Sciences
SPCB	:	State Pollution Control Board
SSAP	:	State-Specific Action Plan
ST	:	Scheduled Tribes
STP	:	Sewage Treatment Plant
TPP	:	Thermal Power Plant
TWS	:	Total water storage
ULB	:	Urban Local Bodies
UMTAs	:	Unified Metropolitan Transport Authorities
UNDP	:	United Nations Development Programme

UNESCO	:	United Nations Educational, Scientific and Cultural Organization
URIF	:	Urban Reform Incentive Fund
UT	:	Union Territory
UTLSC	:	Union Territory Level Steering Committee
UTLSC	:	Union Territory Level Monitoring Committee
VHSNC	:	Village Health and Sanitation Committee
WALMI	:	Water and Land Management Institute
WUE	:	Water Use Efficiency

1. State Specific Action Plan

1.1. Background

Water is a fundamental resource that sustains life and is known to play a vital role in the socio-economic development of any region. In the picturesque landscape of Jammu and Kashmir, water resources hold exceptional significance, contributing to agriculture, hydropower generation, tourism, and domestic consumption. However, the state faces unique challenges that warrant a focused and tailored approach towards managing its water sector sustainably and efficiently[1].

The hydrological cycle, also often referred to as the water cycle, is the continuous process of how water circulates on the Earth (Rast et al. 2014). It involves the movement of water through various stages, including evaporation, condensation, precipitation, and runoff. The hydrological cycle in the region of Jammu and Kashmir, follows the same principles as the water cycle globally but is influenced by the local climate, topography, flora and fauna. The hydrological cycle in Jammu and Kashmir is vital for the regional ecosystems, agriculture, and overall water availability for human consumption and other activities. Changes in the climate and anthropogenic activities can influence the balance of this cycle, affecting the health of the region's water resources and ecosystem (Kundzewicz 2008). The sustainable management and conservation of water resources to ensure the well-being of both the environment and the people in the region is understably essential (N.D. 2023).

The State Specific Action Plan (SSAP)[2] is a strategic and tailored plan designed to address the unique challenges and priorities of a specific state, union territory (UT) or region within India. The SSAP is typically developed within the framework of broader national policies and initiatives to ensure effective implementation and coordination at the State/UT level[3]. The SSAP for the Water Sector of the UT of Jammu and Kashmir aims to address the critical issues pertaining to the water availability, distribution, conservation, and quality across the region. This comprehensive plan has been formulated through an intensive collaborative effort involving governmental bodies, experts, local communities, and various stakeholders.

1.2. National Action Plan on Climate Change

The National Action Plan on Climate Change (NAPCC) is a comprehensive policy initiative implemented by several countries, including India. Launched in

[1] https://www.nbr.org/wp-content/uploads/pdfs/publications/indiacaucus_april2019.pdf
[2] https://nwm.gov.in/state-specific-action-plan-ssap
[3] https://nwm.gov.in/sites/default/files/Background%20Note_0.pdf

2008, India NAPCC aims to effectively address the challenges of climate change while promoting sustainable development (Prodipto Ghosh 2009). The plan encompasses a series of strategic missions targeting specific sectors to both mitigate greenhouse gas emissions and adaption strategies to limit the impacts of climate change[1].

The NAPCC in India consists of eight key missions[2]:

a) **National Solar Mission**

The National Solar Mission aims to boost the utilization of solar energy for electricity generation and other applications, with the goal of increasing its share in the overall energy mix.

b) **National Mission for Enhanced Energy Efficiency**

The National Mission for Enhanced Energy Efficiency is focused on various sectors like industry, buildings, and appliances, this mission seeks to improve energy efficiency to reduce energy consumption and lower greenhouse gas emissions.

c) **National Mission on Sustainable Habitat**

The National Mission on Sustainable Habitat is geared towards fostering sustainable urban development and enhancing energy efficiency in buildings and infrastructure.

d) **National Water Mission**

The objective of the National Water Mission is to address water-related challenges, such as conservation, efficient use, and equitable distribution, in the context of climate change.

e) **National Mission for Sustaining the Himalayan Ecosystem**

The National Mission for Sustaining the Himalayan Ecosystem aims to protect the fragile Himalayan ecosystem, which is particularly susceptible to the impacts of climate change.

f) **National Mission for a Green India**

The National Mission for a Green India is focused on expanding forest cover and improving the quality of existing forests, this mission aims to enhance carbon sequestration and preserve biodiversity.

[1] https://moef.gov.in/wp-content/uploads/2018/07/CC_ghosh.pdf
[2] https://static.pib.gov.in/WriteReadData/specificdocs/documents/2021/dec/doc202112101.pdf

g) National Mission for Sustainable Agriculture

The National Mission for Sustainable Agriculture concentrates on promoting sustainable agricultural practices, ensuring food security, and reducing emissions from the agriculture sector.

h) National Mission on Strategic Knowledge for Climate Change

The National Mission on Strategic Knowledge for Climate Change aims to advance climate science research, knowledge, and capacity building in India.

India demonstrates its commitment to combat climate change while addressing its unique development challenges, with the ultimate goal of contributing to global efforts for a more sustainable future through these missions. Due to the changing climate scenarios, it is important to note that the specifics of the National Action Plan on Climate Change may evolve over time as policies and circumstances change. The National Water Mission (NWM), which is one of the eight missions under the NAPCC, addresses water-related issues and concerns on a national level, and its objectives are applicable to different regions of India, including Jammu and Kashmir.

The National Water Mission focuses on the following key objectives:

1. Comprehensive water data base in public domain and assessment of the impact of climate change on water resources

a) Review and establishment of network for collection of additional necessary data;

b) Development of Water Resources Information System;

c) Development / implementation of modern technology for measurement of various data;

d) Developing inventory of wetlands;

e) Research and studies on all aspects related to impact of climate change on water resources including quality aspects of water resources with active collaboration of all research organizations working in the area of climate change;

f) Reassessment of basin wise water situation; and

g) Projection of the impact of climate change on water resources.

2. **Promotion of citizen and state action for water conservation, augmentation and preservation**

   a) Empowerment and involvement of Panchayati Raj Institutions, urban local bodies, Water Users Associations and primary stake holders in management of water resources with focus on water conservation, augmentation and preservation;

   b) Promote participatory irrigation management;

   c) Sensitization of elected representatives of over-exploited areas on dimensions of the problems and to orient investment under MNREGP towards water conservation;

   d) Provide incentives for water neutral and water positive technologies in industry;

   e) Encourage participation of NGOs in various activities related to water resources management, particularly in planning, capacity building and mass awareness; and

   f) Involve and encourage corporate sector / industries to take up, support and promote water conservation, augmentation and preservation within the industry and as part of corporate social responsibility.

3. **Focused attention to vulnerable areas including over-exploited areas**

   a) Expeditious implementation of water resources projects particularly the multipurpose projects with carry over storages benefitting drought prone and rain deficit areas;

   b) Promotion of traditional system of water conservation;

   c) Physical sustainability of groundwater resources;

   d) Intensive programme for ground water recharge in over-exploited, critical and semi-critical areas;

   e) Conservation and preservation of wetlands;

   f) Intensive programmes to addressing the quality aspects of drinking water particularly in rural areas;

   g) Promotion of water purification and desalination; and

   h) Systematic approach for coping with floods.

4. **Increasing water use efficiency by 20%**

   a) Research in area of increasing water use efficiency and maintaining its quality in agriculture, industry and domestic sectors;

b) Incentivize recycling of water including wastewater;

c) Development of Eco-friendly sanitation system;

d) Improve efficiency of urban water supply system;

e) Efficiency labelling of water appliances and fixtures;

f) Promotion of water efficient techniques and technologies;

g) Undertake Pilot Projects for improvement in water use efficiency in collaboration with States;

h) Promote Water Regulatory Authorities for ensuring equitable water distribution and rational charges for water facilities;

i) Promote mandatory water audit including those for drinking water purposes;

j) Adequate provision for operation & maintenance of water resources projects;

k) Incentives through award for water conservation & efficient use of water; and

l) Incentivize use of efficient irrigation practices and fully utilize the created facilities.

5. Promotion of basin level integrated water resources management

a) Review of National Water Policy;

b) Review of State Water Policy;

c) Guidelines for different uses of water e.g., irrigation, drinking, industrial, etc. particularly in context of basin wise situations;

d) Planning on the principle of integrated water resources development and management;

e) Inter-basin integration particularly for augmenting water by converting surplus flood water into utilizable water; and

f) Ensuring convergence among various water resources programmes.

Although the implementation and specific actions may vary depending on the regional requirements and challenges faced by each state, including Jammu and Kashmir, these objectives of the National Water Mission (NWM) are overarching and relevant for the entire country. The NWM is a part of the National Action Plan on Climate Change (NAPCC) in India, and it aims to address various water-related challenges in different regions, including Jammu and Kashmir. The NWM's objectives include promoting sustainable water use, water conservation, and efficient water management.

1.3. Objectives of SSAP for water sector

The objectives of SSAP for water sector as defined by the NWM[1] are summarized as follows.

a) Critical analysis of existing water scenario based on current and past data / information-both on availability and development (supply side) and use (demand side).

b) Critical review of existing water policies, regulations, institutions and various ongoing interventions / Schemes / Programmes on Water being undertaken by various government and non-government agencies including the best practices.

c) To identify current and future development needs, challenges; vulnerable areas and communities; and explore possible solutions and strategies for sustainable development and management.

d) To evolve and formulate performance indicators for each of the water cycle/ dimension component including Sustainable Development Goals.

e) To formulate annual State / UT Water Budgets.

f) To designate one State Department as responsible for enabling, coordinating and supervising all aspects of water- Quantity (supply side, demand side) and quality dimensions / components of Water / Water Cycle in the State with a responsibility to formulate annual State/ UT Water Budgets.

g) To document assessment / Impact of Climate Change on the State-resources, livelihoods and growth from Water perspective and the development of possible scenario on Water.

h) To formulate a strategic action plan including location and context specific contingency plans to manage the impact of climate change.

i) To formulate a comprehensive and integrated water plan for WATER SECURITY, SAFETY AND SUSTAINABILITY TILL 2050 with equity through convergence, synergy and role / accountability of all stakeholders - Government and Non-Government agencies including civil society.

[1] https://nwm.gov.in/sites/default/files/Background%20Note_0.pdf

1.4. Expected Outcomes

The State Specific Action Plan (SSAP) for Jammu and Kashmir in the water sector, aims to achieve the following outcomes.

a) **Integrated Approach:** Implement an integrated approach that fosters collaboration between various departments involved in the water sector.

b) **Robust Database:** Establish a reliable and robust database on water-related information, centralized at a single platform.

c) **Identifying Water Availability:** Identify areas with excess water availability and regions facing water scarcity to target appropriate water management strategies.

d) **Supply and Demand Assessment:** Evaluate water supply and demand trends in different sectors up to the year 2050, based on historical data.

e) **Balancing Groundwater and Surface Water Use:** Develop a balanced approach between utilizing groundwater and surface water for various purposes.

f) **Disaster Management:** Create a system to effectively manage disasters like landslides, extreme rainfall, droughts, and river erosion in Jammu and Kashmir

g) **River Rejuvenation:** Identify and prioritize projects for the rejuvenation of rivers, streams, lakes, and wetlands in the state.

h) **Formulating Water Laws:** Develop new acts and laws for the water sector to regulate and improve existing practices.

i) **Water Budgeting:** Formulate a water budget based on the findings and recommendations of the SSAP report, to be updated annually.

1.5. Constitution of Committees

There are two primary committees for the State Specific Action Plan of the UT of Jammu and Kashmir defined as the Union Territory Level Steering Committee (UTLSC), and the Union Territory Level Monitoring Committee (UTLMC). Both committees comprise members from various departments and personnel directly or indirectly associated with the supply and or demand side of water resources from the UT and central government. The detailed description of the associated members with these committes are listed in Table 1.1. and Table 1.2.

Table 1.1. Union Territory Level Steering Committee (UTLSC)

S. No.	Designation and Department	Position
1	Chief Secretary, J&K	Chairman

2	Administrative Secretary, Jal Shakti Department	Vice Chairman
3	Chief Engineer, Jal Shakti (I&FC) Department Jammu (Nodal Officer UTSAP)	Convenor
UT Government- Departments associated in providing/developing/Monitoring of Water		
4	Administrative Secretary, Forest, Ecology & Environment Department	Member
5	Administrative Secretary, Housing and Urban Development Department	Member
6	Administrative Secretary, Department of Rural Development and Panchayati Raj	Member
7	Administrative Secretary, Department of Disaster Management, Relief Rehabilitation and Reconstruction	Member
8	Chairman, J&K Pollution Control Committee	Member
9	Principal Chief Conservator of Forests & HOFF, UT of J&K	Member
10	PCCF (Wildlife) Chief Wildlife Warden, UT of	Member
11	VC, J&K Lake Conservation & Management Authority	Member
12	MD, JKPDC, UT of	Member
13	Director General, Economics & Statistics J&K	Member
14	Chief Engineer Jal Shakti (I&FC) Department, Kashmir	Member
15	Chief Engineer Jal Shakti (PHE) Department, Jammu	Member
16	Chief Engineer Jal Shakti (PHE) Department, Kashmir	Member
17	Chief Engineer UEED, J&K	Member
18	Director Rural Development Department Jammu/Kashmir	Member
19	Director Rural Sanitation, J&K	Member
20	Chief Executive Director, Wular Conservation & Management Authority	Member
21	Secretary, JK WRRA	Member
UT Government - User Departments		
22	Administrative Secretary, Agriculture Production & Department	Member
23	Administrative Secretary, Industries and Commerce Department	Member
24	Chief Engineer PWD Jammu/Kashmir	Member
25	Director Agriculture Jammu/Kashmir	Member
26	Director Fisheries, J&K	Member
27	MD, Housing Board, J&K	Member
28	VC, Jammu Development Authority	Member
29	VC, Srinagar Development Authority	Member
30	Director, Tourism Jammu/Kashmir	Member
31	Director, Education Jammu/Kashmir	Member
32	Director, Health Jammu/ Kashmir	Member
33	Director, Local Bodies Jammu/Kashmir	Member

Central Government Departments		
34	Central Water Commission, J&K (Director)	Member
35	IMD J&K (Regional Director)	Member
36	CGWB (Regional Director)	Member
37	Northern Railways Firozpur Division (DRM)	Member
38	National Remote Sensing Center, J&K (Director)	Member
39	NABARD Jammu (CGM)	Member
40	Western Regional Himalayan Centre Jammu, (Scientist 'G' & Head)	Member
Expert Institutions		
41	National Institute of Technology, Srinagar (HOD Civil)	Member
42	Sher-e-Kashmir University of Agricultural Sciences & Technology, Jammu (Director Extension)	Member
43	Indian Institute of Integrative Medicine Jammu (Director)	Member
Water Experts		
44	Sh. Shiv Nandan Kumar, Chairman Krishna River Management Board	Member
45	Dr. Anil Dutt Vyas, WASH Specialist, Professor Department of Civil Engineering, Manipal University, Jaipur	Member
Civil Society Sector		
46	NGO, Advanced Centre for Water Resources Development and Management, Maharashtra (Dr. Himanshu Kulkarni)	Member

Table 1.2. Union Territory Level Monitoring Committee (UTLMC)

S. No.	Designation and Department	Position
I	Administrative Secretary, Jal Shakti Department	Chairman
2	Chief Engineer Jal Shakti (I&FC) Department Jammu (Nodal Officer UTSAP)	Convenor
UT Government - Departments associated in Providing/Development/Monitoring of Water		
3	Representative of Administrative Secretary, Forest, Ecology & Environment Department.	Member
4	Representative of Administrative Secretary, Housing & Urban Development Department	Member
5	Representative of Administrative Secretary, Rural Development & Panchayti Raj	Member
6	Representative of Administrative Secretary, Disaster Management, Relief, Rehabilitation and Reconstruction.	Member
7	Representative of Chairman, J&K Pollution Control Committee	Member
8 9	Representative of Principal Chief Conservator of Forests & HOFF, UT of J&K	Member
10	Representative of PCCF (Wildlife) Chief Wildlife Warden, UT of J&K	Member

11	MD PDC	Member
12	Director General, Economics & Statistics J&K	Member
13	Chief Engineer Jal Shakti (I&FC) Department, Kashmir	Member
14	Chief Engineer Jal Shakti (PHE) Department, Jammu	Member
15	Chief Engineer Jal Shakti (PHE) Department, Kashmir	Member
16	Chief Engineer UEED,	Member
17	Director Rural Development Department Jammu/ Kashmir	Member
18	Director Rural Sanitation, J&K	Member
19	Chief Executive Director, Wular Conservation & Management Authority	Member
20	VC, J&K Lake Conservation & Management Authority	Member
21	Secretary, JK WRRA	Member
UT Government - User Departments		
22	Representative of Administrative Secretary, Agriculture Production Department	Member
23	Representative of Administrative Secretary, Industries & Commerce Department	Member
24	Chief Engineer, PWD, Jammu/Kashmir	Member
25	Director, Agriculture Jammu/Kashmir	Member
26	Director, Fisheries J&K	Member
27	MD, Housing Board, J&K	Member
28	VC, Jammu Development Authority	Member
29	VC, Srinagar Development Authority	Member
30	Director, Tourism Jammu/Kashmir	Member
31	Director, Education Jammu/ Kashmir	Member
32	Director, Health Jammu/Kashmir	Member
33	Director, Local Bodies Jammu/Kashmir	Member
Central Government Departments		
34	Central Water Commission, J&K (Director)	Member
35	IMD J&K (Regional Director)	Member
36	CGWB (Regional Director)	Member
37	Northern Railways Firozpur Division (DRM)	Member
38	National Remote Sensing Centre, J&K (Director)	Member
39	NABARD Jammu (CGM)	Member
40	Western Regional Himalayan Centre Jammu, NIH (Scientist 'G' & Head)	Member
Members from Expert Institutes		
41	National Institute of Technology, Srinagar (HOD Civil)	Member
42	Sher-e-Kashmir University of Agricultural Sciences & Technology, Jammu (Director Extension)	Member
43	Indian Institute of Integrative Medicine Jammu (Director)	Member
Expert Institutions		

44	Sh. Shiv Nandan Kumar, Chairman Krishna River Management Board	Member
45	Dr. Anil Dutt Vyas, WASH Specialist, Professor Department of Civil Engineering, Manipal University, Jaipur	Member
Civil Society Sector		
46	NGO, Advanced Centre for Water Resources Development and Management, Maharashtra (Dr. Himanshu Kulkarni)	Member

2. ABOUT THE STATE: From Water Perspective

2.1. Geographical Location

The UT of Jammu and Kashmir (Figure 2.1) is located in the northern part of India, spanning between longitude 32° 26’ to 80° 30' E & latitude 32° 17' N to 37° 58' N and elevation is 205 m to 6533 m above the mean sea level. The region is bordered by the Indian states of Himachal Pradesh and Punjab to the south, UT of Ladakh to the east, and Pakistan occupied Kashmir to the noth and the west (Romshoo et al. 2020; Raina 2022).

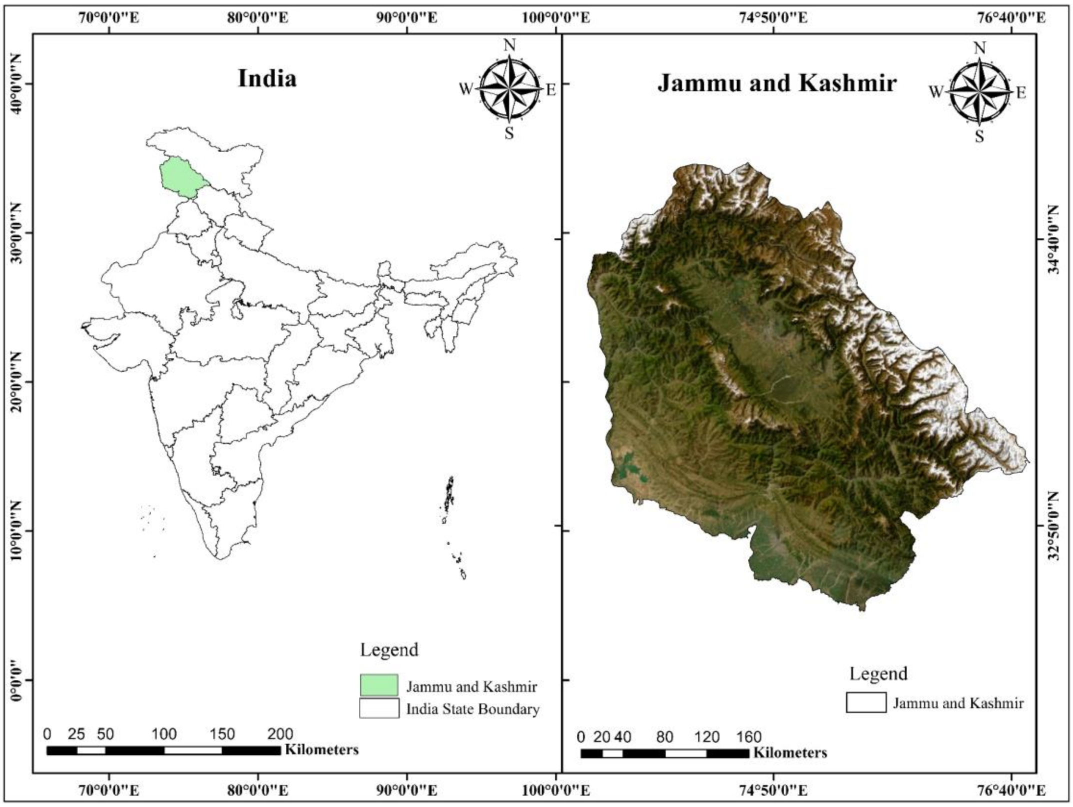


Figure 2.1. The geographical extent of the UT of Jammu and Kashmir, base layer Google Satellite.

The geology of Jammu and Kashmir is predominantly marked by the presence of various rock formations, including sedimentary, metamorphic, and igneous rocks (Romshoo et al. 2020). The Himalayan range, which extends through the state, is composed of sedimentary rocks such as shale, limestone, and sandstone, reflecting the ancient marine deposits from the Tethys Sea (Romshoo et al. 2020). The intense tectonic activity in the region has led to the uplifting of these rock layers, resulting in the towering peaks and deep valleys that characterize the landscape (Valdiya 1984). Geomorphologically, Jammu and Kashmir boast a diverse topography, ranging from high mountain peaks to deep river valleys. The valleys, carved by the major rivers like the Jhelum and the Chenab, exhibit impressive fluvial landforms, including alluvial plains and terraces. Glacial activity has also left its mark on the region, with numerous glacial valleys and cirques found in the higher altitudes (Whitehouse 1990).

Presently, Jammu and Kashmir comprise 20 districts and spans an area of approximately 42,577 square kilometres[1]. According to the Census of India 2011[2], Jammu and Kashmir have total population of 12,541,302 in which males were 6,640,662 while females were 5,900,640 and it had a literacy rate of 67.16%. The Average Sex Ration of Jammu and Kashmir is 889 out of 1000. The Demographic profile of Jammu and Kashmir shown in Table 2.1. The UT of Jammu and Kashmir[3] the district- wise distribution of village, gram Panchayats block and is shown in Table 2.2 .

Table 2.1. Demographic profile of Jammu and Kashmir. Source: Census of india, 2011

S.N.	Demographic Group	Percentage of Total Population	Important Communities/Groups
1	Scheduled Castes (SC)	Around 7-8%	Valmiki, Chamar/ Ramdasia, Megh
2	Scheduled Tribes (ST)	Less than 1%	Gujjar, Bakarwal, Gaddi
3	Muslims	Majority	Kashmiri Muslims, Other Muslim communities
4	Hindus	Significant Minority	Kashmiri Pandits, Other Hindu communities
5	Sikhs	Small Minority	Sikhs residing in certain areas (e.g., Rajouri, Poonch)
6	Buddhists	Small Minority	Buddhists residing in Ladakh region (e.g., Leh)
7	Christians	Small Minority	Christians residing in various areas
8	Women	Approximately 48-49% of the total population	-
9	Persons with Disabilities (PWD)	Data not available	People with various types of disabilities

[1] https://jkfcr.nic.in/administrative_structure.html#:~:text=The%20divisions%20are%20further%20sub,Sub%2DDivided%20into%20207%20Tehsils.

[2] https://censusindia.gov.in/census.website/data/census-tables

[3] https://jk.gov.in/jammukashmir/districts/

Table 2.2 The district- wise distribution of village, gram Panchayat block and municipality in UT of Jammu and Kashmir.
Source: https://jk.gov.in/jammukashmir/districts

S. No.	District	Village	Gram Panchayats	Tehsil	Block	Municipality
1	Kathua	-	257	11	19	-
2	Jammu	-	-	21	20	02
3	Samba	382	101	06	09	01
4	Udhampur	357	236	08	17	03
5	Reasi	259	147	09	12	-
6	Rajouri	386	312	13	19	05
7	Poonch	178	229	06	11	02
8	Doda	402	231	16	17	03
9	Ramban	-	-	08	11	03
10	Kishtwar	157	136	11	13	01
11	Anantnag	395	335	12	16	10
12	Kulgam	273	-	07	11	04
13	Pulwama	327	-	08	-	-
14	Shopian	232	-	07	09	01
15	Budgam	504	-	09	17	06
16	Srinagar	-	21	07	04	02
17	Ganderbal	139	-	07	07	-
18	Bandipore	122	-	07	12	03
19	Baramulla	-	402	18	26	07
20	Kupwara	-	-	16	24	-

2.2. Physiography

The physiography of Jammu and Kashmir (Figure 2.2 & Figure 2.3) refers to the physical landscape and geographical features of the region. The physiography of Jammu and Kashmir is incredibly diverse, comprising a wide range of landforms, from high mountain ranges to fertile valleys and plateaus. Here are the major physiographic regions of Jammu and Kashmir:

The Himalayas: The northern part of Jammu and Kashmir is dominated by the Great Himalayan Range, which runs along the northern boundary of the region, separating it from Tibet (China). This range includes some of the highest peaks in the world, such as Nanga Parbat, which is the ninth-highest mountain globally. The expansive Great Himalayas encompass ranges that boast an array of peaks, many of which ascend to elevations surpassing 20,000 feet (6,100 meters) or even higher. These peaks are interspersed by intricate valleys, deeply incised and situated at considerable distances from convenient access.

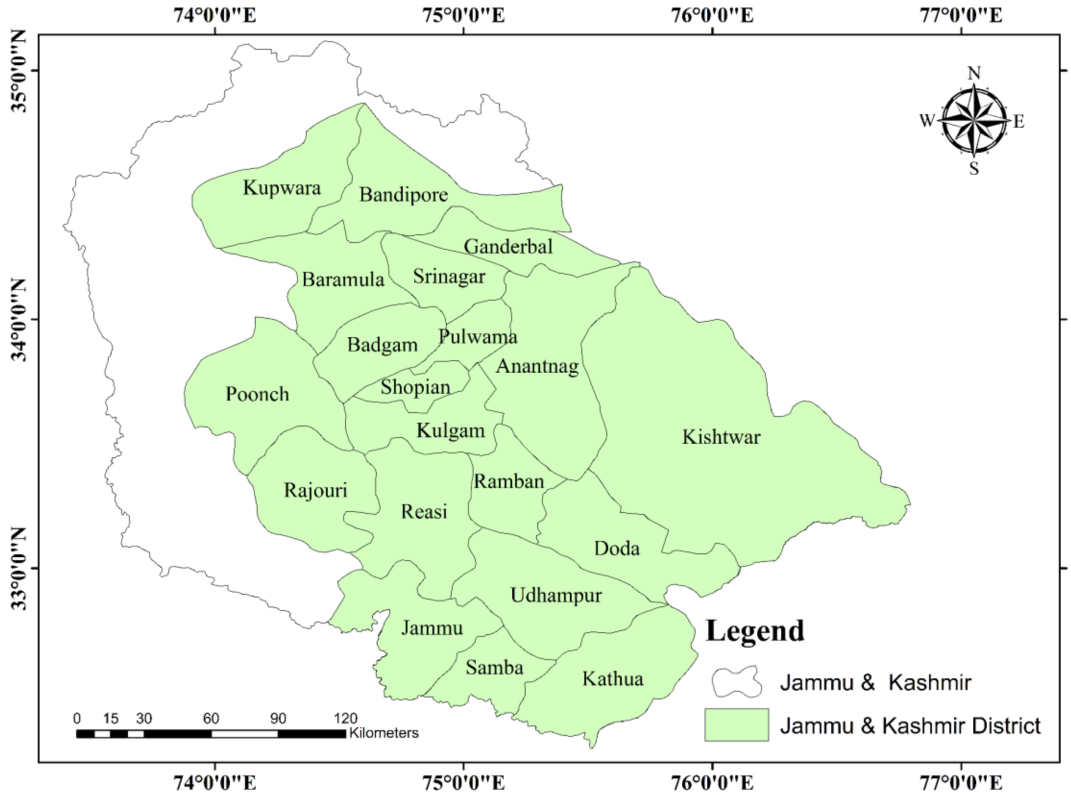


Figure 2.2 The administrative boundaries of the UT of Jammu and Kashmir.

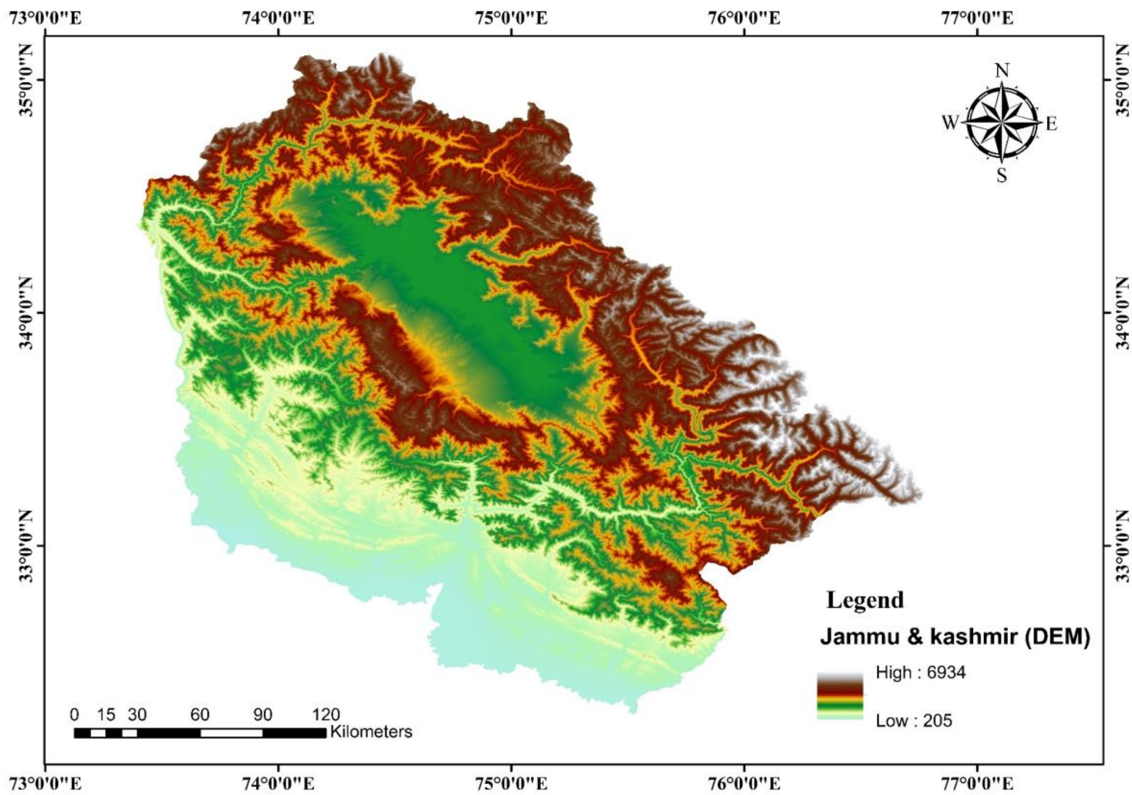


Figure 2.3. The topography of the UT of Jammu and Kashmir based on the 1 arc-sec Shuttle Radar Topography Mission (SRTM) Digital Elevation Model (DEM).

The Kashmir Valley: Situated between the Great Himalayas in the north and the Pir-Panjal Range in the south, the Kashmir Valley is a large basin that stretches from northeast to southwest. The valley is primarily formed by the Jhelum River and its tributaries, and it is famous for its breath-taking beauty, lush meadows, and serene lakes. An average height of 5,300 feet (1,620 meters), the Vale of Kashmir is a deep and uneven basin positioned between the Pir Panjal Range and the western terminus of the Great Himalayas.

a) **Pir-Panjal Range:** South of the Kashmir Valley lies the Pir-Panjal Range, a significant mountain range in Jammu and Kashmir. The Pir-Panjal acts as a natural barrier between the Kashmir Valley and the plains of Jammu. The area boasts an average ridge height of 12,500 feet (3,800 meters), where individual peaks soar to heights around 15,000 feet (4,600 meters).

b) **Plains of Jammu:** The southernmost part of Jammu and Kashmir comprises the Jammu Plains, a relatively flat region with fertile alluvial soil. The city of Jammu, the winter capital of the region, is located in this area.

c) **Chenab Jhelum & Ravi Rivers:** These transboundary rivers flow through the Jammu & Kashmir region before exiting the UT in to Pakistan. They contribute to the fertile plains of Jammu and are essential for agriculture in the area.

d) **Glaciers and High-altitude Lakes:** Jammu and Kashmir are home to numerous glaciers and high-altitude lakes, which are vital sources of water for the region. The famous glaciers Kolahoi Glacier, *etc.* while notable lakes include Dal Lake, Wular Lake, Gangabal Lake, Tarsar Marsar Lakes, and Tulian Lake *etc.*

Table 2.3. Administrative Unit of Jammu and Kashmir. Source: Government of Jammu & Kashmir.

S.N.	Administrative Unit	Type	Headquarters	Division	Area (Km^2)
	Jammu and Kashmir	**Union Territory**	**Srinagar (Summer), Jammu (Winter)**		-
1	Kathua	District	Kathua	Jammu	42,2
2	Jammu	District	Jammu		2,342
3	Samba	District	Samba		904
4	Udhampur	District	Udhampur		2,367
5	Reasi	District	Reasi		1,719
6	Rajouri	District	Rajouri		2,630
7	Poonch	District	Poonch		1,674
8	Doda	District	Doda		2,625
9	Ramban	District	Ramban		1,329

10	Kishtwar	District	Kishtwar		7,737
11	Anantnag	District	Anantnag	Kashmir	3,574
12	Kulgam	District	Kulgam		410
13	Pulwama	District	Pulwama		1,086
14	Shopian	District	Shopian		312
15	Badgam	District	Badgam		1,361
16	Srinagar	District	Srinagar		1,979
17	Ganderbal	District	Ganderbal		1059
18	Bandipore	District	Bandipore		345
19	Baramulla	District	Baramulla		4,243
20	Kupwara	District	Kupwara		2,379

The diverse physiography of Jammu and Kashmir (Table 2.3) not only contributes to its scenic beauty but also presents various environmental challenges and opportunities for tourism and agriculture. The region-wise mean annual temperature and rainfall in Jammu and Kashmir shown in Table 2.4.

Table 2.4. Region-wise mean annual temperature and rainfall in Jammu and Kashmir. Source: Department of Environment and Remote Sensing, Government of Jammu & Kashmir.

S.N.	Region	Altitude	Mean Annual Temperature	Mean Annual Rainfall in mm	Type of Climate
1	Jammu	366m	24.5^{0}c	1052	Sub-Tropical
2	Srinagar	1585m	13.3^{0}c	664	Temperate

2.3. Environment

The resources found in the Jammu and Kashmir region make substantial contributions to the area's economy, biodiversity, and the well-being of its inhabitants. Effective management and conservation of these resources are essential for the region's long-term development and environmental stability. In general, the environment of Jammu and Kashmir had several key sectors:

2.3.1. Forests

The UT of Jammu and Kashmir is known for the lush green forests, which cover a substantial area of the region. The forests are dominated by coniferous trees like deodar, Chir, Kali, fir, and spruce in the higher altitudes, while lower elevations have broad-leaved species like oak, maple, and walnut. These forests are not only a source of timber but also contribute to the region's biodiversity and play a crucial role in maintaining ecological balance. The Area under different forest types and available trees species is shown in Table 2.5 and forest land diverted for non-forestry purpose is shown in Table 2.6.

Table 2.5. The Area under different forest types and available trees species, 2022. Source: J&K forest department office of the principal chief conservator of forests & HoFF, Govermrnt of Jammu and Kashmir.

S. No.	Type of Forests	Tree Species	Area (Sq Km)
1	Subtropical Deciduous	Acacia, Dalbergia, Albizia, Grewia, Bauhinia, Terminalia, etc..	807
2	Subtropical pine	Chir Pine, Dalbergia, Kamila, Olea, Cassia, Berberis, Dodonea, etc.	2732
3	Subtropical Ever-green	Pinus gerardiana, Chir Pine.	690
4	Himalayan dry temperate	Deodar, Blue Pine, Picea, Abies, Taxus, Juglans, Acer, Betula, Rhododendron, Chinar, Popular, Willow etc	1371
5	Himalayan Moist temperate	Deodar, Blue Pine, Picea, Abies, Juglans, Quercus.	8914
6	Dry Alpine/Moist alpine dry alpine scrub	Juniper, Betula, Rhododendron, Wild flowers and Grasses, etc.	5716

Table 2.6 Forest land diverted for non-forestry purpose (last five years) Source: J&K forest department office of the principal chief conservator of forests & HoFF, Govermrnt of Jammu and Kashmir.

S. No.	Year	Forest Land diverted (in Hectare)
1	2019-20	1259.49
2	2020-21	125.64
3	2021-22	201.47
4	2022-23	988.84
5	2023-24 (ending February, 2024)	432.76

2.3.2. Bio-diversity

The UT of Jammu and Kashmir host a high endemicity area which is heavily rich in bio-diversity and is also referred to as the biomass state of India. The diverse range of habitats in Jammu and Kashmir supports a variety of plant and animal species.

The varied plant life contributes significantly to the regional food and habitat requirements of the wild and domesticated animals besides the regional people. The faunal component is also established to be rich with several unique forms both in the forest zone and above forest line. The variety of animal forms ranges from higher groups like vertebrates, including mammals, birds, reptiles, amphibians and lower groups like invertebrates including insects and even unicellular micro-organisms. The region is home to several wildlife sanctuaries and national parks, such as Decigram National Park, Hemis National Park, and Gulmarg Wildlife Sanctuary. Here, one can find species like the Himalayan tahr, markhor, snow leopard, hangul (Kashmir stag), musk deer, and various bird species etc.

The flora of Himalayan Kashmir consists of more than 3000 species (angiosperms, gymnosperms and pteridophytes), out of which about 506 species are found in Jammu. Several of the western Himalayan plants are renouned for their medicinal properties often used by pharmaceutical industries and the wide range of aromatic plants (nearly 55 species) provide the key ingredients for perfume industries.

Jammu and Kashmir play a crucial role in India's biodiversity, contributing to approximately 16% of the nation's fauna. Vertebrates are the dominant group, making up around 14% of the species in the region, while invertebrates account for about 2%. The UT hosts an impressive total of 867 vertebrate species, representing a substantial portion of India's 6,122 species. This includes 120 fish species, 17 amphibians, 63 reptiles, 555 birds, and 112 mammals. The distribution of these species varies, with fish comprising about 14%, amphibians 2%, reptiles 7%, birds 64%, and mammals 13% of the total.

Medicinal Herbs: The region is known for its rich biodiversity, which includes various medicinal plants and herbs. These herbs have traditional and medicinal significance and are used in traditional medicine practices. For example, Trillium, wormwood, Kutki, Solo Plant, Zakhm-e-Hayat (Bergenia Ciliata), Salam Panja (Dactylorhiza hatagirea), Papra (Podophyllum hexandrum), Snow-Lotus (Saussurea Laniceps) & Phen kamal (Saussurea gossypiphora) *etc.*

Sericulture: The temperate climate in parts of Jammu and Kashmir is suitable for sericulture, and the region produces silk from silkworms. For example, Mulberry Cultivation, Silkworm Rearing, Silk Production *etc.*

2.3.3. Aquatic Life

The UT of Jammu and Kashmir are blessed with abundant water bodies due to the presence of rivers, lakes, and glaciers. The famous Dal Lake in Srinagar and Wular Lake are two significant freshwater bodies. These lakes support a variety of aquatic life, including fish and other aquatic organisms. Additionally, the region's rivers, like the Jhelum and Chenab, contribute to the availability of water resources for irrigation and hydropower generation.

Aquatic ecosystems play a pivotal role in providing valuable economic goods and essential ecosystem services. Jammu and Kashmir, known for its diverse landscapes, particularly boasts a rich variety of these ecosystems, contributing significantly to its picturesque environment. Lakes predominate, followed by wetlands and rivers, forming a vital part of the state's natural beauty. Altitudinal differences characterize these aquatic ecosystems, with a higher occurrence at high altitudes, followed by mid- and low altitudes.

The distribution pattern assessment highlights the prevalence of aquatic bodies at varying altitudes. These ecosystems host a diverse array of macrophytes, phytoplankton, zooplankton, and macrofauna. Unfortunately, over the years, the aquatic ecosystems in this Himalayan state have faced considerable anthropogenic pressures, leading to a noteworthy decline in their ecological health.

2.3.4. Minerals

Jammu and Kashmir, a region known for its breathtaking landscapes, also boasts a rich repository of minerals that contribute significantly to its economic and industrial development. The UT geological diversity has endowed it with various valuable mineral resources (Table 2.7), playing a pivotal role in supporting local industries and fostering economic growth.

Table 2.7. Mineral reserves with occurrence in Jammu and Kashmir.

Minerals	Reserves	Occurance	Uses
Limestone	5000 MT	All Districts except Jammu, Doda & Ponch	Manufacture of Cement, Calcium Carbine
Gypsum	152 MT	Baramula, Uri, Doda	Manufacture of Cement, Fertilizer, Paint, Rubber
Marble	405 M Cub Mt.	Kupwara	Decorative Building Stone
Bauxite	07 MT	Udhampur, Ponch	Manufacure Of Aluminium
Coal	9.50 MT	Kalakot, Moghla, Udhampur, Rajouri	As fuel
Magnesite	4 MT	Udhampur, Panthal, Reasi	Refractory bricks for furnaces
Slates	1.5 M Cub Mt.	Doda & Baramulla	Bulding Material
Sapphire	-	Doda, Paddar	Precious Stone
Quartzite	2 MT	Anantnag, Kupwara	Glass & IT Industries
Dolomite	4.37 MT	Udhampur, Kupwara	Refractory Material
Borex	0.742 MT	Udhampur, Rajouri	Borosil Glass, Enamels Ceramics, Silver
Bentonite Clay	0.122 MT	District Udhampur	Abrasive, Glass, Pottery, Moulding

Quartz & Silica Sand	3.1 MT	District Jammu	Drilling mud, Refining Oils, Fats
Diaspora	1188 Tones	Anantnag, Doda, Udhampur	High Alumina Refractory, Paints
Graphite	62 MT	Baramulla	Crucible Foundry, Refractory, Paints

Source: Department of Industries & Commerce J&K

2.3.5. Hydroelectric Power

Jammu and Kashmir, blessed with abundant water resources owing to its picturesque landscapes and numerous rivers, stands as a prominent hub for hydroelectric power generation. The region's topography, characterized by steep valleys and fast-flowing rivers, provides an ideal setting for harnessing hydropower. The state strategically invests in the ongoing development of hydroelectric projects to meet its energy needs and contribute to the national power grid. The exploitation of this renewable energy source not only bolsters the energy security of Jammu and Kashmir but also plays a vital role in the sustainable growth of the region. With a focus on clean and renewable energy, the hydroelectric power sector in Jammu and Kashmir stands as a testament to the state's commitment to both environmental conservation and economic progress.

As per Hydropower Policy 2022, Jammu & Kashmir is endowed with an estimated hydro-power potential, of which 14,867 MW has already been identified by the Central Electricity Authority. However, only 3,505 MW, approximately 23% of the estimated potential, has been harnessed so far. The utilization of small-hydropower (up to 25 MW) has been notably insufficient. The primary objective of this policy is to establish a framework for the optimal utilization of J&K's hydropower resources, with a particular focus on small hydropower projects. Simultaneously, the policy aims to foster entrepreneurship and encourage private sector investment, positioning hydropower as an attractive economic venture. This approach is designed to enhance the availability of affordable and clean electric power for Jammu & Kashmir.The hydroelectric power projects (Table 2.8) in the region generate electricity not only for local consumption but also for supplying to other parts of the country.

Table 2.8. Hydro Electric Projects in Jammu and Kashmir. Source: indiawris.gov.in

S.N.	Name	District	Basin	River
1	Baglihar Stage- I Hydroelectric Project	Doda	Indus up to International Border	Chenab

2	Chenani Hydroelectric Project	Ladden 8 km from Udhampur, J&K	Indus up to International Border	River Tawi tributary of Chenab
3	Chenani-III Hydroelectric Project	Udhampur	Indus up to International Border	Tawi
5	Dulhasti Hydroelectric Project	Doda	Indus up to International Border	CHENAB
6	Ganderbal Hydroelectric Project	20 km from Srinagar, J&K	Indus up to International Border	Sindh Nallah tributary of Jhelum
7	Kishenganga Hydroelectric Project	Near Dharmahama Village, 5 km north of Bandipore in the Kashmir valley	Indus up to International Border	Kishanganga
8	Lower Jhelum Hydroelectric Project	Near Warikhah, Baramulla	Indus up to International Border	Jhelum river
9	Salal - I & II Hydroelectric Project	Reasi/Udhampur	Indus up to International Border	River Chenab
10	Sewa-II Hydroelectric Project	Kathua	Indus up to International Border	Sewa
11	Sewa-III Hydroelectric Project	Kathua	Indus up to International Border	Ravi
12	Upper Sindh Hydroelectric Project	57 km from srinagar, J&K	Indus up to International Border	Sindh Nallah tributary of Jhelum
13	Upper Sindh-II Hydroelectric Project	Ganderbal	Indus up to International Border	Sindh Nallah & Wangath nallah of Jhelum
14	Uri-I Hydroelectric Project	8 km from Baramula, Distt-Kashmir North	Indus up to International Border	Jhelum
15	Uri-II Hydroelectric Project	Baramullah	Indus up to International Border	Jhelum

2.4. Land Use and Land Cover

Land use and land cover classification is the process of categorizing and mapping the Earth's surface into different classes based on the way the land is used by humans or the type of natural vegetation and cover present. This classification provides valuable information for various purposes, including urban planning, resource management, environmental monitoring, and policy formulation (Roy et al. N.D.). While the terms "land cover (LC)" and "land use (LU)" are often used interchangeably, they retain their distinctiveness in the region. Land cover, describing what currently covers the Earth's surface, encompasses diverse classes such as water, snow, grassland, deciduous forest, and bare soil. Meanwhile, land use, reflecting how the land is currently used, includes categories like wildlife management areas, agricultural land, urban spaces, and recreation areas (Saipova et al. 2022).

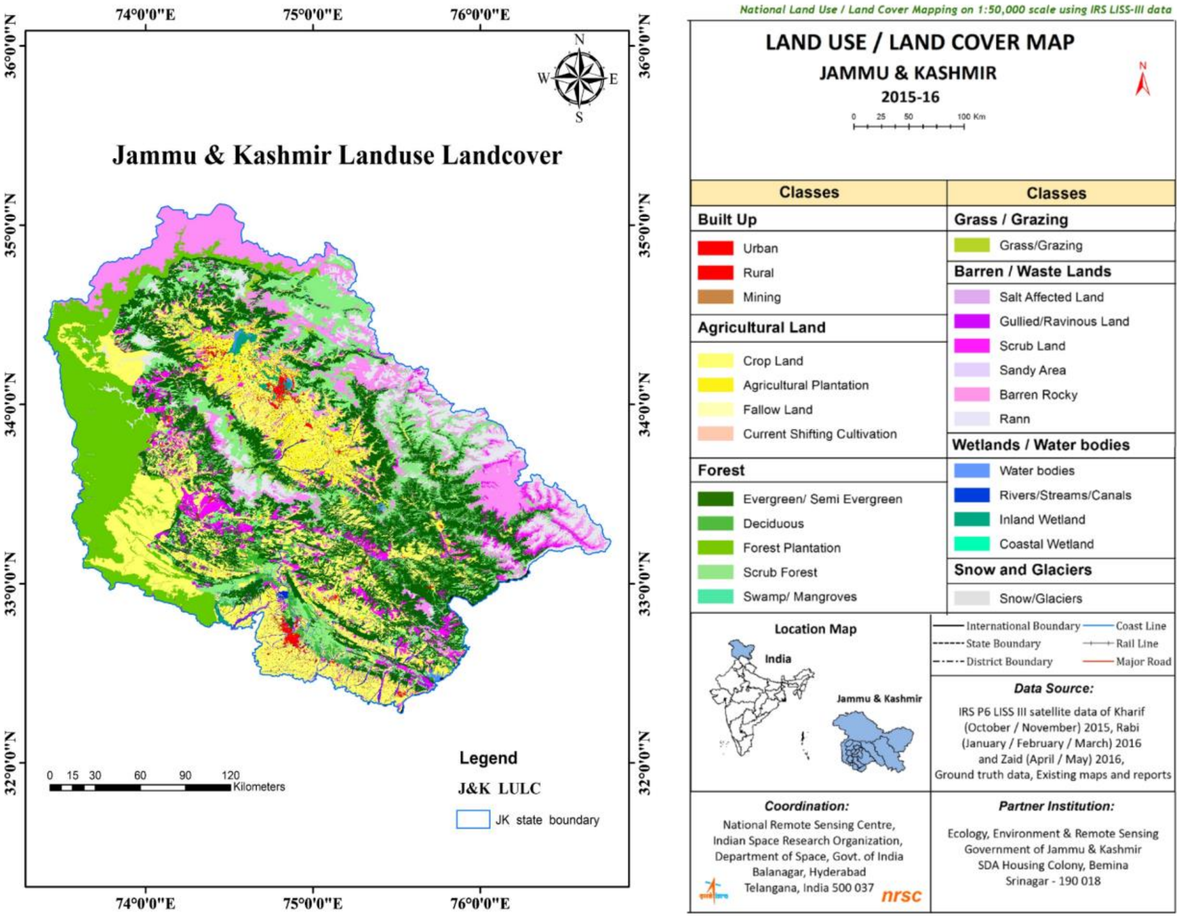
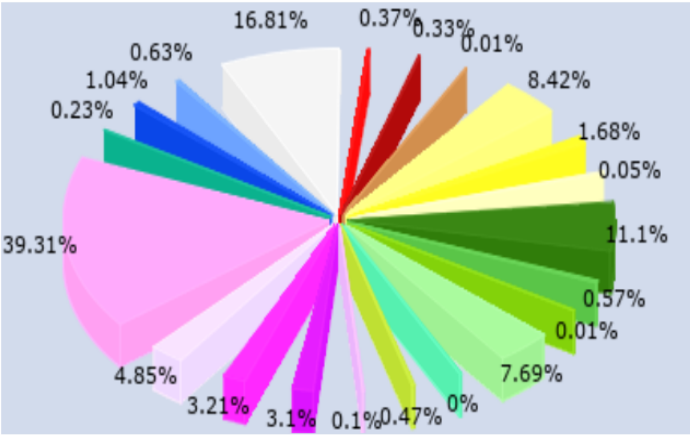


Figure 2.4. Land use land cover of Jammu and Kashmir. Source: Bhuvan, NRSC, India.

In Jammu and Kashmir, a region marked by its diverse topography and rich ecosystems, has experienced profound changes in land cover over the past few decades due to the interplay of economic development and population growth (Romshoo et al. 2020). The expanding urbanization and infrastructure development, particularly in cities like Jammu and Srinagar, have led to alterations in land cover as agricultural lands and natural habitats make way for built-up areas (Varade et al. 2023). The increasing demand for food, driven by population growth, has resulted in the expansion of agricultural activities, impacting natural landscapes. Additionally, the region's status as a tourist destination has prompted the development of tourism-related infrastructure, influencing land cover patterns in areas like Gulmarg and Pahalgam (PDMD JK 2022). Conservation concerns arise from the extraction of resources for economic purposes, such as timber and forest products, impacting the region's biodiversity (Romshoo et al. 2020). Furthermore, the vulnerability of Jammu and Kashmir to climate change is heightened by deforestation, altered land use, and increased human activities (DEERS JK 2013).



LULC Class	Area (Sq.Km)	LULC Class	Area (Sq.Km)
Builtup,Urban	378.09	Builtup,Rural	336.75
Builtup,Mining	12.07	Agriculture,Crop land	8532.46
Agriculture,Plantation	1703.17	Agriculture,Fallow	52.81
Forest,Evergreen/ Semi evergreen	11257.19	Forest,Deciduous	579.78
Forest,Forest Plantation	13.12	Forest,Scrub Forest	7798.57
Forest,Swamp/ Mangroves	0.42	Grass/Grazing	476.8
Barren/unculturable/ Wastelands, Salt Affected land	102.67	Barren/unculturable/ Wastelands, Gullied/Ravinous Land	3141.16
Barren/unculturable/ Wastelands, Scrub land	3254.03	Barren/unculturable/ Wastelands, Sandy area	4921.51
Barren/unculturable/ Wastelands, Barren rocky	39859.69	Wetlands/Water Bodies, Inland Wetland	237.65
Wetlands/Water Bodies, River/Stream/canals	1053.53	Wetlands/Water Bodies, Reservoir/Lakes/Ponds	634.28
Snow and Glacier	17041.82		

Figure 2.5. Land use land cover distribution of Jammu and Kashmir. Source: Bhuvan, NRSC, India.

The diverse landscapes, including mountains, forests, and water bodies, currently influence the regulation of the hydrologic cycle and energy budget, impacting ongoing weather and climate predictions. Land cover changes, such as deforestation and regrowth, continue to influence the carbon cycle, affecting atmospheric CO_2

concentrations and the strength of the greenhouse effect. Additionally, land cover continues to serve as a crucial indicator of resources like food, fuel, timber, and shelter for the local population, maintaining its fundamental role in biodiversity and ecosystem health (Sleeter et al. 2018). Ongoing monitoring of land cover in Jammu and Kashmir remains essential for effective watershed management, agricultural productivity, and addressing the evolving societal needs.

Satellite imagery is employed to capture land cover types and changes over time, aiding in land use classification and monitoring. GIS technology facilitates spatial analysis, integration of various data layers, and mapping of land use patterns. Techniques like image differencing and classification accuracy assessment are utilized to identify changes in land use over specific periods (Varade et al. 2023).

The land use and land cover (LULC) in Jammu and Kashmir (Figure 2.4, Figure 2.5), India, exhibit a remarkable diversity owing to the region's unique geographical features. In the Jammu region, fertile plains support intensive agriculture with terraced fields adorning hilly landscapes, producing crops like rice, wheat, and fruits. Kashmir, often described as "Paradise on Earth," is characterized by its breath-taking scenery, featuring meadows, dense forests, and pristine lakes, including Dal Lake and Wular Lake, while saffron cultivation is a notable activity (Romshoo et al. 2020). High mountain ranges in the Greater Himalayas contribute to alpine pastures used for seasonal grazing and play a vital role in the livelihoods of local communities. The presence of glaciers, particularly in Ladakh and Kashmir, not only shapes the region's LULC but also significantly influences water resources and environmental dynamics, making Jammu and Kashmir a distinct and ecologically rich territory within India (Romshoo et al. 2020).

2.5. Economy

The UT of Jammu and Kashmir (J & K) in northern India is known for its diverse economy. In August 2019, the Indian government revoked the special autonomous status of Jammu and Kashmir under Article 370 of the Indian Constitution and reorganized the region into two separate union territories: Jammu & Kashmir (with a legislative assembly) and Ladakh (without a legislative assembly).

As per the Economic Survey of Jammu and Kashmir for the year 2022-23[1], the economic landscape of Jammu and Kashmir (J&K) is actively contributing to India's overall growth, projecting a growth rate of 8.0 per cent during 2022-23 at constant prices. This robust performance, positions Jammu & Kashmir as one of the fastest-growing major economies in the country. The Gross State Domestic Product (GSDP) of Jammu & Kashmir is expected to record a substantial growth of 15 percent at current prices, aligning closely with the national level. The positive

[1] https://ecostatjk.nic.in/pdf/publications/ecosurvey/Economic%20Survey-2023f.pdf

economic trend in Jammu & Kashmir has been evident from 2014-15 to 2021-22, registering a compound annual growth rate of 5.7 per cent, surpassing the national average of 5.1 percent.

The per capita income in the Union Territory (UT) is on a commendable trajectory, showing rapid growth and catching up with the national average and that of most northern states. The service sector emerges as a pivotal contributor, holding a significant share of about 64 per cent in the Gross State Value Added (GSVA) during 2022-23. This sector not only plays a crucial role in economic output but also contributes significantly to employment, with a share of 31 per cent. In contrast, the agriculture sector constitutes 41 per cent, and the industries sector holds 28 per cent, as per the Periodic Labour Force Survey (PLFS) 2020-21.

Jammu & Kashmir, with a contribution of 0.8 per cent to the Gross Domestic Product (GDP) in proportion to its population (0.98 percent), is ambitiously aiming for a doubled GSDP by 2027-28. The government is implementing various initiatives across sectors such as agriculture, horticulture, tourism, industries, and services to achieve this goal. The inflation trend in Jammu & Kashmir, standing at 6.88 per cent, closely mirrors the national level inflation of 6.69 per cent in 2022. Notably, this is achieved despite the region being a consumption-driven economy with high transportation costs. The focus on sectors like agriculture, horticulture, tourism, and services underscores the commitment to diversifying and strengthening the economy of Jammu and Kashmir for sustainable and inclusive growth.

In general, the economy of Jammu and Kashmir has several key sectors discussed as follows.

2.5.1. Agriculture

The majority of the population in Jammu and Kashmir primarily engages in subsistence agriculture, cultivating a diverse range of crops suited to local terraced slopes. The central crop is rice, sown in May and reaped by late September. Alongside rice, key summer crops include corn, millet, various pulses (like peas, beans, and lentils), cotton, and tobacco. During the spring, focus shifts to wheat and barley cultivation. The regions close to urban markets or well-irrigated areas with fertile organic soils grow a variety of temperate fruits and vegetables. Sericulture, involving the cultivation of silk, is also a widespread activity (Convenor J&K Bank 2017).

According to Assessment Survey of Agriculture Households conducted by the National Statistical Office (NSO 2021)[1], Jammu and Kashmir stand at the 5th position in terms of average monthly income per agriculture household, which is Rs. 18,918. This ranking places Jammu & Kashmir after Meghalaya (Rs. 29,348), Punjab (Rs. 26,701), Haryana (Rs. 22,841), and Arunachal Pradesh (Rs. 19,225).

[1] https://mospi.gov.in/sites/default/files/publication_reports/Report_587m_0.pdf

As per the Economic Survey of Jammu and Kashmir for the year 2022-23, the Union Territory is making significant strides towards achieving self-reliance in vegetable production, with plans to export to neighboring states and Union Territories. The production of vegetables is projected to grow from 19.90 lakh metric tonnes to 25.87 lakh metric tonnes over the next five years (PDMD JK 2023).

2.5.2. Tourism

The UT of Jammu and Kashmir is a popular tourist destination known for its natural beauty, including picturesque landscapes, lakes, mountains, and historical sites. Tourism played a significant role in generating employment and revenue. The UT of Jammu and Kashmir is in the process of developing 75 new tourist destinations, 75 heritage and cultural sites, 75 Sufism and religious sites, as well as 75 adventure treks and sites, all designed to cater to the diverse preferences of visitors across all four seasons (PDMD JK 2023, 2022). These offerings encompass the realms of nature, adventure, pilgrimage, heritage, sports, and more. Additionally, the region is actively exploring further opportunities in tourism, such as amusement parks, water parks, adventure activities (including water sports, rafting, rock climbing, and snow parks), and entertainment options to enhance its appeal and draw more tourists.

As per the Economic Survey 2022-23[1] of the UT of Jammu & Kashmir, Kashmir witnessed an unprecedented influx of tourists, reaching a record high of 2.7 million (27 lakhs), surpassing the previous peak of 1.3 million (13 lakhs) recorded in 2016 (PDMD JK 2023). The total number of tourists for the year stood at 18.9 million (1.89 crores), comprising approximately 19,985 international visitors, 365,000 devotees of the Shri Amarnath Ji shrine, and 9.12 million (91.20 lakhs) pilgrims visiting the Shri Mata Vaishno Devi shrine in the Jammu & Kashmir region.

2.5.3. Handicrafts

Handicrafts[2] in Jammu and Kashmir currently epitomize the region's rich cultural heritage, playing a pivotal role in shaping its unique identity. Celebrated for their intricate craftsmanship, these handicrafts encompass a diverse range of traditional items, including Pashmina shawls, carpets, papier-mâché products, walnut wood carvings, and distinctive rugs. This artistic tradition serves as an ongoing testament to the skills passed down through generations, reflecting the continued cultural richness of the local communities.

Globally acclaimed, the Pashmina shawls woven from the fine wool of the Pashmina goat continue to be sought after for their luxurious texture and intricate designs. The Kashmiri carpet industry, characterized by hand-knotted creations showcasing vibrant colors and cultural motifs, is currently thriving. The tradition of papier-mâché, where artisans meticulously craft intricate designs on various items,

[1] https://ecostatjk.nic.in/pdf/publications/ecosurvey/Economic%20Survey-2023f.pdf
[2] https://www.jkhandicrafts.com/products.htm

and the detailed wood carvings in walnut wood are actively contributing to the region's artistic legacy.

Beyond being an artistic expression, handicrafts remain a significant economic driver, providing employment to numerous skilled artisans and contributing to household income, particularly in rural areas. These products were not only sold domestically but were also exported. Despite facing challenges from changing market trends and competition from machine-made products, ongoing efforts are being made to actively promote and preserve these traditional crafts at both local and national levels. The continued support for this sector is crucial for sustaining its economic impact and preserving the invaluable cultural heritage of Jammu and Kashmir.

In Economic Survey 2022-23[10] above Jammu & Kashmir, Handicrafts exports have seen a significant rise, increasing from Rs. 563.31 crores in the fiscal year 2021-22 to Rs. 728.99 crores in the current financial year, ending in January 2023.

2.5.4. Horticulture

The Jammu and Kashmir region's temperate climate is conducive to horticulture, and fruit production was a major contributor to the economy. Apples, pears, cherries, and almonds were some of the main fruits produced.

The entire Kashmir Valley and parts of Poonch, Rajouri, Doda, Kathua, and Udhampur Districts in the Jammu Division are renowned for their cultivation of apples, pears, cherries, walnuts, almonds, chestnuts, strawberries, stone fruits, and grapes, among other fruits. Specifically, parts of Kathua District, parts of Poonch District (such as Surankote), parts of Rajouri District (including Rajouri and Kalakot), parts of Udhampur District, parts of Reasi, some portions of Doda District, Ramban, Kishtwar, and minor locations in Uri Tehsil of Baramulla District and Karnah Tehsil of Kupwara District are known for the cultivation of stone fruits (such as peaches, plums, apricots), almonds, pears, pecan nuts, olives, and kiwis.

In Jammu District, parts of Kathua District, parts of Rajouri District, parts of Udhampur District, and the lower areas of Reasi, as well as parts of Doda District (including Ramban), are famous for growing mangoes, citrus fruits, guavas, lychees, pears, amla, and grapes.

According to the Directorate of Horticulture, Jammu and Kashmir, the production of fresh fruit during the period from 2004-05 to 2012-13 was recorded at 982.99 thousand metric tons (MTS), while the production of dry fruit during the same period amounted to 15,545.35 thousand metric tons (MTS). Apple being the major product in Jammu and Kashmir observed an increased production from 1.73 MTs per ha to 10-12 MTs leading to a turnover of Rs. 5000.00 crore during 2013-14. Further, 14.79 Lac MTs. fresh and dry fruit exported during the year 2015-16 valuing about 6000.00 crore. The fruit cultivation area in Jammu and Kashmir increased from 2.95 lakh hectares in 2007-08 to 3.57 lakh hectares in 2015-16 as estimated by the Department of Horticulture, Government of Jammu and Kashmir. The fruit production increased from 16.36 lac MTs in 2007-08 to 24.94 lakh MTs in 2015-16. Table 2.9 and Table 2.10 illustrates the horticulture productivity and exports from 2010-2016 in the UT of Jammu and Kashmir.

Table 2.9. Horticulture area and production from 2010-2016 in the UT of Jammu and Kashmir. Source http://www.Kashmirhorticulture.com/

Year	Area (Lakh Ha)	Production (Lakh MTs)	Productivity Per Hect.
2010-11	3.25	22.22	6.83
2011-12	3.42	21.61	6.32
2013-14	3.55	21.17	5.96
2014-15	3.56	17.12	4.76
2015-16	3.38	24.94	7.38

Table 2.10. Horticulture exports from 2011-2016 in the UT of Jammu and Kashmir. Source http://www.Kashmirhorticulture.com/

Year	Fresh Fruits (Apple (95%), Pear, Cherry, Apricot & Peach etc. (in LMT)	Walnut Fresh (in LMT)
2011-12	10.54	0.19
2012-13	11.76	0.18
2013-14	11.92	0.18
2014-15	12.55	0.15
2015-16	14.58	0.14

2.5.5. Hydroelectric Power

Hydroelectric power generation is an important industry for the UT of Jammu and Kashmir due to the higher hydrological potential of the rivers in the UT. In the context of Jammu and Kashmir, the utilization of hydropower is of particular significance due to the region's topography and the abundance of rivers, especially in the Himalayan terrain. Jammu and Kashmir power requirements have been on the rise, driven by economic development and population growth. The government focus on expanding hydropower capacities aligns with the region's potential to harness energy from its rivers, further striving towards the national goals towards green energy and sustainability.

The Indian Himalayan region, including Jammu and Kashmir, presents an ideal setting for hydropower projects. The steep gradients and high seasonal run-off rates in the rivers of this region provide favorable conditions for efficient hydropower generation. The '50,000 MW Initiative' and the emphasis on increasing hydropower's share in the total electricity generation can be seen as a strategic move to address the energy needs of Jammu and Kashmir and bridge the existing supply-demand gap. These projects, designed to utilize the natural flow and elevation drop of rivers, fit well with the landscape and hydrological characteristics of the region. By tapping into the hydropower potential of the rivers, the government aims not only to meet the growing energy demands but also to contribute to the socio-economic development of the UT.

The longevity of hydropower projects, with operational lifespans extending over 50 years, aligns with the goal of sustainable and long-term energy solutions for Jammu and Kashmir. Additionally, the environmental benefits of hydropower, being a renewable and environmentally benign source of energy, are crucial for a region known for its ecological diversity and sensitivity. However, it's essential to consider the environmental and social impacts associated with large-scale hydropower projects, especially in ecologically sensitive regions like Jammu and Kashmir. Proper planning, environmental assessments, and community engagement are imperative to ensure the responsible and sustainable development of hydropower in the region, balancing the need for energy with the preservation of the unique natural environment and local communities.

According to the Economic Survey of Jammu and Kashmir for 2022-23[1], the region has harnessed approximately 24.44% of its identified hydro-power potential, which amounts to 3633.21 megawatt (MW) out of a total potential of 14,867 MW. This utilization is divided among different sectors, with 1220.96 MW in the State Sector, 2339 MW in the Central Sector, and 73.25 MW in Independent Power Producers (IPP). The estimated hydro power potential for the Union Territory of Jammu and Kashmir is 18,392 MW.

2.5.6. Manufacturing and Industry

The UT of Jammu and Kashmir exhibits some industrial activities, including small-scale manufacturing of textiles, food products, and agro-based industries. The manufacturing sector in Jammu and Kashmir encompasses a wide array of products, ranging from traditional handcrafted goods like Pashmina shawls and carpets to modern industrial output.

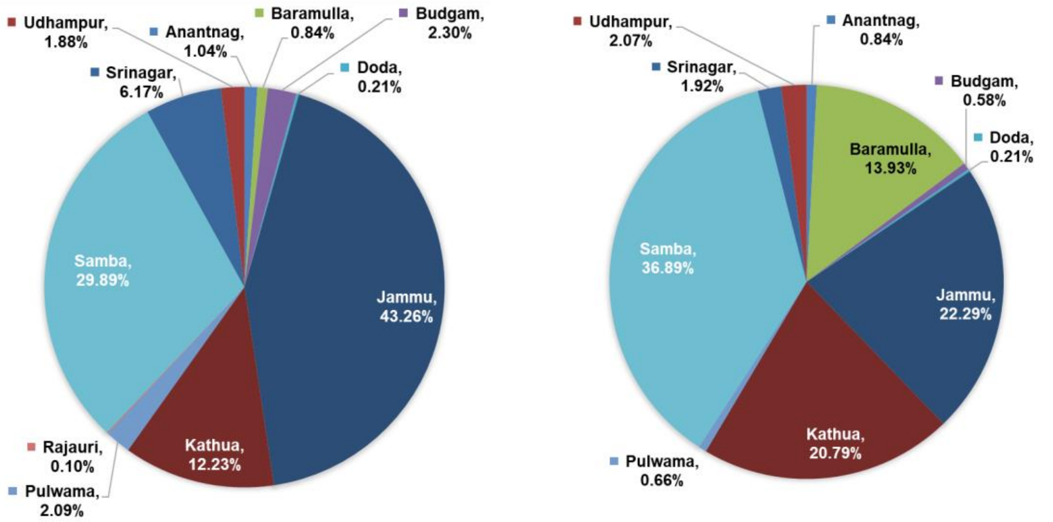
The government focus on promoting industrialization[2] in the region is evident through the establishment of industrial estates, special economic zones, and various incentives to attract investments. This strategic emphasis aims to leverage the unique strengths of the territory, including its skilled workforce, rich natural resources, and strategic geographical location. Noteworthy contributions to the industrial sector include the growth of sectors such as textiles, food processing, and pharmaceuticals. Additionally, the region has seen an uptick in infrastructure development, with

[1] https://ecostatjk.nic.in/pdf/publications/ecosurvey/Economic%20Survey-2023f.pdf

[2] https://ecostatjk.nic.in/pdf/reports/surveyofindustries/ASI2019.pdf

initiatives aimed at creating a conducive environment for industrial growth. The integration of modern technologies and practices is gradually transforming the industrial landscape, enhancing productivity and competitiveness.

As per the Economic Survey of Jammu and Kashmir for the year 2022-23,[10] it is projected that total food production will rise from 16,699 thousand quintals (Th. Qtls) to 18,681 thousand quintals (Th. Qtls), representing an 11.87% increase over the next five years. The Jammu region hosts majority of the operational factories and also significantly contributes to the Gross Value, as illustrated in Figure 2.6.



(a) (b)

Figure 2.6. (a) District wise no of operational factories in percentage, (b) District wise Gross Value Added of operational factories in percentage. Source: Annual Survey of Industries Report, 2018-19, Directorate of Economics & Statistics Planning Development & Monitoring Department, J&K.

2.6. Drinking and Domestic use

Resources serve as a crucial gauge for assessing a country prospect for growth and development. Nonetheless, when there is an imbalance between the availability of resources and their rate of consumption, the specter of a crisis becomes increasingly likely. This crisis often evolves into conflicts. In the case of Jammu and Kashmir, the well-documented scarcity of drinking water is a pressing issue. However, it is imperative to recognize that concentrating solely on this fact, without considering its repercussions, offers an incomplete perspective.

To better understand the scarcity of drinking water, we must first examine the availability of drinking water, which will enable a more comprehensive assessment of the situation. The various sources of drinking water as per the Census report of 2011 are shown in

Figure 2.7. According to the Census reports, in 2001, the total number of households in Jammu and Kashmir was 15,51,768, and this number increased significantly to 20,15,088 in 2011.

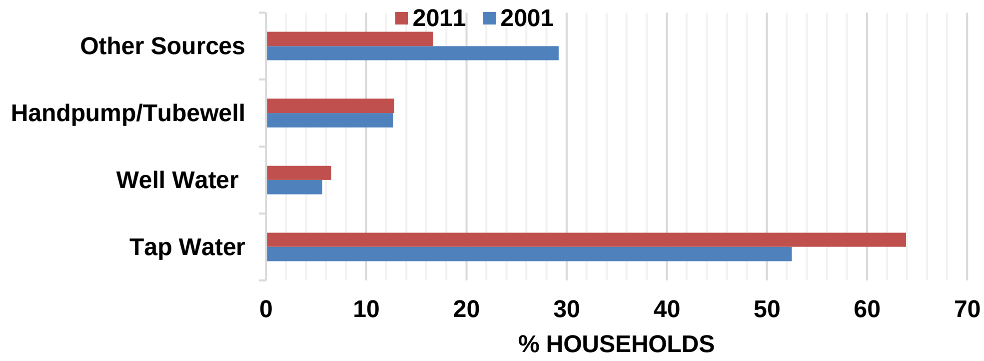
In the 2011 Census report[1], the distribution of households with access to water in Jammu and Kashmir was as follows:

a) 48.2% had water available within their premises.

b) 28.7% had water available near their premises.

c) 23.1% had to source water from a distance away from their premises.

A)



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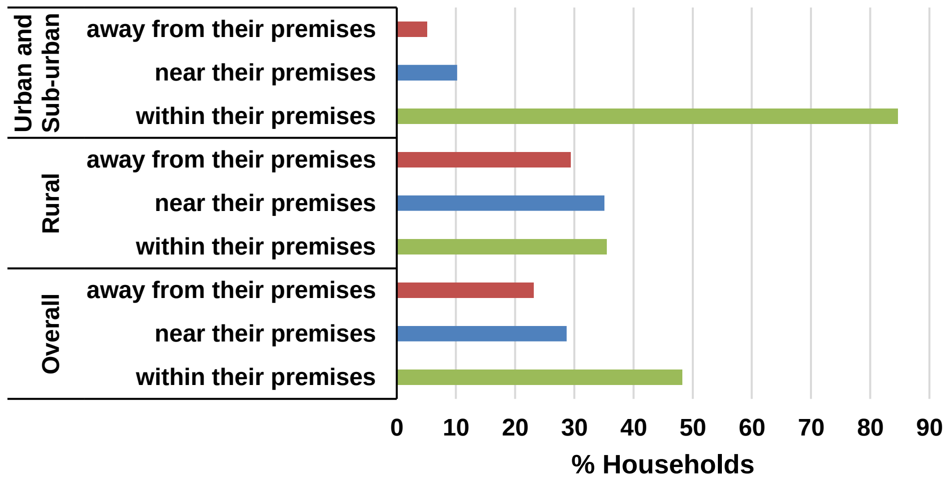


Figure 2.7. Sources of Drinking Water of Jammu and Kashmir. Source: Census Report, 2011.

In the rural areas of Jammu and Kashmir, the breakdown of households receiving water supply was as follows:

a) 35.5% had water available within their premises.

[1] https://censusindia.gov.in

b) 35.1% had water available near their premises.

c) 29.4% had to fetch water from a location away from their premises.

In contrast, in the urban and suburban areas, the percentages of households with continuous water supply were quite different:

a) 84.7% had water available within their premises.

b) 10.2% had water available near their premises.

c) 5.1% had to obtain water from a location away from their premises.

This data schematically represented in reveals disparity in the access to drinking water between urban and rural areas in Jammu and Kashmir, emphasizing the need for targeted efforts to address the drinking water crisis in a region with such significant variations in access. As per the Economic Survey 2022-23 of Jammu and Kashmir, the Union Territory has successfully provided tap water connections within the premises to 57.32% of households, slightly below the national coverage rate of 58.68%. Out of a total of 18.67 lakh households, 10.66 lakh have already been covered under the mission, and the remainder will be provided with tap water connections during the fiscal year 2023-24.

2.7. Agriculture, Livestock, Fisheries & other water-based farming systems

2.7.1. Soil profile in Jammu and Kashmir

Soil is a naturally occurring and intricate amalgamation of mineral particles, organic substances, water, air, and an array of microorganisms. It constitutes the uppermost layer of the Earth crust and serves as the essential medium for the growth of plants. Soil acts as the cornerstone for total ecosystems and carries out a crucial function in sustaining life on our planet. The characteristics and attributes of soil exhibit significant variations contingent on factors such as climate, geological composition, vegetation, and human influences.

The soil composition in Jammu and Kashmir is highly diverse, encompassing a variety of soil texture, including loam, Clay-loam, Clay, Sandy-loam, Unweathered Bedrock. This diversity is of paramount importance for the region, primarily due to its pivotal role in supporting the local agriculture sector. Particularly, the Kashmir Valley exhibits exceptionally fertile and form the bedrock for cultivating essential crops like rice, wheat, saffron, and a wide range of horticultural produce. This agricultural productivity is fundamental to the livelihoods of a significant portion of the population. Moreover, the assortment of soil types in the region presents opportunities for cultivating a wide variety of crops, fostering diversification in agricultural production, and enhancing food security in the area.

The Jammu and Kashmir soil profile here has been obtained from the Digital Soil Map of the World, specifically using the soil dataset from Food and Agriculture Organization of the United Nations. The details of the soil profile are presented in Table 2.11, with a visual representation in Figure 2.8.

Table 2.11. Soil profile of the UT of Jammu and Kashmir.

SNUM	HSG	CLAY, (%)	SILT, (%)	SAND, (%)	RUSLE K-factor	Texture class
3512	D	30	30	40	0.284	Loam
3667	C	34	31	35	0.291	Clay-loam
3668	D	33	32	35	0.283	Clay-loam
3672	C	41	34	25	0.290	Clay
3673	D	24	35	41	0.266	Loam
3679	D	23	37	40	0.272	Loam
3680	D	23	35	42	0.284	Loam
3712	C	26	30	44	0.252	Loam
3736	D	29	44	27	0.376	Clay-loam
3799	C	13	9	78	0.283	Sandy-loam
3871	D	29	49	22	0.311	Clay-loam
6997	D	NA	NA	NA	0.000	Water
6998	D	5	25	70	0.010	UWB
HSG: Hydrologic Soil Group; NA: Not Applicable; UWB: Unweathered Bedrock						

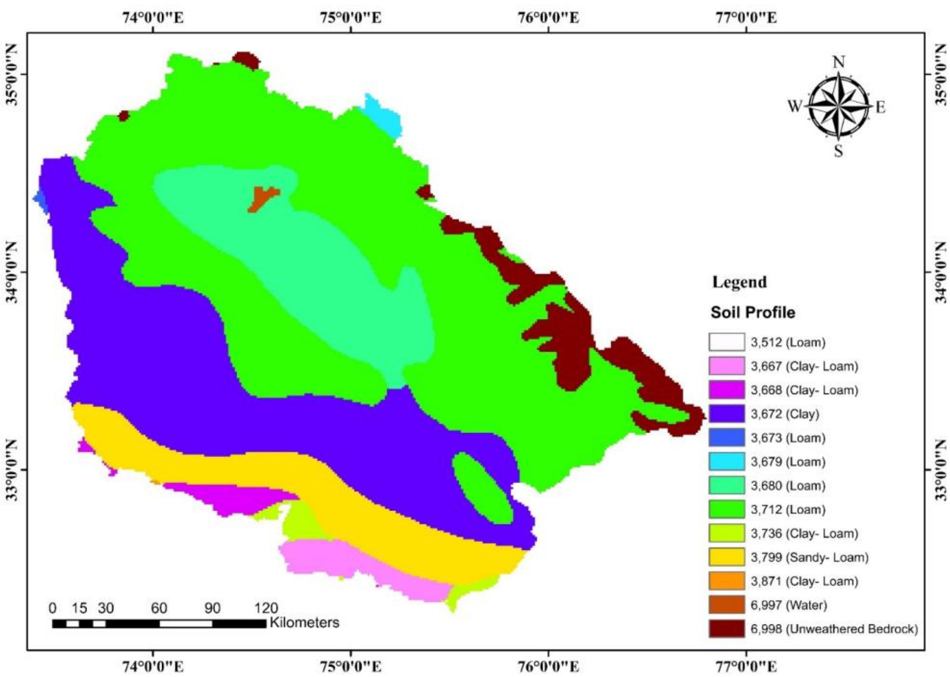


Figure 2.8. The soil profile of the UT of Jammu and Kashmir based on the Digital Soil Map of the World available from Food and Agriculture Organization of the United Nations.

2.7.2. Soil erosion and run off status

In the hilly and mountainous areas of Jammu and Kashmir, soil erosion can be a significant concern. The steep slopes and heavy monsoon rains can lead to significant soil erosion, especially in areas with poor land management practices. Erosion can result in the loss of fertile topsoil, which is detrimental to agriculture and the environment.

The runoff status in Jammu and Kashmir is influenced by its river systems, including the Chenab, Jhelum & Ravi River and its tributaries. The region experiences seasonal variations in runoff, with increased water flow during the monsoon season. Proper management of runoff is crucial to prevent flooding and effectively utilize water resources for agriculture and other purposes. The soil erosion susceptibility based for the UT of Jammu and Kashmir is depicted in Figure 2.9, where notably a significant soil area (more than 50%) in the UT falls under the 'severe' or 'very severe' category. The quantitative coverage of the soil erosion classes is illustrated in Table 2.12.

Table 2.12. Status of soil erosion in UT of Jammu and Kashmir.Source: indiawris.gov.in

S. No.	Soil Erosion Classes	Area (in Ha.)	Area (%)
1	Moderate	1606483.27	30.28
2	None to slight, slight	534976.35	10.08
3	Severe	2348495.56	44.27
4	Very severe, gullied	814944.7	15.36
5	Data Not Available	440.92	0.01

According to the Soil & Water Conservation Department of Jammu and Kashmir[1], approximately 31.6% of the land area, is afflicted by various soil degradation issues in the region. Among this degraded land, approximately 77.78% is vulnerable to water erosion, while around 19.37% experiences wind erosion, primarily concentrated in adjoining area of Ladakh.

Additionally, water logging and flooding impact roughly 2.85% of the total degraded land. Furthermore, estimates from the Indian Institute of Soil and Water Conservation reveal that the state of Jammu and Kashmir experiences an annual soil loss of 20 tonnes per hectare, a figure significantly higher than the national average of 16.35 tonnes per hectare. This highlights the critical need for soil and water conservation efforts in the region to address these degradation challenges and protect the precious soil resources.

In the context of land use planning, it's essential to acknowledge that water erosion stands as one of the most critical degradation issues in Jammu and Kashmir. This phenomenon leads to the loss of topsoil and the alteration of terrain, causing deformation in the landscape. It underscores the significance of addressing water

[1] https://jkdosc.com/jkdosc/Files/introduction.html

erosion through appropriate land management practices and policies to preserve soil quality and land sustainability.

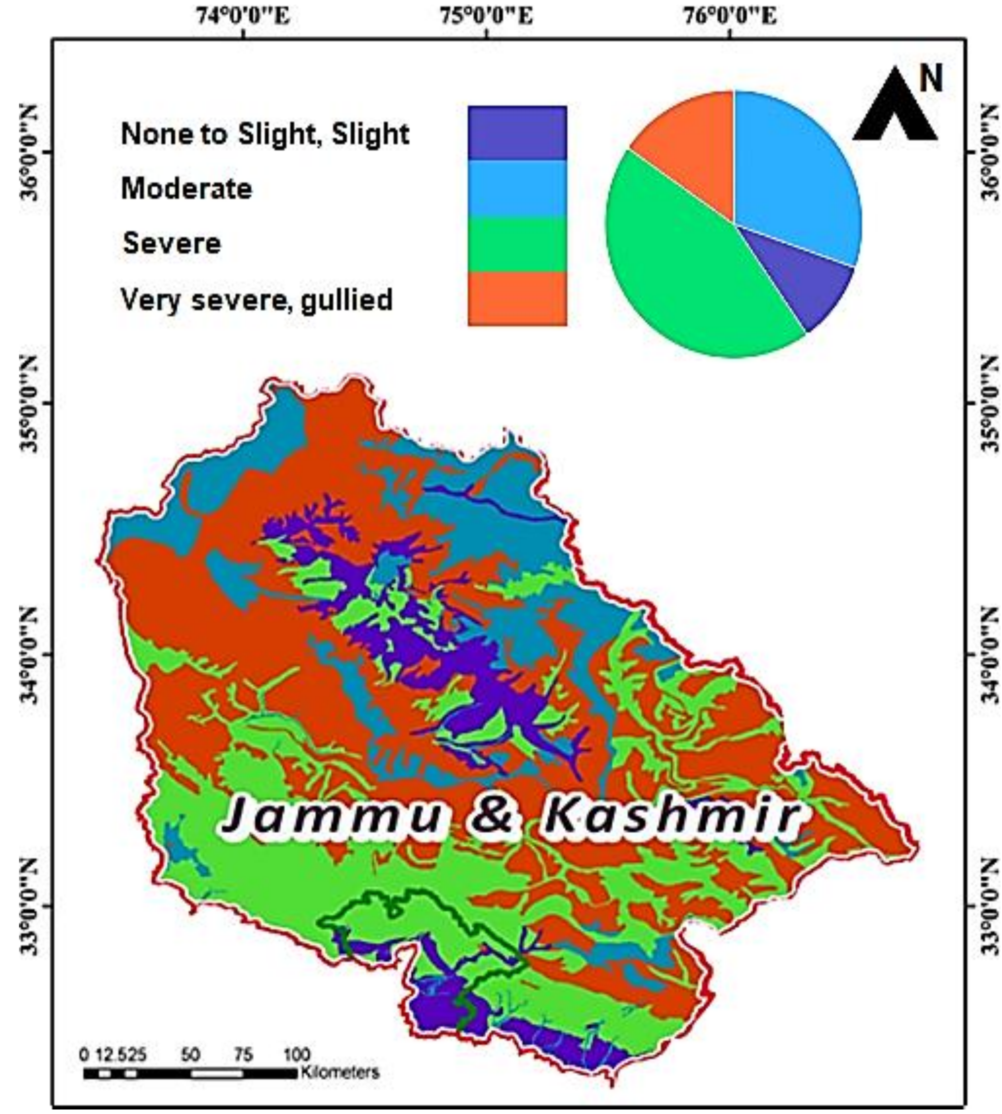


Figure 2.9. A map depicting the Soil Erosion susceptibility in the UT of Jammu and Kashmir. Source: indiawris.gov.in

2.7.3. Agro-ecological/ Climatic zones

The UT of Jammu and Kashmir boasts a diverse range of agro-ecological and climatic zones, primarily attributed to its varied topography and elevations. These zones play a pivotal role in influencing the types of crops that can be cultivated and the viability of agricultural practices across the region. Here is an overview of the agro-climatic status of the divisions of Jammu and Kashmir[1]:

Jammu Division: Jammu division is characterized by its relatively lower elevation and relatively warmer temperatures, and has a subtropical climate. This region is well-

[1] cgwb.gov.in/cgwbpnm/public/uploads/documents/1688375103592311888file.pdf

suited for the cultivation of a variety of crops, including fruits like mangoes, guavas, and citrus fruits. The plains of the Jammu division are conducive to the growth of crops such as rice, maize, wheat, and pulses. The Chenab River and its tributaries contribute significantly to the irrigation needs of the agricultural lands in this division.

The designated zone is characterized by a monsoon climate, marked by concentrated precipitation, a hot spell during the summer, relatively dry yet pronounced winters, and a prevalence of alluvial soils. It encompasses the entire Jammu district and the lower regions of Kathua, Udhampur, Poonch, and Rajouri districts. The maximum rainfall occurs during the months of July to September. The mean elevation above sea level ranges from less than 300 meters to nearly 1350 meters. The hottest months in this zone are May, June, and July, while the coldest months are December, January, and February.

The sub-zone within this region includes the outer hills with a predominance of brown hill soil, slightly higher in elevation compared to the subtropical zone. This zone exhibits a subtropical-temperate transition, covering the mid and high-altitude areas of the Panjal trap. It is characterized by a monsoon climate with concentrated precipitation, relatively wetter conditions, cold winters, and a higher mean annual rainfall compared to the subtropical zone. The predominant soils in this region are mainly spodic. It encompasses areas above the outer hills, including the districts of Doda, Poonch, parts of Rajouri, Udhampur, and Kathua. The elevation within this zone varies from 800 to 1500 meters above sea level in mid-altitude and up to 4000 meters above sea level in higher altitudes. The major drainage basin in this zone consists of the River Chenab and its tributaries, with the upper parts of the Kathua district draining into the Ravi River. The sub-zone delineates the boundary between the valley temperate and cold arid zones. During the summer, this zone receives more rainfall than the subtropical and valley temperate zones, as it represents the almost last line of the South Western monsoon and North Western disturbance in summer and winter, respectively.

Kashmir Division: Kashmir Division, with its higher altitude and cooler climate, is known for its picturesque landscapes and is conducive to the cultivation of temperate crops. The valley is renowned for the production of apples, cherries, apricots, and saffron. Paddy fields are also a common sight in the Kashmir Valley, where the Jhelum River and its tributaries facilitate irrigation. The division experiences distinct seasons, with harsh winters that impact the cropping patterns.

The Kashmir region, or temperate zone, essentially comprises the valley of Kashmir, including the districts of Anantnag, Pulwama, Srinagar, Budgam, Baramulla, and Kupwara *etc.* This zone presently experiences wet and often severe winters characterized by frost, snow, and rain, along with relatively dry and warm summers. Snowfall, a significant form of precipitation, plays a crucial role in maintaining adequate moisture supply during the summer months when rainfall is sparse. The valley temperate zone encompasses areas with varied relief. The plain valleys have an altitude of 1560 meters above sea level (masl), rising to 1950 meters in low-altitude Karewas in mid-belts, reaching 2400 to 3000 meters in the upper belts, and extending to 4200 meters in snowbound areas. The soils in the Kashmir valley are predominantly alluvial, with approximately 62 percent of the area being irrigated. Meteorologically, the temperate zone receives an annual rainfall of around 680 mm, with nearly 70 percent occurring during the winter and spring seasons (from December to May). The average temperature varies from 1.2°C to 24.5°C in different months, with a cold thermal index and a humid hydric index. Presently, these climatic and geographical features define the distinctive characteristics of the temperate zone in the Kashmir region.

The diverse agro-ecological and climatic zones in J&K (Table 2.13) offer both opportunities and challenges for agriculture and horticulture. The temperate zone, known for its bountiful fruit production, stands as a celebrated region. In contrast, the Kashmir region grapples with the distinctive challenges presented by its extreme cold desert conditions. To harness the agricultural potential of each zone and ensure the well-being of local communities, effective agricultural planning and sustainable practices are imperative.

Table 2.13. Agro-ecological/ Climatic zones in Jammu and Kashmir. Source: Department of Horticulture, Jammu and Kashmir.

Zone	**Location**	**Suitable Fruit Crops**
Sub-Tropical	300m-1000m above MSL	Mango, Litchi, Citrus, Guava, Ber, Loquat, Grapes, Strawberry, Aonla
Intermediate	1000m-1500m above MSL	Stone fruits (Peach, Plum, Apricot), Pear, Pecan nut, Olive, Kiwi)
Temperate	Above 1500m above MSL	Apple, Pear, Stone fruits (Peach, Plum, Apricot), Walnut, Pecan nut, Almond

2.7.4. Aquifer Systems

The UT of Jammu and Kashmir, a region in the northern part of India, features a complex aquifer system due to its diverse geological and hydrogeological characteristics. The aquifer system is shown in Figure 2.10.

The hydrogeological setup in the Union Territory of Jammu and Kashmir[1] exhibits complexity due to diverse geological settings and vivid groundwater conditions. Both regions of the UT, namely Kashmir and Jammu, portray entirely

[1] cgwb.gov.in/cgwbpnm/public/uploads/documents/1688375103592311888file.pdf

different groundwater regimes. Based on geology and aquifer characteristics, the UT's area can be divided into two broad hydrogeological units: Porous Formation and Fissured Formation.

Porous Formation: Porous formations is deemed ideal for exploration and development, and harbor potential zones. In the outer plains of the Jammu region, extending from the river Ravi in the east to Munnawar Tawi in the west, groundwater occurs in Piedmont deposits from the upper Pleistocene to the Recent age. These deposits consist of unconsolidated sediments in terraces and coalescent alluvial fans, including coarse clastics in loose clay matrices and occasional bands of clay. Kankar is interspersed at intervals. Down south, the deposits comprise alternate bands of sands, clay, and gravel.

The Kandi formation, characterized by coarse material and varying clay thickness, is not typical in the outer plain but includes boulder gravel, pebbles, coarse sand, and substantial clay. The Sirowal formation follows the Kandi formation in the south, where groundwater occurs under both confined and unconfined conditions. The Dun Belt, separating the Siwalik hills, exhibits isolated sub-recent to recent valley-fill deposits, dissected due to the present-day drainage pattern.

Isolated valleys in the middle Himalayas, like the Kistwar valley, contain groundwater in valley-fill deposits comprising lacustrine to fluvioglacial sediments. In the Kashmir region, the valley consists of Karewas, a substantial pile of alternating bands of sand, silt, and clay interspersed by glacial boulder beds. Groundwater in the Karewas occurs under both confined and unconfined conditions.

Fissured Formation: In the hilly terrain occupying about 15,000 sq. km in the Jammu region, rocks range from Pre-Cambrian to Miocene or Pliocene. Rock types vary from soft sandstones, clays, shales, and conglomerates to hard rocks like traps and metamorphic rocks. The Siwalik terrain taps groundwater mainly from the weathered mantle or joints and cracks in these rocks. The Friable Siwalik sandstone possesses primary porosity but is not a highly potential aquifer.

The delineation of these hydrogeological units is vital for understanding and managing groundwater resources in the Jammu & Kashmir UT. The aquifer system in Jammu and Kashmir is crucial for meeting the water needs of both the population and agriculture. However, the sustainability of these aquifers can be influenced by factors such as climate change, over-extraction, and pollution. It is essential to manage and monitor these aquifers carefully to ensure their long-term viability and to safeguard the water resources in the region. The Principal Aquifer System of Jammu and Kashmir presented in Table 2.14.

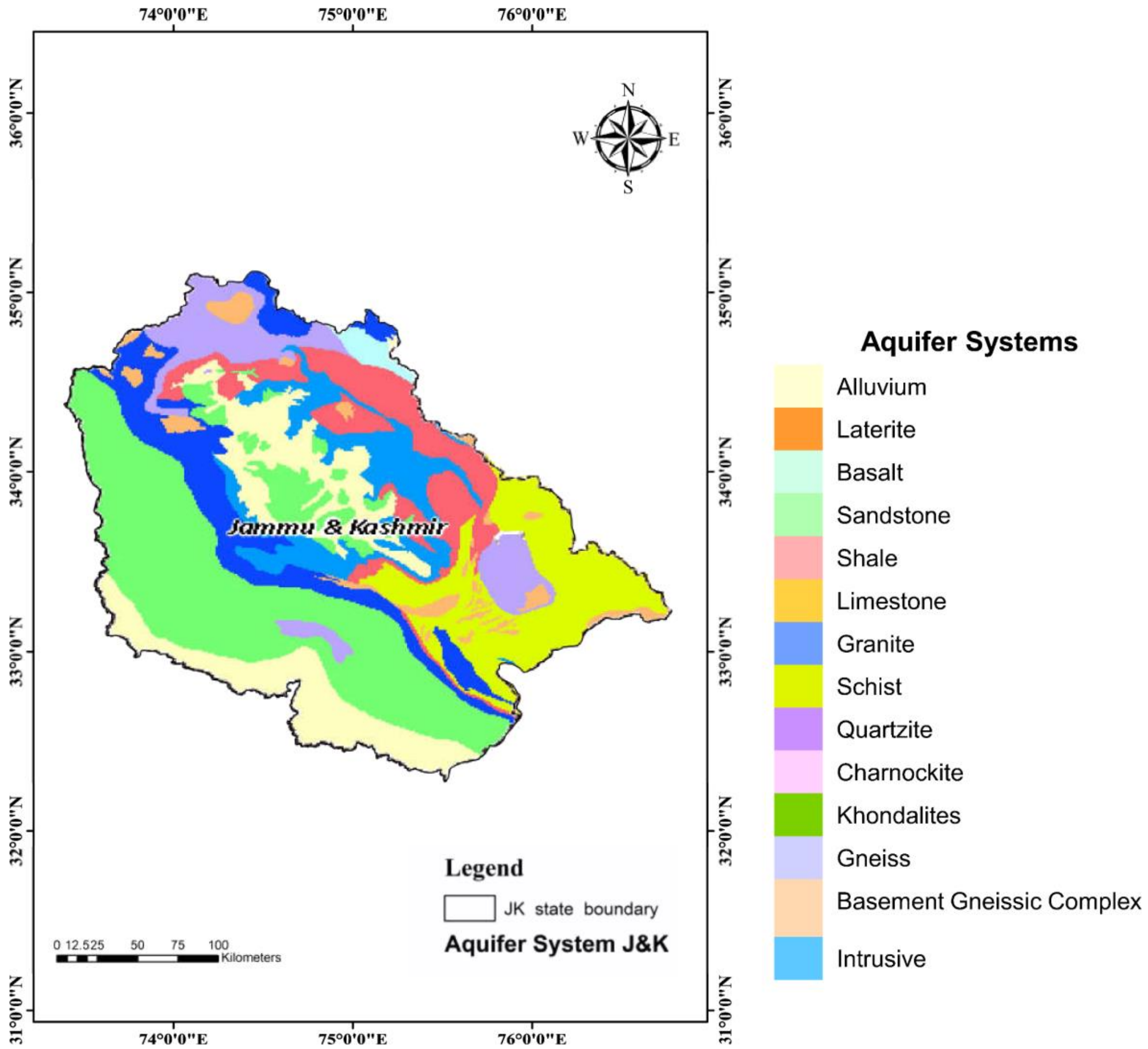


Figure 2.10. The hydrogeological aquifer distribution in the UT of Jammu and Kashmir. Source: indiawris.gov.in

Table 2.14. Principal acquifer systems in UT of Jammu and Kashmir. Source: indiawris.gov.in

S. No	Principle Aquifer	Area (Sq. Km)	Area (%)
1	Alluvium	2816.79	6.62
2	Basalt	260.25	0.61
3	Basement Gneissic Complex	1947.70	4.57
4	Gneiss	1603.58	3.77
5	Granite	5266.97	12.37
6	Intrusive	4554.49	10.70
7	Sandstone	15241.32	35.80
8	Schist	802.85	1.89
9	Shale	157.38	0.37
10	Unclassified	52.41	0.12

2.7.5. Irrigation Status in Jammu and Kashmir

Irrigation plays a crucial role in the agricultural sector of the Jammu and Kashmir economy. The Jammu and Kashmir region is known to receive inconsistent rainfall annually. In the Jammu region, climatic conditions are favourable for year-round crop cultivation, but a significant hindrance is the insufficient water supply for irrigation. There is a growing emphasis on expanding irrigation to various parts of the UT, as self-sufficiency and food security are directly linked to it.

In the Kashmir Valley, rainfall primarily occurs during the winter when temperatures are too low for plant growth. As temperatures begin to rise from May onwards, rainfall becomes scarce, with only sporadic showers in July and August, leaving most of the growing season dry. For generations, the agricultural economy has relied on a single crop. Consequently, farmers heavily rely on canals for irrigation. Despite the presence of many snow-fed streams descending from the mountains, which makes it feasible for the government to construct small canals or reservoirs, only 60 percent of the land in the valley is currently irrigated. The water source-wise irrigated area of Jammu & Kashmir is presented in Table 2.15.

Table 2.15. Source-wise irrigated area of Jammu & Kashmir.

Year	Canals ('000' Ha)		Tanks ('000' Ha)		Wells ('000' Ha)		Other Source ('000' Ha)		Total ('000' Ha)
1980	285	93.7 %	2	0.65 %	4	1.3%	13	4.2%	304
1990	278	93.6 %	1.58	0.53%	1.3	0.43%	16	5.4%	297
2000	284	91.3 %	2.7	0.86%	1.5	0.48%	22.4	7.2%	311
2010	288	89.7 %	6.2	1.9%	11.6	3.6%	14.6	4.5%	321
2020	265.93	83.39 %	11.41	3.57 %	18.04	5.65 %	23.50	7.37 %	318.89

Source: Directorate of Economics & Statistics, Govt. of Jammu and Kashmir, 2010.

In Jammu and Kashmir, agriculture can be classified and analysed based on the irrigation practices, specifically under rain-fed and irrigated agriculture. This classification is essential for understanding the regional agricultural dynamics and its impact on the regional economy and food security:

a) **Rain-fed Agriculture:** Rain-fed agriculture in Jammu and Kashmir primarily relies on natural precipitation for crop cultivation. This type of farming is prevalent in areas with adequate rainfall and suitable climatic conditions. While it is less resource-intensive than irrigated agriculture, it is highly dependent on the vagaries of weather. The success of rain-fed agriculture in the region is linked to seasonal monsoons and variations in precipitation, making it susceptible to droughts and crop failures during periods of low rainfall. Common rain-fed crops include maize, millet, and pulses.

b) **Irrigated Agriculture:** In contrast, irrigated agriculture in Jammu and Kashmir is characterized by controlled water supply to crops through various irrigation systems. The region has access to an extensive network of canals, rivers, and lakes that facilitate irrigation, making it possible to cultivate high-value crops and support larger agricultural enterprises. Irrigated agriculture is critical for ensuring stable yields and diversifying crops, including rice, wheat, saffron, fruits, and cash crops. This method provides a buffer against the risks associated with rain-fed agriculture and enables multiple cropping seasons.

c) **Water harvesting:** Water harvesting in Jammu and Kashmir is a critical practice that varies across the diverse landscapes of the region. In the high-altitude Himalayan areas, snowmelt water management is paramount. Small dams and reservoirs are constructed to capture and store the precious meltwater, ensuring a consistent water supply during the dry seasons. In the valley regions, such as the Kashmir Valley, rainwater harvesting plays a significant role. Rainwater is collected from rooftops during the monsoon season and used for a variety of purposes, including irrigation and household needs. Terrace farming is also common in Kashmir for hilly terrains, not only preventing soil erosion but also capturing rainwater for agricultural use. Traditional canal systems, known as "kul" are employed to divert water from streams and rivers to fields for irrigation.

Table 2.16. List of Gauged, Discharge, Silt, Water Quality Sites designated by the CWC.

S.No.	Name of Site	Name of River/Tributary	Type of Site
1	Akhnoor	Chenab	GDSQ
2	Dhamkund	Chenab	GDSQ
3	Gulabgarh	Chenab	GDS
4	Kidur	Chenab	GDS
5	Prem Nagar	Chenab	GDSQ
6	Sirshi	Sirshi	G
7	Dharmari	Ans	GD
8	Bhut Nallah	Bhot Nallah	GD
9	Chhapriyal (Bardoh)	Mannawar Tawi	GD
10	Kalnai Nallah	Kalnai Nallha	G
11	KuriyaPul	Marusudar	GDS
12	Neeru Nallah	Neeru Nallah	G
13	Bari Pattan	Mannawar River	G
14	Jammu Tawi	Tawi	GDSQ
15	Kishanpur (Manwal)	Tawi	G
16	Kralpora Doodganga	Doodganga	GDS
17	Ravi / Basantar	Basantar	G
18	Ganeshpora	Lidder	G

19	Khanabal	Jhelum	GDS
20	Ram Munshi Bagh	Jhelum	GDS
21	Safapora	Jhelum	GDS
22	Sangam	Jhelum	GDS
23	Arwani	Vishow	G
24	Bainch	Poonch (Plust)	G
25	Prang/Fatehpora	Sindh	GDS
26	Rumshi	Rumshi	GDS
27	Sonmarg	Sindh	G
28	Uri	Jhelum	GDS
29	Watchi	Rambiara	GDS

G: Gauge; D: Discharge; S: Silt; Q: Water Quality
Source: cwc.gov.in

In the plains and semi-arid areas of Jammu, where reliance on groundwater is high, techniques like groundwater recharge through percolation pits and recharge wells are used to maintain a sustainable supply. Additionally, check dams and small ponds are constructed to capture rainwater, replenishing groundwater and providing water for agriculture and livestock. Measurement of hydrometric parameters on site is often critical in the assessment of water resources which is typically commanded at both state/UT and central Level. The gauged, discharge, silt and water quality stations/sites designated by the Central Water Comisssiom (CWC), government of India are listed in Table 2.16.

2.7.6. Drainage System

The Indus Basin[1] covers a total drainage area of 1,178,440 km^2, of which 453,250 km^2 is located in the high Himalayan mountains, and the remaining 725,190 km^2 is in the plains. India holds 321,290 km^2 of this basin, whereas Pakistan's share is 131,960 km^2.

The Indus River, known as Sindhu in Sanskrit, Sinthos in Greek, and Sindhus in Latin, originates from the lofty mountains near Mansarovar Lake at an elevation of 5182 m. It travels for several hundred kilometers through Tibet and India before reaching the Suleiman mountains in Pakistan. Some parts of the Indus Basin lie above the permanent snow line, ranging from 4268 m in the eastern part to 5792 m in the western part. In the Ladakh Region, the snow line is at 5488 m above mean sea level, and it recedes during the summer.

The hydrographic system of the Indus Basin is extensive. The major sub-basins of the Indus System in Jammu & Kashmir are the Jhelum Sub-basin, the Chenab Sub-basin, and the Ravi Sub-basin. The Ravi and and the Chenab sub-basins cover the majority part of the Jammu region while the Jhelum sub-basin covers primarily the Kashmir region as shown in Figure 2.11. The terrain aspect of the entire

[1] https://cgwb.gov.in//cgwbpnm/public/uploads/documents/1688375103592311888file.pdf

region is mostly concentrated in the south to south-west directions as depiced in Figure 2.12.

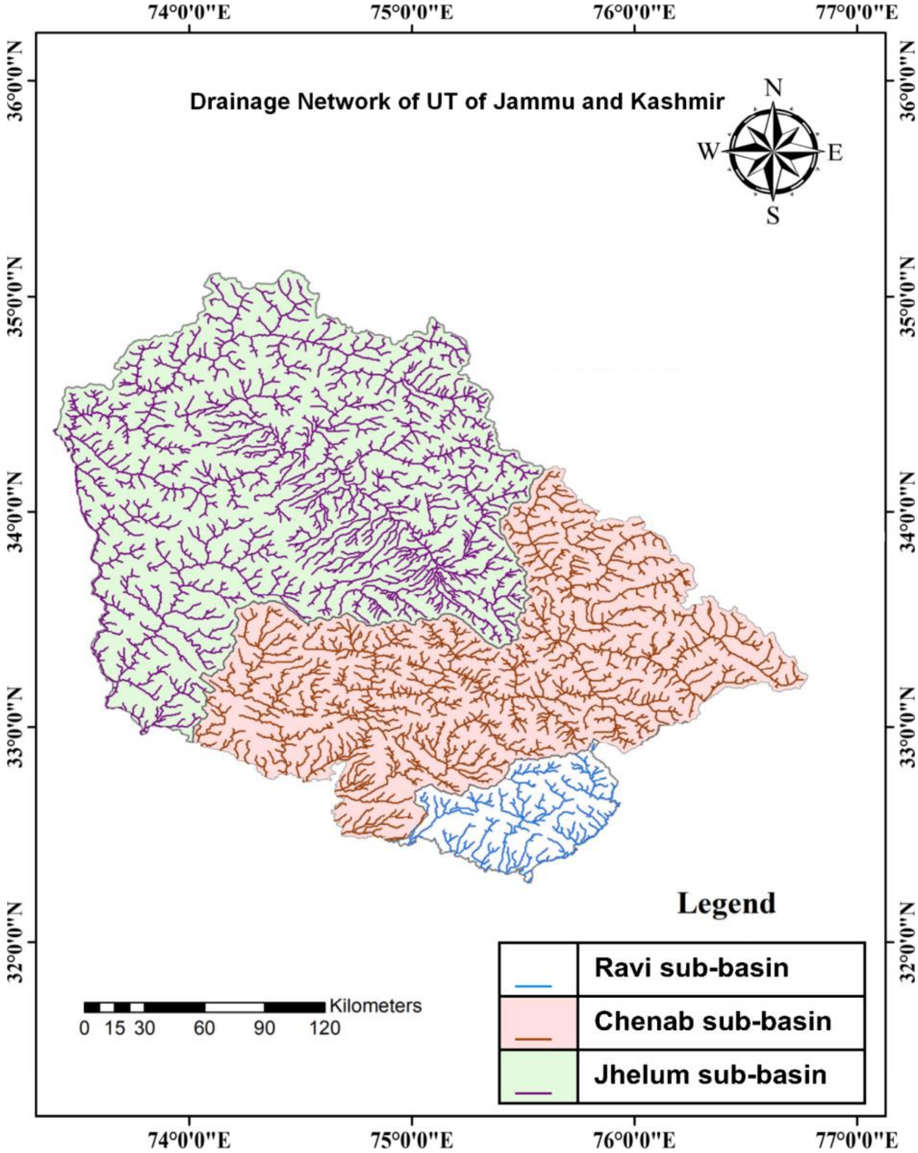


Figure 2.11. The drainage network of the UT of Jammu and Kashmir comprising three sub-basins of Ravi River, Chenab River, and Jhelum River (primarily in Kashmir region).

I. **Jhelum Sub-Basin:** The Jhelum River, known as the Veth River in Kashmir, plays a significant role in draining most parts of the Kashmir Valley. It flows in a north-westerly direction. Within the valley, the river receives various tributaries, some of which originate from the perpetual snows of the Liddar Valley. Near Srinagar, it is joined by the Sind River and then gives rise to the Wular Lake in Baramulla District, which serves as a delta for the Jhelum River. Below Baramulla, the river departs from the fertile valley banks and rapidly descends through a deep gorge at Khadnayar, eventually merging with the Chenab River at Trimmu in Pakistan.

2. **Chenab Sub-Basin:** The Chenab River, formerly known as Asikin in Vedic times, is created by the convergence of two significant tributaries, the Chandra and the Bhaga, which meet near Keylong in Himachal Pradesh. This confluence forms the Chandra-Bhaga or the Chenab River in Himachal Pradesh. Subsequently, the river traverses through the Kashmir Himalayas, eventually reaching the plains at Akhnoor in Jammu District, 410 km from its source. at Akhnoor tehsil, the Ranbir canal diverts from its left bank.
3. **Ravi Sub-Basin:** A very small portion of the state, primarily located in the far southeast, falls within the Ravi Sub-basin. The Ravi River originates from the northern side of Rohtang Pass in Himachal Pradesh, at an elevation of 4,116 meters. It passes through the Dhaula Dhar hill ranges and reemerges from the foothills near Madhopur, where the headworks of the Upper Bari Doab Canal are situated. Among the rivers in the Indus System, the Ravi River has the smallest catchment area. An important tributary of the Ravi River is the Ujh River, which originates from the Basohli hills in Kathua District and joins the main river on its right side at Lassian.

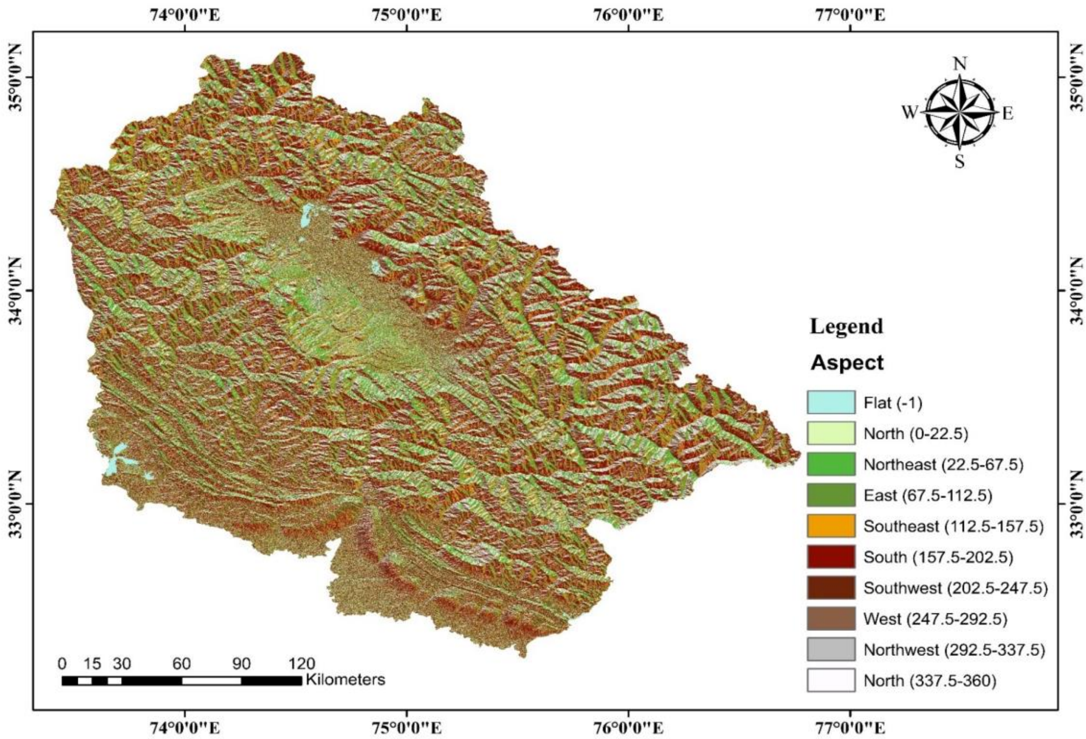


Figure 2.12. Aspect image of UT of Jammu and Kashmir derived from 1 arcSec SRTM DEM.

2.7.7. Drainage Water Quality

The current status of drainage water quality in Jammu and Kashmir reflects a dynamic interplay of various factors influencing environmental conditions. The region's heavy reliance on agriculture contributes to the transportation of agrochemicals, pesticides, and fertilizers into water bodies through runoff, impacting the quality of drainage water. Additionally, industrial discharges pose a potential risk, with untreated effluents potentially degrading water quality. Urban areas may contribute to the issue through the discharge of untreated or inadequately treated wastewater, introducing pathogens and pollutants into the drainage systems. Geological factors play a role as well, with specific formations contributing minerals or contaminants to the water. Human activities, including improper waste disposal, further exacerbate the problem, introducing solid waste and non-biodegradable materials into the drainage network.

The Central Ground Water Board (CGWB) 2021-22 report on Jammu and Kashmir[1] water quality analysis reveals several significant findings. The assessment considered a range of parameters, with the majority of samples exhibiting specific electrical conductivity levels (66.8%). The pH values fell within the range of 6.15 to 9.04, with 37.6% of samples predominating in this range, signifying varying degrees of water acidity or alkalinity. Chloride concentrations varied widely, ranging from 5.4 to 216.8 mg/l, impacting the water salinity.

Notably, fluoride concentrations in the majority of samples (93.2%) remained within the acceptable limit of 1.0 mg/l. The study also indicated low nitrate concentrations in 88.8% of samples, while 11.2% exhibited higher values. Sulphate concentrations were within permissible limits. The water was classified as hard in the majority of cases, with calcium and magnesium concentrations displaying variation within recommended boundaries. These findings contribute essential insights into the region's water quality, guiding informed water resource management for safe and sustainable water usage in Jammu and Kashmir.

The current groundwater quality for Jammu and Kashmir, as of May 2021, is presented in Table 2.17 and the present recommended classification concerning Sodium Absorption Ratio and residual sodium carbonate under customary irrigation conditions is depicted in Table 2.18.

Table 2.17. Groundwater Quality during May 2021 for Jammu and Kashmir. Source: CGWB Year book- 2021-22.

S.No.	Parameter	Samples Analysed	Permissible limit	Ranges	No.of Sample	Percentage, (%)
1	Electrical Conductivity µs/cm at 25 °C	250	3000 µs/cm	<750 750-3000 >3000	167 83 0	66.8 33.2 0
2	Chloride (mg/l)	250	1000 mg/l	< 250 250-1000 >1000	250 00 00	100 0 0
3	Fluoride (mg/l)	250	1.50 mg/l	<1.00	233	93.2

[1] https://cgwb.gov.in/ cgwbpnm/public/uploads/documents/16883751035923118888file.pdf

				1.01-1.50 >1.50	12 5	4.8 2.0
4	Nitrate (mg/l)	250	45 mg/l	<45 <45	222 28	88.8 11.2

Table 2.18. Sodium Adsorption Ratio (SAR) and Residual Sodium Carbonate (RSC) durin May 2021 for Jammu and Kashmir. Source: CGWB Year book- 2021-22.

Water Class	**Alkalinity Hazards**	
	SAR	**RSC (meq/l)**
Excellent	<10	<1.25
Good	10-18	1.25-2.0
Medium	18-26	2.0-2.5
Bad	>26	2.5-3.0

2.7.8. Fisheries

Jammu and Kashmir boast a wealth of water resources, including rivers, lakes, and reservoirs, providing favourable conditions for fisheries. Further, the fisheries sector is a significant contributor to the Jammu & Kashmir economy, providing employment and income to a large number of people, particularly in rural areas and has a wide range of freshwater and cold-water fish species, including trout, carp, and other indigenous fish[1]. The typical fisheries resources and the productivity is reported in Table 2.19. These resources offer opportunities for both subsistence and commercial fishing. The Fish production in last nine years in Jammu & Kashmir is presented in Table 2.20. The transition of the fisheries sector from traditional to commercial scale has resulted in a notable increase in fish production[2].

The fisheries sector from 2014-2019 received significant central assistance amounting to Rs 2189 lakhs for the overall development providing nearly 21 Ha land area for aquaculture with 5 sanctioned construction of landing centres and an approved re-circulatory acquaculture system. Further investments included in approved installation of 72 cages in reservoirs and other open water bodies with establishment of about 7 fish/prawn hatcheries and several fishing raceways. A significant investment was also observed in fish transport facilities was also observed with benefits to fishermen through skill training and housing.

Table 2.19. Typical fisheries resources in the UT of Jammu and Kashmir.

Inland:	
Total inland water bodies (lakh Ha)	0.30
Rivers & canals (Km)	27781

[1] https://dof.gov.in/documents/state-fisheries-profile/jammu-and-kashmir.

[2] https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fdof.gov.in%2Fsites%2Ffiles%2F2020-01%2FJammuandKashmir.doc&wdOrigin=Browselink.

Reservoirs (Lakh Ha)	0.07
Tanks & ponds (lakh Ha)	0.17
Flood plain lakes/derelict waters (lakh Ha)	0.06
Average productivity reported (Kg/Ha/year)-FFDA	3,000

Table 2.20. Fish production in last nine years in Jammu & Kashmir. Source: Department of fisheries, Jammu and Kashmir.

Year	Inland Fish production		Fish Seed Production
	Fish production ('000' tons)	Growth rate (%)	No of fish seeds produced (Carps/ Trout), in lacs
2004-05	19.10	-3.29	160
2005-06	19.15	0.26	170
2006-07	19.20	0.26	173
2007-08	17.33	-9.74	171
2008-09	19.27	11.19	181
2009-10	19.30	0.16	201
2010-11	19.70	2.07	260
2011-12	19.85	0.76	260
2012-13	19.95	0.50	345
2013-14	19.98	0.15	350
2014-15	20.03	0.15	530
2015-16	20.08	0.24	620
2016-17	20.39	1.54	690
2017-18	20.70	1.52	712
2018-19	21.06	1.73	762
2019-20	21.35	1.37	770
2020-21	21.35	0	772.50
2021-22	25.40	18.96	767.80
2022-23	26.90	5.90	780

The fisheries department of Jammu and Kashmir has been adamantly pursuing its vision towards sustainable development of fisheries for nutritional security and employment generation while focusing on the economic prosperity of the region. The primary objectives of the department are to ensure social security and welfare of the fishing community, development of fish culture using high quality fish seed and sustainable fish production with conservations and development of natural fisheries resources of the UT. The department also focuses on periodic capacity building programs for training schemes for fisherments and stakeholders.

2.7.9. Livestock

Livestock plays a pivotal role in the rural economy of Jammu and Kashmir, with a significant population of 8.32 million according to the 20th Livestock Census. The rural economy in Jammu and Kashmir connects a significant rural household to livestock-related activities. Animal husbandry is a significant contributor to the UT economy, accounting for 0.13% of the GDP. The region possesses valuable livestock resources, including cattle, buffalo, sheep, goats, and poultry. Among these, cattle and poultry play a pivotal role in driving rural economic development. Furthermore, the production of prized commodities like Pashmina shawls, carpets, shawls, and blankets from Kashmir generates substantial foreign exchange for the country. This highlights the substantial potential for the development of the livestock industry in the state, offering rapid economic gains and playing a crucial role in overall economic and social advancement.

The distribution of sheep, cattle, goats, and buffalo comprises 36.84%, 30.41%, and 21.93%, respectively, contributing substantially to the total livestock count. Jammu and Kashmir hold the 6th position in sheep population, standing out as the leading region for yaks, ranking 2nd for horses and ponies, and securing 3rd place for mules. Additionally, the UT boasts the 6th highest donkey population in India.

The Gurez breed from Gurez Tehsil of Kashmir faces endangerment but currently maintains a normal status, with a population of 17,207 (Table 2.21). The Gaddi breed, found in Kistwar and Baderwah, Jammu; boasts a substantial population of 92,194 and is considered normal in status. The Karnah breed, located in Karnah Tehsil at an altitude of 1200-4600 meters, faces endangerment and vulnerability, with a population of 2,946 and 2,252 females. Bakerwal, thriving in the high ranges of Pirpanchal mountains, Kashmir Valley, and other hills, also grapples with endangerment but maintains normalcy, with a population of 24,575 and 17,890 females. Poonchi, found in Poonch and surrounding areas, confronts endangerment and vulnerability, with a population of 2,643 and 1,864 females. Unfortunately, breeds like Ghidord Phamphri, Punchi Bakerwali, Bani, and Karnahi have become extinct (Mubashir Ali Rather 2022) .

According to the 18th livestock census in 2007, the total livestock population in the state increased from 98.99 lakhs in 2003 to 104.73 lakhs in 2007, marking a growth of 5.8%. During the 2003-04 fiscal year, the livestock sector in the Kashmir Valley made a substantial economic contribution of 775.91 crores rupees. This included revenue streams of Rs. 690 crores from milk production, Rs. 38.8 crore from egg sales, Rs. 17.1 crore from poultry meat, and Rs. 30 crores from farm yard manure. Additionally, the region saw the production of 63.2 million eggs annually, thanks to 5.6 million poultry, and small ruminants, consisting of 3.4 million sheep and 2 million goats, played a significant role in bolstering the overall livestock population of the state.

According to Digest of Statistics 2022-2023[1], the production of livestock products in Jammu and Kashmir has seen a significant increase from the year 2021-2022 to 2022-2023. Milk production rose from 25.72 lakh tonnes to 32.94 lakh tonnes. Meat production also saw an increase, growing from 31.93 thousand tonnes to 34.61 thousand tonnes. Similarly, egg production experienced a substantial rise, with numbers going up from 200.93 million to 244.3 million. This data highlights (Figure 2.13) a notable growth in the livestock sector in Jammu and Kashmir over the specified period.

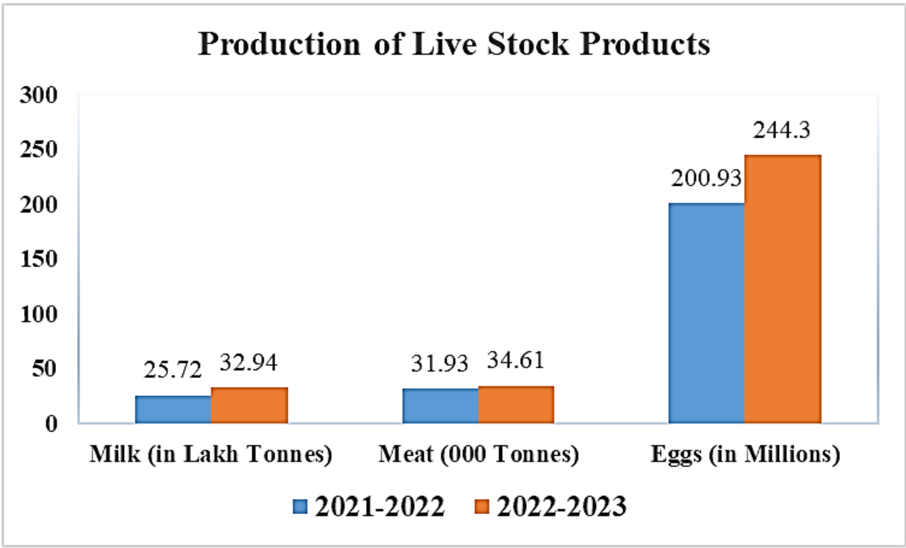


Figure 2.13 Production of Live Stock Products for Jammu and Kashmir. Source: Digest of Statistics 2022-2023.

Table 2.21. Breeding tracts, total population, female population and status of various sheep breeds (thousands), based on Hamadani et al. (2022).

S. No.	Breed	Habitat	Population (2014)	Female Population	Status
1	Gurez	Gurez Tehsil of Kashmir	17,207	10,690	Endangered (2005) to Normal (2012)
2	Gaddi	Kistwar, Baderwah, Jammu	92,194	69,226	Normal (2012)
3	Kashmir Valley	Kashmir Valley at an altitude of 5000- 6000			
4	Karnah	Karnah Tehsil at an altitude of 1200-4600 meters	2,946	2,252	Endangered (2005) to Vulnerable (2012)

[1] https://ecostatjk.nic.in/pdf/publications/digeststat/Digest%20of%20Staistics%202022-23.pdf

5	Bakerwal	High ranges of Pirpanchal mountains, Kashmir Valley and other low lying hills of Jammu and Kashmir	24,575	17,890	Endangered (2005) to Normal (2012)
6	Poonchi	Poonch and surrounding places situated at a high elevation	2,643	1,864	Endangered (2005) to Vulnerable (2012)

2.8. Infrastructure

Infrastructure development in Jammu and Kashmir has been a multifaceted endeavour to address the region unique challenges and promote its socio-economic growth. This includes enhancing transportation networks with an emphasis on all-weather road and rail connectivity, such as the Kashmir Railway project, and expanding and modernizing airports for improved accessibility.

Power infrastructure development has harnessed the region abundant water resources for hydroelectric projects, ensuring a stable energy supply. In the tourism sector, investments in accommodations and amenities have been made to encourage tourism, given the region scenic beauty and cultural significance. Meanwhile, healthcare and education infrastructure improvements, the establishment of AIIMS facilities, and housing and urban development projects have enhanced the quality of life for the residents.

Furthermore, initiatives have been undertaken to extend telecommunications and internet services, particularly in remote areas. The regional proximity to international borders also necessitates investments in border infrastructure for national security. The forthcoming approved projects in Jammu and Kashmir, which are presented in the Figure 2.14. The power supply scenario in J&K is presented in Table 2.22.

According to the Economic Survey 2022-23, Jammu and Kashmir[1] is currently witnessing a substantial progress in bolstering its energy infrastructure and overall development. The hydro-power generation capacity is slated to double to 6647 MWs by 2026 and triple to 9931 MWs by 2030, representing a significant increase from the current 3633.21 MWs. This ambitious plan also entails a remarkable scaling up of the installed capacity of rooftop solar energy, aiming to elevate it from 36.4 MW to an impressive 300 MW in the coming years. Moreover, the transmission and distribution capacity have experienced commendable growth, with

[1] https://ecostatjk.nic.in/pdf/publications/ecosurvey/Economic%20Survey-2023f.pdf

an increase of over 15% in the last three years. Per capita electricity consumption has consistently grown, registering an average annual rate of 6.6% over the last decade, reaching from 887 kilowatt-hour (KWHr) to 1471 KWHr.

The commitment to sustainable energy practices is evident in the installation of 32,479 solar street lights, the distribution of 30,186 solar home lights in remote areas, and the initiation of solar-powered irrigation pump sets. The "Jammu Solar City Mission" is a significant initiative, planning to establish 200 MW Grid-tied Rooftop solar energy plants and 20 MW Grid Connected Rooftop Solar Power Plants on residential buildings across the Union Territory. Additionally, there is a targeted installation of an aggregate capacity of 12MW on the rooftops of government buildings by March 2024, aligning with the Rooftop Solar Power Plants on Government Buildings initiative as part of the Jammu Smart City Mission.

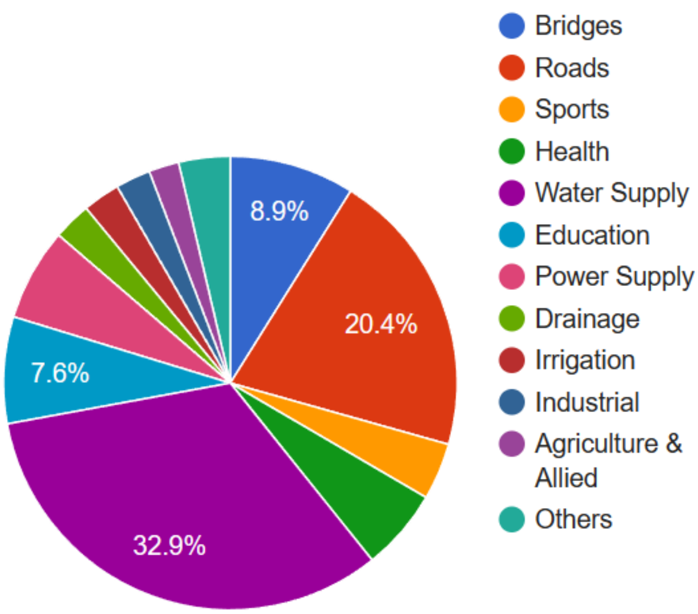


Figure 2.14. Upcoming projects in Jammu and Kashmir. Source: Jammu & Kashmir Infrastructure development finance corporation limited.

Table 2.22. Energy Requriment and availability in Jammu and Kashmir. Source: Power Development Department, Jammu &Kashmir.

S.No.	Parameter	unit	2019-20	2020-21	2021-2022	2022-23
1	Energy Requriment	MU	21200	22000	23600	26000
2	Energy available	MU	17100	18100	19900	22500
3	Energy Surplus/Defict	MU	4100	3900	3700	3500
4	Peak Demand	MW	3140	3210	3330	3600
5	Peak availability	MW	2574	2680	2826	3100
6	Peak Surpluse/Deficit	MW	566	530	504	500

Infrastructure development extends to transportation, with the ongoing 4-laning of the Jammu-Srinagar National Highway expected to be completed by June 2024, promising a five-hour reduction in travel time. The Jammu-Udhampur-Srinagar-Baramulla Rail link is projected to be completed by August 2023, enhancing connectivity in the region. Airports in Jammu and Srinagar are undergoing expansion, complemented by the addition of seven new helipads.

In terms of urban development, 18 ropeway projects have been identified, and work on two projects is anticipated to commence soon. High-tech interventions like VAHAAN, SARTHI, IDTR, ICC have been introduced to enhance services under the Motor Vehicles Act. The establishment of Metropolitan Region Development Authorities for Jammu and Srinagar cities reflects commitment to a balanced regional development.

Jammu and Kashmir have emerged as flag bearers in the implementation of flagship schemes across the country, with most schemes reaching saturation. The Smart City Mission in Jammu and Srinagar has seen the completion of 143 projects, with work ongoing on 122 more. Under the AMRUT (Phase-I), 73 projects have been successfully completed. Remarkably, the iconic Dal Lake is now cleaner, marking a significant achievement after three decades. Furthermore, under the Prime Minister's Development Programme, 29 projects have been completed or substantially completed, highlighting the continued efforts towards holistic development in Jammu and Kashmir.

2.9. Industries

Jammu and Kashmir, a union territory in northern India, boasts a diverse economic landscape with prominent industries including agriculture and horticulture, known for high-quality apples and handicrafts like Pashmina shawls; tourism, driven by its picturesque landscapes and religious shrines; hydropower generation leveraging abundant water resources; mineral extraction; food processing, particularly in fruit and dairy products; small-scale industries; and emerging sectors like IT and software services. Despite challenges related to its political situation, the region continues to focus on economic development and diversification to support its economy etc.

As per Department of Industries & Commerce, the financial year 2022-23, Jammu and Kashmir[1] attracted investments totaling ₹2153.45 Cr, marking the highest in the last decade. This initiative has resulted in direct employment for 11,091 individuals and indirect employment, including subcontracting on the same project site, for 5582 people. Moreover, the Prime Minister's Employment Generation Programme (PMEGP) employment stands at an impressive 77,743. An

[1] https://jkindustriescommerce.nic.in/Orders%202023/Compendium%20I&C%20Deptt%202023.pdf

additional 169 units, with an investment of ₹7096 Cr and employment opportunities for 21,076, are in the early stages of groundwork and are expected to commence production soon. The region has received a total of 6231 investment proposals amounting to ₹87,923 Crores, potentially generating employment for 3,92,162 individuals. Furthermore, 1072 units, with an envisaged investment of ₹14940 Cr and employment opportunities for 72,874, have received premiums.

Jammu and Kashmir has witnessed the implementation of the highest-ever package by the Central Government through the New Central Sector Scheme (NCSS), featuring a financial outlay of ₹28,000 crores. This scheme aims to encourage new investments in J&K with a return on investment (RoI) in India of up to 400%. The fiscal incentives provided to Micro, Small, and Medium Enterprises (MSME) players for establishing their units within the UT of J&K include capital investment incentives related to P&M/Building/Durable Assets, interest subvention, working capital, and Goods and Services Tax (GST) -linked subsidy. Following the introduction of the new industrial policy, the average investment per kanal has increased significantly from 0.24 crores to 2.24 crores based on land premiums received. Under the PMEGP, a total of 89,063 cases have been sanctioned, releasing ₹1,150 Cr in margin money and providing employment to more than 7,12,504 people since 2019.

In terms of industrial infrastructure, Change of Land Use (CLU) has been introduced to diversify the industrial base, facilitating the establishment of various industries and reducing dependency on government estates. Private industry is contributing to the development of 3,722 kanals of land. Additionally, 46 new Industrial Estates covering an area of 17,012 kanals are under development, bringing the total to 110 estates. Central Public Sector Undertakings (CPSUs) NBCC and IRCON, along with CPWD, are engaged in fast-tracking the development of 6 new Industrial Estates.

Policy interventions have played a crucial role, with 12 policies aimed at attracting investment in Jammu and Kashmir being notified. These policies include the J&K Industrial Policy 2021, J&K Industrial Land Allotment Policy 2021, J&K Private Industrial Policy 2021, J&K Ayush Policy 2020, J&K Health Investment Policy 2019, J&K FDI Policy 2022, J&K Film Policy 2021, J&K IT & ITeS Policy 2020, J&K Poultry Policy 2020, J&K Tourism Policy 2020, J&K Township & Housing Policy 2020, and J&K Wool Processing, Handloom, and Handicraft Policy 2020. Additionally, new policies, including the New Start-up Policy 2023, J&K Logistic Policy, and New Export Policy 2023, are currently in the drafting stage.

The Handicrafts industry[1] has been receiving priority attention from the Government in view of its large employment base and exports potential. Jammu &

[1] https://ecostatjk.nic.in/pdf/reports/surveyofindustries/ASI2019.pdf

Kashmir is famous for its small-scale and cottage industries such as carpet weaving, silks, shawls, basketry, pottery, copper and silverware, papier-mache and walnut wood.

As per Department of Industries & Commerce, Srinagar has been chosen by United Nations Educational, Scientific and Cultural Organization (UNESCO) as one of the 49 cities in the Creative City Network, specifically in the Crafts and Folk-Art category. In a significant development, India has introduced its first QR code-based mechanism for Geographical Indication (GI) certification of Kashmir Carpets. Currently, a total of 20,126 Pashmina Shawls have received GI labels, and 9,700 carpets have been labeled with GI Tags.

The total export from Jammu and Kashmir from financial year 2019-20 until now amounts to 4.74 thousand Crores. The primary commodities exported include Pharmaceuticals, Apparel Articles, Carpets, Fruits, Cotton, Organic Chemicals, Cereals, and Edible Vegetables.

The government has launched several new schemes to support the handloom and handicraft sector, such as the Credit Card Scheme for Artisans/Weavers, Financial Support Scheme for Cooperative Societies/SHG's, Education Scheme for Artisans/Weavers, Karkhandar Scheme, 10% Export Subsidy Scheme, and UT Level Awards for Artisans/Weavers.

Jammu and Kashmir boast a rich tradition of handicrafts, and the government has implemented various measures to promote and safeguard these crafts. Ten crafts from the region, including Pashmina, Carpet, Sozni, Walnut Wood Carving, Kashmir Papier Mache, Kani Shawl, Khatamband, Basholi Painting, Basholi Pashmina, and Chikri Wood, have already been registered under the Geographical Indication (GI) tag. Additionally, 12 more crafts, seven from Kashmir and five from Jammu, are in the process of obtaining GI tagging. This initiative aims to enhance recognition, protection, and economic growth for these crafts. Jammu and Kashmir has achieved the distinction of being the first UT in India to issue QR-based labels for all its crafts. An export strategy is being devised for Pashmina, Carpets, Paper Machie, Walnut, and Sozni, with the objective of doubling exports within the next five years. A Memorandum of Understanding (MoU) has been signed with the National Institute of Fashion Technology (NIFT) for contemporary design and packaging.

Industrialization plays a significant role in employment creation of any economy. Large-scale and heavy industries are not present in an acceptable statistic due to poor infrastructure and climatic disadvantages in J&K. Only Micro, Small and Medium enterprises are growing in the UT. The availability of raw material, cultural and climatic conditions is supporting those enterprises in growth. Small scale industrial units of the UT are manufacturing food products, beverages, silk, bricks, plastic products etc.

2.10.Services Sector- Transportation

Transport in Jammu and Kashmir is a vital lifeline that connects the diverse and challenging terrain of the region. This union territory, characterized by its mountainous terrain, poses unique challenges and opportunities for transportation infrastructure. The state boasts a network of well-maintained roadways, including the iconic Jammu-Srinagar Highway, which serves as a crucial artery linking the Jammu region to the Kashmir Valley. Additionally, the state offers picturesque railway routes such as the Jammu-Udhampur-Srinagar-Baramulla railway line, which not only facilitates transportation but also provides travellers with breath-taking views of the Himalayan landscape.

In the winter months, when heavy snowfall often isolates certain regions, the government operates specialized snow-clearing machinery and the famous 'Kashmir Railway' to ensure connectivity. Air travel is another essential mode of transport, with airports in Srinagar and Jammu providing connectivity to other parts of the country. Moreover, the state's rivers and lakes are integral to its transportation network, with traditional Shikara boats and ferries offering vital links between communities. Overall, the diverse transport infrastructure in Jammu and Kashmir not only ensures connectivity and accessibility but also provides travelers with an opportunity to experience the stunning natural beauty of the region.

As per Economic Survey 2022-23[1], the growth of Jammu and Kashmir in both public and private transport has been substantial over the years. From 13,65,552 vehicles (registered in 2016), the number has increased to 23,81,619 as of November 2022. In the financial year 2022-23, the Motor Vehicles Department generated revenue amounting to Rs. 617.24 Crores, falling short of the target of Rs. 955.00 Crores. For the financial year 2022-23 (ending January 2023), the department registered 1.29 lakh vehicles, issued 4169 new route permits, and renewed 37,337 existing route permits. Additionally, 80,536 new driving licenses were issued, while 86,470 licenses were renewed. The department also issued 8,132 new Fitness Certificates for various commercial vehicles, and 42,792 Fitness Certificates were renewed. The Cumulative Vehicles (Public and Private) in the UT of Jammu and Kashmir is presented in Table 2.23.

Table 2.23. Cumulative vehicles (Public & Private) in the UT of J&K. Source: Transport Department, J&K

Total Vehicle (in Lakh No.)	March-16	March-17	March-18	March-19	March-20	March-21	March-22	2022-2023
	13.66	14.88	16.57	18.36	20.14	21.36	22.73	23.82

[1] https://ecostatjk.nic.in/pdf/publications/ecosurvey/Economic%20Survey-2023f.pdf

2.11.Urbanization

Urbanization in Jammu and Kashmir is gaining momentum, and to facilitate the planning of a sustainable urban future, it is imperative to address the spatial distribution of the population. There is a notable disparity among the various regions of the state in this regard. The process of urbanization is influenced by various factors, including physiographic, social, economic, historical, and political conditions, which can vary from one region to another. Consequently, the rate of urbanization varies among different regions.

In the case of Jammu and Kashmir, it has been observed that the level of urbanization is relatively lower (27.37%) compared to the national average of 31.16%. However, it is worth noting that two districts, Srinagar and Jammu, exhibit substantial levels of urbanization. The regional and inter-district distribution of the urban population and emphasizes the growth of cities and towns within the state. In 2011, the level of urbanization in Jammu and Kashmir stood at 27.37%, reflecting an increase from 24.81% in 2001.

As per Economic Survey 2022-23[1], the third millennium witnessed the largest wave of urbanization across the world, with over 50 percent of the global population now residing in cities. Projections suggest that this ratio will escalate to 70 percent by 2050. Cities have become pivotal in economic, social, and political developments. The burgeoning urban agglomerations necessitate the development of infrastructure to accommodate the housing requirements of the urban population, efficient waste management, city decongestion, planned town development, and enhanced urban mobility. In response to these challenges, the Government is diligently working within the available resources to fortify basic urban infrastructure. The focus is on empowering grassroots governance, bringing it closer to the citizens, and making them integral in planning and implementing various development initiatives.

The implementation of the Constitution 74th Amendment Act, 1992, also known as the Nagarpalika Act, in Jammu & Kashmir has bestowed constitutional status upon Urban Local Bodies (ULBs). Eighteen mandatory functions, such as Parks & Gardens, Water Supply Divisions, Elementary Education, ICDS, Health Centers, Roads within Municipal areas, and Fire Services, have been devolved to Urban Local Bodies.Several initiatives, including the Aspirational Towns Development Programme (ATDP), Urban Reform Incentive Fund (URIF), and the Jammu & Kashmir Municipal Development Index (J&K MDI) – 2022, have been introduced to encourage reforms by municipalities and assess the development of Urban Local Bodies.

The Jammu and Kashmir Tenancy Act, currently forwarded to Ministry of Home Affairs (MHA) for parliamentary enactment, is designed to regulate the rental

[1] https://ecostatjk.nic.in/pdf/publications/ecosurvey/Economic%20Survey-2023f.pdf

housing landscape, empowering both tenants and landlords while encouraging new investors to list their unused properties for rent. The Real Estate (Regulation and Development) Act, 2016, and Jammu and Kashmir Real Estate (Regulatory and Development) Rules, 2020, ensure the prior registration of all real estate projects and real estate agents. The new Jammu and Kashmir Housing, Affordable Housing, Slum Redevelopment and Rehabilitation, and Township Policy 2020 have been introduced to ensure affordability across various housing categories. Jammu & Kashmir hosted its first Real Estate Summit on 27.12.2021 with the objective of developing Integrated Townships, Luxury, Group, and Affordable Houses in Jammu & Kashmir in collaboration with leading developers in the country. A total of 39 Non-Binding MoUs, amounting to Rs. 18900.00 Crore, were signed between the Government of Jammu & Kashmir and the Leading Real Estate Developers/NAREDECO.

Metropolitan Region Development Authorities (MRDA) have been established for Srinagar and Jammu cities, alongside Unified Metropolitan Transport Authorities (UMTAs), to develop Master Plans (Comprehensive Regional Plans) for the two capital cities and create an integrated, efficient, modern, multi-model mobility system focusing on hassle-free movement of people and goods. Jammu & Kashmir Protection of Livelihood and Regulation of Street Vending Rules, 2021, were notified to regulate the functioning of street vendors, with 21 department services now available online.

2.12. Traditional Water Structures

Traditional water structures in Jammu and Kashmir have played a vital role in harnessing and managing water resources in the region. Some of these structures include:

1. **Kunds:** Kunds are traditional rainwater harvesting structures built in hilly and mountainous areas of Jammu and Kashmir. These structures are designed to capture rainwater and channel it for various uses, including agriculture and drinking water.
2. **Zing:** Zing is a traditional irrigation system that involves diverting water from streams and rivers into a network of canals and channels to supply water to fields for agricultural purposes. This system has been in use for centuries and is an integral part of the regional agriculture.
3. **Ahar-Bal System:** The Ahar-Bal system is an ancient water management technique in the Kashmir Valley. It consists of a series of embankments and canals designed to divert and store water for agricultural irrigation. These systems have historical and cultural significance in the region.

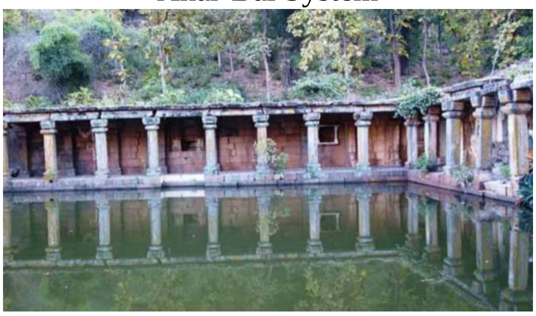
4. **Khuls:** Khuls are small channels that divert water from rivers and streams to supply water to villages and agricultural fields. They are a part of the intricate network of traditional irrigation systems in the region.
5. **Tulini and Sarai:** Tulini and Sarai are traditional water storage structures used to store water for various purposes, including drinking water and irrigation. These structures are typically found in the hilly and mountainous regions of Jammu and Kashmir.
6. **Kariz (Karez):** Though more common in other parts of Asia and the Middle East, some parts of Jammu and Kashmir also have kariz systems, which are underground tunnels used to transport water from a source to areas where it is needed for irrigation and domestic use.

Kunds

Zing

Ahar-Bal System

Khuls



Tulini and Sarai

Kariz (Karez)

Figure 2.15. Traditional water structures in the UT of Jammu and Kashmir. Sources: indiawaterportal.org, deccan-heritage-foundation.org.

2.13. Socio Economic Overview

The socio-economic landscape of Jammu and Kashmir presents a diverse and complex tapestry. This region is endowed with significant potential for development, with numerous contributing factors encompassing physical, biological, cultural, and technical dimensions.

In this dynamic environment, the state socio-economic development hinges on various key elements. These include population growth, which drives demographic changes and workforce dynamics, as well as advancements in agriculture, where traditional and modern practices coexist to sustain livelihoods. The land revenue system plays a pivotal role in shaping land use and property rights, while cooperatives provide a platform for collective economic endeavours. Additionally, the flourishing tourism sector, bolstered by the state's natural beauty and cultural richness, serves as a critical driver of economic activity and job creation.

Crucially, in the absence of large-scale industries, the exceptional skills of local artisans in activities like silk and woollen production, embroidery, carpet weaving, wood carving, and mineral resource utilization significantly contribute to the socio-economic development of the Jammu and Kashmir. This intricate interplay of factors highlights the potential for growth and prosperity in Jammu and Kashmir, underlining the importance of harnessing its unique strengths for the betterment of the region people etc.

As per Indian Brand Equity Foundation, the economy of Jammu and Kashmir[1] is primarily services-based and agriculture-oriented. The UT has experienced a consistent growth in GSDP, with a Compounded Annual Growth Rate (CAGR) of 8.84% between 2018-19 and 2023-24. Jammu & Kashmir benefits from a rich natural resource base, enabling the cultivation of major fruits. The region's favorable agro-climatic conditions make it highly suitable for horticulture, while food processing and agro-based industries thrive. The handicraft industry, particularly known for its world-famous products, serves as a major employment provider, engaging around 340,000 artisans in various crafts.

As of April 30, 2023, Jammu & Kashmir boasts a total installed power-generation capacity of 3,516.07 MW. The region's total exports amounted to US$ 89.77 million in financial year (FY) 2022-23. The government has undertaken various initiatives to promote Jammu & Kashmir as an investment destination, with a cumulative Foreign direct investment (FDI) inflow valued at US$ 07 million between October 2019 and March 2023.

The government's focus on housing and urban development is evident with an allocation of Rs. 2,928.04 crores (US$ 357.4 million) under the State Budget 2023-

[1] https://www.ibef.org/about-us

24. Other sectors, such as silk production, drug formulations and biologicals exports, tourism, horticulture, and infrastructure development, have seen positive trends and investments. Notably, international commitments, like the UAE's investment pledge of Rs. 3,000 crores (US$ 391.8 million) in March 2022, contribute to Jammu & Kashmir economic development.

The industrial policy of Jammu & Kashmir offers attractive incentives and a streamlined clearance mechanism, emphasizing the allocation of land at concessional rates in industrial areas for 90 years. Infrastructure projects, including the development of tunnels and an elevated light metro rail system, are underway to enhance connectivity and address transportation challenges.

Overall, Jammu and Kashmir's diverse economic landscape, coupled with government initiatives and international investments, positions it as a region with significant growth potential across various sectors. The focus on sustainable development, infrastructure enhancement, and promotion of tourism and industries underscores the commitment to fostering economic prosperity in the UT.

2.14.Extreme events / Disasters

Jammu and Kashmir, a region of stunning natural beauty and complex topography, faces a variety of extreme events and disasters. Earthquakes are a recurring threat due to its location in seismically active zones categorized under “very high damage risk” and “high damage risk” zones as illustrated in Figure 2.16.

The region of Jammu and Kashmir[1] has a rich yet challenging history marked by a series of natural calamities, encompassing devastating earthquakes, destructive floods, snow blizzards, avalanches, landslides, and windstorms. These occurrences are attributed to the distinctive topography, rugged terrain, extreme weather conditions, and unique geographical and geo-climatic features of the area. One significant incident transpired in February 2005 when Waltengu Nad in the Kulgam district of south Kashmir fell victim to a snow blizzard, claiming the lives of 175 individuals. Shortly thereafter, on October 8, 2005, the state experienced a powerful earthquake measuring 7.6 in magnitude, resulting in thousands of casualties and injuries. Over 24,000 houses were completely demolished.

In the intervening night of August 5 and 6, 2010, Jammu and Kashmir faced an unprecedented cloudburst, leading to flash floods and mudslides. This calamity claimed the lives of 255 people, including international tourists, and incurred significant financial losses. Leh, being a cold desert, witnessed a precipitation volume during the cloudburst equivalent to the total annual rainfall.

[1] https://www.voanews.com/a/extreme-weather-events-in-kashmir-blamed-on-climate-change-/6723930.html

The region is also prone to floods[1], particularly during the monsoon season, and the 2014 Jammu and Kashmir floods underscore the vulnerability, causing massive displacement and infrastructure damage. The state confronted a dire situation in September 2014 when devastating floods caused nearly 300 fatalities and extensive damage to over 250,000 houses. The floods affected virtually all districts (**Figure 2.17**), displacing more than 550,000 individuals who required temporary shelter. Public service infrastructure, including hospitals, schools, and offices, suffered colossal damage, alongside severe destruction of residential and commercial establishments. Although the valley had experienced massive floods in 1841 and 1893, the damage inflicted by the 2014 floods was unparalleled.

The hilly terrain makes landslides and avalanches a frequent occurrence, impacting transportation and often leading to property damage and casualties (**Figure 2.18**). The winter of 1995 witnessed tragic snow avalanches and landslides on both sides of the Jawahar Tunnel on the Srinagar-Jammu national highway, claiming more than 150 lives. In addition to natural disasters, the region has grappled with human-induced disasters in its historical narrative.

Furthermore, the melting of glaciers in the Himalayan region, including parts of Jammu and Kashmir, has raised concerns about glacial lake outburst floods. As a result, efforts to address these challenges include disaster preparedness, early warning systems, improved infrastructure, and community resilience building, all while considering the evolving risks associated with climate change and glacier melt. The recurrent onslaught of disasters has exacted a heavy toll on Jammu and Kashmir, manifesting in substantial losses of life and property. The heightened vulnerabilities of the built environment render the state highly susceptible to natural disasters.

[1] https://kashmirobserver.net/2023/07/12/Climate-induced Disasters Killed 552 People Over Past 10 Years -in-jk/

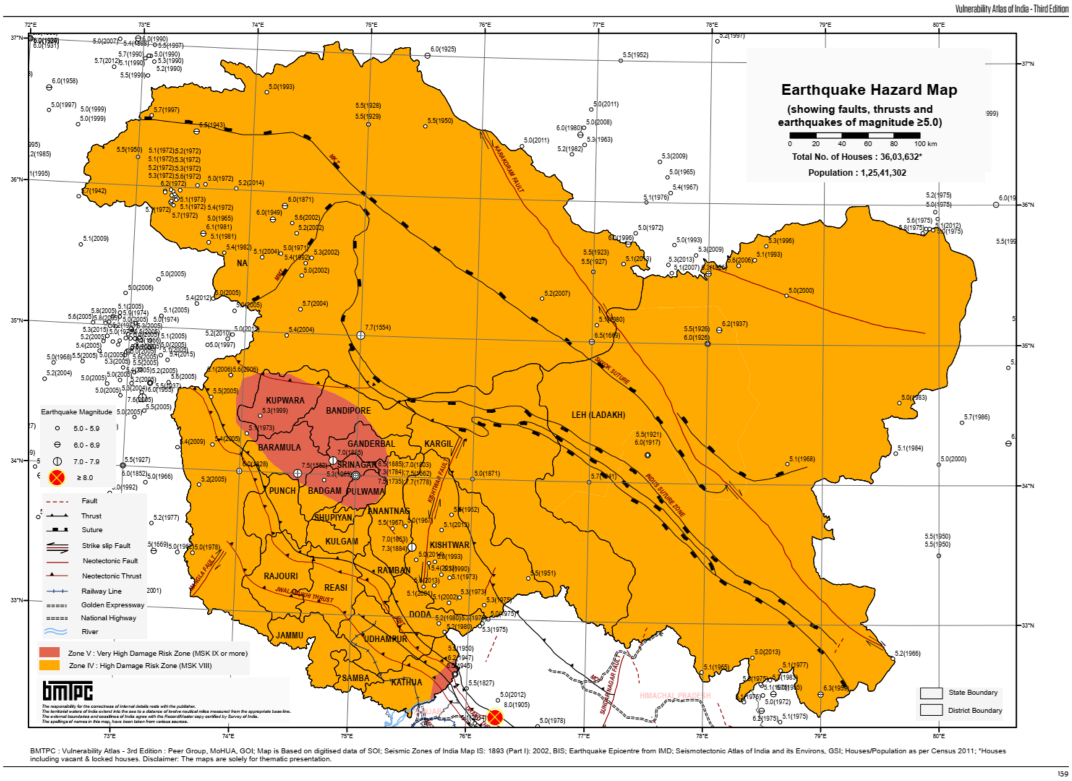


Figure 2.16. Earthquake hazard map of UTs of Jammu & Kashmir and Ladakh. Note: the old map shows a different aerial extent of J&K and Ladakh on the right. Source: Building Materials Technology Promotion Council (BMTPC).

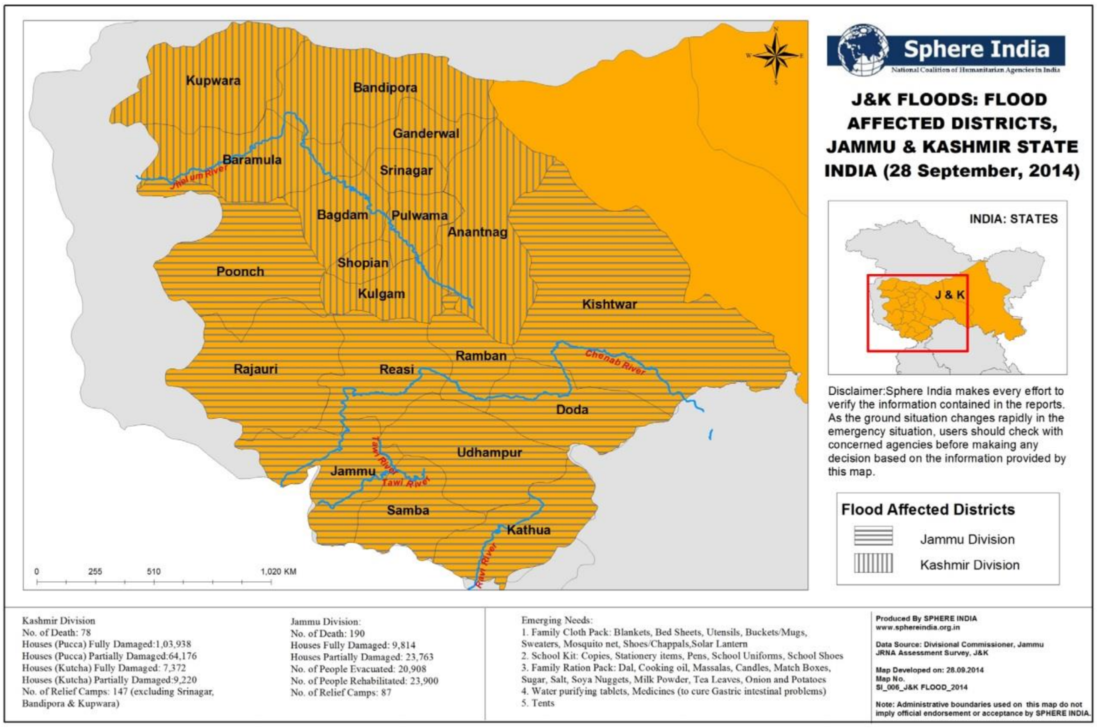


Figure 2.17. Flood affected districts during the September 2014 floods in Jammu and Kashmir. Note: the old map shows a different aerial extent of J&K and Ladakh on the right. Source: Sphere India

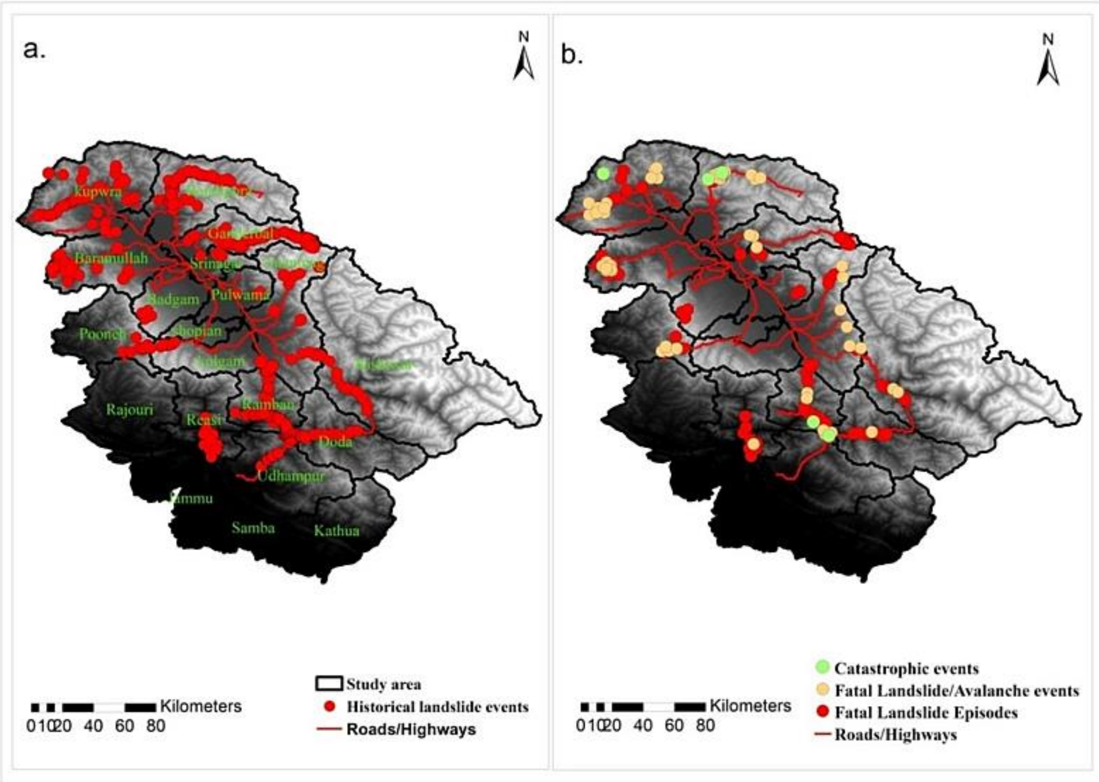


Figure 2.18. Spatial distribution of (a) 736 landslide events and (b) 180 fatal events (landslide/avalanches) in Kashmir Himalayas (1990-2020). Source: Shah et al. 2021, https://doi.org/10.21203/rs.3.rs-1145281/v1

3. DEVELOPMENT VISION OF THE STATE- Opportunities and Challenges: From Water Perspective

The water and demand/consumption requirements for the sectors of Srinagar Development Authority is illustrated in Table 3.1 and Table 3.2.

Table 3.1. Calculation of water requirement for base year 2020 of assets of srinagar development authority. Source: Srinagar Development Authority (S.D.A), Govt. of Jammu and Kashmir.

S.N.	Sector	Sub-Sector	Calculation Of Water Quantity	Approx. Water Requ. Base Year 2020 (G/Day)
1	Industries & Infrastructure	Construction	10000 litres/Day	2640
2	Establishment & Institution	Govt. Offices & Campuses	(a) Main Office= 100 Persons	
			(b) Guest House= 20 Persons	
			(c) Other Offices= 100 Persons	
			Total = 220Persons@135lpcd@30 %	2352.24
		Retail Shops/Malls	Total Shops= 3618@2person/Shop@135 lpcd@0.30%	77367.312
		Convention Centres/ Wedding Halls	Total Halls= 15@200 Person/Hall@135lpcd@0. 30%	32076G
3	Drinking Water/ Domestic Use	Urban Water Supply & Domestic Use	(A) Present (a) SDA Housing Colony at Bemina/NoorBagh/ KhashkhashBagh/ SamarBug=6000plots*5p erson/Plot=30,000Person (b) Shahjar multi-storyed Apartments 5 Towers @28 Flats/Tower=	1111968G

			140flats@5person/flat=700person (c) Gulposh Apartment=100Flats@5person/flat=500Person Total = 31200Person@135Lpcd	
			(B) Proposed (A) Srinagar Satellite Township Rakh Gund Aksha Bemina (a) Flats = 4979@5Person/flat=24895 persons (b) Plots = 1724 plots@5person/plot= 5556 persons (B) Shahjar multi-storeyed Apartments 17 Towers@28 Flats/Tower= 476 Flats@5person/flat= 2380 persons Total = 32831 persons@135Lpcd	1170096.84G

Table 3.2. Demand/consumption site of Srinagar Development Authority Srinagar.
Source: Srinagar Development Authority (S.D.A), Govt. of Jammu and Kashmir

SN	Sector	Sub-Sector	Approximate Water Requirement Over a Period (Measreable)			
			2020	2030	2040	2050
1	Industries & Infrastructure	Construction	2640G/D	2904G/D	3194G/D	3514G/D
2	Establishment & Institution	Government Offices & Campuses	2352G/D	2587G/D	2846G/D	3131G/D
		Retail Shops/Malls	77367G/D	85103G/D	93614G/D	102975G/D
		Convention Centres/Wedding Halls	32076G/D	35283G/D	38812G/D	42693G/D
3	Drinking Water/Domestic Use	Urban Water Supply & Domestic Use	1111968G/D	1502000G/D	1892032G/D	3394032G/D

No Vision Goals/Targets and Approx. Water requirement over a period (Measurable & NonMeasurable) has been provided by other departments yet.

4. Water Resources- (Source, Demand and Quality)

4.1. Water: Supply / Source Side:

4.1.1. Climate – Precipitation (Rainfall/ Snow)

4.1.1.1. Subject matter

The UT of Jammu and Kashmir, owing to its diverse topography and geographical features, exhibits a wide range of climatic conditions that are significantly influenced by its rugged terrain (JKAPD N.D.). The region experiences distinct climates in its different zones, with particularly noteworthy temperature variations. It is vital to acknowledge that global climate phenomena contribute to the overall climate dynamics in Jammu and Kashmir, and these conditions may undergo changes over time.

The climate of the Jammu division exhibits a sub-humid to sub-tropical nature, comprising two distinct parts: the plain region located south of the Siwaliks and the mountainous region spanning the Middle and Greater Himalayas in districts such as Doda, Rajouri, Poonch, and Udhampur (JKAPD N.D.). This area experiences a sub-tropical climate characterized by hot and dry summers and cold winters. Positioned in the northern hemisphere above the Tropic of Cancer, the district encounters a wide range of temperatures, with minimum and maximum values fluctuating between 4°C and 47°C. The onset of monsoon in this region typically begins in early July and extends through the first week of September.

The climate showcases a distinct seasonal rhythm resulting from the reversal of winds, specifically the south-west and north-east monsoons (IMD 2014). Between October and June, the precipitation and temperature patterns closely resemble those of the valley temperature zones. Nevertheless, during the summer, the rainfall and temperature align more with the characteristics of the sub-tropical zone. The Jammu region receives an average annual precipitation of 1070 mm, primarily in the form of rainfall. Notably, high mountainous areas in the Jammu region such as the Patni Top witness snowfall due to the south-west monsoon between July and September, contributing approximately 80% of the total rainfall. In the plain areas of Jammu, temperatures soar to as high as 45°C in summer and plummet to as low as 3°C during the winter season (IMD 2014).

The weather and climate of the Kashmir Division are intricately tied to the broader weather patterns of the Indian subcontinent (IMD 2014). Situated at a high altitude of approximately 1600m in the north-western corner of the subcontinent, the Kashmir Valley is surrounded by towering mountains on all sides, conferring upon it a distinctive geographical character with unique climatic features. The region receives an average annual precipitation of 660 mm. During winters, rainfall is a consequence of western disturbances, which are temperate cyclones originating in the Mediterranean Sea. This rainfall, locally known as Alamgir, is fairly widespread.

Table 4.1. Climatological data (Period – 1991-2020) for Jammu region. Source: IMD

Month	**Mean Temperature(°C)**		**Mean Total Rainfall (mm)**	**Mean Number of Rainy Days**	**Mean Number of days with**			
	Daily Minimum	**Daily Maximum**			Hail	Thunder	Fog	Squall
Jan	7.3	18.1	67.9	3.5	0.2	1.4	0	0.0
Feb	10.2	21.5	74.6	4.3	0.3	3.6	0	0.0
Mar	14.5	26.6	64.1	4.3	0.5	4.8	0.2	0.0
Apr	19.7	32.7	41.4	2.8	0.3	6	1.5	0.0
May	24.3	37.6	22.5	2.4	0.4	7.8	2.1	0.0
Jun	26.1	38.3	109.5	6.0	0.2	10.1	1.3	0.0
Jul	25.5	34.3	416.5	13.2	0	15.6	0	0.0
Aug	24.9	33.1	403.1	12.3	0.1	14.6	0	0.0
Sep	23.2	32.8	144.8	6.0	0.1	8.2	0	0.0
Oct	18.4	31.1	23.5	1.6	0	2.4	0.2	0.0
Nov	13.0	26.4	12.2	0.9	0.1	1.3	0	0.0
Dec	8.7	21.1	21.9	1.5	0	1	0	0.0
Annual	18.0	29.5	1401.9	59.0	2.4	76.8	5.4	0.0

Table 4.2. Climatological data (Period – 1991-2020) for Kashmir region. Source: IMD

Month	**Mean Temperature (°C)**		**Mean Total Rainfall (mm)**	**Mean Number of Rainy Days**	**Mean Number of days with**			
	Daily Minimum	**Daily Maximum**			Hail	Thunder	Fog	Squall
Jan	-1.9	7.1	63.6	5.4	0	0.1	1.1	0.0
Feb	0.7	10.5	85.0	6.0	0	0.5	0.5	0.0
Mar	4.3	15.5	104.6	7.2	0.1	1.6	0	0.0
Apr	7.9	20.6	91.8	7.0	0.3	4.3	0.1	0.0
May	11.2	24.7	63.5	5.9	0.3	8.4	0.1	0.0
Jun	15.0	28.5	46.4	4.1	0.2	6.7	0.1	0.0
Jul	18.4	30.0	64.0	5.0	0	6.6	0.1	0.0
Aug	17.8	29.7	64.5	5.4	0.2	4.8	0.2	0.0
Sep	13.1	27.6	37.4	3.1	0.1	3	0.2	0.0
Oct	6.2	23.0	21.8	2.0	0	1.7	0.2	0.0
Nov	1.2	15.9	27.7	2.2	0	0.5	1.1	0.0
Dec	-1.6	9.9	27.2	2.6	0	0.1	1.5	0.0
Annual	7.6	20.2	697.5	55.9	1.2	38.3	5.2	0.0

Notably, about 65% of the precipitation occurs in the form of snow during the winter season, spanning from December to February. March and April witness rainfall, while the period from May to September is relatively dry. Temperature variations are notable in the Kashmir Valley, with mercury plunging to between -8°C and 12°C during winter and attaining a moderate range of around 35°C during the summer months. A comprehensive data on mean daily minimum and maximum temperatures, mean total rainfall, mean total rainy days, as well as occurrences of hail, thunder, fog, and squall for the period of 1991-2020 in Jammu and Kashmir is illustrated in Table 4.1 and Table 4.2. The mean monthly Rainfall, Temperature and PET for the UT of Jammu and Kashmir (1991-2020) is shown Table 4.3. These statistics offer valuable insights into the climatic patterns and weather phenomena that shape the region environment over the years. Figure 4.1 illustrates the monthly mean Potential Evapo-transpiration (PET) for the region of Jammu and Kashmir from 1991-2020 based on the data available from the Indian Meteorological Department (IMD).

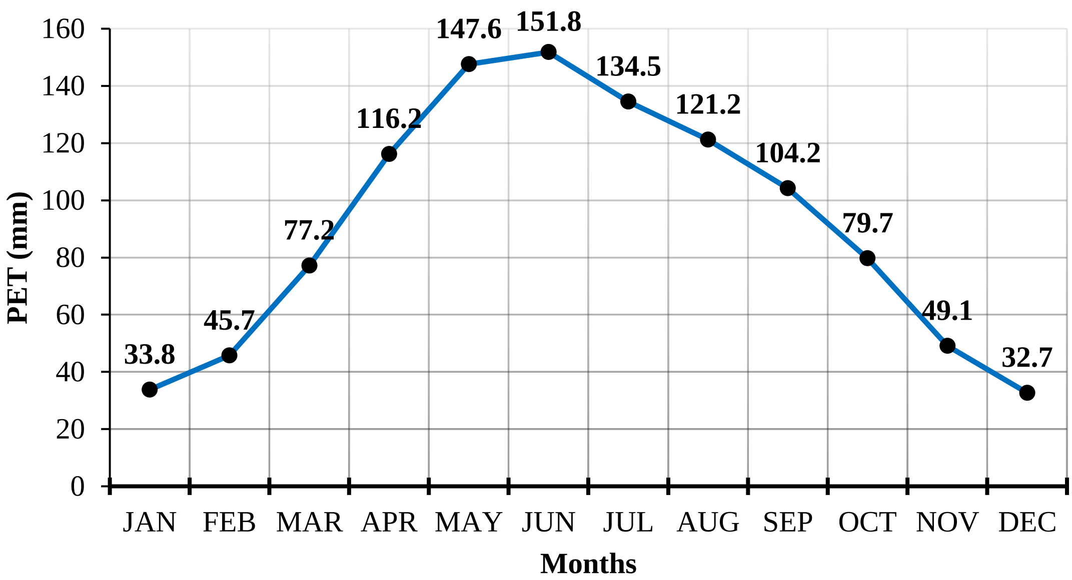


Figure 4.1. Plot of Average monthly and Annual Potential Evapo-transpiration (PET) in mm (Period – 1991-2020) of Jammu & Kashmir. Source: IMD

The annual rainfall in the UT of Jammu and Kashmir region has been observed to exhibit significant spatio-temporal variations as illustrated by Figure 4.2, Figure 4.3, and Figure 4.4, which illustrates the mean annual rainfall for the decades 1990-2000, 2000-2010, and 2010-2020, respectively. The mean annual decadal rainfall spatial patterns in the northern region of the UT are observed to be uniform and consistent with values in the 350-550 mm.

The annual mean minimum temperature in the Jammu and Kashmir region, is shown in Figure 4.5, Figure 4.6, Figure 4.7. The maps shown in these figures highlight the significant spatio-temporal variations of the annual mean minimum temperature for the decades 1990-2000, 2000-2010, and 2010-2020, respectively. Spatial patterns reveal fluctuations, with annual mean minimum temperature varying between -1.1 to 16.6 °C. Similarly, the annual mean maximum temperature in the UT, as depicted in Figure 4.8, Figure 4.9, and Figure 4.10, reflects considerable spatio-temporal variations for the decades 1990-2000, 2000-2010, and 2010-2020, repsectively. Spatial patterns of the annual mean maximum temperature indicate varying temperatures, ranging from 3.53 to 29.6 °C.

In terms of the annual PET in Jammu and Kashmir, Figure 4.11, Figure 4.12, Figure 4.13, demonstrate significant spatio-temporal variations for the decades 1990-2000, 2000-2010, 2010-2020, respectively. Spatial patterns of the PET show fluctuations, with PET values ranging from 1.95 to 3.23 mm.

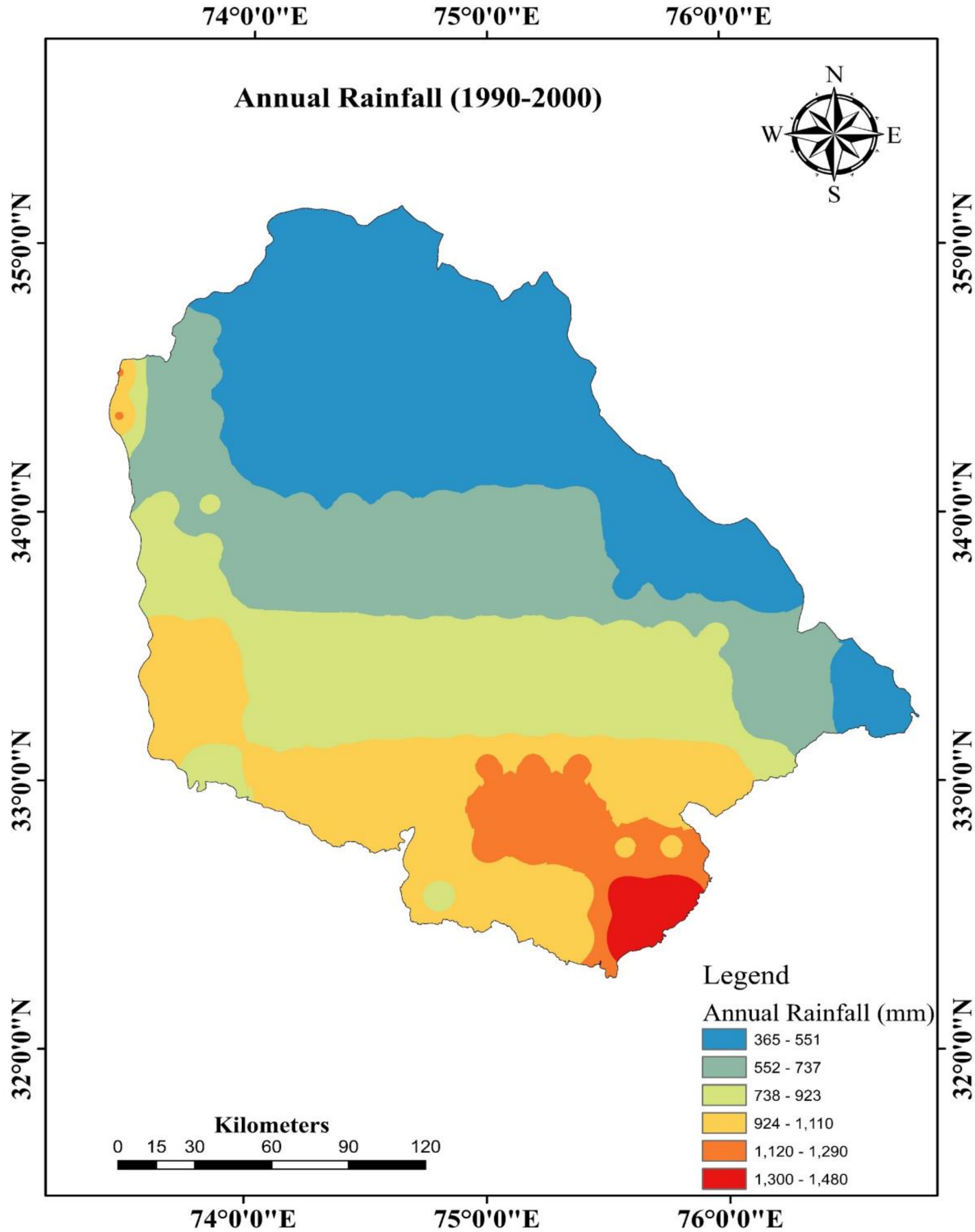


Figure 4.2. Annual Rainfall Map (Period – 1990-2000) of Jammu and Kashmir.

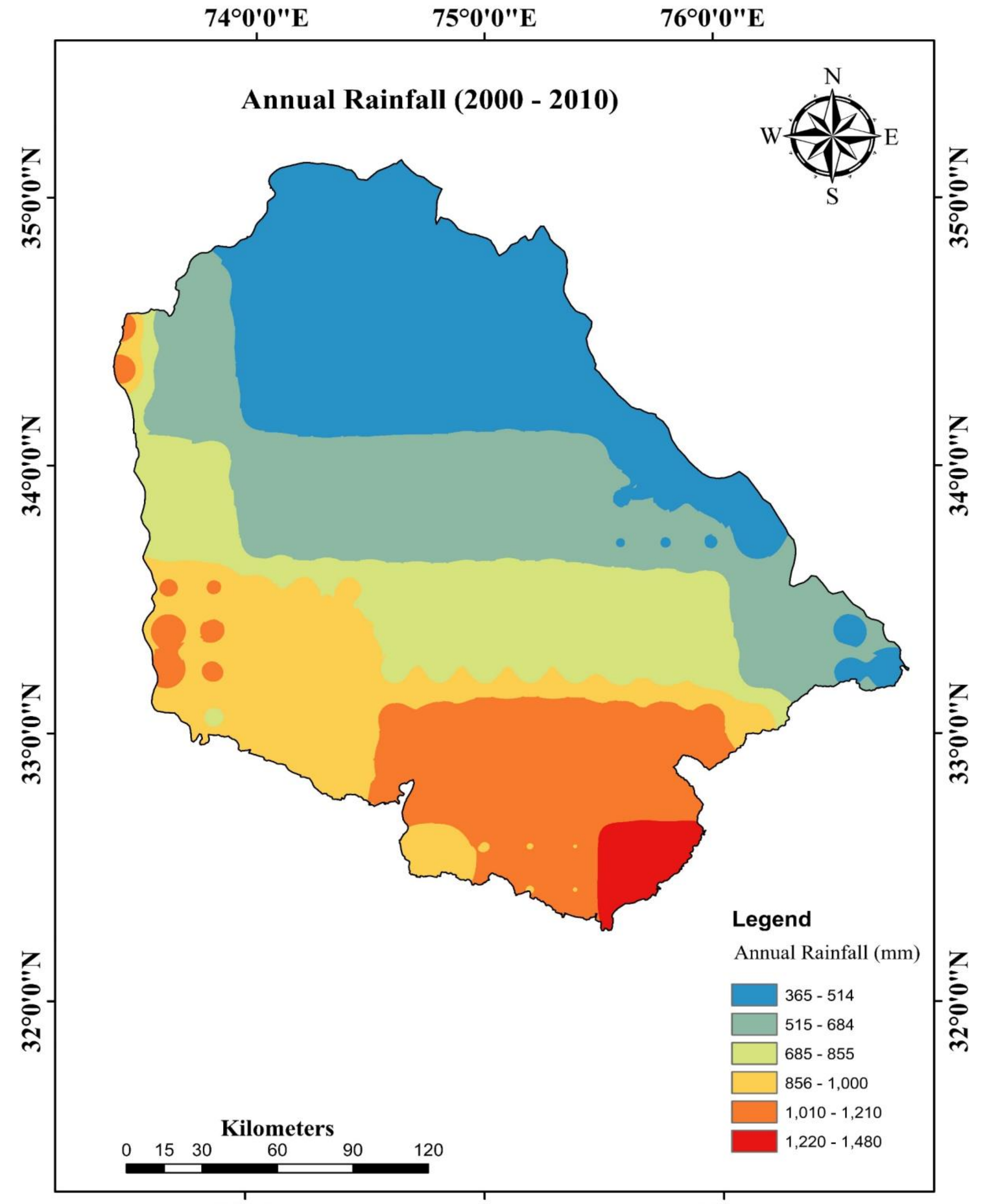


Figure 4.3. Annual Rainfall Map (Period – 2000-2010) of Jammu and Kashmir.

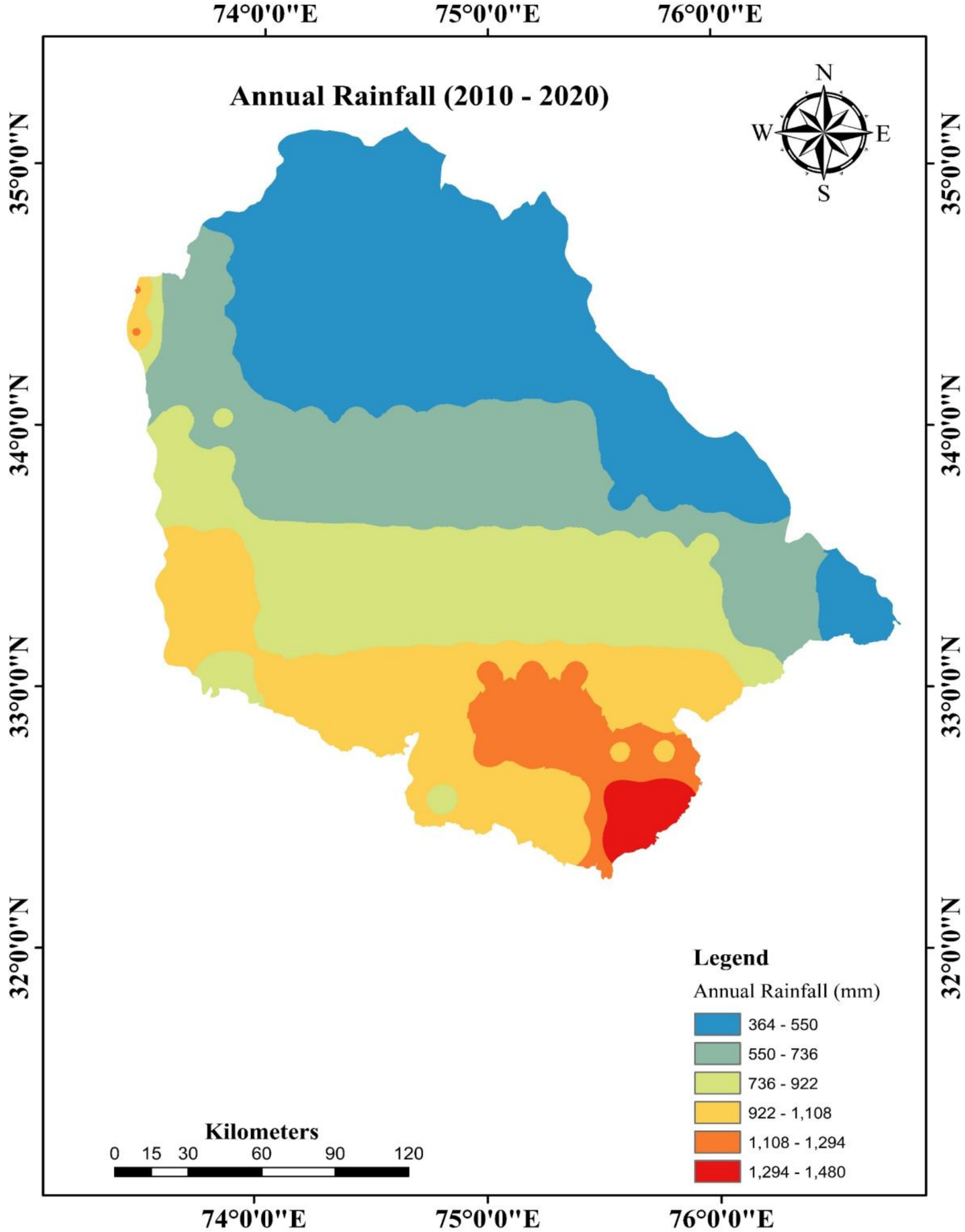


Figure 4.4. Annual Rainfall Map (Period – 2010-2020) of Jammu and Kashmir.

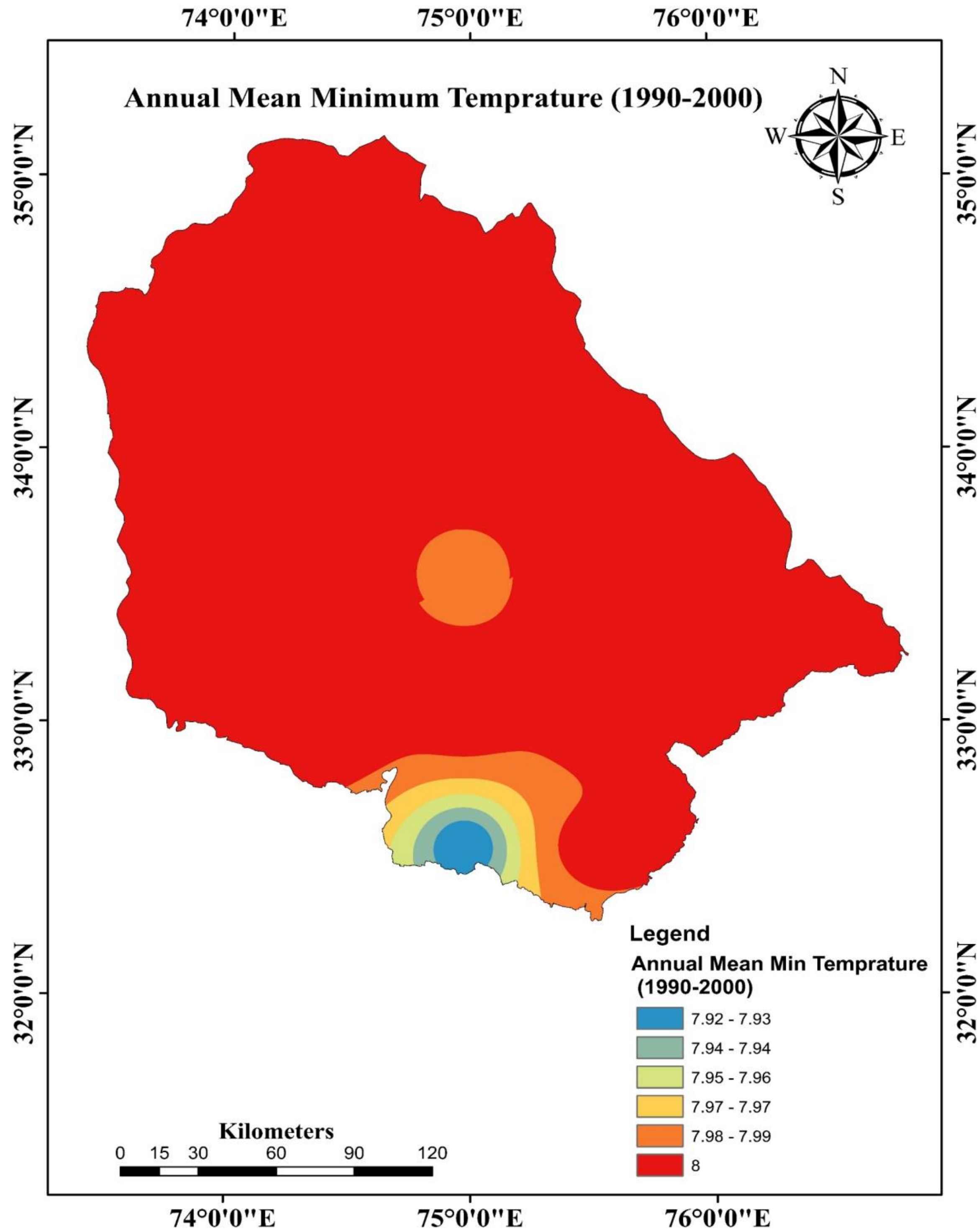


Figure 4.5. Annual Mean Minimum Temprature Map (Period – 1990-2000) of Jammu and Kashmir.

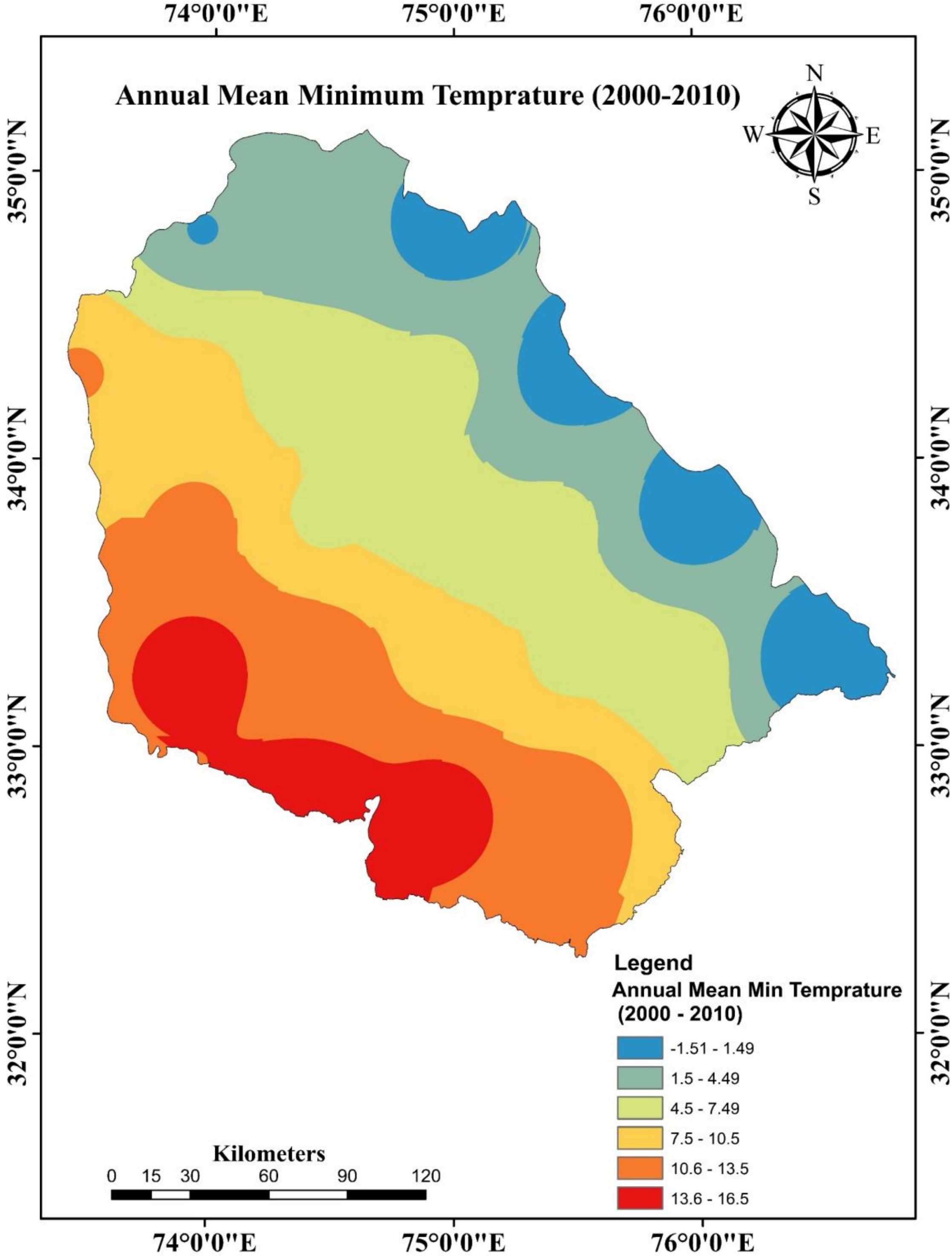


Figure 4.6. Annual Mean Minimum Temprature Map (Period – 2000-2010) of Jammu and Kashmir.

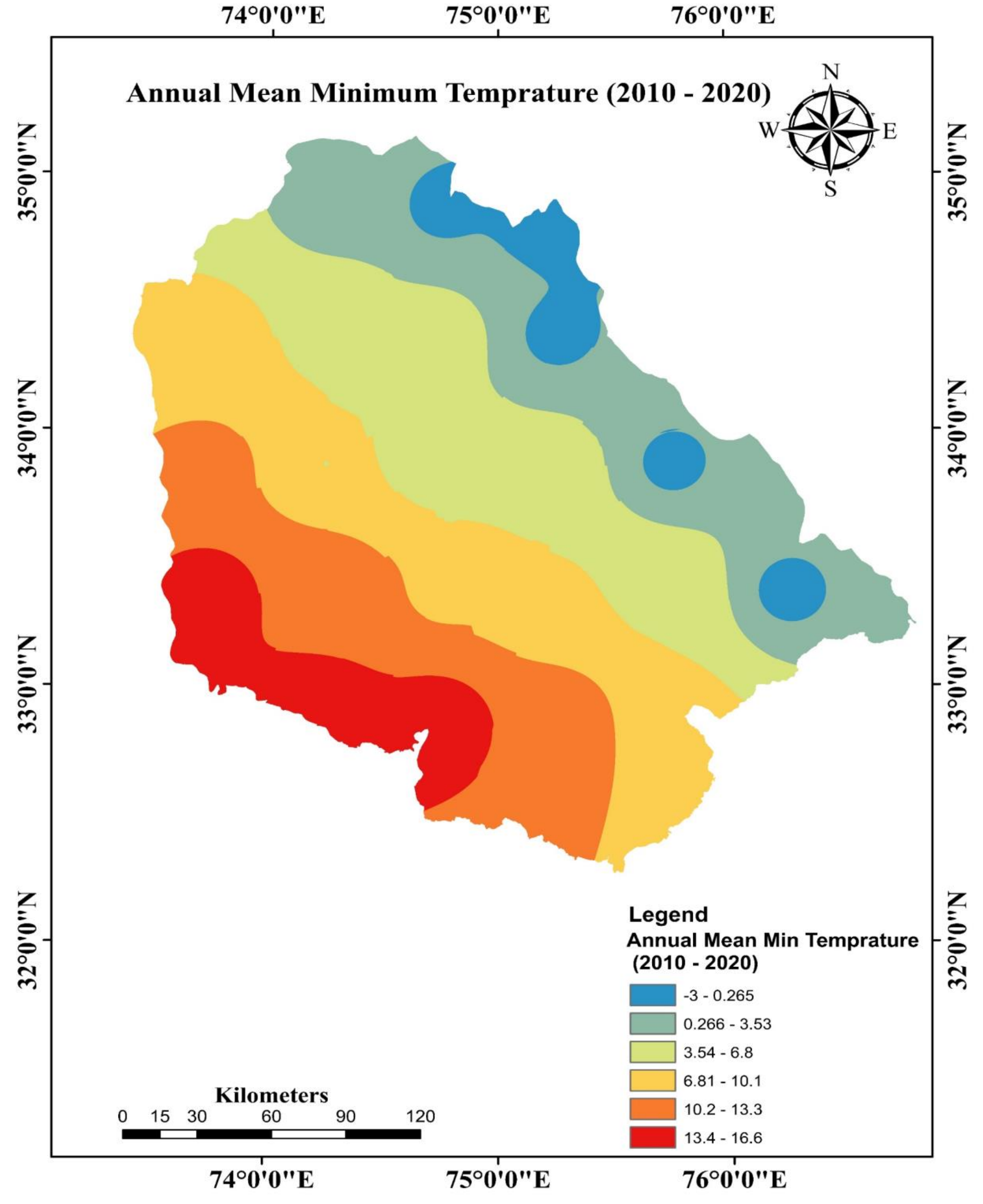


Figure 4.7. Annual Mean Minimum Temprature Map (Period – 2010-2020) of Jammu and Kashmir.

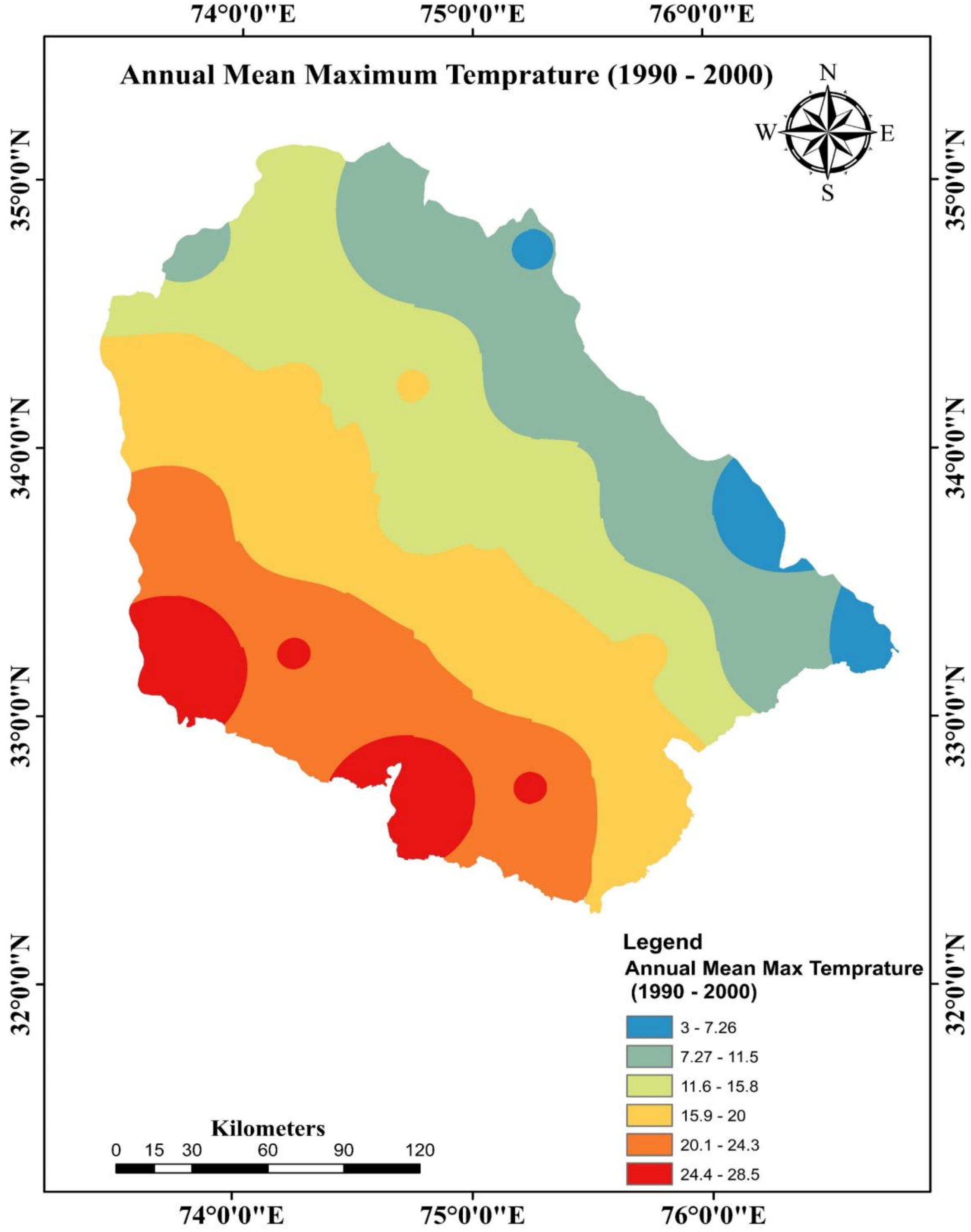


Figure 4.8. Annual Mean Max. Temprature Map (Period – 1990-2000) of Jammu and Kashmir.

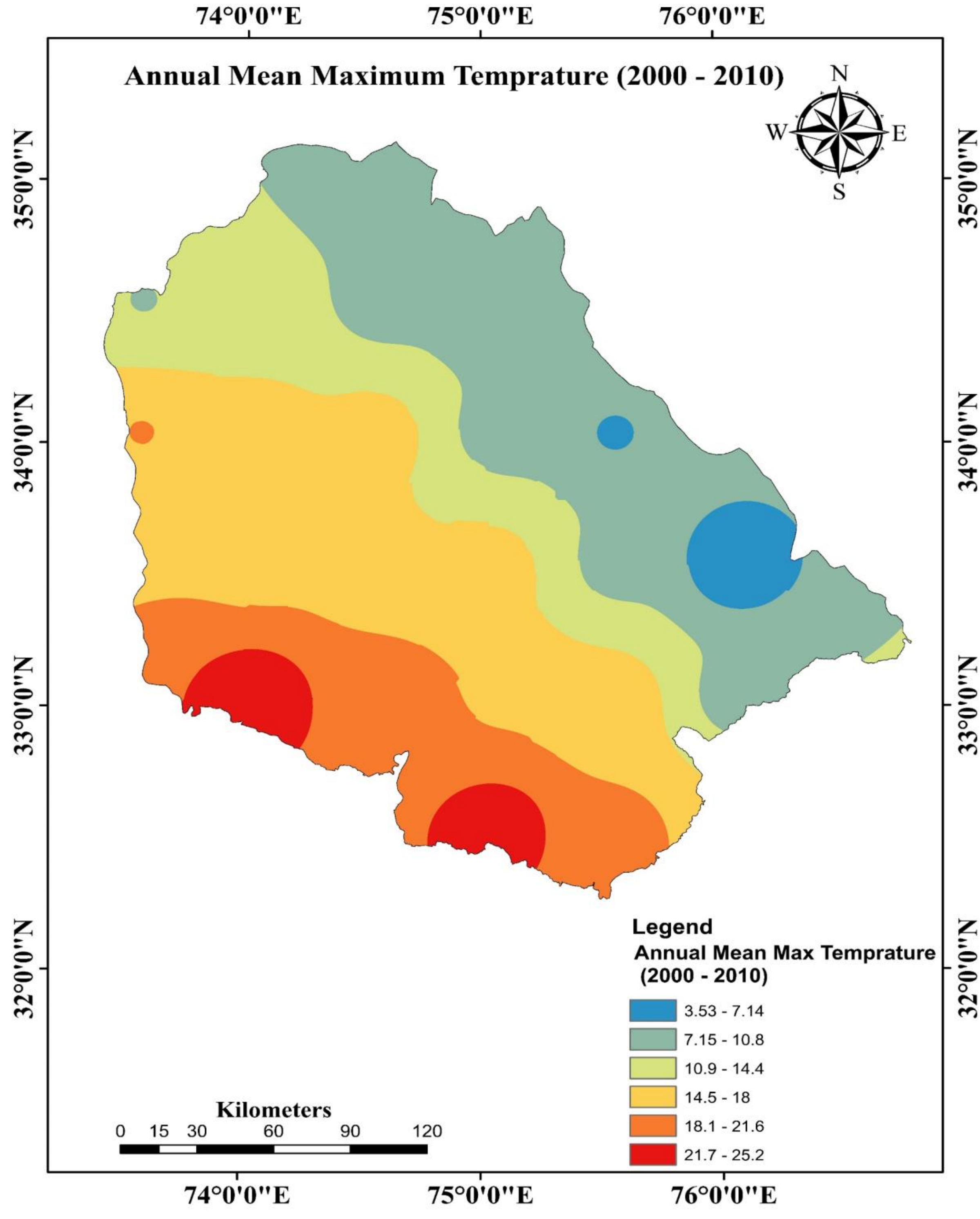


Figure 4.9. Annual Mean Max. Temprature Map (Period – 2000-2010) of Jammu and Kashmir.

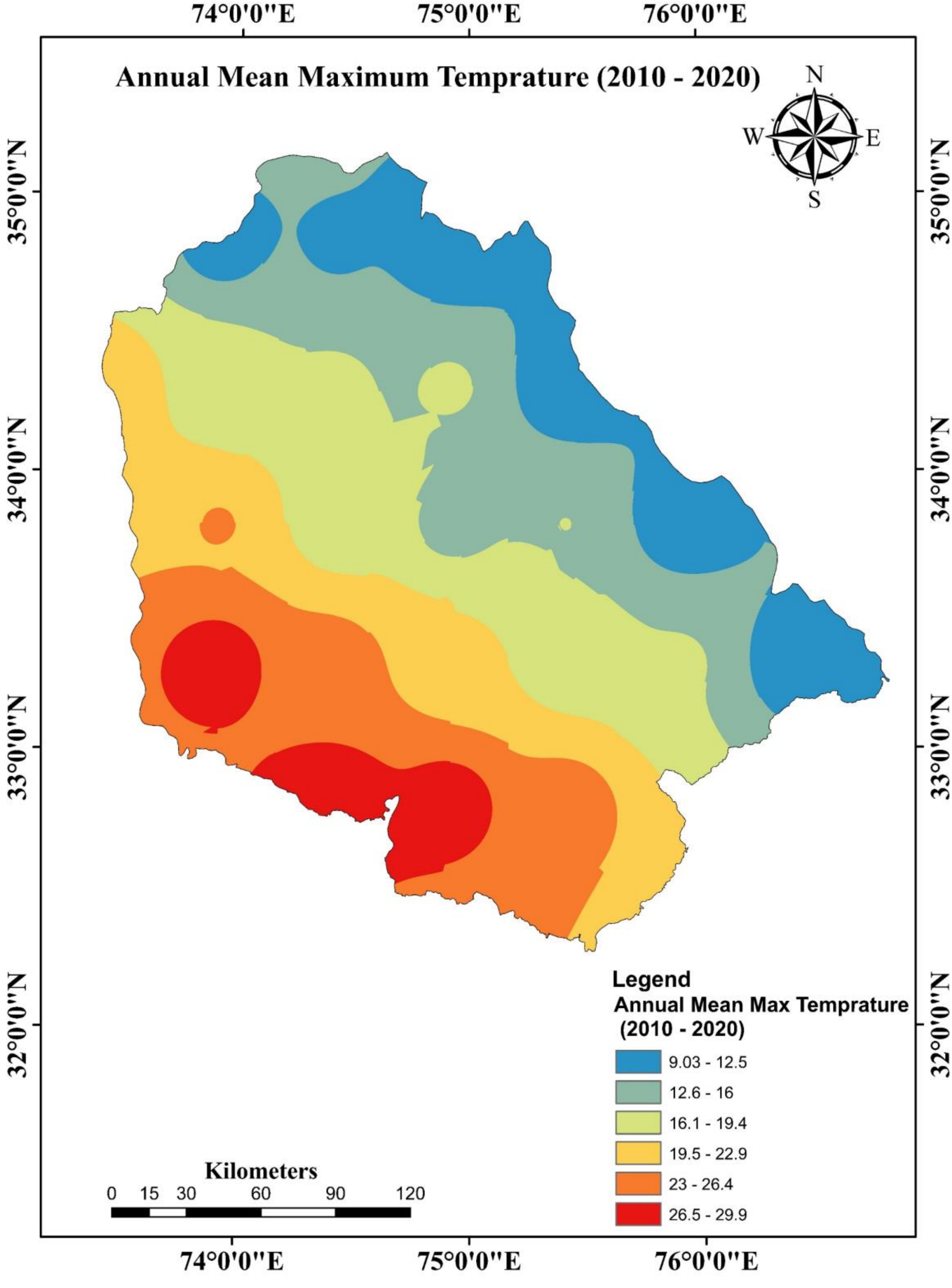


Figure 4.10. Annual Mean Max. Temprature Map (Period – 2010-2020) of Jammu and Kashmir.

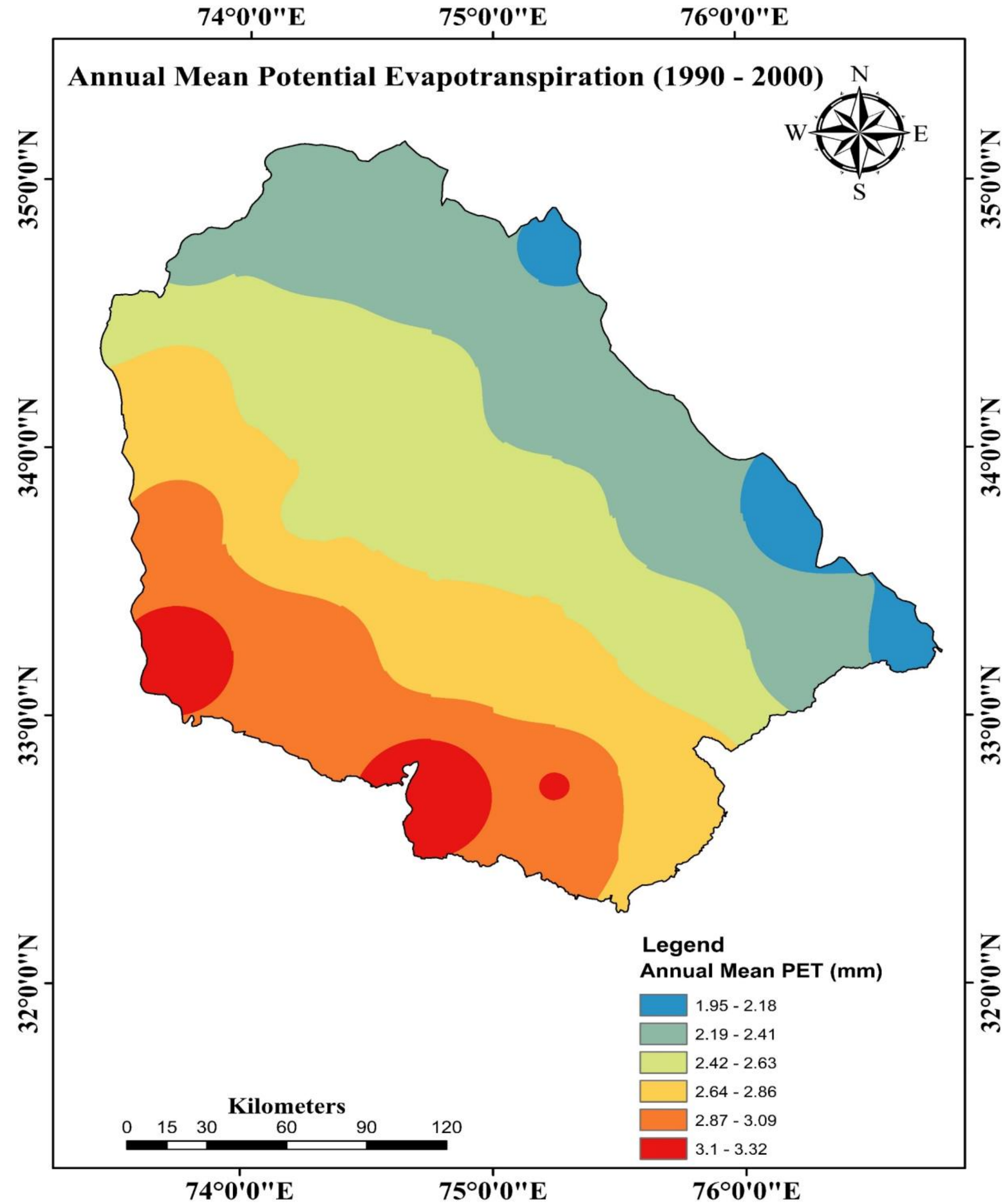


Figure 4.11. Annual PET Map (Period – 1990-2000) of Jammu and Kashmir.

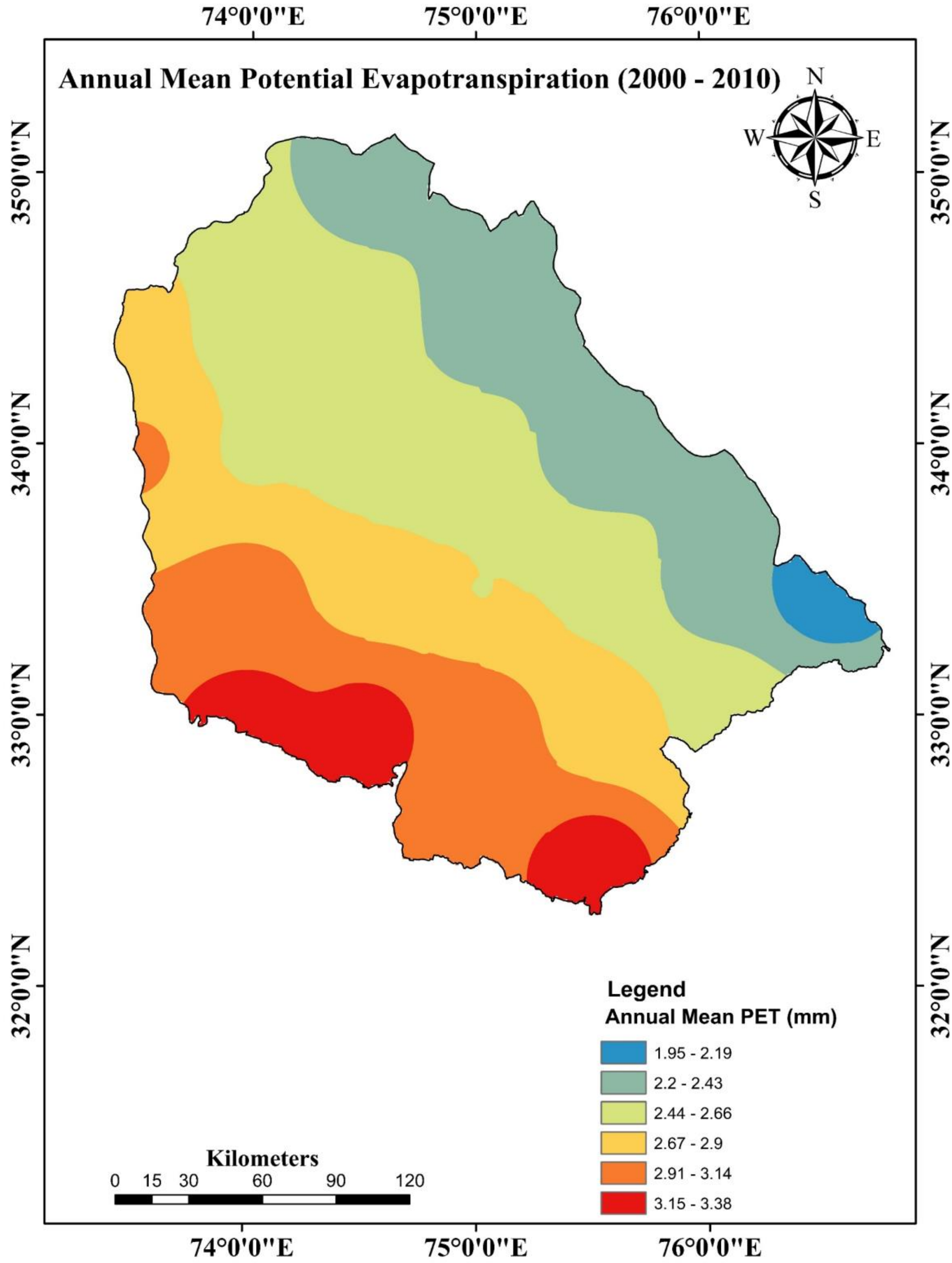


Figure 4.12. Annual PET Map (Period – 2000-2010) of Jammu and Kashmir.

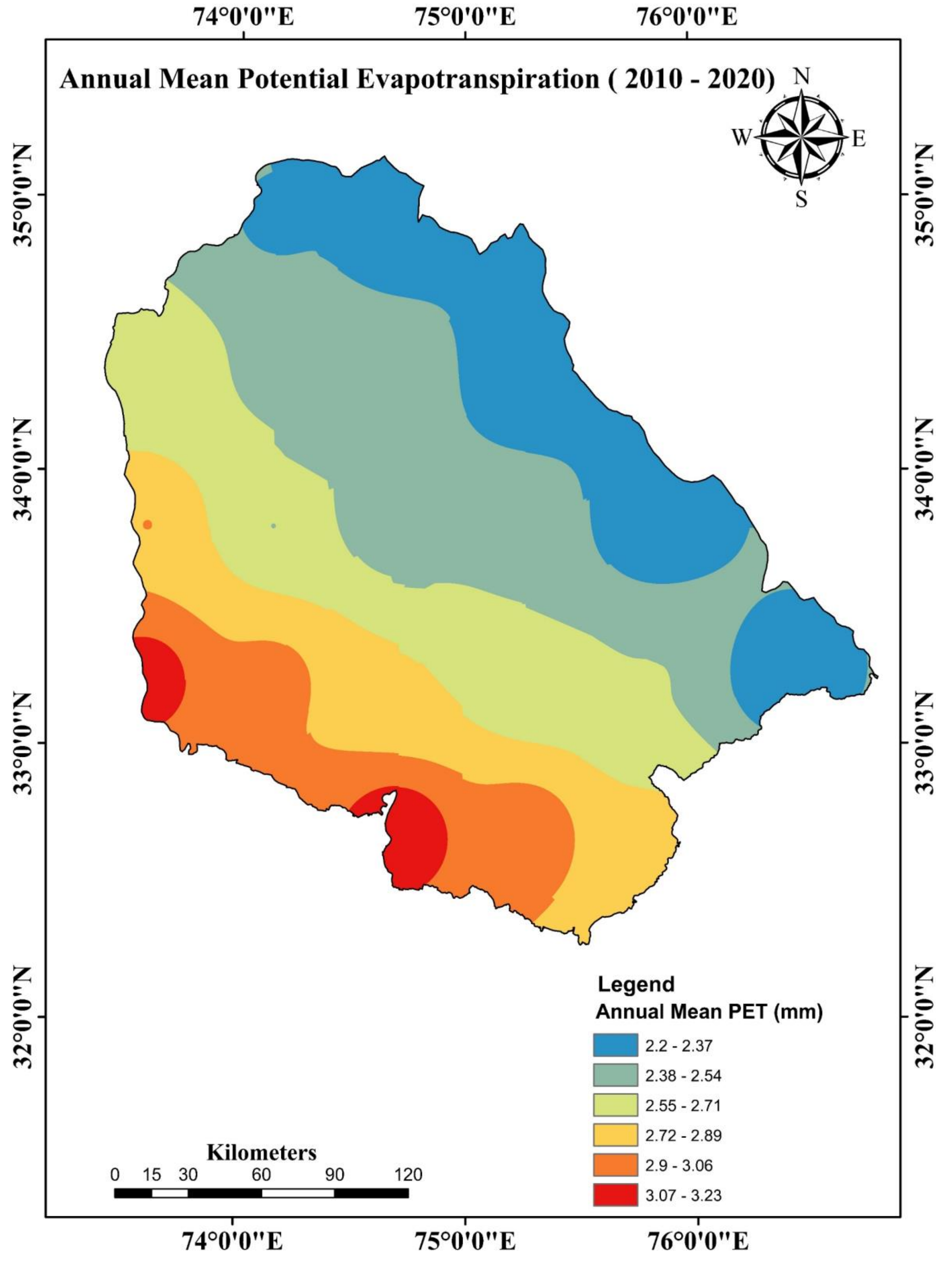


Figure 4.13. Annual PET Map (Period -2010-2020) of Jammu and Kashmir.

Table 4.3. Mean monthly Rainfall, Temperature and PET for the UT of Jammu and Kashmir (1991-2020)

Month	**Rainfall (mm)**	**Max Temp (°C)**	**Min Temp (°C)**	**PET, mm/day**
January	65.75	12.60	2.7	33.8
February	79.80	16.00	5.45	45.7
March	84.35	21.05	9.4	77.2
April	66.60	26.65	13.8	116.2
May	43.00	31.15	17.75	147.6
June	77.95	33.40	20.55	151.8
July	240.25	32.15	21.95	134.5
August	233.80	31.40	21.35	121.2
September	91.10	30.20	18.15	104.2
October	22.65	27.05	12.3	79.7
November	19.95	21.15	7.1	49.1
December	24.55	15.50	3.55	32.7
Annual	1049.75	24.86	12.84	1093.7

4.1.1.2. Issues and Challenges:

In the UT of Jammu and Kashmir, the region faces several issues and challenges, particularly in the realm of hydrological and environmental studies:

- The lack of direct access to automatic weather station data presents significant hurdles for researchers and policymakers. This limitation affects the accuracy and reliability of weather-related data, which is crucial for various studies and decision-making processes.
- The region faces significant challenges due to its restricted network of hydrological and meteorological stations. This hampers the accurate assessment and management of water resources, which is crucial for both agricultural and hydropower sectors. The rugged terrain and remote locations further complicate the installation and maintenance of these stations, leading to data gaps and reduced spatial coverage. Consequently, the lack of comprehensive data makes it difficult to predict and manage extreme weather events such as floods and droughts, which are becoming more frequent with climate change.
- Freely available gridded products for precipitation, temperature, and evaporation are invaluable resources for hydrological studies and climate modeling, especially in regions with complex terrain like Jammu and Kashmir.

- Upgrading weather stations in Jammu and Kashmir presents both significant opportunities and notable challenges. The region's diverse and complex topography, ranging from plains to high-altitude mountainous areas, necessitates a robust and comprehensive network of weather and snowgauge stations to accurately monitor and predict weather patterns. Enhanced weather stations can provide critical data to improve forecasts for agriculture, disaster management, and hydrological studies, thereby supporting the local economy and safeguarding lives and property.
- The diverse and rugged terrain, coupled with the impact of climate change, necessitates a more targeted approach to weather station deployment. By increasing the number of such stations in critical areas, we can significantly enhance the accuracy of weather and climate data, which is essential for effective flood management, agricultural planning, and disaster preparedness. The current distribution of weather stations limits our ability to capture localized climatic variations, making it challenging to predict and respond to extreme weather events and their impacts on vulnerable communities. Therefore, optimizing the network to ensure that stations are strategically placed where they are most needed will improve data reliability and support better decision-making for sustainable development in the region.
- The absence of a centralized information portal directly linked to the Union Territory (UT) presents significant challenges. This lack of a cohesive platform impedes effective communication and coordination between government bodies, stakeholders, and the public.

Table 4.4. Performance Indicators- climate monitoring.

Indicators	**Automatic weather stations**		**Manual Observations**
Development and testing of sensors for improved accuracy	yes		
Timely forecasting of monsoon onset and its intermittent spells	yes		
Calibration and Maintenance of Instruments	yes		
Trained man power for maintenance	yes		
Technology initiative to achieve Last mile connectivity	Jammu	Kashmir	…
Mobile apps	yes	yes	
Dedicated Website Portal			

4.1.1.3. Governance / Management:

In Jammu and Kashmir, IMD Srinagar monitors various meteorological observatories and station.

Surface Meteorological Instrumentataion Division of IMD maintains detailed instruction manuals and engineering drawings on all instruments. The division established and maintains a large network of Automatic Weather Stations (AWS), Radiation Observatories, Airport Meteorological Instruments etc. These activities have contributed towards IMD; Pune being designated as the Regional Training Center for instruments by the World Meteorological Organization. The Division is headed by the Deputy Director General of Meteorology (Surface Instruments). The mandate of the division is as follows[1].

1. To manufacture, calibrate, supply and maintain surface meteorological instruments at observatories of IMD.
2. To supply and maintain Airport Meteorlogical Instruments for civil airports.
3. To supply instruments to defence organisations.
4. To maintain the network of Automatic Weather stations (AWS) and Automatic Raingauge stations (ARG) for near real time weather forecasting services of IMD.
5. To impart trainings to operational staff of IMD for maintenance and upkeep of instruments.

4.1.1.4. Measurement, Monitoring and Data Constrains / Management:

The following Measurement, Monitoring and Data Constrains / Management are these:

Measurement

a) Utilize rain gauges to measure precipitation in the form of rain.
b) Employ snow gauges or snow stakes to measure snowfall depth.
c) Deploy advanced weather radar systems for real-time precipitation monitoring.
d) Use satellite-based precipitation estimation for broader coverage.

Monitoring

a) Establish a network of weather stations across Jammu and Kashmir for localized monitoring.
b) Implement automated monitoring systems to ensure continuous data collection.

[1] https://mausam.imd.gov.in/responsive/servicesMetSurface.php

c) Utilize remote sensing technologies to monitor precipitation patterns from a broader perspective.
d) Integrate ground-based observations with satellite data for comprehensive monitoring.

Data Constraints/Challenges

a) Address the limited availability of weather stations in remote or difficult-to-access areas.
b) Ensure the reliability and accuracy of data collected, considering the diverse terrain.
c) Address potential data transmission issues, especially in adverse weather conditions.

4.1.1.5. Performance Indicators:

Bench Marks/ Norms/ Standards currently:

I. Agrometeorological Observatories & Data Management.

The UT of Jammu and Kashmir includes—25 AWS by IMD out of which five are Agro Automatic Weather Stations (AWS), 14 Automatic Rain Gauge (ARG), One Doppler Weather Radar (DWR) in Srinagar (X-Band), 3 AGRO stations.

- 42,577 sq. km/ 18 AWS = 1 AWS per 2,365.9 sq. km
- 42,577 sq. km/ 14 ARG = 1 ARG per 3041.2 sq. km

The World Meteorological Organization (WMO) guidelines for the hydro-meteorological network density recommendations are illustrated in Table 4.5 (WMO 2020).

Table 4.5. Recommended minimum densities of stations (area in sq.km per station). Source: WMO

Physiographic Unit	Precipitation		Evaporation	Stream Flow	Sediments	Water Quality
	Non-Recording	Recording				
Coastal	900	9000	50000	2750	18300	55000
Mountains	250	2500	50000	1000	6700	20000
Interior plains	575	5750	5000	1875	12500	37500
Hilly/ Undulating	575	5750	50000	1875	12500	47500
Small Islands	25	250	50000	300	2000	6000
Urban Areas	-	10-20	-	-	-	-
Polar/Arid	10000	100000	100000	20000	200000	200000

The locations of the IMD stations in UT of Jammu and Kashmir are shown as follows.

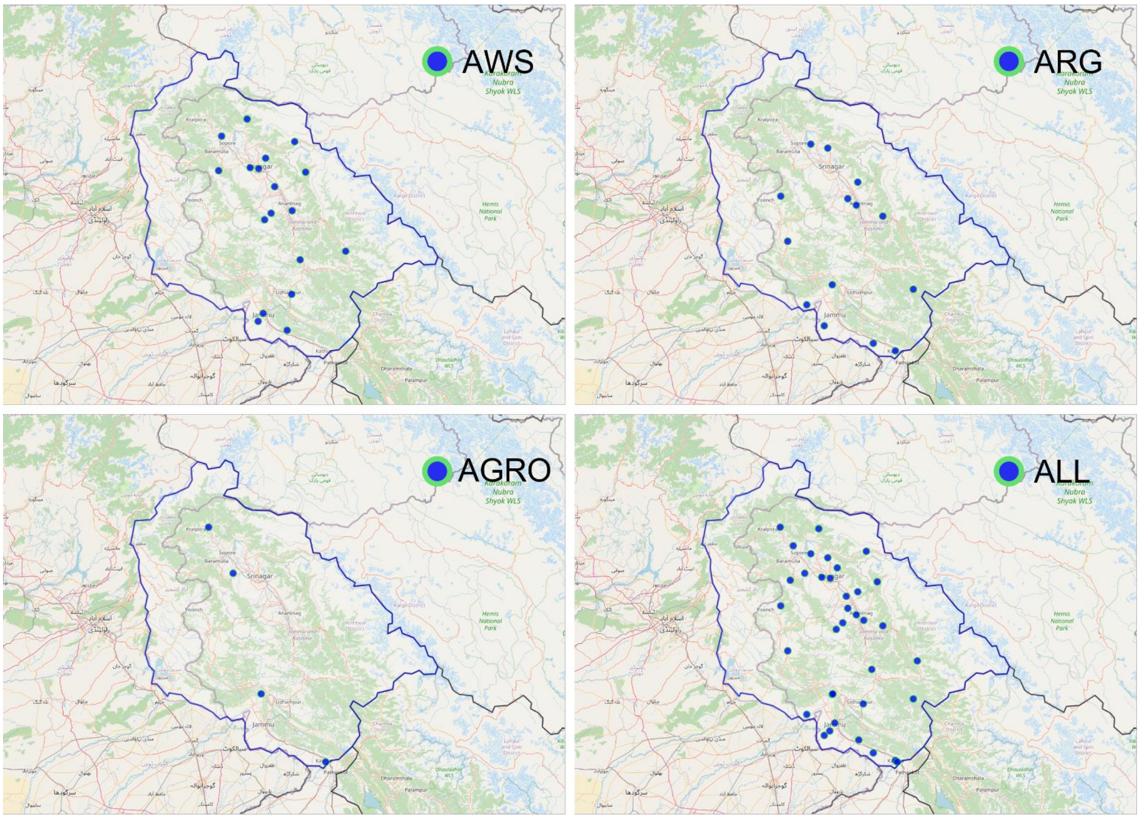


Figure 4.14. IMD observation stations in the UT of Jammu and Kashmir. Source: IMD[1]

[1] http://aws.imd.gov.in:8091/state/JAMMU_AND_KASHMIR/

4.1.1.6. Annexure- Climate: Precipitation (Rainfall/Snow)

Table 4.6 The detailed IMD observation stations in the UT of Jammu and Kashmir. Source: Indian Meteorolgical Department, Jammu and Kashmir, Ministry of Earth Sciences, Government of India.

S. No.	District	Station	Type	Latitude	Longitude	Altitude
1	Anantnag	Amarnath	AWS	34.2156	75.5042	3920.2
2	Anantnag	Amarnath	AWS	33.6692	75.1719	1645.9
3	Anantnag	Chandanwari	AWS	34.0792	75.4161	2845.5
4	Anantnag	Khudwani	ARG	33.72	75.09	-
5	Anantnag	Larnoo	ARG	33.62	75.38	-
6	Anantnag	Pahalgam	AWS	34.02	75.32	2133.0
7	Anantnag	Panchtarni	AWS	34.1864	75.5022	3642.1
8	Anantnag	Sheshnag	AWS	34.1025	75.5064	3770.1
9	Badgam	Harran	AWS	34.0619	74.71	1592.3
10	Bandipora	Bandipora	ARG	34.2733	74.59	-
11	Bandipora	Bandipora	AWS	34.5	74.68	1581.0
12	Baramulla	Baramulla_AMFU	AWS	34.3494	74.4017	1584.1
13	Baramulla	Baramulla_KVK	AGRO	34.096	74.525	1702.0
14	Baramulla	Gulmarge	AWS	34.0339	74.3658	3077.2
15	Doda	Bhaderwah	ARG	32.95	75.72	-
16	Ganderbal	Baltal	AWS	34.2561	75.4169	2880.7
17	Ganderbal	Bararri	AWS	34.2131	75.4606	3705.8
18	Ganderbal	Ganderbal	ARG	34.24	74.78	-
19	Ganderbal	Sangam	AWS	34.2025	75.4764	3550.3
20	Ganderbal	Sonemarg	AWS	34.2983	75.3078	2707.7
21	Jammu	Bakore	ARG	32.8071	74.55	-
22	Jammu	Chatha_AMFU	AWS	32.6533	74.7992	268.1
23	Jammu	Jammu	AWS	32.7266	74.857	327.0
24	Jammu	R_S_Pura	ARG	32.61	74.74	-
25	Kathua	Burmal	ARG	32.45	75.28	-
26	Kathua	Kathua	ARG	32.38	75.52	-
27	Kathua	Kathua_KVK	AGRO	32.368	75.544	334.8
28	Kishtwar	Kisthtwar	AWS	33.3	75.76	1650.0
29	Kulgam	Kulgam_AMFU	AWS	33.6477	74.9433	1841.7
30	Kupwara	Kupw_KVK	AGRO	34.516	74.256	1623.6
31	Poonch	Rajpura_MANDI	ARG	33.8	74.26	-
32	Pulwama	Malangpura	AWS	33.8892	74.9808	1595.6
33	Pulwama	Tral	ARG	33.93	75.11	-
34	Rajouri	Rajouri_ARG	ARG	33.94	74.34	-
35	Ramban	Govindpura	AWS	33.2219	75.2614	745.1
36	Reasi	Reasi	ARG	32.99	74.83	-

37	Reasi	Reasi_KVK	AGRO	32.994	74.832	345.5
38	Samba	Samba	AWS	32.5703	75.1203	354.6
39	Shopian	Shopian	AWS	33.5872	74.8722	1904.0
40	Shopian	Zainapora	ARG	33.78	75	-
41	Srinagar	Rambagh	AWS	34.0508	74.8044	1587.6
42	Srinagar	Srinagar_AMFU	AWS	34.1497	74.8822	1602.0
43	Udhampur	Kawa	AWS	32.9022	75.1667	583.8

4.1.2. Snow and Glaciers

4.1.2.1. Subject matter

The UT of Jammu and Kashmir experiences a division between the temperate zone of Kashmir and the subtropical Jammu in the south based on its climate. Areas above 3600 meters are characterized by snow and glaciers. Approximately 300 million people residing upstream and downstream in the Indus basin rely on the three major rivers—the Indus, Jhelum, and Chenab—that are nourished by the meltwaters from the snow and ice in this region.

Due to its diverse topography, altitude, and climate, Jammu and Kashmir sustain a remarkably rich biodiversity, earning it recognition as a global biodiversity hotspot. The region, with its unique geological, geomorphic, and climatic features, is susceptible to various disasters, particularly earthquakes, floods, landslides, and avalanches (Romshoo et al. 2020).

There are around 1934 Glaciers in the Union Territory of Jammu and Kashmir ranging from 0.011 to 48.43 Sq.kms. The glaciers have varied range of mean elevation which spans from 3539 to 6143, slope ranging from 27-49 Degrees and dynamic aspects. The total Glacierized area in the UT of Jammu and Kashmir as per RGI Version 6.0, released July 28, 2017 is 1814.36 Sq.kms approx.

Monitoring glacier change is important because it links the impact that glaciers impose on the environment (Karpilo 2009). There is a significant scarcity of in situ glacier measurements for monitoring and comprehending glacier dynamics in the Himalayas. The shortage of in situ measurements in the Himalayan region is linked to its remote and challenging environment, as well as its rugged terrain (Bolch et al. 2012). Consequently, remote sensing has emerged as a reliable alternative method for evaluating and monitoring the cryosphere in the challenging Himalayan landscape. Utilizing remote sensing techniques, numerous global, regional, and local glacier inventories have been created (Nuimura et al. 2015).

The primary factor influencing glacier melting in the Himalayan region has been identified as the impact of changing climate (Kulkarni et al. 2011). Over the past few decades, the region has experienced a rise in temperature and a decrease in precipitation, contributing significantly to the accelerated melting of glaciers in the Indian Himalayan region, as highlighted in research by Immerzeel et al. (2010). Apprehensions about the retreat of glaciers in the Himalayas are specifically tied to the influence of a changing climate on the flow of streams.

The Kashmir Himalaya is dominated by western disturbances (WD) as opposed to the monsoons predominant in most of the Indo-Gangetic and peninsular India. The Pir Panjal range, most often than not, acts as a barrier to the southwestern monsoons changing the climate of the Kashmir Valley from a typical tropical-type found in the rest of India to more arid to windy-type (Dar et al. 2014). The WDs bring moist air through eastward-moving low-pressure systems originating from the Mediterranean Sea or mid-west Atlantic Ocean during winters and decrease substantially as the warm seasons progress in the region (Scott et al. 2012).

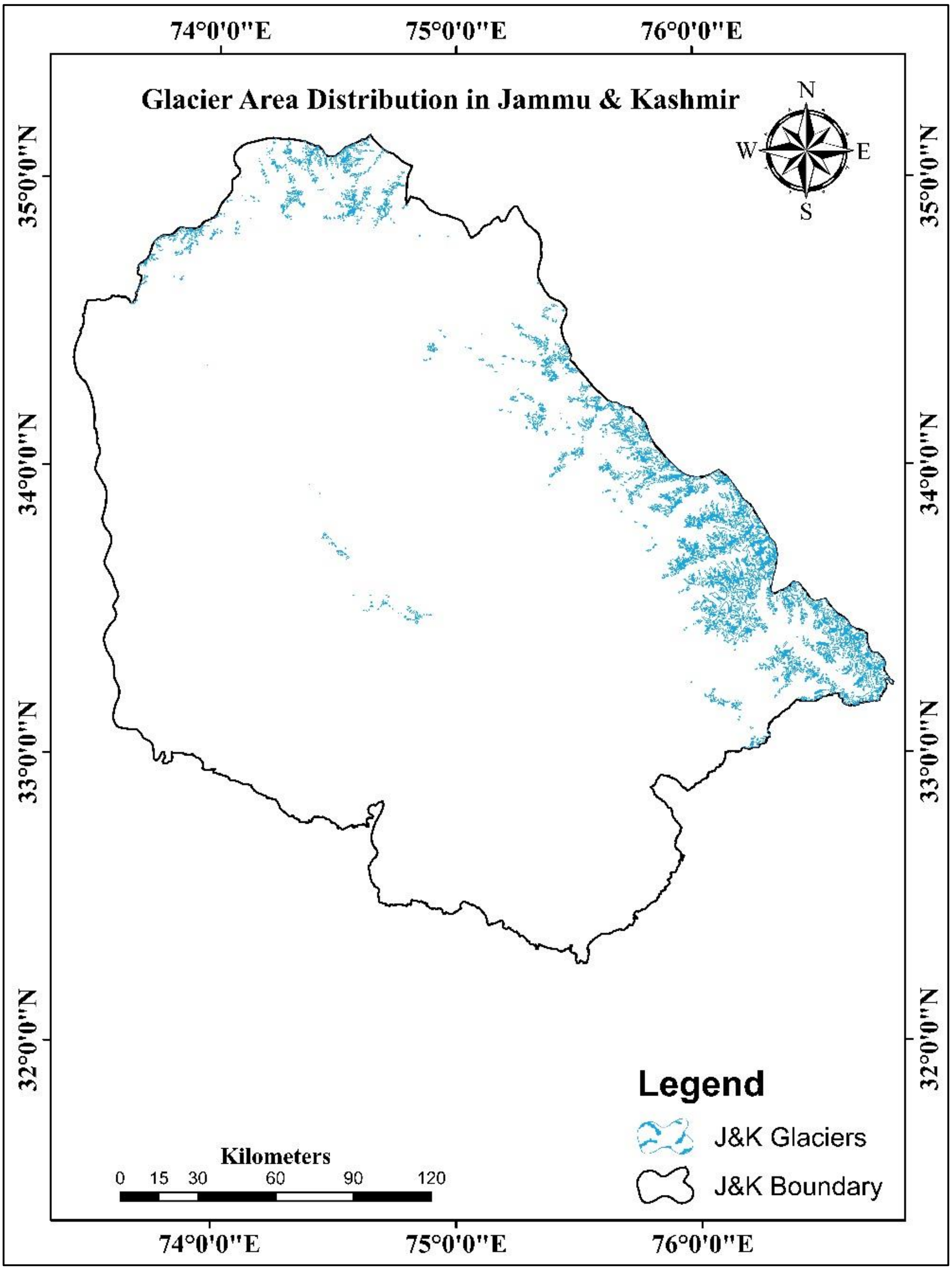


Figure 4.15. Spatial distribution of glaciers across Jammu and Kashmir as per RGI Version 6.0, released July 28, 2017.

Further, the glaciers in the Jammu and Kashmir region are predominantly fed by the westerlies with small contribution from the monsoons during July to August months. Muhammad et al. (2019) have reported that the westerlies contribute 60% accumulation during winter and 40% during summer in the Astore Basin. The Kashmir Valley has four seasons with an average annual precipitation of 710 mm, and the average annual temperature of 13.5 °C (Dar et al. 2014). The Glacier Parameter like Glacier Area, Glacier Size and No. of Glacier etc. are presented in Table 4.7 & Table 4.8, and the spatial distribution of the glaciers in the UT of Jammu and Kashmir is shown in Figure 4.15.

Table 4.7. Glacier Area, Glacier Size & No. of Glacier for Jammu & Kashmir region.

Sr. No.	Glacier Size (km^2)	No. of Glaciers	Glacier Area in (km^2)
1	<1	1625	422.02
2	1-5	249	518.75
3	5-10	32	214.19
4	>10	28	659.37
Total		1934	1814.34

Table 4.8 Basin wise Glacier Parameter for Jammu and Kashmir Region.

	Jhelum	Chenab
Glacierized Area	381.30	1456.07
Basin Area	31504.02	22469.51
No. of Glaciers	828	1148
Glacierised Area %	1.21	6.48
No of Glaciers <5 sq. kms	821	1095
No of Glaciers >5 sq. kms	7	53
Largest Glacier	Ghughuel Glacier	Prul Glacier
Area of Largest Glacier (sq. kms)	10.64	48.43
Length of Longest Glacier (kms)	8.62	10.70

Indian Himalayas are home to numerous glacial lakes, which can pose serious threat to downstream communities and lead to catastrophic socioeconomic disasters in case of a glacial lake outburst flood (GLOF). In 2018, a comprehensive inventory was conducted in the Indian Himalayas, encompassing 329 glacial lakes with a size exceeding 0.05 square kilometers. These lakes were distributed across four states—Himachal Pradesh, Uttarakhand, Sikkim, and Arunachal Pradesh—as well as two union territories, namely Ladakh and Jammu and Kashmir (Dubey and Goyal 2020).

The distribution of these lakes on a state-wise basis highlights that the union territories account for 98 lakes, constituting 30% of the total. Himachal Pradesh hosts 36 lakes (11%), Uttarakhand features 22 lakes (7%), Sikkim boasts 88 lakes (27%), and Arunachal Pradesh is home to 85 lakes (26%). When examining the distribution across major river basins, it is observed that the Indus basin houses 134 lakes (41%), the Ganga basin includes 22 lakes (7%), and the Brahmaputra basin encompasses 173 lakes (52%), as illustrated in Figure 4.16 (a). In 2018, these lakes collectively covered an area of 65.80 ± 4.37 square kilometers. The size distribution analysis of these lakes indicated that 129 lakes (39%) were smaller than 0.1 square kilometers, 178 lakes (54%) ranged in size from 0.1 to 0.5 square kilometers, and only 22 lakes (7%) exceeded 0.5 square kilometers. Categorizing the lakes based on their types revealed that moraine-dammed lakes constituted the majority with 154 lakes (47%), followed by 57 ice-dammed lakes (17%), 31 bedrock-dammed lakes (9%), and 87 other lakes, including erosional and debris-dammed lakes (26%), as depicted in Figure 4.16 (b). The elevation profile analysis of the lakes unveiled a range spanning from 3,000 meters above sea level (m.a.s.l) to 5,661 m.a.s.l, with a mean elevation of 4,484 m.a.s.l. Lakes situated above the 5,000 m.a.s.l threshold were primarily characterized by being ice-dammed and moraine-dammed. Conversely, nearly all bedrock-dammed lakes were found below the 5,000 m.a.s.l mark, while other lake types exhibited a more uniform distribution across all elevation zones, as illustrated in Figure 4.16 (c).

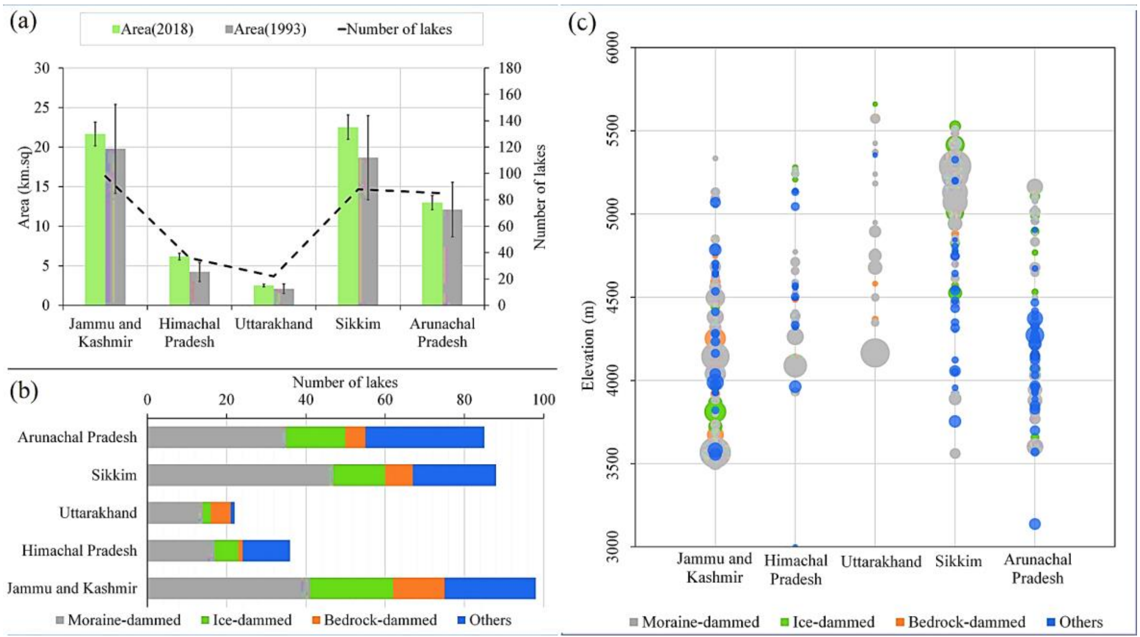


Figure 4.16. Comparison of glacial lakes between Indian Himalayan states based on the study by Dubey and Goyal (2020). Image modified from Dubey and Goyal (2020).

The amount of snowfall and the extent of snow cover in Jammu and Kashmir can vary depending on the specific location and the altitude. The Kashmir Valley, including cities like Srinagar, often experiences moderate to heavy snowfall during the winter season. The Pir Panjal range and the Himalayan region in the state receive substantial snowfall, contributing to the snow cover. It contributes to the water resources of the Jammu and Kashmir region region, as the melting snow feeds into rivers and streams, supporting agriculture and other activities (Rani 2021).

The maximum annual change in snow cover for the Jhelum River basin occurred in 2021, reaching 3038.76 square kilometers. In contrast, the minimum annual change in snow cover for the Jhelum River basin was observed in 2016, with a value of 1976.02 square kilometers for the Chenab River basin, the highest annual change in snow cover took place in 2020, registering 1915.25 square kilometers. Conversely, the lowest annual change occurred in 2016, with a value of 1497.70 square kilometers. In the case of the Ravi River basin, the maximum annual change in snow cover was recorded in 2015, amounting to 37.53 square kilometers. The minimum annual change in snow cover for the Ravi River basin was observed in 2016, with a value of 18.03 square kilometers. The change in snow cover of Jammu and Kashmir watershed on yearly basis are presented in Table 4.9.

Table 4.9 Change in Snow Cover of Jammu and Kashmir River Basin calculated from MODIS Tera snow cover product.

Indicator	Year	Jhelum	Chenab	Ravi
Change in Snow Cover (Sq. Km)	2011	2796.53	1927.14	32.03
	2012	2222.33	1719.81	35.49
	2013	2478.81	1774.96	33.10
	2014	2452.86	2025.03	34.35
	2015	2702.50	2107.20	37.53
	2016	1976.02	1497.70	18.03
	2017	2041.11	1576.09	29.37
	2018	2658.62	1932.37	26.94
	2019	2546.53	1924.19	43.47
	2020	2653.76	1915.25	45.28
	2021	3038.76	1974.13	25.59
	2022	2596.54	1979.29	37.45

4.1.2.2. Issues and Challenges

- The formation of glacial lakes poses significant challenges, particularly due to the potential for Glacial Lake Outburst Floods (GLOFs). As glaciers in the region continue to recede due to climate change, they often lead to formation of glacial lakes that can become unstable. These lakes are often dammed by moraines, which may be weak or prone to failure. The risk of GLOFs increases as the volume of these lakes grows and the structural integrity of the natural dam diminishes. Such floods can have devastating impacts on downstream communities, infrastructure, and ecosystems.
- Snowmelt is a critical hydrological process influencing water resources, agriculture, and flood management. However, the lack of ground-based observation stations poses significant challenges for accurately monitoring

and predicting snowmelt dynamics. Relying solely on remote sensing data, while offering broad spatial coverage and temporal insights, encounters limitations such as the resolution of satellite imagery, atmospheric interference, and variability in snow properties.

- The challenge of climate change-induced glacier melting is compounded by a lack of on-site monitoring stations. Rising temperatures due to climate change are accelerating glacier melt in the region, which significantly impacts water resources, agriculture, and local communities. The absence of dedicated stations to monitor glacier melt and dynamics exacerbates the difficulty of accurately assessing and managing these changes.
- The impact of changing river dynamics and water supply on downstream areas is a significant concern. The region's rivers, heavily influenced by snowmelt and glacial runoff, are experiencing altered flow patterns due to climate change and shifts in snowpack. This leads to reduced water availability during dry periods and increased risk of flooding during peak melt seasons. Such variability poses challenges for water resource management, agriculture, and hydroelectric power generation.

4.1.2.3. Problem Root Cause Analysis for issues and challenges

The primary cause of glacier shrinkage in Jammu and Kashmir is attributed to climate change, particularly the general rise in atmospheric temperatures resulting from anthropogenic activities. Additional factors contributing to glacier shrinkage include changes in precipitation patterns (especially the shift from snow to liquid precipitation), aspects, slope conditions, and the presence of debris cover on glaciers (Rashid et al. 2020). Recent decades have witnessed adverse variations in crucial glacier parameters, and it is now well-established that climate change serves as the main driving force behind these changes. Climatic factors affecting glaciers in the region encompass variations in meteorological parameters, specifically temperature and precipitation (Romshoo et al. 2022). Over the last century, the Himalayan region, including Jammu and Kashmir, has experienced a reported rise in temperature ranging from 0.6°C to 1.6°C. Furthermore, there has been a substantial decreasing trend in monsoon precipitation in the last century, which contributes to the overall challenges faced by glaciers in Jammu and Kashmir (Dad et al. 2021).

4.1.2.4. Governance / Management of Glacier

I. **Institutions governing / managing / monitoring the resources and Institutional structure:**

- The Geological Survey of India (GSI)
- State Remote Sensing Centre

- Space Application Centre, Ahmedabad
- National Remote Sensing Centre (NRSC), Hyderabad
- State Irrigation Department
- Central Water Commission (CWC)

4.1.2.5. Constraints in Meausrement, Monitoring and data Collection

- Absence of dedicated personnel for measurement and monitoring activities, with the exception of discharge measurements downstream for hydropower projects.
- Challenges related to inaccessibility to glaciers due to tough terrain and adverse weather conditions.
- Shortage of trained manpower for conducting glacier-related studies and monitoring activities.
- Insufficient standard infrastructure and logistics to support glacier research and monitoring efforts.
- Absence of a centralized database center for systematic storage and retrieval of glacier-related information.
- Limited availability of meteorological stations, hampering comprehensive climate data collection.

4.1.3. Springs (Only Perennial Spring)

4.1.3.1. Subject Matter:

The Himalayan watersheds serve as vital repositories of natural resources, forming the essential foundation for life in mountainous regions while supplying water to millions downstream through a perennial river system. Despite this critical role, the uneven spatial and temporal distribution of these resources can lead to acute shortages in hill areas, particularly during summer and periods of low flow. Consequently, there is a pressing need to comprehensively investigate the current water availability, utilization, and their impacts on watershed hydrology.

The primary water source in hilly areas, particularly in the Himalayan region, is predominantly springs (Verma and Jamwal 2022). These springs, categorized as gravitational fracture springs with both perennial and seasonal flows, benefit from a geological system characterized by extensive weathering and fractures, allowing for the rapid movement of water through the aquifer. However, a significant challenge arises during early summer when these springs often experience drying up (Gupta and Kulkarni 2018). This occurrence can be linked to the degradation of soil with water-retaining capacity, a consequence of deforestation and the thinning of forest cover. The reduction in forest density and tree removal diminishes the soil ability to retain water effectively, leading to decreased water flow from the springs.

Additionally, alterations in rainfall patterns, marked by an increase in high-intensity storms and longer dry spells, further impact aquifer recharge, contributing to the vulnerability of springs to drying up (Verma and Jamwal 2022). In the Himalayan region, groundwater primarily manifests as springs, occurring under unconfined conditions (Gupta and Kulkarni 2018). The regional water table closely follows the topography, and these springs may exhibit both hot and cold characteristics. Hot water springs, commonly found in the Central Crystallines, are structurally controlled and classified as non-gravitational springs.

Springs in Jammu and Kashmir play a significant role in shaping the region hydrological landscape and are integral to the local ecology and human livelihoods. These natural springs, often nestled amidst picturesque landscapes, serve as vital sources of freshwater, supporting various ecosystems, agriculture, and communities. The diverse topography of Jammu and Kashmir, with its mountainous terrain, contributes to the abundance of springs across the region (Gupta and Kulkarni 2018). These springs are fed by precipitation, melting snow, and underground aquifers, making them crucial for maintaining a sustainable water supply. Figure 4.17. shows the springs in a much smaller Tawi river basin in the Jammu region.

Despite their vital role, springs in Jammu and Kashmir face challenges, including changes in precipitation patterns, anthropogenic activities, and the impact of climate change. Preservation and sustainable management of these natural resources are essential to ensure continued access to clean water, maintain ecological balance, and uphold the cultural heritage associated with these springs (Bhat et al. 2022).

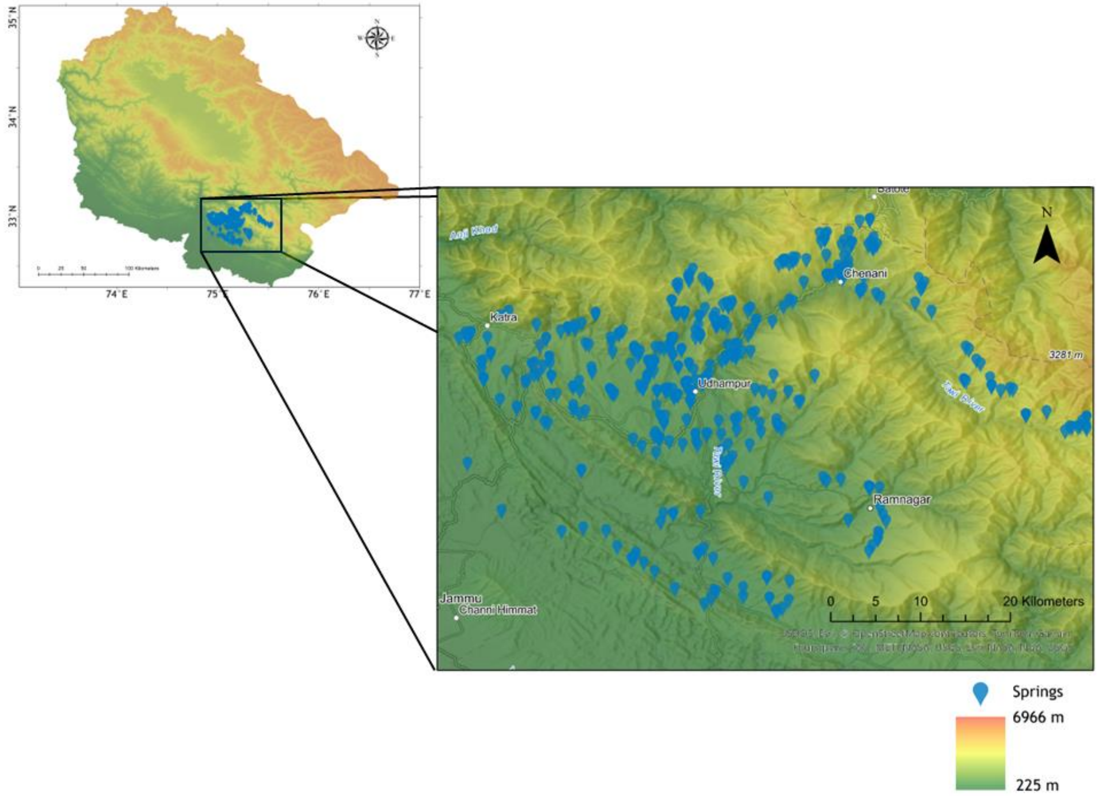


Figure 4.17. Geographical locations and spatial distributions of springs in the Tawi River basin of Jammu region.

4.1.3.2. Issue and Challenge:

- The reduction in spring discharges is attributed to factors such as deforestation and other environmental causes.
- Challenges in effectively managing the distribution of water from springs contribute to the problem.
- The inaccessibility or hilly terrain of spring source areas poses difficulties in sustainable spring management.
- Conflicts of interest related to spring land ownership.
- Continuous monitoring of spring parameters, including discharge, faces various difficulties.
- Alterations in the biophysical landscape impact the health of springs, contributing to their decline.
- Changes in Land Use Land Cover led to the drying up of springs.
- The hydro-geological setup in perennial springs, coupled with eco-hydrological changes, influences their sustainability.

- The decline in spring discharges is influenced by factors such as deforestation, variations in rainfall intensity, temperature rise, seismic activity, and landslides.
- Excessive developmental activities, such as road construction, industrialization, tunnelling, and hydropower development, contribute to the problem.
- Increased demand in various sectors, including agriculture, industry, infrastructure, establishments, institutions, and domestic use, impacts spring water consumption.
- Pollution from domestic and sewage sources poses a significant threat to spring ecosystems.
- Negligence and a lack of interest in spring conservation play a pivotal role in exacerbating the issue.
- The challenging topography of our hilly terrain complicates the task of creating a comprehensive database for mapping spring areas and recharge zones, essential for effective conservation and management.
- The swift industrialization in Jammu & Kashmir has led to a surge in pollution, posing a challenge in maintaining the permeability of spring recharge zones.
- Springs face vulnerabilities stemming from various elements such as rainfall patterns, temperature variations, human capacity, and levels of water literacy.

4.1.3.3. Problem / Root Cause Analysis

(No data available)

4.1.3.4. Constraints in Measurement, Monitoring and Data Management:

a) Challenges in accessing spring sources due to factors such as distance and difficult terrain conditions.
b) Insufficient manpower leading to the absence of personnel dedicated to measuring discharge or water quality.
c) Shortage of trained personnel, specifically Para Hydro-geologists.
d) Inadequate availability of essential tools such as potable water quality measuring kits, discharge measuring equipment, and standard infrastructure.
e) Absence of a centralized database and analytical support, among other deficiencies.

4.1.3.5. Governance / Management of springs:

Spring Rejuvenation[1]**:** The approach emphasizes granting both design and execution

[1] https://nhp.mowr.gov.in//HIS/docs/Manual/Spring_Rejuvenation.pdf

autonomy while ensuring convergence on desired outcomes. Various states have already embarked on programs and initiatives within their jurisdictions. Although there are shared objectives, the solutions and methodologies employed are tailored to the unique hydrogeological, social, cultural, and operational capacities of each state/UT. Essentially, spring rejuvenation involves comprehensive mapping of the springshed, the identification of recharge areas, and the precise location of sites suitable for the implementation of appropriate recharge structures.

The institutions governing/managing are as follows:

a) Central Ground Water Board

b) Geological Survey of India

c) Survey of India

d) National Remote Sensing Centre

e) National Institute of Hydrology

f) Wadia Institute of Himalayan Geology.

4.1.3.6. Road map of activities/ tasks proposed for better governance with timelines and agencies responsible for each task/activity[1].

- Comprehensive mapping of springs and springsheds.
- Setting up of a data monitoring system.
- Understanding socio-economic and governance systems of springs.
- Creating a conceptual hydrogeological layout of the springshed.
- Developing springshed management and governance protocols and Impact assessment.
- Hydrogeological mapping.
- Classification of spring type, identifying mountain aquifer and demarcating recharge area

[1] https://nhp.mowr.gov.in//HIS/docs/Manual/Spring_Rejuvenation.pdf

4.1.3.7. Annexure- Springs

Table 4.10. The Location of Tawi River Basin of Springs of Jammu and Kashmir. Source: National Institute of hydrology, Department of Water Resources, River Development and Ganga Rejuvenation Minsitry of Jal Shakti, Government of India.

Spring Id	Disch-arge (lpm)	Lat (° N)	Long (° E)	Altitude (a.m.s.l in m)	Block	pH	EC (μS/cm)
TS001	90.2	32.92433	75.14555	685	Udhampur	-	-
TS002	38.4	32.92492	75.14545	695	Narsoo	6.5	434
TS003	17.8	32.93016	75.14959	760	Udhampur	6.5	418
TS004	137.1	32.93369	75.15267	773	Udhampur	6.4	405
TS005	106.7	32.91506	75.13707	695	Udhampur	6.2	562
TS006	38.4	32.9153	75.13621	697	Udhampur	6.6	462
TS007	63.9	32.91599	75.1354	707	Udhampur	6.3	590
TS008	4.6	32.91613	75.13502	715	Udhampur	7	582
TS009	22.9	32.91361	75.13592	695	Udhampur	7.4	615
TS010	25.3	32.9136	75.13588	695	Udhampur	7.2	662
TS011	53.3	32.9136	75.13587	695	Udhampur	7.5	662
TS012	8.9	32.912	75.134	721	Udhampur	7.3	577
TS013	192	32.90585	75.13409	693	Udhampur	7	444
TS014	-	32.90591	75.13412	693	Udhampur	6.8	315
TS015	50.5	32.90602	75.1342	690	Udhampur	7.4	410
TS016	96	32.90562	75.1341	694	Udhampur	7.2	441
TS017	120	32.90575	75.13419	689	Udhampur	7.2	345
TS018	32	32.90575	75.1341	694	Udhampur	8	362
TS019	3.2	32.90623	75.13429	689	Udhampur	-	-
TS020	12.6	32.90563	75.13396	694	Udhampur	7.4	359
TS021	-	32.90564	75.13437	689	Udhampur	7	386
TS022	3	32.91633	75.11011	669	Udhampur	7.8	246
TS023	76.8	32.91653	75.10077	673	Udhampur	7.1	248
TS024	-	32.93636	75.09749	751	Udhampur	7.8	335
TS025	6.4	32.92678	75.13956	765	Udhampur	7.4	847
TS026	3.2	32.91806	75.11611	683	Udhampur	7.4	847
TS027	8	32.91885	75.11176	672	Udhampur	7.7	755
TS028	32	32.94093	75.09436	712	Udhampur	7.8	446
TS029	-	32.94092	75.09422	710	Udhampur	-	-
TS030	3.2	32.94632	75.09834	757	Udhampur	6.9	470
TS031	7.2	32.94639	75.09823	742	Udhampur	6.5	240
TS032	3.2	32.94399	75.13266	816	Udhampur	6.5	231

TS033	4.8	32.94587	75.09831	785	Udhampur	6.2	237
TS034	2.1	32.94618	75.09803	780	Udhampur	8.3	236
TS035	2.1	32.98123	75.17134	993	Narsoo	8.2	703
TS036	2	32.98506	75.16636	1033	Narsoo	8	410
TS037	16	32.98511	75.16625	1033	Narsoo	8	410
TS038	1.6	32.98767	75.16561	1086	Narsoo	8.1	492
TS039	2	32.98683	75.16836	1060	Narsoo	8	542
TS040	3.2	32.96234	75.17133	823	Narsoo	7.8	565
TS041	3.2	32.94395	75.13267	814	Narsoo	8	564
TS042	2	32.9984	75.19153	1175	Narsoo	8	450
TS043	53.3	33.00047	75.19436	980	Narsoo	7.9	625
TS044	2.1	32.98882	75.20032	912	Narsoo	7.9	637
TS045	24	32.98701	75.21625	1430	Narsoo	7.9	615
TS046	1.3	32.98701	75.19958	990	Sewna	7.9	610
TS047	80	32.95839	75.12517	788	Udhampur	7.6	555
TS048	10.7	32.94079	75.12188	719	Udhampur	7.9	400
TS049	9.6	32.95839	75.12517	788	Udhampur	7.5	444
TS050	47.3	32.94079	75.12188	719	Udhampur	7.5	499
TS051	-	32.95839	75.12517	788	Udhampur	7.4	418
TS052	6.6	32.96425	75.11385	795	Udhampur	7.6	894
TS053	3.2	32.96434	75.11459	796	Udhampur	7.9	762
TS054	80	32.95937	75.10765	769	Udhampur	7.7	391
TS055	7.1	32.96434	75.11459	796	Udhampur	7.7	764
TS056	-	32.96434	75.11459	796	Udhampur	7.8	767
TS057	7.1	32.92528	75.13136	718	Udhampur	7.3	519
TS058	4	32.92516	75.1311	716	Udhampur	6.9	368
TS059	4.9	32.92521	75.1311	716	Udhampur	6.8	414
TS060	-	32.92532	75.13112	717	Udhampur	6.8	410
TS061	8.4	32.92523	75.1311	716	Udhampur	6.9	425
TS062	5.3	32.92521	75.1311	716	Udhampur	6.8	436
TS063	3	32.92331	75.12928	712	Udhampur	6.8	466
TS064	4	32.92337	75.12919	715	Udhampur	6.9	479
TS065	-	32.92302	75.12905	714	Udhampur	-	-
TS066	4.4	32.92339	75.12954	719	Udhampur	7.1	524
TS067	9.6	32.04611	75.27889	1208	Chennani	8.5	534
TS068	16.4	32.01278	75.36972	1523	Chennani	8.4	567
TS069	24.4	33.02016	75.36462	1603	Chennani	8.2	417
TS070	-	33.03649	75.28425	1126	Chennani	8	610
TS071	-	33.07747	75.29294	1824	Chennani	8.1	476
TS072	5.9	32.88595	75.16255	576	Jaganoo	7.7	201
TS073	7.8	32.86164	75.14123	627	Jaganoo	8.3	543

TS074	-	32.88706	75.13028	675	Jaganoo	-	-
TS075	0.2	32.86468	75.13982	625	Jaganoo	7.5	380
TS076	2	32.8713	75.13892	598	Jaganoo	7.2	388
TS077	1.6	32.87277	75.13937	595	Jaganoo	7	665
TS078	43.6	32.79449	75.14423	511	Parli Dhar	7	848
TS079	72	32.75619	75.14742	534	Majalta	7	845
TS080	13.7	32.75126	75.14159	503	Majalta	7.2	680
TS081	3.2	32.75206	75.14261	516	Majalta	7	717
TS082	11.7	32.75294	75.14322	520	Majalta	7	720
TS083	6.6	32.7527	75.14289	523	Majalta	7.1	740
TS084	16	33.03535	75.28666	1087	Chennani	7.3	640
TS085	1.3	32.94233	75.15368	804	Chennani	7.7	820
TS086	-	33.03665	75.28346	1112	Chennani	7.1	748
TS087	5	33.03069	75.28653	1031	Chennani	8.5	343
TS088	20	33.01512	75.32	1171	Chennani	7.2	587
TS089	80	33.01155	75.3244	1185	Chennani	7.2	545
TS090	34.3	33.02018	75.3068	1156	Chennani	7.4	560
TS091	13.7	33.01752	75.30378	1239	Chennani	7.3	520
TS092	16	33.01834	75.3038	1215	Chennani	7.4	518
TS093	5.2	33.01907	75.30409	1196	Chennani	7.3	558
TS094	7.4	33.03945	75.28286	1147	Chennani	7.2	565
TS095	35.6	33.05946	75.29262	1461	Chennani	7.5	253
TS096	-	33.06739	75.29489	1539	Chennani	7.1	653
TS097	36	33.06714	75.29621	1514	Chennani	7	670
TS098	18.4	32.8739	75.09909	615	Udhampur	7.4	591
TS099	1	32.86987	75.10108	608	Udhampur	7.3	524
TS100	-	32.87087	75.09792	624	Udhampur	7.2	623
TS101	-	32.86813	75.10358	586	Udhampur	7.3	534
TS102	-	32.8681	75.10302	600	Udhampur	-	-
TS103	-	32.86812	75.10292	600	Udhampur	-	-
TS104	4.8	32.865	75.11312	626	Udhampur	7.4	609
TS105	5.6	32.85373	75.09968	630	Udhampur	7.7	424
TS106	3	32.86023	75.08557	647	Udhampur	7.2	563
TS107	57.6	32.86737	75.07676	650	Udhampur	7	475
TS108	30	32.79196	75.10717	480	Dhansal	7.2	622
TS109	3.5	32.78306	75.10444	467	Dhansal	7.7	686
TS110	-	32.79178	75.11709	456	Dhansal	7	771
TS111	-	32.79175	75.11706	456	Dhansal	7	769
TS112	-	32.79158	75.11686	452	Dhansal	-	-
TS113	-	32.79157	75.11682	452	Dhansal	-	-
TS114	5.6	32.8356	75.02516	394	Dhansal	8.2	746

TS115	9.1	32.83577	75.0248	400	Dhansal	7.3	693
TS116	56.5	32.98046	75.01311	964	Tikri	8.1	381
TS117	27.4	32.98063	75.01132	958	Tikri	8.2	390
TS118	5.6	32.98048	75.01148	955	Tikri	8.2	396
TS119	12.8	32.96427	75.02917	850	Udhampur	7.3	329
TS120	4.9	32.98515	75.02552	964	Udhampur	8	312
TS121	96	32.99522	75.03934	1002	Moungri	7.4	453
TS122	12	32.99439	75.03914	1001	Moungri	7.5	519
TS123	6.4	32.97946	75.01895	883	Udhampur	7.8	485
TS124	28.2	32.98311	75.01859	987	Udhampur	7.6	475
TS125	36	32.97719	75.00442	922	Udhampur	7.2	618
TS126	14.8	32.91327	75.05813	696	Udhampur	7.1	808
TS127	73.8	32.91704	75.05414	689	Udhampur	7.2	617
TS128	27.4	32.91727	75.05382	690	Udhampur	7.2	617
TS129	120	32.9165	75.05446	693	Udhampur	7.3	625
TS130	43.6	32.91568	75.05508	681	Udhampur	7.4	630
TS131	30	32.91572	75.05505	681	Udhampur	7.5	590
TS132	118.7	32.91558	75.05542	684	Udhampur	7.5	610
TS133	-	32.91541	75.05545	676	Udhampur	7.4	625
TS134	32	32.91511	75.05555	678	Udhampur	8.2	348
TS135	50.5	32.91531	75.05595	685	Udhampur	7.3	580
TS136	11.1	32.91446	75.05681	680	Udhampur	7.3	520
TS137	11.7	32.87948	75.51596	1968	Latti Marothi	7.5	160
TS138	3.4	32.88957	75.53065	2103	Latti Marothi	7.4	126
TS139	1.6	32.88978	75.53046	2103	Latti Marothi	8.3	114
TS140	0.6	32.88559	75.52621	2098	Latti Marothi	7.8	330
TS141	8.7	32.87977	75.51358	1992	Latti Marothi	7.3	202
TS142	5.3	32.88004	75.52185	1958	Latti Marothi	7.8	105
TS143	45.7	32.88089	75.52384	1913	Latti Marothi	8.2	200
TS144	6.5	32.8807	75.53019	2034	Latti Marothi	7.6	250
TS145	-	32.87795	75.53075	2050	Latti Marothi	7.4	147
TS146	3	32.87548	75.50914	1881	Latti Marothi	7.5	132
TS147	0.2	32.89535	75.49068	1901	Latti Marothi	8.7	250
TS148	2.2	32.89222	75.46968	1813	Latti Marothi	-	-
TS149	4.3	32.89206	75.47017	1816	Latti Marothi	8	425
TS150	6	32.89211	75.46994	1814	Latti Marothi	8.1	427
TS151	17.8	32.91891	75.45395	1819	Latti Marothi	8.2	255
TS152	15.5	32.91813	75.45705	1821	Latti Marothi	8.1	318
TS153	-	32.91702	75.44476	1822	Latti Marothi	NA	-
TS154	6.4	32.92101	75.43524	1954	Latti Marothi	7.7	510
TS155	3.2	32.9215	75.43581	1931	Latti Marothi	7.8	552

TS156	6.2	32.92957	75.43398	1910	Latti Marothi	7.6	253
TS157	-	32.92754	75.40788	1951	Latti Marothi	-	-
TS158	-	32.92754	75.40775	1946	Latti Marothi	7.8	252
TS159	4	32.92616	75.40999	1927	Latti Marothi	8	540
TS160	17.5	32.94391	75.42453	1970	Latti Marothi	-	-
TS161	1.3	32.94765	75.4203	1968	Latti Marothi	7.4	450
TS162	4.3	32.95871	75.41281	1811	Latti Marothi	7.7	330
TS163	8.7	32.96073	75.40959	1815	Latti Marothi	7.7	436
TS164	25.6	33.02646	75.36826	1706	Chennani	7.8	256
TS165	15	33.0307	75.36247	1697	Chennani	8.1	310
TS166	9.5	32.82836	75.26692	709	Ramnagar	7.7	591
TS167	6.4	32.82506	75.27022	756	Ramnagar	7.2	592
TS168	6.4	32.82642	75.28458	791	Ramnagar	7.1	807
TS169	18.5	32.81905	75.31238	874	Ghordi	-	-
TS170	9.6	32.81862	75.3132	866	Ghordi	7.1	615
TS171	8	32.81829	75.31379	863	Ghordi	7.1	640
TS172	6	32.81831	75.31388	863	Ghordi	7.2	782
TS173	14.8	32.81785	75.32335	809	Ghordi	8.1	620
TS174	6	32.75924	75.31625	1158	Ramnagar	7.1	545
TS175	8	32.7537	75.31296	1165	Ramnagar	7.5	543
TS176	3	32.76599	75.32197	1110	Ramnagar	7.5	343
TS177	5	32.76623	75.32167	1097	Ramnagar	8.1	495
TS178	2.5	32.77135	75.32286	1087	Ramnagar	7.7	554
TS179	20	32.77267	75.322	1059	Ramnagar	7.4	545
TS180	8	32.78419	75.32987	1055	Ramnagar	7.3	560
TS181	8	32.79058	75.32676	1054	Ramnagar	7.4	640
TS182	-	32.798	75.32401	1005	Ramnagar	-	-
TS183	6.4	32.78545	75.29218	781	Ramnagar	7.3	813
TS184	8	32.95638	75.1859	847	Sewna	7.3	333
TS185	6.4	32.95369	75.1799	817	Sewna	7.3	545
TS186	9.6	32.95309	75.17894	817	Sewna	7.5	569
TS187	4	32.95063	75.17972	868	Sewna	7.7	427
TS188	3.6	32.95368	75.17628	781	Sewna	8.1	475
TS189	4.8	32.9536	75.17639	790	Sewna	8.2	460
TS190	15.4	32.95335	75.17572	775	Sewna	7.4	575
TS191	12.8	32.95039	75.16949	758	Sewna	7.2	520
TS192	8	32.95035	75.17031	769	Sewna	7.5	501
TS193	3.8	32.9468	75.16547	690	Sewna	7.6	643
TS194	14.7	32.94701	74.92682	645	Katra	7.4	690
TS195	96	32.90012	74.96051	532	Dansal	7.9	802
TS196	3.7	32.92736	74.97121	648	Ramnagar	7.2	756

TS197	48	32.92605	74.969	622	Ramnagar	-	-
TS198	5.3	32.93614	74.94985	685	Katra	7.4	769
TS199	46.7	32.95481	74.93439	653	Katra	7.5	655
TS200	-	32.95437	74.93432	645	Katra	-	-
TS201	68.6	32.95405	74.93419	640	Katra	7.4	645
TS202	19.2	32.97077	74.931	756	Katra	7.3	870
TS203	137.1	32.98378	74.9802	947	Udhampur	7.6	540
TS204	3.8	32.96954	74.98982	910	Tikri	7.5	531
TS205	3.1	32.96941	74.98994	918	Tikri	7.3	550
TS206	3.2	32.96234	74.98365	805	Tikri	7.3	710
TS207	53.3	32.9077	74.94351	539	Latti Marothi	7.5	600
TS208	8.9	32.93875	74.92512	652	Latti Marothi	7.6	750
TS209	3.6	32.94611	74.92427	612	Latti Marothi	7.2	682
TS210	3.6	32.92886	74.92715	631	Latti Marothi	7.2	851
TS211	4	32.92895	74.9269	640	Latti Marothi	7.1	821
TS212	67.4	32.92863	74.92754	626	Latti Marothi	7.1	821
TS213	240	32.89894	74.96047	495	Dansal	7.5	496
TS214	4	32.8947	74.98008	524	Dansal	7.2	744
TS215	2.7	32.89428	74.97859	480	Dansal	7.2	880
TS216	156.3	32.88505	74.98804	460	Dansal	7.5	790
TS217	0.4	32.88363	74.99143	475	Dansal	7.5	670
TS218	6.8	33.03176	75.3075	1135	Chennani	7.5	660
TS219	2	33.0431	75.2922	1120	Chennani	7.6	661
TS220	-	33.0434	75.28213	1224	Chennani	7.7	576
TS221	64	33.06505	75.32082	1502	Chennani	8.2	489
TS222	4	33.07197	75.31737	1452	Chennani	7.6	460
TS223	2.6	33.06396	75.31745	1395	Chennani	7.4	616
TS224	3.2	33.06203	75.31632	1388	Chennani	7.3	724
TS225	1	33.06181	75.31757	1426	Chennani	7.4	600
TS226	16	33.0906	75.31382	1890	Chennani	7.6	400
TS227	-	33.0902	75.31357	1849	Chennani	-	-
TS228	14.1	33.08879	75.30348	1787	Chennani	7.7	400
TS229	40	33.07045	75.26861	1861	Chennani	8.1	190
TS230	-	33.07036	75.26867	1861	Chennani	-	-
TS231	36.9	33.06799	75.26485	1789	Chennani	8.2	290
TS232	21.3	33.0763	75.26351	2013	Chennani	7.9	210
TS233	19.2	33.07688	75.27093	1970	Chennani	8.1	210
TS234	-	33.07528	75.2694	1959	Chennani	-	-
TS235	5.6	33.06908	75.2881	1720	Chennani	7.3	510
TS236	2.7	33.06432	75.28555	1692	Chennani	7.3	559
TS237	3	33.05263	75.288	1406	Chennani	7.5	570

TS238	1.5	32.93754	75.13753	782	Narsoo	6.6	586
TS239	3.4	32.94632	75.09831	742	Udhampur	6.6	114
TS240	2	32.94637	75.09831	742	Udhampur	6.8	158
TS241	3.9	32.94589	75.0982	740	Udhampur	7.4	145
TS242	3.7	32.99554	75.11912	1153	Udhampur	7.4	398
TS243	3.6	32.99513	75.12022	1135	Udhampur	7.3	350
TS244	-	32.99593	75.12214	1080	Udhampur	-	-
TS245	2.4	32.99412	75.12798	973	Udhampur	7.6	393
TS246	4.2	32.96944	75.11522	823	Udhampur	7.1	510
TS247	-	32.96991	75.11477	838	Udhampur	-	-
TS248	12.8	32.97191	75.14428	1227	Udhampur	7.6	245
TS249	-	32.97212	75.14401	1227	Udhampur	NA	-
TS250	1.1	32.97226	75.14418	1238	Udhampur	7.7	270
TS251	2.3	32.97427	75.14336	1222	Udhampur	7.7	226
TS252	2	32.97729	75.13912	1106	Udhampur	7.7	190
TS253	3.1	32.95597	75.05632	808	Udhampur	7.4	265
TS254	2.1	32.97728	75.06642	1022	Ghordi	7.4	295
TS255	-	32.97489	75.06318	971	Ghordi	-	-
TS256	2.3	32.97394	75.06221	937	Ghordi	7.1	320
TS257	0.9	32.97022	75.0544	903	Udhampur	7.1	395
TS258	2.5	32.96614	75.05515	873	Udhampur	7.2	310
TS259	1.6	32.95874	75.07749	765	Udhampur	7.3	210
TS260	2	32.96096	75.078	781	Udhampur	7.3	340
TS261	2.6	32.95868	75.08011	758	Udhampur	7.1	365
TS262	2.9	32.95876	75.07822	761	Udhampur	7.3	375
TS263	8.6	32.95228	75.0819	747	Udhampur	7.3	333
TS264	17.6	32.95283	75.1163	738	Udhampur	7	231
TS265	-	32.95275	75.11633	738	Udhampur	-	-
TS266	4	32.95768	75.11391	775	Udhampur	7.2	300
TS267	6.4	32.94642	75.0914	738	Udhampur	7.3	325
TS268	2	32.94619	75.09276	721	Udhampur	7.4	336
TS269	1.4	32.94676	75.09271	723	Udhampur	7.3	343
TS270	4	32.9327	75.09221	733	Udhampur	6.2	51
TS271	3	32.93145	75.09071	724	Udhampur	6.3	33
TS272	13.5	32.92744	75.09022	736	Udhampur	-	-
TS273	4.2	33.02874	75.1329	1488	Udhampur	7.5	179
TS274	2.6	33.03113	75.13213	1525	Udhampur	7.5	337
TS275	4	33.0318	75.13179	1535	Udhampur	7.6	236
TS276	2.7	33.02132	75.12216	1442	Udhampur	7.3	257
TS277	1.7	33.02403	75.1199	1494	Udhampur	7.8	207
TS278	3.4	33.02563	75.12192	1486	Udhampur	7.7	232

TS279	2.1	33.03449	75.13283	1568	Udhampur	7.6	369
TS280	3	33.04009	75.13655	1603	Udhampur	8	245
TS281	3.5	33.00785	75.11507	1295	Udhampur	7.8	293
TS282	0.4	33.00769	75.11602	1269	Udhampur	7.6	324
TS283	2.7	32.9964	75.12853	982	Udhampur	7.1	358
TS284	-	32.99639	75.1287	976	Udhampur	-	-
TS285	2.7	32.97003	75.11769	811	Udhampur	7.3	353
TS286	4.2	32.97006	75.11728	808	Udhampur	7.4	352
TS287	42.7	32.96051	75.1039	771	Udhampur	7.4	407
TS288	0.8	32.96039	75.09923	775	Udhampur	7.5	477
TS289	0.5	32.95629	75.0836	766	Udhampur	7.1	121
TS290	15.5	32.94354	75.07459	704	Udhampur	7.2	350
TS291	2.2	32.91936	75.08615	659	Udhampur	7.2	387
TS292	2.1	32.91944	75.08703	679	Udhampur	7.4	291
TS293	96	32.89067	75.10414	630	Narsoo	7	300
TS294	115.2	32.89039	75.10426	631	Narsoo	6.8	220
TS295	18.3	32.88342	75.1076	591	Narsoo	7.1	382
TS296	14.1	32.88387	75.10772	594	Udhampur	7.1	327
TS297	38.4	32.89096	75.10873	626	Udhampur	6.5	171
TS298	2.7	32.90132	75.10027	630	Udhampur	6.9	167
TS299	2.1	32.91005	75.11773	680	Narsoo	6.6	185
TS300	3.9	32.91015	75.11809	688	Narsoo	7.3	180
TS301	27.4	32.91225	75.12164	719	Narsoo	6.5	248
TS302	13.9	32.91198	75.12117	705	Narsoo	6.7	221
TS303	4.2	32.92528	75.13136	718	Narsoo	6.7	290
TS304	4.2	32.92516	75.1311	716	Narsoo	6.2	225
TS305	-	32.92521	75.1311	716	Narsoo	6.3	220
TS306	3.9	32.92395	75.12954	714	Narsoo	6.2	606
TS307	7.7	32.92295	75.12903	714	Narsoo	6.8	253
TS308	140	32.92488	75.12973	712	Narsoo	6	204
TS309	-	32.92455	75.12937	710	Narsoo	6.8	198
TS310	10.1	32.92436	75.12895	707	Narsoo	6.5	165
TS311	-	32.92184	75.08332	654	Udhampur	7	271
TS312	36.9	32.91653	75.10063	673	Udhampur	6.7	149
TS313	5.5	32.91634	75.10999	659	Udhampur	7.5	175
TS314	1.3	33.03071	75.14627	1364	Udhampur	7.2	300
TS315	4.7	33.02618	75.15196	1340	Narsoo	8.2	223
TS316	0.1	33.02308	75.15249	1311	Narsoo	7.2	256
TS317	7.1	32.99994	75.14873	1172	Narsoo	7.6	223
TS318	-	32.99237	75.14331	1149	Narsoo	-	-
TS319	2.6	32.99233	75.143	1144	Narsoo	8	256

TS320	2.5	32.98305	75.14208	1103	Narsoo	7.3	222
TS321	12.5	32.9707	75.1392	1057	Narsoo	7.4	243
TS322	67.9	32.92341	75.14673	679	Narsoo	6.3	214
TS323	96	32.92672	75.14501	700	Narsoo	6.6	223
TS324	75.4	33.00583	75.17029	1459	Narsoo	6.6	64
TS325	85.7	33.00741	75.17523	1443	Narsoo	7.5	116
TS326	20	33.00528	75.176	1370	Narsoo	7.6	133
TS327	0.6	33.00232	75.17223	1384	Narsoo	7.6	151
TS328	5	33.0031	75.17157	1410	Narsoo	6.8	128
TS329	66.7	33.00371	75.16682	1422	Narsoo	7.6	205
TS330	1	32.99507	75.15926	1376	Narsoo	6.5	101
TS331	3.3	32.99119	75.1569	1325	Narsoo	6.7	136
TS332	7.5	32.98829	75.15795	1240	Narsoo	7.2	216
TS333	6.7	32.98598	75.16076	1145	Narsoo	8.1	250
TS334	10.9	32.98566	75.1613	1143	Narsoo	7	242
TS335	3.3	32.98443	75.1615	1143	Narsoo	7.2	262
TS336	46.2	32.9839	75.15961	1174	Narsoo	7.5	215
TS337	5	32.98284	75.16048	1174	Narsoo	7.4	275
TS338	10	32.98321	75.1597	1184	Narsoo	7.3	297
TS339	0.7	33.05432	75.27004	1556	Chennani	7.9	254
TS340	66.7	33.04978	75.25016	1732	Chennani	7.5	332
TS341	15.8	33.0484	75.2265	1887	Panchari	7.5	145
TS342	6.7	33.04915	75.22737	1901	Panchari	7.8	118
TS343	2.6	33.04929	75.22945	1914	Panchari	7.8	198
TS344	12	33.04499	75.22266	1888	Narsoo	7.6	122
TS345	0.5	33.04601	75.23306	1847	Panchari	8.1	173
TS346	4	33.04806	75.23682	1818	Chennani	7.4	203
TS347	12	33.05172	75.23679	1822	Chennani	7.6	209
TS348	150	33.05116	75.23983	1814	Chennani	7.7	209
TS349	60	32.91792	75.05326	691	Udhampur	7.3	367
TS350	-	32.93536	75.03593	784	Udhampur	7.3	356
TS351	2.5	32.93987	75.03521	786	Udhampur	7.1	370
TS352	1.6	32.96334	75.03232	851	Udhampur	7.4	324
TS353	5.5	33.02703	75.2476	1120	Chennani	7.7	247
TS354	8.6	33.03374	75.27019	1082	Chennani	7.7	287
TS355	132	33.03408	75.27032	1073	Chennani	8.3	230
TS356	21.4	33.03443	75.27263	1073	Chennani	7.6	300
TS357	20	33.03402	75.27363	1082	Chennani	7.5	280
TS358	5.1	33.0344	75.27762	1088	Chennani	7.2	425
TS359	12	33.03865	75.28185	1095	Chennani	7.6	264
TS360	3.7	33.04781	75.29218	1201	Chennani	7.3	-

TS361	1.4	33.0674	75.31444	842	Chennani	7.6	-
TS362	6.7	33.06446	75.31231	1286	Chennani	7.7	-
TS363	1.7	32.79474	74.94506	283	Nagrota	7.2	630
TS364	2.5	32.84283	74.91113	336	Nagrota	6.5	456
TS365	75	32.72707	75.21066	638	Majalta	7.8	341
TS366	10.3	32.72692	75.21069	639	Majalta	7.6	300
TS367	-	32.72761	75.21087	647	Majalta	-	-
TS368	2.9	32.72327	75.23337	797	Majalta	7.3	358
TS369	2.3	32.70586	75.21327	645	Majalta	7.2	495
TS370	-	32.70597	75.2132	645	Majalta	-	-
TS371	12	32.70348	75.23249	668	Majalta	6.7	150
TS372	3.9	32.69541	75.22614	644	Majalta	6.9	137
TS373	6.6	32.69185	75.22087	646	Majalta	7.3	465
TS374	1.2	32.69313	75.21928	641	Majalta	7.4	419
TS375	2.6	32.77443	75.04981	536	Dansal	7.6	595
TS376	-	32.75814	75.06081	573	Dansal	-	-
TS377	4.6	32.74576	75.07524	620	Udhampur	7.3	504
TS378	1	32.74594	75.07584	603	Udhampur	7.3	481
TS379	1.7	32.74688	75.0778	603	Udhampur	7.4	485
TS380	5.7	32.75165	75.07972	626	Udhampur	7.2	480
TS381	2	32.74815	75.07857	607	Udhampur	7.4	560
TS382	2.4	32.74162	75.08756	644	Udhampur	7.6	386
TS383	1.2	32.73284	75.09839	621	Udhampur	7.7	404
TS384	5	32.71562	75.11853	575	Majalta	7.7	410
TS385	-	32.71343	75.15784	574	Majalta	-	-
TS386	4.9	32.7125	75.15993	576	Majalta	7	418
TS387	-	32.70565	75.15463	618	Udhampur	-	-
TS388	1.2	32.93119	74.99519	838	Tikri	-	-
TS389	0.1	32.93159	74.99484	834	Tikri	7.3	450
TS390	2.5	32.94168	74.98699	772	Tikri	7.2	398
TS391	3	32.9507	74.99294	824	Tikri	7.6	340
TS392	3	32.95071	74.99294	824	Tikri	7.3	365
TS393	2.5	32.94483	74.99366	795	Tikri	7.4	347
TS394	0.8	32.93351	74.98151	783	Tikri	7.3	371
TS395	2	32.93304	74.97774	805	Tikri	7.5	353
TS396	3	32.94345	74.9753	784	Tikri	7.4	404
TS397	2.5	32.94326	74.97558	782	Tikri	7.5	369
TS398	3	32.94321	74.976	781	Tikri	7.5	358
TS399	3	32.94478	74.97817	752.494	Tikri	7.4	323
TS400	2.6	32.90624	75.24405	1333.29	Tikri	7.9	139
TS401	0.9	32.93191	75.25844	969.969	Ghordi	7.8	378

TS402	3.4	32.90585	75.24221	1016	Ghordi	7.7	245
TS403	3.1	32.9158	75.23208	1026	Ghordi	7.8	280
TS404	3.7	32.91201	75.21581	996	Ghordi	7.5	405
TS405	1	32.91596	75.20689	1015	Ghordi	7.6	378
TS406	-	32.91807	75.19886	883	Ghordi	-	-
TS407	120	32.93214	75.2173	1441	Ghordi	7.7	258
TS408	-	32.88919	75.18224	705	Jaganoo	-	-
TS409	33.3	32.88712	75.17934	665	Jaganoo	7.4	380
TS410	15	32.8873	75.17841	635	Jaganoo	7.6	360
TS411	3.9	32.87649	75.18031	618	Jaganoo	7.5	201
TS412	2	32.86169	75.19344	672	Jaganoo	7.6	200
TS413	66.7	32.824	75.18756	592	Ramnagar	7.5	342
TS414	4.4	32.83918	75.1694	586	Udhampur	7.1	375
TS415	6.2	32.84372	75.16645	574	Ramnagar	7.4	456
TS416	33.3	32.87222	75.14994	586	Jaganoo	6.8	265
TS417	30	32.87308	75.15091	574	Jaganoo	7.8	260
TS418	2.3	32.87207	75.16492	597	Jaganoo	7.3	461
TS419	9.2	32.89463	75.19907	717	Majalta	8	427
TS420	21.4	32.89306	75.19555	703	Majalta	7.8	540
TS421	-	32.88337	75.20357	790	Ramnagar	7.4	482
TS422	7.1	32.87461	75.20466	768	Ramnagar	7.2	325
TS423	40	32.87833	75.22534	722	Ramnagar	7.3	340
TS424	2	32.88078	75.22212	792	Ramnagar	7.6	253
TS425	40	32.88711	75.22028	843	Ramnagar	7.1	406
TS426	-	32.88259	75.22014	820	Ramnagar	7.3	166
TS427	1.8	32.80805	75.21224	613	Ramnagar	7.6	268
TS428	3.9	32.84962	75.17623	607	Jaganoo	7.4	288
TS429	33.3	32.84579	75.17317	590	Jaganoo	7.4	336
TS430	0.8	32.8621	75.17183	609	Jaganoo	7.7	220
TS431	3.4	32.85619	75.16511	593	Jaganoo	7.5	366
TS432	13.3	32.86209	75.1264	624	Udhampur	7.3	390
TS433	-	32.95669	75.19433	899	Udhampur	7.7	228
TS434	10.9	32.96315	75.17839	1019	Narsoo	8.1	167
TS435	6.5	32.96398	75.18147	1060	Narsoo	7.2	86
TS436	10.7	32.97316	75.192	1074	Sewna	7.5	309
TS437	2.4	32.97849	75.19533	1077	Sewna	7.4	169
TS438	0.9	33.00216	75.22738	1071	Sewna	7.3	265
TS439	40	33.00754	75.23673	1019	Sewna	7.8	201
TS440	8.3	33.00873	75.23311	996	Sewna	8	482
TS441	3.3	32.8958	75.02897	727	Tikri	6.7	304
TS442	2	32.89353	75.02333	738	Tikri	6.8	400

TS443	5	32.89759	75.01684	745	Tikri	6.2	397
TS444	3.3	32.91259	74.99382	829	Tikri	6.2	310
TS445	2	32.91292	75.00025	834	Tikri	6.5	446
TS446	2	32.90135	75.01698	751	Tikri	6.6	347
TS447	3.3	32.9168	75.02351	784	Udhampur	6.3	359
TS448	3.3	32.92038	75.01662	811	Udhampur	6.4	330
TS449	3.3	32.92037	75.01662	811	Udhampur	6.2	339
TS450	3.3	32.92619	75.02285	742	Udhampur	6.5	318
TS451	-	32.74657	75.15681	537	Majalta	7.72	412
TS452	120	32.70738	75.18689	572	Majalta	7.56	452
TS453	2	32.71644	75.18686	583	Majalta	7.62	326
TS454	88.3	32.72595	75.17124	520	Majalta	7.34	759
TS455	-	32.70001	75.14814	666	Udhampur	-	-
TS456	12	32.77358	75.00527	536	Jammu	7.2	540
TS457	15.2	32.77715	75.02682	621	Dhansal	7.4	450
TS458	26.8	32.97535	74.90924	737	Katra	8.09	456
TS459	4.2	32.97024	74.90272	722	Katra	8.78	479
TS460	8.7	32.97194	74.91022	686	Katra	8.3	531
TS461	90	32.97314	74.91323	706	Katra	8.4	474
TS462	3.6	32.97487	74.91372	741	Katra	7.5	830
TS463	61.8	32.97566	74.91468	744	Katra	7.2	831
TS464	8.2	32.99717	74.95232	1035	Katra	7.7	480
TS465	15.5	32.99301	74.94429	880	Katra	7.6	400
TS466	6.4	32.99719	75.37551	1610	Chennani	-	-
TS467	60.6	33.02224	75.36627	1555	Chennani	8.25	326
TS468	66.5	32.91801	75.10853	672	Udhampur	7.25	660
TS469	19.5	33.00578	75.35918	1599	Chennani	8.21	461
TS470	96.8	33.0417	75.28738	1193	Chennani	7.6	593

4.1.4. River Basins

4.1.4.1. Subject Matter:

The river system in Jammu and Kashmir, a region in the northern part of India, is an intricate network of water bodies that play a crucial role in shaping the geography, ecology, and livelihoods of the region are presented in Figure 4.18. Nestled amidst the majestic Himalayan Mountain range, Jammu and Kashmir is blessed with numerous rivers and their tributaries, contributing to the overall topographical diversity and natural beauty of the area. The prominent rivers in Jammu and Kashmir include the Jhelum, Chenab, Ravi, and among others small scale river basin. These rivers not only serve as a source of water for irrigation and domestic use but also hold cultural and historical significance, influencing the lifestyle and traditions of the local communities. The utilization of water resources in Jammu and Kashmir has been a source of political tension between India and Pakistan, as many of these rivers also flow through Pakistan-administered territories. The region's rivers have been extensively tapped for hydropower projects, leading to environmental concerns and debates over their ecological impact.

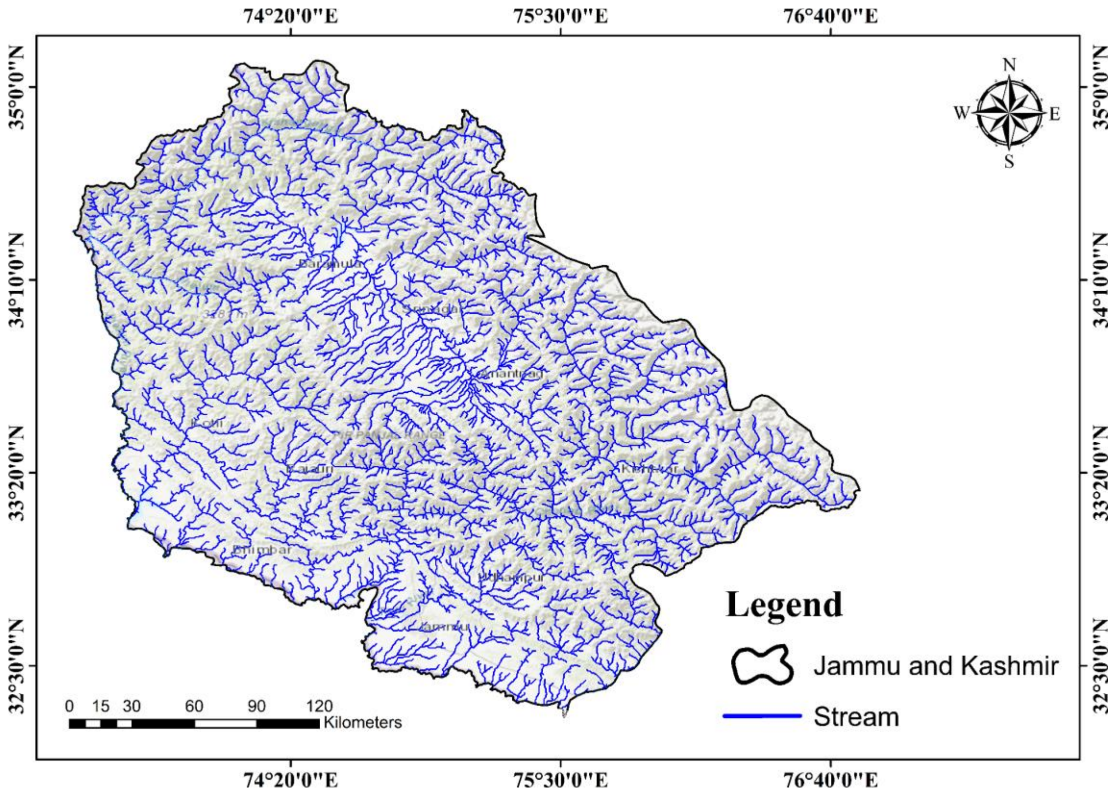


Figure 4.18 Hydrology based region topography for Jammu and Kashmir.

A. Characteristics of each river including catchment area:

Jhelum[1]

The Jhelum River originates from the Verinag spring in Anantnag, flowing through Srinagar before reaching Wular Lake (Romshoo 2017). It continues its course through Baramula and Uri, ultimately entering Pakistan. The accompanying Figure 4.19 illustrates the geographical location of the Jhelum basin.

The transverse ridges on the southwest and northwest sides of the basin are approximately 190 km apart, with a distance of about 100 kilometers from the crest of the Pir Panjal to the Great Himalayan range. The altitude within the basin varies from 1,549 m at Wular Lake to a maximum of 5,432 m at Kolahoi Peak.The Jhelum basin, responsible for draining the entire Kashmir valley, is situated in a longitudinal depression within the extensive northwestern complex of the Himalayan ranges. This hydrological feature holds significant geographic importance. The total catchment area up to the Line of Control, where it enters Pakistan, is approximately 15,856 km², encompassing 24 watersheds (refer toTable 4.11).

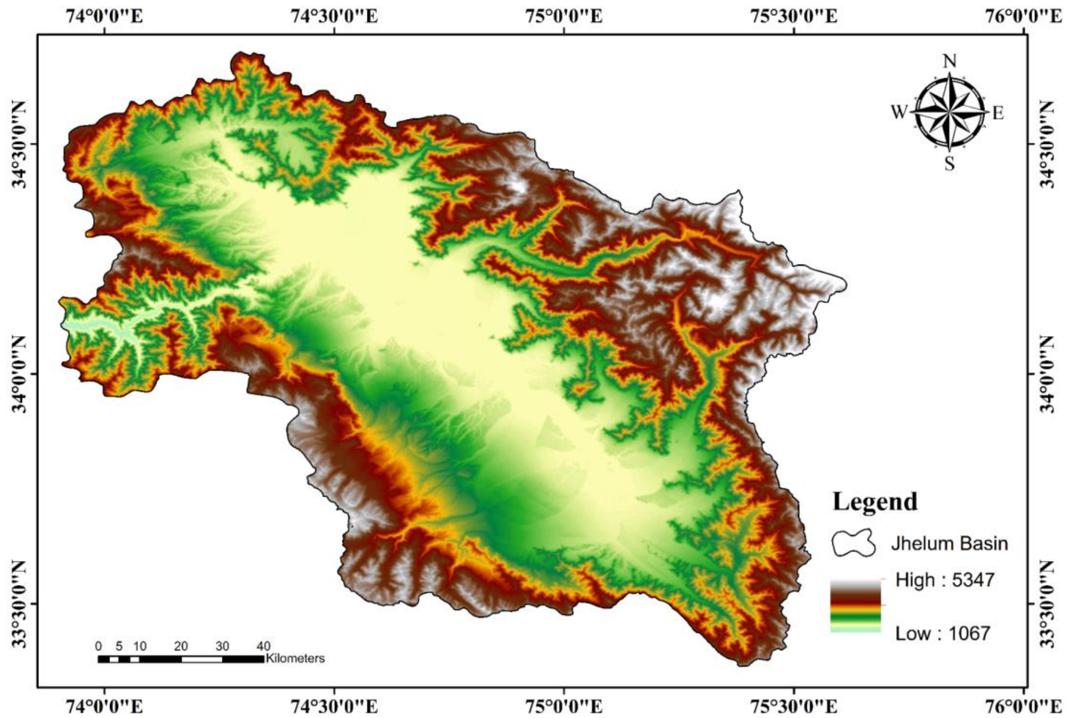


Figure 4.19. Location and Extents of the Jhelum River Basin. Source: Layer based on the 1 arc sec Shuttle Radar Topography Mission (SRTM) Digital Elevation Model (DEM).

[1] https://link.springer.com/chapter/10.1007/978-981-10-2984-4_30

Figure 4.20 illustrates the drainage pattern of the Kashmir valley, showcasing distinct differences on the Pir Panjal and Greater Himalayan sides. With 24 tributaries, some originating from the Pir Panjal range join the river on the left bank, while others flow from the Himalayan range and join on the right bank. The Jhelum basin features a well-established drainage system, primarily led by the Jhelum itself, as depicted in Figure 4.20. The encircling mountain ranges, adorned with ridges and covered in snow throughout the year, foster the development of numerous streams within the basin.

Table 4.11. Sub-watershed/ basin of Jhelum River basin for Jammu and Kashmir. Source: Indian river Week-Jhelum 2016.

S. No	Sub-watershed/ basin	Area (sq Km)	Tributary	Length (Km)	
1	Vishaw	994	Vishaw	72	Left bank tributaries
2	Romshi	338	Romshi	52	
3	Rembaira	702	Rembaira	66	
4	Sukhnag	433	Sukhnag	57	
5	Ferozpura	446	Ferozpura	52	
6	Dodhganga	756	Dodhganga	49	
7	Ningal Nallah	200	Ningal Nallah	31	
8	Vij-Dakil	103	Vij-Dakil nallah	30	
9	Gundar	164	Gundar	16	
10	Lower Jhelum	1061	Part of main Jhelum	60	
11	Lidder	1229	Lidder	110	Right bank tributaries
12	Bringi	676	Bringi	49	
13	Aripath	291	Aripath	30	
14	Sandram	473	Sandran	53	
15	Arpal	618	Arpal	24	
16	Sindh	1560	Sindh	138	
17	Dachigam	336	Dachigam	37	
18	Erin	251	Erin	13	
19	Mahumati	420	Mahumati	39	
20	Pohru	1837	Pohru	177	
21	Wular 1	396	-	-	
22	Wular 2	53	-	-	
23	Garzan	105	-	-	
24	Anchar	92	-	-	

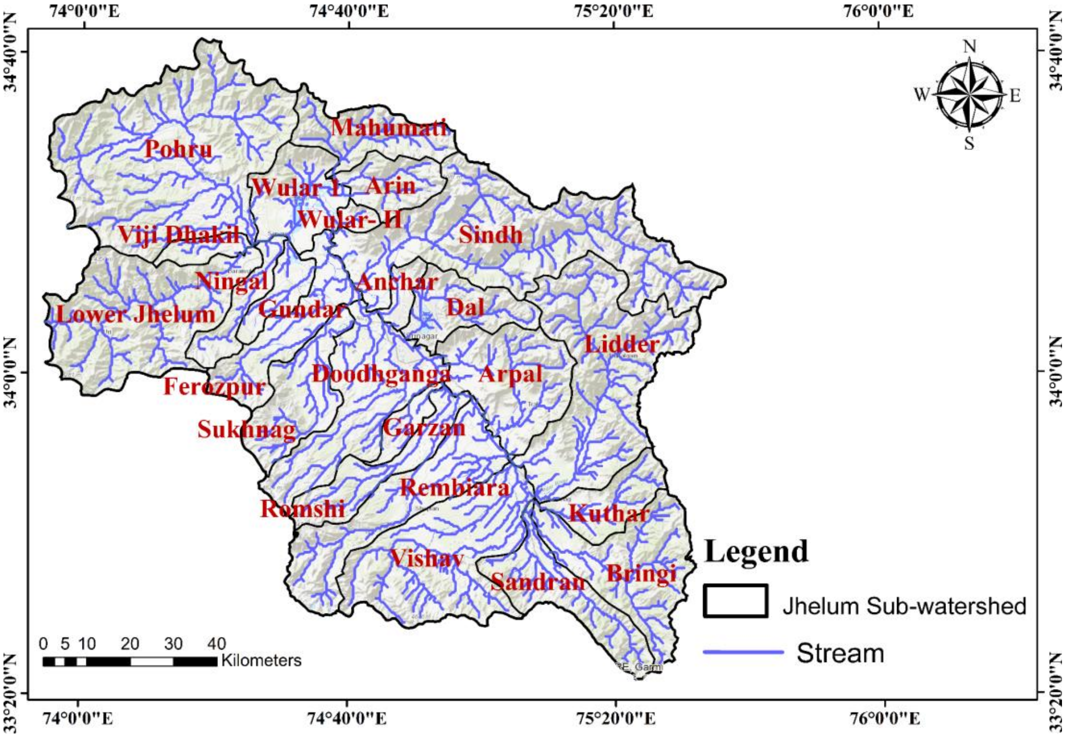


Figure 4.20. Sub-watershed map of Jhelum basin for Jammu and Kashmir.

Chenab[1]

The River Chenab, one of the major tributaries of the Indus basin, originates in the upper Himalayas in the Lahaul region districts of Himachal Pradesh (Shukla and Ali 2018). The name "Chenab" is derived from the combination of two streams, Chandra (Moon) and Bhaga (Luck or Snraj Bhaga), which converge at Tandi in Himachal Pradesh. Chandra emerges from a lake, while Bhaga joins it near Tandi. Together, these rivers are collectively known as Chandra-Bhaga. After the confluence at Tandi, the Chenab enters the Pangi Valley of Chamba district, flowing through the Bhujind area, and then continues into the Podar Valley of Kashmir. With a total length of approximately 1363 km and a catchment area of about 41,899 km², the river spans across Himachal Pradesh, Jammu and Kashmir, and Pakistan. The catchment area is distributed with 52% in Pakistan, 42.5% in Jammu and Kashmir, and 6.5% in Himachal Pradesh. The river gains momentum from numerous tributaries as it travels from its headwaters to Kishtwar in Jammu and Kashmir, where it takes a south-westerly direction through deep gorges along the northern base of the Pir Panjal Range. As the Chenab meanders through the mountainous terrain, it becomes less suitable for irrigation and cultivation due to its challenging topography. From Kishtwar, the river follows

[1] https://link.springer.com/chapter/10.1007/978-981-10-2984-4_30

a westerly direction towards the fort of Reasi and continues to Akhnoor. The total length of the river from the Chandra-Bhaga confluence to Akhnoor is approximately 410 km. Upon reaching the Sialkot district in Pakistan, the Chenab turns south-west and is eventually joined by the Jhelum River above Trimmu. About 64 km below Trimmu, the River Ravi also merges with the Chenab. This confluence forms the Punjnad, which further joins the Sutlej River. Finally, approximately 64 km downstream, the combined rivers meet the Indus River at Mithankot. It's important to note that the entire course of the Chenab River plays a significant role in shaping the geographical and hydrological landscape of Jammu and Kashmir, as well as contributing to the larger Indus basin in Pakistan. There are Smaller tributaries like the Minawar Tawi, Marao-Wardwan, and Ans rivers that contribute to the increased volume of water in the Chenab river. The location of Chenab River basin is shown in Figure 4.21.

Tawi: The Tawi River (Figure 4.22), a significant left bank tributary of the Chenab River, originates from the Kali Kundi glacier in the Kalaish range, situated at an elevation of 4419 meters above sea level (Ashraf and Jamwal 2022). Its source is in the Doda Valley, extending about 64 km eastward from Chennai. Initially flowing in a northwesterly direction for approximately 45 km towards Chenani, the river collects water from various small streams in its upper course. After this, the Tawi River takes a south- waters from Burmin, Sulah Khad, and Dudar on the right bank, as well as Ramna Garwali Khad on the left side. Continuing in a westerly direction, the Tawi River eventually reaches the town of Jammu before finally joining the Chenab River. From its source to the confluence with the Chenab River, the Tawi River spans a total length of approximately 112 km, with a catchment area of about 2168 km², encompassing the districts of Doda, Udhampur, and Jammu. western course, covering a distance of 24 km through a deep valley from Chennai. As it approaches Udhampur, the river changes direction to the south and receives waters from Burmin, Sulah Khad, and Dudar on the right bank, as well as Ramna Garwali Khad on the left side. Continuing in a westerly direction, the Tawi River eventually reaches the town of Jammu before finally joining the Chenab River.From its source to the confluence with the Chenab River, the Tawi River spans a total length of approximately 112 km, with a catchment area of about 2168 km², encompassing the districts of Doda, Udhampur, and Jammu.

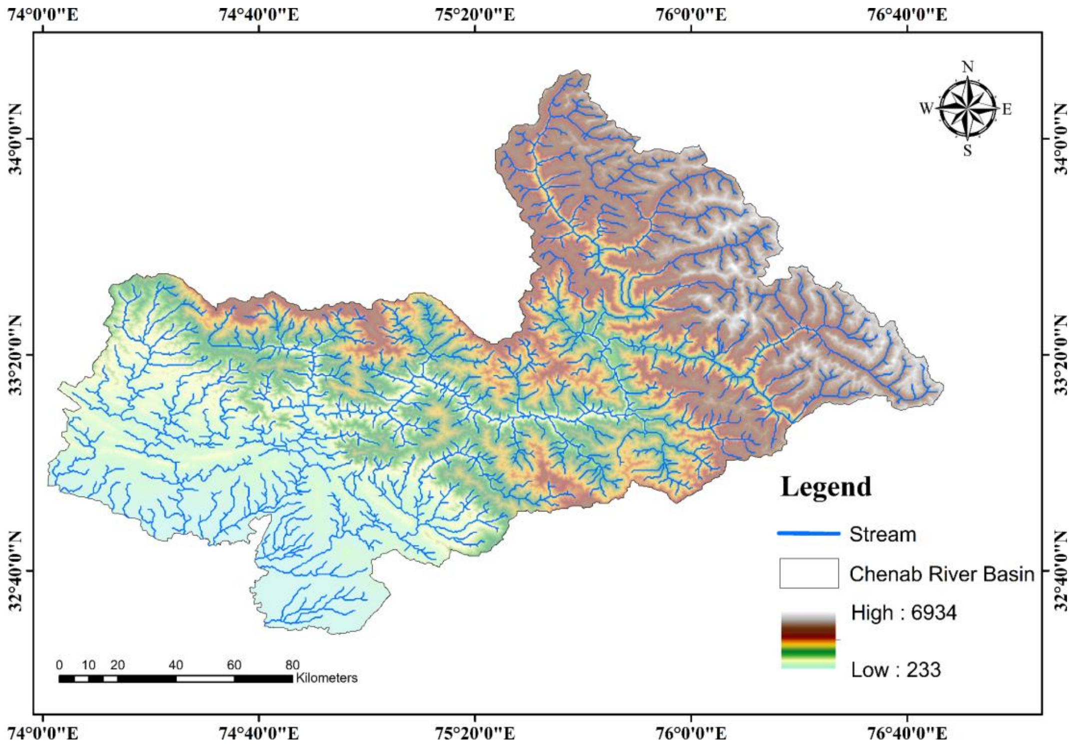


Figure 4.21. location of Chenab River Baisn of Jammu and Kashmir. Source: Layer based on the 1 arcSec Shuttle Radar Topography Mission (SRTM) Digital Elevation Model (DEM).

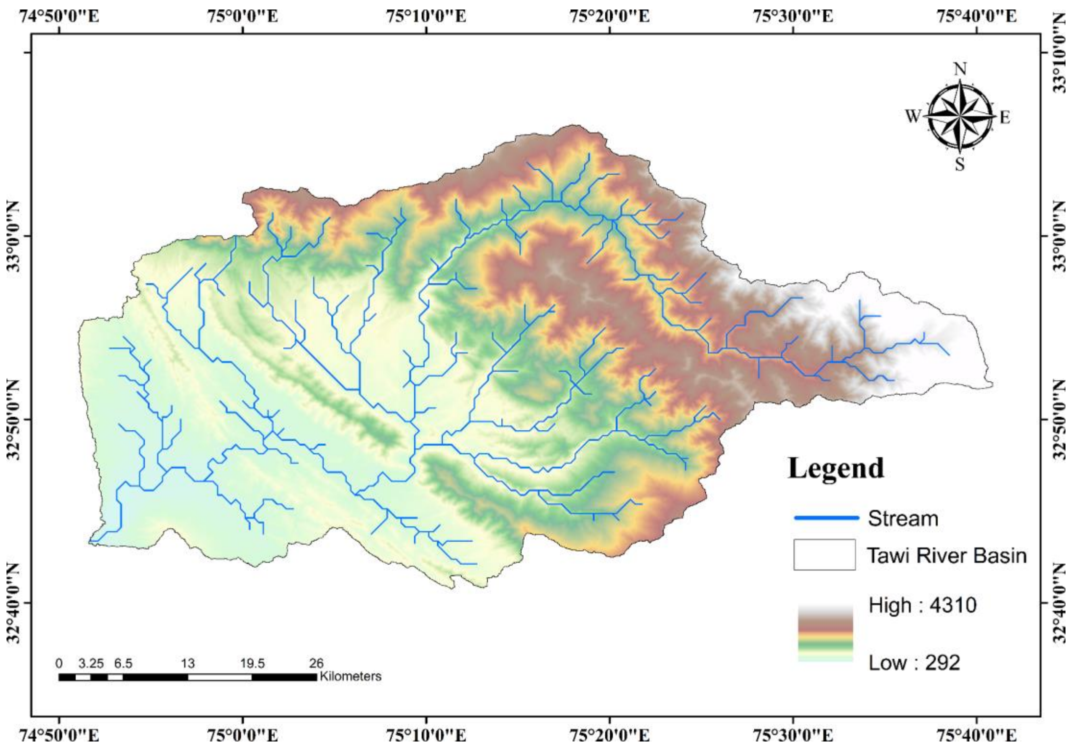


Figure 4.22 The location of Tawi River Baisn of Jammu and Kashmir. Source: Layer based on the 1 arcSec Shuttle Radar Topography Mission (SRTM) Digital Elevation Model (DEM).

Ravi[1]

The Ravi River (Figure 4.23), the smallest river in the Punjab region that spans both India and Pakistan, is formed by three main streams: the Ravi Proper, the Budhil, and the Nai (Shukla and Ali 2018). This confluence occurs below Wulas in the Chamba Valley, situated in the Himachal Pradesh. Notable right bank tributaries include the Budhil, Tundahan, Beljedi, Saho, and Siul, while the Chirchind Nala is a significant left bank tributary. Flowing in a northwesterly direction from its source, the Ravi River meanders through narrow valleys between the Pir Panjal and Dhauladhar ranges, entering the Chamba district of Himachal Pradesh. Upon traversing this district, it exits the Himalayas at Basoli and passes near Kathua. Taking a sudden westerly turn, it enters the Punjab Plain near Madhopur, subsequently marking the boundary between the two Punjabs—west in Pakistan and east in India—some distance below Madhopur. As the river continues through the plain area of western Punjab (Pakistan), it adopts a southwesterly course, passing through prominent cities such as Lahore and Chichawatni. Eventually, it merges with the Chenab River below Sardarpur, after flowing over a length of 1059 km.

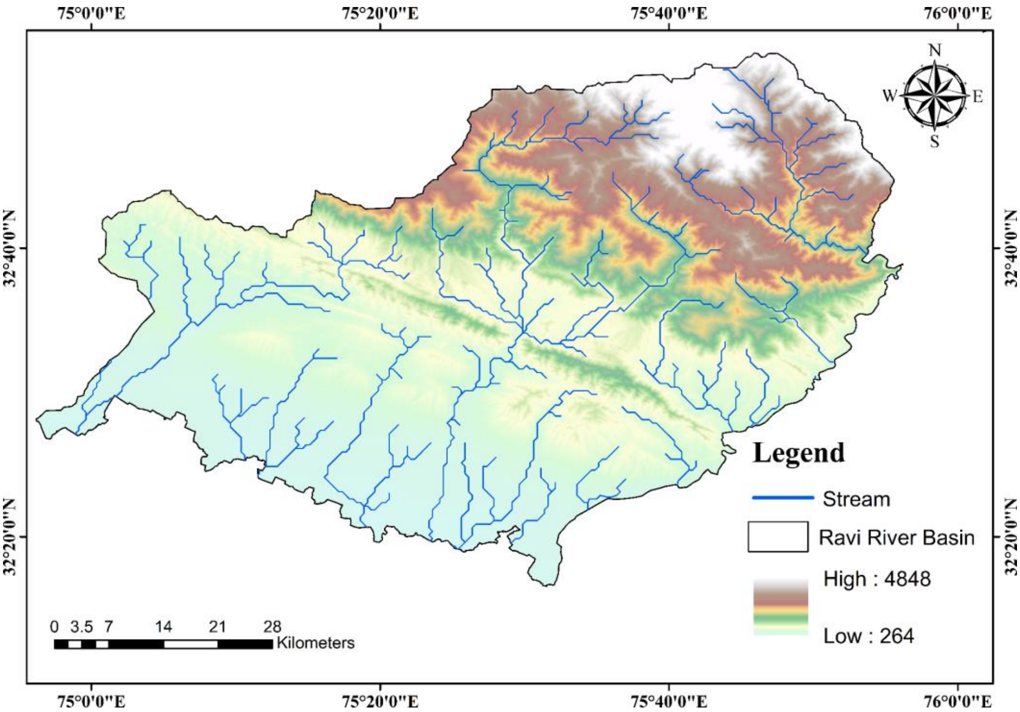


Figure 4.23. Location of Ravi River Basin of Jammu and Kashmir. Source: Layer based on the 1 arcSec Shuttle Radar Topography Mission (SRTM) Digital Elevation Model (DEM).

The total catchment area of the Ravi River is approximately 25,333 km², with 29% (7094 km²) lying in India and 71% (18,239 km²) in Pakistan. The river's journey

[1] https://link.springer.com/chapter/10.1007/978-981-10-2984-4_30

holds geographical significance in the context of the Jammu and Kashmir region, reflecting the intricate dynamics between India and Pakistan.The location of Ravi River basin is shown in Figure 4.23.

B. Land Use/ Cover

Land Use and Land Cover (LULC) alterations represent a significant facet of human-induced modifications, prompting inquiries about their repercussions on hydrology and climate. The intricate interplay of energy and water fluxes at the land surface, dictated by LULC, can wield considerable influence on the water and energy cycles. The magnitude of these effects at the basin scale hinges on the scale, type, and heterogeneity of LULC changes. In the context of the Jammu and Kashmir River basin, the assessment discloses a crucial compensatory mechanism inherent in hydrological shifts triggered by LULC transformations. The adverse outcomes, such as heightened surface runoff attributable to urbanization, manifesting in one locality, find offsetting counterbalances in favorable alterations, like diminished surface runoff due to forest plantation, occurring elsewhere within the river basin of Jammu and Kashmir. This compensation mechanism results in seemingly inconsequential hydrological changes at the basin scale. However, the ramifications become pronounced when scrutinized at local and sub-basin scales.

Table 4.12. Land Use and Land Cover Distribution of Jammu & Kashmir rivers of Year 2017. Source: National Water Informatics Centre

S. No	Classes	Area Sq. Km
1	Built up	627.723712
2	Kharif crop	3138.035264
3	Rabi crop	258.911296
4	Zaid crop	214.979072
5	Double / Triple Crop	4633.653248
6	Current fallow	560.484736
7	Plantation	1757.831488
8	Evergreen forest	11832.93395
9	Deciduous forest	4710.529152
10	Degraded / Scrub Forest	6845.107136
11	Littoral swamp	0
12	Grassland	209.65728
13	Shifting cultivation	0
14	Wasteland	10322.22867
15	Rann	0
16	Waterbodies max	878.923584
17	Waterbodies min	362.079424
18	Snow cover	6692.625408

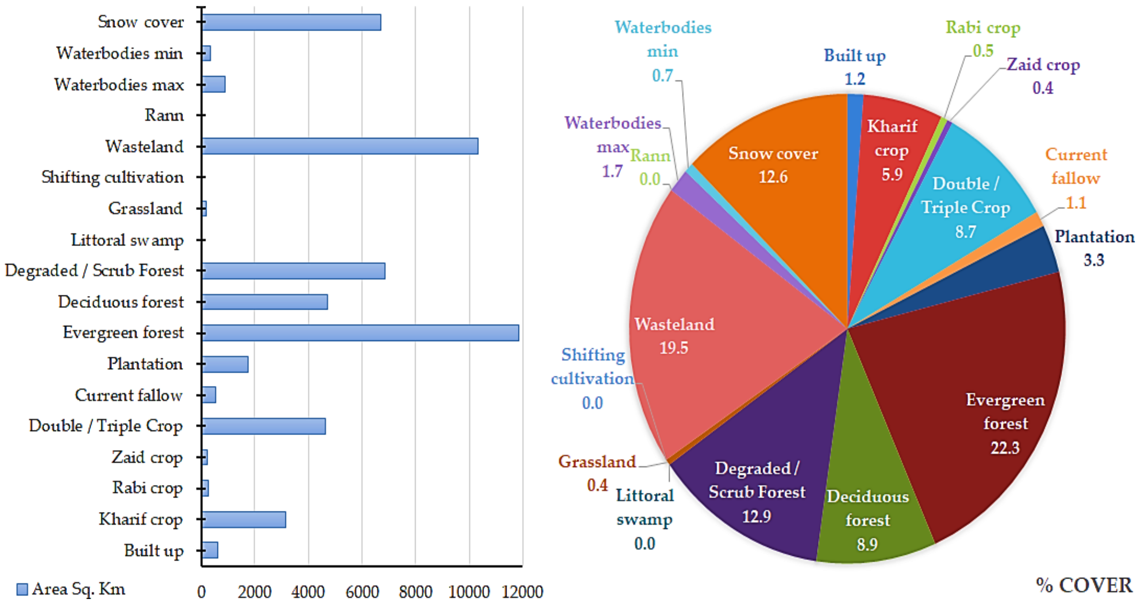


Figure 4.24. Land Use and Land Cover Distribution of Jammu & Kashmir rivers of Year 2017. Source: National Water Informatics Centre.

For an understanding corresponding to the LULC specific to the Jammu and Kashmir River basins, please refer to Figure 4.24. Land Use and Land Cover Distribution of Jammu & Kashmir rivers of Year 2017. Source: National Water Informatics Centre.for a visual representation of the LULC and Table 4.12. Land Use and Land Cover Distribution of Jammu & Kashmir rivers of Year 2017. Source: National Water Informatics Centre for a tabulated representation of the pertinent data. This delineation facilitates a comprehensive understanding of how LULC modifications in the Jammu and Kashmir River basin contribute uniquely to the overall hydrological dynamics, given the region's distinctive geographical and environmental characteristics. The primary land cover comprises forests, wastelands and snow cover, followed by agricultural lands.

C. Hydrological data Observation Network:

The Hydrological Data Observation Network for Jammu and Kashmir (J&K) is a system of monitoring stations and infrastructure established to collect, analyze, and manage hydrological data in the region. This network plays a crucial role in understanding the water dynamics, assessing the availability and quality of water resources, and making informed decisions for water resource management. Here are key aspects of the Hydrological Data Observation Network for J&K:

a) Monitoring Stations
b) River Gauging Stations
c) Meteorological Stations
d) Glacial Monitoring Stations
e) Data Collection Instrument

D. Environmental Flow:

E-flows are the flow regimes that are widely acceptable in maintaining the apt or a predetermined environmental state of a river. Environmental flow or e-flow refers to the quantity, quality, and timing of water flow required to sustain the health, function, and resilience of aquatic ecosystems and the services they provide. It encompasses the water necessary to support various ecological processes, such as the growth and reproduction of aquatic plants and animals, to maintain critical habitat conditions, and to ensure continuous flow in the rivers. Environmental flow definitions often consider seasonal variations, ecological needs, and human impacts to ensure that rivers and streams continue to support biodiversity, maintain water quality, and provide ecosystem services. This approach helps to balance human water needs with the protection of natural water systems and ensures the minimum required environmental flow of water even after the river flow gets diverted by projects and structures for purposes like irrigation, hydropower, domestic and industrial use etc. is maintained. According to (Mehmood et.al 2023) environmental flow requirements for the rivers of Jammu and Kashmir is presented in Table 4.13.

The NWM recognizes the usage of water and the ecological needs of the river as of high significance and subsequently, brought forward the National Water Policy (2012)[1]. The salient features of the policy are discussed in section 6.2. The policy emphasises the necessity of water for sustenance and considerations for minimum ecological needs of an eco-system by keeping a regulated fraction of river flow as per the low and high flow season for meeting the ecological needs.

Table 4.13 Environmental flow requirements for the rivers of Jammu and Kashmir.

S. No.	Environmental Management Classification (EMCs)	Jhelum		Chenab		Ravi	
		% of Mean Annual Flow (MAF)	Environmental Flow Requirement (EFRs m^3/s)	% of Mean Annual Flow (MAF)	Environmental Flow Requirement (EFRs m3/s)	% of Mean Annual Flow (MAF)	Environmental Flow Requirement (EFRs m3/s)
1	A	80	683	77	744	83	581
2	B	62	534	59	564	68	478
3	C	48	412	44	425	56	389
4	D	37	315	34	324	45	314
5	E	28	240	26	253	36	250
6	F	22	186	21	205	28	196
7	Oct-Apr	10	86	10	96	10	70

[1] https://nwm.gov.in/sites/default/files/national%20water%20policy%202012_0.pdf

8	May-Sept	30	257	30	288	30	210
9	Q_{90}	23	193	20	194	35	244
10	Q_{95}	19	162	18	175	14	101
11	$7Q_{10}$	21	176	21	200	14	100
A, B, C, D, E, F = General Ecological Flow Categories; Q_{90} = 90th Percentile Flow; Q_{95} = 95th percentile flow; 7Q10 = 7-day, 10-year low flow.							

4.1.4.2. Issues and Challenges

The key issues and challenges for the Jammu and Kashmir (J&K) river basin:

- Accelerated glacial and snow melting due to climate change poses significant threats to water availability and quality in the Jammu and Kashmir. As temperatures rise, glaciers and snowpacks in the region are retreating at an alarming rate, leading to increased runoff and altered river flows. This rapid melting not only threatens to deplete long-term water reserves but also disrupts the timing and volume of water flow, impacting agriculture, drinking water supply, and hydropower generation.
- Growing water scarcity in Jammu and Kashmir is becoming a significant challenge due to the increasing demand from agriculture, industry, and urbanization. The region's agricultural sector, which relies heavily on irrigation, is putting immense pressure on the water resources. Additionally, industrial growth and urban expansion are further exacerbating the situation by increasing water consumption and pollution. Addresing this complex scenario requires sustainable management of water resources, necessitating integrated solutions to balance the needs of various sectors and ensure the long-term availability of water in the region.
- Deforestation contributes to soil erosion, loss of biodiversity, and disruption of the delicate ecological balance within the river basin.
- Rapid and unplanned urbanization, agricultural expansion, and infrastructure development lead to significant changes in land use, impacting hydrology and ecosystems.
- Inadequate data and monitoring infrastructure hinder effective water resource management and decision-making in the basin.
- Water-related challenges have socio-economic repercussions, affecting livelihoods, agriculture, and overall well-being of communities' dependent on the J&K river basin.
- Snow and glacier melt significantly contribute to river discharge, especially in the summer months. As temperatures rise, the accumulated snow and glaciers in the higher altitudes of the Himalayas begin to melt. This meltwater flows

downstream, feeding into rivers such as the Jhelum, Chenab. The meltwater is a crucial component of the hydrological cycle in this region, sustaining river flow during dry periods and supporting agriculture, hydropower generation, and drinking water supplies. Accurate measurement and modeling of snow and glacier melt are essential for managing water resources, predicting floods, and mitigating the impacts of climate change in Jammu and Kashmir.

- The collection and dissemination of meteorological, hydrological, and environmental data are largely managed by central government agencies. The central bodies are responsible for the installation, maintenance, and operation of weather stations, river gauging stations, and remote sensing infrastructure. As a result, there is a lack of state or Union Territory-specific data collection initiatives and infrastructure, making the region dependent on centralized data sources for planning, research, and management purposes. This reliance can sometimes lead to delays and gaps in localized data availability and hinders the development of region-specific environmental policies and strategies.

4.1.4.3. Govenance/ Management

I. **Statute / Law / Policy/ Regulations if any:**

a) **Jammu and Kashmir Water Resources (Regulation and Management) Act, 2010[1]:** This state-level legislation may have addressed various aspects of water resources regulation, allocation, and management within the region.

b) **Inter-State River Water Disputes Act, 1956[2]:** Applies to disputes between states over the use, distribution, or control of waters of inter-state rivers. The constitution of a tribunal under this act is essential in case of inter-state water disputes. UT of J&K is not under any active disputes tribunals[3].

c) **The Water (Prevention and Control of Pollution) Act, 1974[4]:** Addresses water pollution issues and empowers the Central and State Pollution Control Boards to prevent and control water pollution.

d) **The River Boards Act, 1956[2]:** Provides for the establishment of river boards for the regulation and development of inter-state rivers and river valleys.

e) **National Water Policy (NWP)[5]:** The NWP provides a broad framework for the development and management of water resources in the country, and its principles may be applicable to Jammu and Kashmir. To address the present challenges in water sector, revision of National Water Policy has

[1] https://jkswrra.nic.in/Acts%20&%20Rules/JKSWRRA%20Act,%202010.pdf
[2] https://legalaffairs.gov.in/sites/default/files/Article%20262%20and%20Inter-State%20Disputes%20relating%20to%20Water.pdf
[3] https://pib.gov.in/newsite/PrintRelease.aspx?relid=186654
[4] https://cpcb.nic.in/7thEditionPollutionControlLawSeries2021.pdf
[5] https://nwm.gov.in/sites/default/files/national%20water%20policy%202012_0.pdf

been envisaged and a drafting committee was constituted to revise the National Water Policy[1].

f) **The Environment (Protection) Act, 1986[4]:** Empowers the central government to take measures to protect and improve environmental quality.

II. **Institutions governing the resources and structure:** The Central Water Commission (CWC) at the national level may provide insights into water-related policies and initiatives that impact Jammu and Kashmir. They might collaborate with state authorities on water resource management.

III. **Area of peoples/ Private participations if any**

IV. **Schemes & financing**

4.1.4.4. Measurement, Monitoring and Data Constraints/ Management

a) **Hydrological observation network:** Hydrological networks implement measurement protocols in accordance with standards established by the Central Government and the Bureau of Indian Standards (BIS)[2]. This ensures that the data collected adheres to predefined criteria and quality benchmarks set by authoritative bodies. Standardization in measurement practices guarantees the reliability and consistency of hydrological data across various networks, facilitating accurate assessments and informed decision-making in water resource management. The adoption of these standards contributes to the robustness of hydrological monitoring systems and enhances the overall quality and reliability of data collected from diverse locations within the network.

b) **Other Network:** Not available

c) **Data base management system details:** Not available

d) **Data Constraints:** Ongoing geopolitical tensions and conflicts in the region may result in restricted access to certain areas, leading to data gaps and limitations in understanding specific parts of the basin.

e) **Sediment monitoring and management:** Not available

f) **State-level data dissemination protocol (for sharing the data from State-owned observation stations) based on Hydro-Meteorology Data Dissemination Policy 2013:** Not available

[1] https://pib.gov.in/Pressreleaseshare.aspx?PRID=1782283
[2] https://nhp.mowr.gov.in/Docs/HP-2/Manuals/Manual-SWVolume4DesignManualH.pdf

4.1.4.5. Road map of activities/ tasks proposed for better governance with timelines and agencies responsible for each task/ activity, if any

a) Better Governance
b) Better Source/ Supply Management
c) Better Demand Management
d) Water Quality & Sediment Flow Management
e) Water Economics & Financing
f) Sustainable Water Budgeting

4.1.5. Projects- Irrigation and Multi-Purpose

4.1.5.1. Subject Matter

Jammu and Kashmir, a diverse Union Territory characterized by hilly terrain and rich cultural diversity, heavily relies on agriculture as its economic backbone, with around 70% of the population directly or indirectly engaged in farming (JKAPD 2020). Despite favourable conditions for diverse farming systems, challenges such as difficult terrain and limited accessibility hinder the provision of inputs, products, and knowledge. A significant portion of cultivated land lacks irrigation, leading to low production and productivity. The region faces obstacles like low crop yields, deficits in food-grain, oilseed, and vegetable production, as well as issues of capital inadequacy, insufficient infrastructure, and depleting water resources. The challenging landscape restricts mechanical farming and transportation, contributing to soil erosion. Despite these hurdles, Jammu and Kashmir holds potential in horticulture, with fruit production reaching 14 lakh Mts and possibilities for hydroelectric power generation. However, resource scarcity hampers full exploitation. The agricultural landscape varies, with Jammu resembling Punjab, and Kashmir predominantly adopting a single-cropping pattern.

The practice of irrigating crops has ancient roots, spanning thousands of years in human history (Sharma 2020). Despite technological advancements, the fundamental purpose of irrigation remains consistent: to supplement natural rainfall and enhance crop yields. Irrigation involves the artificial and systematic distribution of water for agriculture and horticulture to achieve higher or better-quality production.

Water use efficiency of irrigation projects: As per the Food & Agriculture Organization (FAO), Water Use Efficiency (WUE) is defined as follows.

"In irrigation, Water Use Efficiency (WUE) represents the ratio between effective water use and actual water withdrawal. It characterizes, in a specific process, how effective is the use of water. Efficiency is scale and process dependent."[1]

WUE can be interpreted in various ways by different experts, such as agriculturists, hydrologists, and engineers. The relevance of a particular definition hinges on the perspective of the author and the specific hydrological boundaries considered, including factors like beneficial use, soil water storage, and effective rainfall utilization. Efficient irrigation at the farm level is influenced by water use, energy consumption, labor, and capital investment, and how these elements contribute to production and profitability. Consequently, no single definition comprehensively addresses all aspects of WUE. The Central Water Commission (CWC) has adopted the standardization of Water Use Efficiency (WUE)[2], as broadly recommended by

[1] https://www.fao.org/fileadmin/user_upload/agwa/docs/1_Efficiency_Thematic%20Brief_En.pdf

[2] https://nwm.gov.in/sites/default/files/WUE%20guidelines_CWC.pdf

the International Commission on Irrigation and Drainage (ICID), into the following components:

a) Reservoir Filling Efficiency/Diversion Efficiency/Operational Efficiency (W_R)
b) Conveyance Efficiency (W_C)
c) On-Farm Application Efficiency (W_F)
d) Drainage Efficiency (W_D)

The overall efficiency (W_P) of the project is taken as:

$$\boldsymbol{W_P = W_R \times W_C \times W_F \times W_D}$$

Irrigation System: The entire Union Territory of Jammu and Kashmir is situated within the Indus River System, and as a result, the irrigation status of the UT varies by district are presented in Table 4.14.

Table 4.14. The irrigation status of Jammu and Kashmir, 2022. Source: Department of Irrigation & Flood Control, Jammu and Kashmir.

S. N.	District	Total Geo. Area (in Ha)	Net Area (in Ha)	Net Area Irrigated (Source) in Ha					Area under Horti. (in Ha)
				Canals	Tanks	Wells	Other	Total	
1	Jammu	237024	103366	76488	1927	2645	2903	83963	12072
2	Samba	83095	34117	8273	-	833	998	10104	7869
3	Udhampur	279310	43556	3085	-	-	-	3085	6466
4	Reasi	151701	15815	1101	33	-	-	1134	5078
5	Doda	187797	29037	2563	38	-	-	2601	8193
6	Kishtwar	109434	19986	2779	-	-	67	2846	3676
7	Ramban	113787	58699	1012	117	-	266	1395	4906
8	Kathua	264729	53480	16366	438	886	3089	20779	12009
9	Rajouri	253341	27192	2782	57	266	1825	4930	10631
10	Poonch	115007	43040	2893	12	189	277	3371	8625
Total Jammu		**1795225**	**428288**	**117342**	**2622**	**4819**	**9425**	**134208**	**79525**
11	Anantnag	72149	35423	23905	418	-	787	25110	20346
12	Kulgam	47642	29283	13104	809	2107	2902	18922	19092
13	Pulwama	60772	32660	21943	169	58	-	22170	12855
14	Shopian	36834	18683	12588	-	-	-	12588	22914
15	Srinagar	11703	5910	2619	997	99	637	4352	5665
16	Ganderbal	39304	13634	10630	103	151	132	11016	8461
17	Budgam	77827	33455	33820	1234	1538	2943	39535	18429
18	Baramulla	109470	64511	29496	-	-	-	29496	26001
19	Bandipora	34368	25402	13861	79	72	1211	15223	6175
20	Kupwara	66593	45718	20234	827	-	1121	22182	19720

Total Kashmir	**556662**	**304679**	**182200**	**4636**	**4025**	**9733**	**200594**	**159658**
G Total	**2351887**	**732967**	**299542**	**7258**	**8844**	**19158**	**334802**	**239183**

4.1.5.2. Availability & Utilizable Water:

The storage in major reservoirs/ projects with Cultivable Command Area (CCA) greater than 10000 Hectares used for irrigation are illustrated in Table 4.15. The storage in Minor Reservoir/Projects with CCA < 2000 Hectares is shown in 4.1.5.7 Annexure, Table 4.16.

Table 4.15. Storage in Major & Medium Reservoir/Projects (MCM) as on 1st June 2023

A5. Storage in Major Reservoir/Projects (MCM) as on 1st June (Cultivable Command Area > 10000 Hectares)		REMARKS
Projects in Indus Basin / Chenab Sub-basin	1. Main Ranbir Canal (Jammu)	CCA = 38603 Ha with no storage
TOTAL		

A6. Storage in Medium Reservoir/Projects (MCM) as on 1st June (CCA in between 2000 & 10000 Hectares)		REMARKS
Projects in Indus Basin/ Chenab Sub-basin	1. New Partap Canal (Akhnoor, Jammu) 2. Ranjan Canal (Akhnoor, Jammu)l 3. Pargwal Canal & Garkhal Khul (Akhnoor, Jammu) 4. Ans Canal (Poonch)	1. CCA = 9065 Ha with no storage 2. CCA = 5000 Ha with no storage 3. CCA = 3060 Ha with no storage 4. CCA = 2000 Ha with no storage
Projects in Indus Basin/ Ravi Sub-basin	1. Kathua Canal	1. CCA = 8463 Ha with no storage
TOTAL		

4.1.5.3. Issues and Challenges:

The issues and challenges related to irrigation projects in Jammu and Kashmir are multifaceted, involving governance, topography, and implementation concerns:

- Although policies exist, the implementation faces significant challenges due to bureaucratic hurdles, lack of coordination among different agencies, and insufficient monitoring mechanisms. The gap between policy formation and on-the-ground execution leads to delays in project completion and inefficiencies in resource utilization.

- The complex and varied topography of Jammu and Kashmir makes it difficult to design and implement irrigation projects. Steep slopes, high-altitude areas, and rugged terrain increase the costs and technical challenges of constructing and maintaining irrigation infrastructure. This diversity in elevation and landscape also complicates the distribution of water, making it hard to ensure equitable access across different regions.
- Meeting project timelines is a persistent issue in the region. Delays are often caused by difficult working conditions due to the terrain, logistical challenges, and disruptions due to the harsh climate. Moreover, the planning and execution phases often encounter setbacks due to land acquisition issues, environmental concerns, and the need for extensive feasibility studies to address the unique challenges of the region.
- The unpredictable and seasonal nature of the climate in Jammu and Kashmir exacerbates the challenges faced by irrigation projects. The variability in rainfall affects water availability, making it difficult to maintain a consistent water supply for irrigation. This unpredictability necessitates the development of resilient and adaptive irrigation systems that can cope with both drought and excessive rainfall conditions.
- The lack of modern irrigation techniques contributes to inefficient water use. The region's reliance on traditional methods like flood irrigation leads to significant water loss, which is especially problematic in the context of increasing water scarcity. While advanced irrigation technologies could help optimize water use, their adoption is limited by high costs, lack of awareness, and inadequate infrastructure.
- The public availability of information on irrigation projects is limited, with most updates focusing on status rather than outcomes. This lack of transparency and detailed reporting makes it difficult to assess the effectiveness of projects and learn from past experiences. Furthermore, many major irrigation projects are still in the early stages of development, adding to the uncertainty regarding their potential impact.

4.1.5.4. Governance/ Management:

a) Statute/ Law/ Policy/ Regulations
b) Institutions governing/ managing/ monitoring the resources and Institutional structure.

Department of Irrigation & Flood Control Jammu and Kashmir:

Jammu Province is being irrigated through a network of irrigation Khuls/Canals in the Chenab, Jhelum and Ravi Basin. Irrigation and Flood Control Department Jammu is entrusted with the job of providing irrigation facility to the farming community in Jammu Division for Kharif and Rabi crops, maintaining existing irrigation infrastructure, creating more irrigation potential by conceiving and executing new irrigation projects. The Department is also responsible for implementing flood control measures in rivers and nallahs in length and breadth of Jammu Province in order to prevent to reduce the detrimental effects of floods.

4.1.5.5. Measurement, Monitoring and Data Constraints/ Management:

Measurement:

a) Employ soil moisture sensors and gauges to measure soil water content for effective irrigation planning.
b) Implement satellite imagery and remote sensing technologies to monitor crop health and water usage.

Monitoring:

c) Establish a network of weather stations for real-time monitoring of climate conditions influencing irrigation needs.
d) Deploy automated sensors to monitor water levels in reservoirs and canals of multi-projects.
e) Utilize drone technology for aerial surveillance and monitoring of large agricultural areas.

Data Constraints/Challenges:

f) Address the lack of comprehensive and real-time data on soil conditions and crop water requirements.
g) Overcome challenges related to data transmission in remote or hilly areas of Jammu and Kashmir.
h) Ensure data accuracy and reliability, considering variations in topography and weather patterns.

4.1.5.6. Road map of activities/ tasks proposed for better governance with timelines and agencies responsible for each task/ activity.

a) Enhanced governance is imperative for effective water resource management, ensuring transparency, accountability, and the implementation of sound policies.

b) Improved source and supply management strategies are crucial for optimizing water resources, minimizing wastage, and ensuring a sustainable water supply.

c) Efficient demand management practices play a pivotal role in balancing water usage, promoting conservation, and addressing the growing demands on water resources.

d) Ensuring water quality is of paramount importance, necessitating robust monitoring, regulation, and remediation measures to safeguard public health and environmental integrity.

e) Sound water economics and financing mechanisms are essential for sustaining water-related infrastructure, promoting equitable access, and supporting ongoing conservation efforts.

f) Implementing sustainable water budgeting practices involves careful allocation of water resources, considering ecological, social, and economic factors to achieve long-term water security and resilience.

4.1.5.7. Annexure- Projects: Irrigation

Table 4.16. Canal attributes and corresponding CCA for the various divisions of Jammu and Kashmir.

S. No.	Name of the Canal & Distribution Network	Basin	Sub Basin	Total length of canal network (Km)	Total length of canal as Lined Canal (Km)	Total length of canal as Unlined Canal (Km)	CCA (Ha)	Name of the Division
1	Chichha	Indus	Chenab	4.8	0.8	4	64.8	HD Kishtwar
2	Koligadh	Indus	Chenab	7.5	0.5	7	116	HD Kishtwar
3	Nagra	Indus	Chenab	10.5	0.5	10	157.2	HD Kishtwar
4	Chichha Nagseena	Indus	Chenab	11.5	0	11.5	164	HD Kishtwar
5	Thakrie	Indus	Chenab	8.8	0.5	8.3	428	HD Kishtwar
6	Mandri	Indus	Chenab	5.5	2	3.5	70.8	HD Kishtwar
7	Naryan	Indus	Chenab	6.5	0.5	6	176	HD Kishtwar
8	Muller janseer	Indus	Chenab	6	0	6	60	HD Kishtwar
9	Singhpura	Indus	Chenab	6.1	0	6.1	80	HD Kishtwar
10	Neera Khul	Indus	Chenab	4	4	0	46	HD Ramban
11	Seri Khul	Indus	Chenab	5	5	0	32	HD Ramban
12	Dukson Khul	Indus	Chenab	5	5	0	70	HD Ramban
13	Govind Pora Khul	Indus	Chenab	2	2	0	20	HD Ramban
14	Batyari Khul	Indus	Chenab	1	1	0	14	HD Ramban
15	Kainthi to Upper Neera Khul	Indus	Chenab	8	8	0	80	HD Ramban
16	Chareel Khul	Indus	Chenab	5	5	0	108	HD Ramban

17	Duligam Khul	Indus	Chenab	4	4	0	70	HD Ramban
18	Lower Duligam Khul	Indus	Chenab	2	2	0	30	HD Ramban
19	Chamalwas Khul	Indus	Chenab	2	2	0	20	HD Ramban
20	Perhinder Khul	Indus	Chenab	5	5	0	108	HD Ramban
21	Bankoot Khul	Indus	Chenab	1	1	0	30	HD Ramban
22	Sumber Khul	Indus	Chenab	2	2	0	36	HD Ramban
23	L.I.S Kaskoot Khul	Indus	Chenab	1	1	0	45	HD Ramban
24	Chakka Khul	Indus	Chenab	3	3	0	25	HD Ramban
25	LIS Zanihal Khul	Indus	Chenab	1	1	0	26	HD Ramban
26	Kalimasta Khul	Indus	Chenab	0.8	0.8	0	11	HD Ramban
27	Dutter Khul Part II	Indus	Chenab	1.35	1.35	0	56	HD Ramban
28	Dharam Khul	Indus	Chenab	1.6	1.6	0	143	HD Ramban
29	Seria Khul	Indus	Chenab	0.7	0.7	0	22	HD Ramban
30	Chachwa Khul	Indus	Chenab	1.1	1.1	0	43	HD Ramban
31	Ind Khul	Indus	Chenab	1.9	1.9	0	105	HD Ramban
32	Karminza Khul	Indus	Chenab	0.45	0.45	0	16	HD Ramban
33	Moila Khul	Indus	Chenab	0.3	0.3	0	8	HD Ramban
34	Seera Dharam Khul	Indus	Chenab	0.7	0.7	0	13	HD Ramban
35	Ludwal Khul	Indus	Chenab	3	3	0	1177	HD Ramban
36	Kundi Khul	Indus	Chenab	5	5	0	48	HD Ramban
37	Rajghar Khul	Indus	Chenab	2	2	0	80	HD Ramban
38	Maitra Khul	Indus	Chenab	2	2	0	36	HD Ramban
39	Sana Khul	Indus	Chenab	1	1	0	50	HD Ramban
40	Seetha Khul	Indus	Chenab	5	5	0	88	HD Ramban
41	Gagarsula Khul	Indus	Chenab	2.5	2.5	0	140	HD Ramban
42	Deeda to Dabber Khul	Indus	Chenab	2.5	2.5	0	148	HD Ramban

43	Maswa Khul	Indus	Chenab	0.865	0.865	0	47	HD Ramban
44	Gagra to Gundi Khul	Indus	Chenab	2.5	2.5	0	152	HD Ramban
45	Harog Khul	Indus	Chenab	3	3	0	44	HD Ramban
46	45 No. Schemes (inc. LIS)	Indus	Chenab, Manwar Tawi & Pouni Tawi	70.7	63	7.7	3370.4	ID Akhnoor
47	Keerian Gandyal Canal	Indus	Ravi	6.85	4	2.85	565	ID Kathua
48	B.P. Canal	Indus	Ravi	8	3	5	253	ID Kathua
49	Dinga Patti Khul	Indus	Ravi	2.3	0	2.3	44	ID Kathua
50	Sample Sapla Khul	Indus	Ravi	3.3	2.6	0.7	121	ID Kathua
51	Badi Da Pal Khul.	Indus	Ravi	0.6	0.6	0	57	ID Kathua
52	Narolian Khul.	Indus	Ravi	2.6	1.6	1	37	ID Kathua
53	Nagwani Khul	Indus	Ravi	3.6	1.7	1.9	50	ID Kathua
54	Gola Khul	Indus	Ravi	2.5	2	0.5	57	ID Kathua
55	Jagirian Wali Khul	Indus	Ravi	0.8	0.2	0.61	14	ID Kathua
56	Balooti Wali Khul	Indus	Ravi	2.2	0.6	1.6	81	ID Kathua
57	Talli Wali Khul	Indus	Ravi	1	0.1	0.9	23	ID Kathua
58	Dhodoor Khul	Indus	Ravi	1.5	0	1.5	112	ID Kathua
59	Barоota Khul	Indus	Ravi	1	0	1	12	ID Kathua
60	Chare Wali Khul	Indus	Ravi	1	0	1	16	ID Kathua
61	Badala Khul and Branches	Indus	Ravi	3	0.35	2.65	58	ID Kathua
62	Behal Wali Khul	Indus	Ravi	2.5	0	2.5	48	ID Kathua
63	Bageechi Wali Khul	Indus	Ravi	1.2	0	1.2	50	ID Kathua
64	Bella Khul	Indus	Ravi	2	0.2	1.8	217	ID Kathua
65	Badal Khul	Indus	Ravi	1	0	1	20	ID Kathua

66	Ballian No : 1 & 2 Khul	Indus	Ravi	1.4	0.1	1.3	14	ID Kathua
67	Bigwan De Choi	Indus	Ravi	1	0	1	30	ID Kathua
68	Birla Bagh Khul.	Indus	Ravi	0.6	0.35	0.25	22	ID Kathua
69	Chigli Talli Khul	Indus	Ravi	0.9	0.05	0.85	62	ID Kathua
70	Devi Wali Khul	Indus	Ravi	2	0.1	1.9	30	ID Kathua
71	Dagool Khul	Indus	Ravi	1.5	0	1.5	45	ID Kathua
72	Dragmal Khul	Indus	Ravi	2	0.2	1.8	20	ID Kathua
73	Geru Khul	Indus	Ravi	0.8	0	0.8	10	ID Kathua
74	Jarian Wali Khul 1 & 02 Khul	Indus	Ravi	1.8	0	1.8	28	ID Kathua
75	Kerian Da Bagh Wali Khul	Indus	Ravi	1	0.05	0.95	90	ID Kathua
76	Kai Wali Khul	Indus	Ravi	0.85	0.1	0.75	12	ID Kathua
77	Kudnu Khul.	Indus	Ravi	1.5	0.8	0.7	12	ID Kathua
78	Kikran Wali Khul No. 01	Indus	Ravi	1.5	0.8	0.7	50	ID Kathua
79	Kikran Wali Khul No. 02	Indus	Ravi	0.5	0	0.5	25	ID Kathua
80	Kehar Wali Khul	Indus	Ravi	1.2	0	1.2	25	ID Kathua
81	Matoor Khul	Indus	Ravi	1	0.1	0.9	247	ID Kathua
82	Mapi Ranki Khul	Indus	Ravi	2	0.07	1.93	15	ID Kathua
83	Muthi Jageer Khul.	Indus	Ravi	0.5	0.5	0	14	ID Kathua
84	Murli Wali Khul.	Indus	Ravi	0.75	0.75	0	14	ID Kathua
85	Maili Wali Khul	Indus	Ravi	1.5	0.15	1.35	60	ID Kathua
86	Mirpur Jaggo Khul	Indus	Ravi	1.3	0.1	1.2	30	ID Kathua
87	Nian Wali Khul and Branches	Indus	Ravi	1.4	0.4	1	50	ID Kathua
88	Nakkie Minor (Minor)	Indus	Ravi	1.1	1.1	0	80	ID Kathua
89	Patti Wali Khul	Indus	Ravi	1	0.1	0.9	72	ID Kathua
90	Ranki Wali Khul	Indus	Ravi	1.4	0.3	1.1	218	ID Kathua
91	Rakh Wali Khul	Indus	Ravi	0.8	0.6	0.2	15	ID Kathua

92	Rumbli Wali Khul.	Indus	Ravi	1	0.4	0.6	25	ID Kathua
93	Rakiran Wali Khul.	Indus	Ravi	1.6	0	1.6	25	ID Kathua
94	Seri Wali Khul	Indus	Ravi	1	0	1	40	ID Kathua
95	Said Ki Bari Khul.	Indus	Ravi	1	0.06	0.94	40	ID Kathua
96	Sasan Wali Khul No. 1 & 2	Indus	Ravi	1.4	0	1.4	18	ID Kathua
97	Sute Wali Khul	Indus	Ravi	1	1	0	31	ID Kathua
98	Salathian Wali Khul	Indus	Ravi	1.5	0.2	1.3	20	ID Kathua
99	Taloor Wali Khul	Indus	Ravi	2	0.2	1.8	200	ID Kathua
100	Tali Wali Khul	Indus	Ravi	1.5	0.1	1.4	49	ID Kathua
101	Tal Palakhi Wali Khul	Indus	Ravi	1	0	1	70	ID Kathua
102	Tibba Khul	Indus	Ravi	0.6	0	0.6	21	ID Kathua
103	Talli Wali Khul	Indus	Ravi	1	0.3	0.7	49	ID Kathua
104	Tikia Wali Khul	Indus	Ravi	0.8	0	0.8	10	ID Kathua
105	Tarna No. 1, 2 & 3	Indus	Ravi	2	0	2	15	ID Kathua
106	Zaram Wali Khul	Indus	Ravi	1.6	0	1.6	45	ID Kathua
107	Jatwal Khul	Indus	Ravi	1	0.75	0.25	14	ID Kathua
108	Chung Khul	Indus	Ravi	1.5	0.3	1.2	60	ID Kathua
109	LIS Jakhole	Indus	Ravi	3.12	2.6	0.52	132	ID Kathua
110	LIS Jandi	Indus	Ravi	1.15	1.15	0	40	ID Kathua
111	LIS Chak Dulma	Indus	Ravi	1.32	1.32	0	74	ID Kathua
112	LIS Juthana	Indus	Ravi	1.8	1.8	0	81	ID Kathua
113	Pranjali Khul	Indus	Ravi	0.54	0	0.54	21	ID Kathua
114	LIS Bobiya	Indus	Ravi	1.2	1.2	0	42	ID Kathua
115	LIS Jandi Nud	Indus	Ravi	1.1	1.1	0	40	ID Kathua
116	Lower Chhallan Khul	Indus	Ravi	1.5	0.7	0.8	25	ID Kathua
117	LIS Ratti Bakhta	Indus	Ravi	1.2	0.95	0.25	28	ID Kathua

118	LIS Palal	Indus	Ravi	1.07	1.07	0	15	ID Kathua
119	Sultan Pur Dhalli Khul	Indus	Ravi	2	0.09	1.91	12	ID Kathua
120	Bana Chak Khl	Indus	Ravi	1.06	1.06	0	15	ID Kathua
121	Salal Pur Khul	Indus	Ravi	2.5	2.5	0	34	ID Kathua
122	Desa Chak Khul	Indus	Ravi	2.1	1.1	1	65	ID Kathua
123	Dhalli Khul	Indus	Ravi	2.08	1.2	0.88	180	ID Kathua
124	Kote Qusba Khul Phase- I	Indus	Ravi	1.44	1.06	0.38	55	ID Kathua
125	Kote Qusba Khul Phase- II	Indus	Ravi	3.02	0.9	2.12	48	ID Kathua
126	Gura Sarkari Khul	Indus	Ravi	0.86	0.86	0	47	ID Kathua
127	Khanpur Khul.	Indus	Ravi	1.88	1.28	0.6	62	ID Kathua
128	Bowli Wali Khul	Indus	Ravi	0.5	0.37	0.14	40	ID Kathua
129	Bolma Khul	Indus	Ravi	2.24	1.9	0.34	96	ID Kathua
130	Hiranagar Khul	Indus	Ravi	1.07	0.42	0.64	50	ID Kathua
131	Manyari Khul	Indus	Ravi	1.4	0.27	1.13	76	ID Kathua
132	Sukhdev Pur Khul.	Indus	Ravi	1.6	0.6	1	65	ID Kathua
133	Drung Khul	Indus	Ravi	27	10	17	504	ID Kathua
134	Naj Canal	Indus	Ravi	19	17	2	440	ID Kathua
135	Seeri Muni Canal	Indus	Ravi	11.5	5.5	6	439	ID Kathua
136	LIS Didwara	Indus	Ravi	2.7	1.5	1.2	76	ID Kathua
137	Machedi Khul	Indus	Ravi	2.5	1	1.5	4	ID Kathua
138	Khul Gulgada	Indus	Ravi	2.4	1.2	1.2	100	ID Kathua
139	Talain Lakhari Khul	Indus	Ravi	2.05	0.5	1.55	230	ID Kathua
140	Parnalla Khul 1 & 2	Indus	Ravi	3.1	0.7	2.4	32	ID Kathua
141	Khul Beril	Indus	Ravi	1.5	0.5	1	17	ID Kathua
142	Sarey 1 & II	Indus	Ravi	3.4	2	1.4	296	ID Kathua
143	Ludera Khul	Indus	Ravi	3.3	1.93	1.38	82	ID Kathua

144	Khora Khul	Indus	Ravi	3	1	2	120	ID Kathua
145	Katal Khul.	Indus	Ravi	0.6	0.55	0.05	48	ID Kathua
146	Mudhal Khul	Indus	Ravi	2.8	2.23	0.57	100	ID Kathua
147	Amuwala Khul	Indus	Ravi	2	1.9	0.1	80	ID Kathua
148	Dhan Khul	Indus	Ravi	3.4	2.8	0.6	180	ID Kathua
149	Dandian Khul	Indus	Ravi	1.9	1.3	0.6	100	ID Kathua
150	LIS Mandli	Indus	Ravi	6.9	4.9	2	174	ID Kathua
151	Khul Draman	Indus	Ravi	2.2	0	2.2	50	ID Kathua
152	Groody Khul	Indus	Ravi	2	1.4	0.6	89	ID Kathua
153	Khul Nowshera	Indus	Ravi	3.5	1.75	1.75	59	ID Kathua
154	Kova Khul	Indus	Ravi	3.5	1.8	1.7	34	ID Kathua
155	Neelipeer Khan	Indus	Ravi	3	2	1	28	ID Kathua
156	Khul Saibra	Indus	Ravi	1.5	0.5	1	18	ID Kathua
157	Kelari Khul	Indus	Ravi	2.3	1.8	0.5	121	ID Kathua
158	Kashri Khul	Indus	Ravi	0.8	0.6	0.2	3	ID Kathua
159	Khul Surjan Chaloge	Indus	Ravi	3	2.4	0.6	10	ID Kathua
160	Dhaggar Dalangal	Indus	Ravi	3.5	1.5	2	169	ID Kathua
161	Chappru Khul	Indus	Ravi	2.5	1	1.5	89	ID Kathua
162	Baccon Khul	Indus	Ravi	0.8	0.7	0.1	30	ID Kathua
163	Panyalog Khul	Indus	Ravi	1.5	1.2	0.3	91	ID Kathua
164	Mandota Khul	Indus	Ravi	0.8	0.7	0.1	309	ID Kathua
165	Khul Tippri	Indus	Ravi	1.5	1.1	0.4	12	ID Kathua
166	Dharol Khul	Indus	Ravi	1.2	0.9	0.3	9	ID Kathua
167	Khul Bharmota (Drabal)	Indus	Ravi	2	1.6	0.4	4	ID Kathua
168	Khul Duugan Bari	Indus	Ravi	4	1	3	50	ID Kathua
169	Duddar Canal	Indus	Chenab	34.5	32	2.5	976	ID Udhampur

170	Distributory of Udhampur Canal	Chenab	Tawi	4.95	4.95	0	251	ID Udhampur
171	Saroori Khul	Chenab	Tawi	1.36	1.36	0	12	ID Udhampur
172	Jugail to Chunail Khul	Chenab	Tawi	1.41	1.41	0	21	ID Udhampur
173	Bain Khul	Chenab	Tawi	4.2	4.2	0	73	ID Udhampur
174	Bashat Khul	Chenab	Tawi	2	2	0	66	ID Udhampur
175	Sudhmahadev Khul	Chenab	Tawi	2.15	2.15	0	28	ID Udhampur
176	Baschal Khul	Chenab	Tawi	1.85	1.85	0	28	ID Udhampur
177	Gouri Kund Khul	Chenab	Tawi	0.59	0.59	0	20	ID Udhampur
178	Sarar Khul	Chenab	Tawi	1.8	1.8	0	19	ID Udhampur
179	Fide Di Bain Khul	Chenab	Tawi	1.5	1.5	0	21	ID Udhampur
180	Banja Khul	Chenab	Tawi	1.41	1.41	0	12	ID Udhampur
181	Jalsoo Khul	Chenab	Tawi	0.65	0.25	0.4	14	ID Udhampur
182	Pangara Khul	Chenab	Tawi	1.4	0.7	0.7	52	ID Udhampur
183	Lander Khul	Chenab	Tawi	1.3	1.3	0	23	ID Udhampur
184	Latyar Khul (right & left)	Chenab	Tawi	1.59	1.59	0	45	ID Udhampur
185	Ossu Khul	Chenab	Tawi	1.4	1.4	0	80	ID Udhampur
186	Diggi Khul	Chenab	Tawi	2.5	1.8	0.7	27	ID Udhampur
187	Katti Khul	Chenab	Tawi	0.45	0.45	0	16	ID Udhampur
188	Menga Khul	Chenab	Tawi	0.8	0.8	0	10	ID Udhampur
189	Raji di Bain Khul	Chenab	Tawi	0.8	0.2	0.6	15	ID Udhampur
190	Angari Khul	Chenab	Tawi	1.2	1.2	0	7	ID Udhampur
191	Veranda Khul	Chenab	Tawi	1.5	1.5	0	16	ID Udhampur
192	Kultyar Khul	Chenab	Tawi	1.8	1.8	0	16	ID Udhampur
193	Khambli Khul	Chenab	Tawi	0.45	0.2	0.25	4	ID Udhampur
194	Dudu Khul	Chenab	Tawi	2.1	2.1	0	54	ID Udhampur

195	Jakhed Khul	Chenab	Tawi	1.17	1.17	0	7	ID Udhampur
196	Sarota khul	Chenab	Tawi	2.5	2.1	0.4	28	ID Udhampur
197	Punna Khul	Chenab	Tawi	0.7	0.7	0	8	ID Udhampur
198	Punara Khul	Chenab	Tawi	1.3	1.3	0	9	ID Udhampur
199	Kirchi Khul	Chenab	Tawi	1	1	0	6	ID Udhampur
200	Mang Khul	Chenab	Tawi	1	1	0	24	ID Udhampur
201	Damera Khul	Chenab	Tawi	0.86	0.86	0	8	ID Udhampur
202	Mathali Khul	Chenab	Tawi	1	0.92	0.08	12	ID Udhampur
203	Keya Khul	Chenab	Tawi	0.8	0.8	0	15	ID Udhampur
204	Reshoul khul	Chenab	Tawi	1.46	1.46	0	26	ID Udhampur
205	Chatrari Khul	Chenab	Tawi	1.2	1.2	0	39	ID Udhampur
206	Mananu Khul	Chenab	Tawi	1	1	0	9	ID Udhampur
207	Bakal Hartaryan Khul	Chenab	Tawi	2	2	0	30	ID Udhampur
208	BasantgarhKhul	Chenab	Tawi	1.95	1.95	0	37	ID Udhampur
209	Sanara Khul	Chenab	Tawi	0.9	0.9	0	10	ID Udhampur
210	Mathan Khul	Chenab	Tawi	1.1	1.1	0	9	ID Udhampur
211	Deoli Khul	Chenab	Tawi	1.1	1.1	0	14	ID Udhampur
212	Bass Khul	Chenab	Tawi	1.2	1.2	0	11	ID Udhampur
213	Sambal Sui Khul	Chenab	Tawi	0.9	0.9	0	6	ID Udhampur
214	Jib Padanoo Khul	Chenab	Tawi	0.75	0.75	0	5	ID Udhampur
215	Ludhyala Khul	Chenab	Tawi	1.27	1.27	0	12	ID Udhampur
216	Krimchi khul	Chenab	Tawi	1.6	1.6	0	10	ID Udhampur
217	Mansar Khul	Chenab	Tawi	1.6	1.6	0	18	ID Udhampur
218	LIS Garnai	Chenab	Tawi	1.2	1.2	0	60	ID Udhampur
219	WSS Sundrani Khul	Chenab	Tawi	1.1	1.1	0	11	ID Udhampur
220	LIS Seen Thakran	Chenab	Tawi	3.2	3.2	0	76	ID Udhampur

221	Nalli nikka Khul	Chenab	Tawi	2	2	0	16	ID Udhampur
222	Sodan Khul (R&L)	Chenab	Tawi	3.2	3.2	0	32	ID Udhampur
223	Dhanu Seri Khul	Chenab	Tawi	2.2	2.2	0	14	ID Udhampur
224	Khuban Salay Khul	Chenab	Tawi	1.2	1.2	0	4	ID Udhampur
225	Muttal Khul	Chenab	Tawi	0.65	0.65	0	12	ID Udhampur
226	Sundrani thagi Khul	Chenab	Tawi	1.45	1.45	0	14	ID Udhampur
227	Panjar Khul	Chenab	Tawi	1.5	1.5	0	17	ID Udhampur
228	Kalsote Khul	Chenab	Tawi	1.5	1.5	0	16	ID Udhampur
229	Basnote Khul	Chenab	Tawi	2.1	2.1	0	10	ID Udhampur
230	Bhounger Khul	Chenab	Tawi	3.55	3.55	0	12	ID Udhampur
231	Manyote Khul	Chenab	Tawi	1.8	1.8	0	12	ID Udhampur
232	Gourni Tonal Khul	Chenab	Tawi	0.85	0.85	0	5	ID Udhampur
233	Moungri Khul	Chenab	Tawi	1.5	1.5	0	13	ID Udhampur
234	Parwa Slay Khul	Chenab	Tawi	0.9	0.9	0	7	ID Udhampur
235	Kharkhan Khul	Chenab	Tawi	1.5	1.5	0	16	ID Udhampur
236	Sulgar Khul	Chenab	Tawi	1	1	0	14	ID Udhampur
237	Blater Khul	Chenab	Tawi	1.35	1.35	0	15	ID Udhampur
238	Mandal Barmeen Khul	Chenab	Tawi	3	2	1	65	ID Udhampur
239	Bindla Satyalta Khul	Chenab	Tawi	1.5	1.3	0.2	45	ID Udhampur
240	Kothi Dhonus Khul	Chenab	Tawi	1.3	1.3	0	14	ID Udhampur
241	Langa Khul	Chenab	Tawi	1.5	1.3	0.2	24	ID Udhampur
242	Nassanwali Khul	Chenab	Tawi	0.9	0.8	0.1	17	ID Udhampur
243	Gorla Khul	Chenab	Tawi	2	1.8	0.2	30	ID Udhampur
244	Bhootanwali Khul	Chenab	Tawi	2.8	2.8	0	80	ID Udhampur
245	Ghordi Jagir Khul	Chenab	Tawi	2.8	2.8	0	44	ID Udhampur
246	Neeli Majana Khul	Chenab	Tawi	2.05	1.8	0.25	14	ID Udhampur

247	Neeli Khul	Chenab	Tawi	1.8	1.8	0	52	ID Udhampur
248	Nallah Ghorian Khul	Chenab	Tawi	1.3	1.3	0	8	ID Udhampur
249	Teli Khul	Chenab	Tawi	0.65	0.65	0	4	ID Udhampur
250	Malog Jandrore Khul	Chenab	Tawi	2.8	2.3	0.5	38	ID Udhampur
251	Nallah Mallian Khul	Chenab	Tawi	2.1	2.1	0	22	ID Udhampur
252	Kalma Khul	Chenab	Tawi	2.1	2.1	0	31	ID Udhampur
253	Garhi Khul	Chenab	Tawi	2.3	1.65	0.75	40	ID Udhampur
254	Jogni Nallah to Chowki Khul	Chenab	Tawi	2.8	2	0.8	28	ID Udhampur
255	Sheetal Puri Khul	Chenab	Tawi	2.8	2	0.8	91	ID Udhampur
256	Champawali Khul	Chenab	Tawi	0.65	0.65	0	28	ID Udhampur
257	Damak Khul	Chenab	Tawi	1.46	1	0.46	12	ID Udhampur
258	Julera Tagan Khul	Chenab	Tawi	5	5	0	70	ID Udhampur
259	Nallah Badi to Ban Talab Khul	Chenab	Tawi	1.55	1.5	0.05	12	ID Udhampur
260	Matansoo Khul	Chenab	Tawi	1.2	1.2	0	10	ID Udhampur
261	Sattian khul	Chenab	Tawi	1.8	1.6	0.2	53	ID Udhampur
262	Katwalt Khul	Chenab	Tawi	1.97	1.97	0	40	ID Udhampur
263	Extension Mananu Khul	Chenab	Tawi	0.8	0.8	0	4	ID Udhampur
264	Shalsher Khul	Chenab	Tawi	0.8	0.8	0	22	ID Udhampur
265	Thanda Pani Khul	Chenab	Tawi	1.3	1.3	0	31	ID Udhampur
266	Baland Khul	Chenab	Tawi	1.6	1.6	0	23	ID Udhampur
267	Dheeran Baryalta Khul	Chenab	Tawi	1.3	1.3	0	42	ID Udhampur
268	Sera Laid Khul	Chenab	Tawi	2	2	0	25	ID Udhampur
269	Sarsoo Khul	Chenab	Tawi	2.1	2	0.1	24	ID Udhampur
270	Prowa Jagir Khul	Chenab	Tawi	1.2	0.8	0.4	17	ID Udhampur
271	Kandi Khul	Chenab	Tawi	1.1	1.1	0	23	ID Udhampur
272	Telani Khul	Chenab	Tawi	3	2.5	0.5	53	ID Udhampur

273	Nakki Dawan Khul	Chenab	Tawi	0.65	0.65	0	10	ID Udhampur
274	Nakki Khul	Chenab	Tawi	2	2	0	42	ID Udhampur
275	Panjgrain Khul	Chenab	Tawi	6	6	0	65	ID Udhampur
276	Breeti Khul	Chenab	Tawi	0.5	0.5	0	2	ID Udhampur
277	Niyald to Mohalla Danga Khul	Chenab	Tawi	0.72	0.72	0	5	ID Udhampur
278	Koulu to narisoo khul	Chenab	Tawi	0.8	0.8	0	5	ID Udhampur
279	Jajjli Khul	Chenab	Tawi	2.07	2.07	0	25	ID Udhampur
280	WSS Ghatyal Dhanu	Chenab	Tawi	4.23	4.23	0	27	ID Udhampur
281	Panjar Kreri Khul	Chenab	Tawi	0.75	0.75	0	14	ID Udhampur
282	Lalli 1st Khul	Chenab	Tawi	2	0.91	1.09	14	ID Udhampur
283	Thanger Khul	Chenab	Tawi	2.3	2.3	0	10	ID Udhampur
284	WSS Khuban Khul	Chenab	Tawi	1.1	1.1	0	12	ID Udhampur
285	Saniote Khul	Chenab	Tawi	1.75	1.75	0	22	ID Udhampur
286	Lalli 2nd Khul	Chenab	Tawi	1	1	0	26	ID Udhampur
287	Shower Lalli Khul	Chenab	Tawi	1	1	0	18	ID Udhampur
288	Jamwal Hartaryan Khul	Chenab	Tawi	2.25	2.1	0.15	29	ID Udhampur
289	Khara Paskoor Khul	Chenab	Tawi	1.5	0.94	0.57	10	ID Udhampur
290	Nagna Pani Khul	Chenab	Tawi	2	1.41	0.59	19	ID Udhampur
291	Pangara Jagir Khul	Chenab	Tawi	1.8	1.31	0.49	8	ID Udhampur
292	Budha Kedar Khul	Chenab	Tawi	2	1.26	0.75	8	ID Udhampur
293	Kulinee to Neeli Khul	Chenab	Tawi	1.5	1.35	0.15	4	ID Udhampur
294	Charat Jout Khul	Chenab	Tawi	3.85	2.6	1.25	14	ID Udhampur
295	Kothi Gaiber Khul	Chenab	Tawi	2.65	2.12	0.53	10	ID Udhampur
296	Dabbar to Lougar Khul	Chenab	Tawi	1.03	1.03	0	18	ID Udhampur
297	Soarp right Khul	Chenab	Tawi	0.8	0.8	0	6	ID Udhampur

298	Gadena Khul	Chenab	Tawi	1	0.98	0.02	8	ID Udhampur
299	Upper Katwalt Khul	Chenab	Tawi	0.5	0.5	0	14	ID Udhampur
300	Somfari Khul	Chenab	Tawi	1.53	1.15	0.38	10	ID Udhampur
301	Tanah Furoh Khul	Chenab	Tawi	1.85	1.5	0.35	14	ID Udhampur
302	Pundal Khul	Chenab	Tawi	1.5	1.5	0	22	ID Udhampur
303	Redu Khul	Chenab	Tawi	0.75	0.75	0	10	ID Udhampur
304	Flungu Khul	Chenab	Tawi	0.8	0.45	0.35	9	ID Udhampur
305	Lower Keya Khul	Chenab	Tawi	0.95	0.85	0.1	9	ID Udhampur
306	Kothi Balota Khul	Chenab	Tawi	0.8	0.67	0.13	16	ID Udhampur
307	Mathli Khul	Chenab	Tawi	0.92	0.92	0	12	ID Udhampur
308	Koi Khul	Chenab	Tawi	1.5	1.3	0.2	15	ID Udhampur
309	Lower Amrothi Khul	Chenab	Tawi	1	1	0	8	ID Udhampur
310	Chitramble to Dakhadu Khul	Chenab	Tawi	0.85	0.85	0	23	ID Udhampur
311	Mona	Indus	Chenab	2	2	0	58	IFCD Bhaderwah
312	Khai Khul	Indus	Chenab	1.5	1.5	0	6.8	IFCD Bhaderwah
313	Chakka Khul	Indus	Chenab	1.3	1.3	0	10	IFCD Bhaderwah
314	Neeroj Khul	Indus	Chenab	6	4	2	113	IFCD Bhaderwah
315	Chirot Khul	Indus	Chenab	2.2	2	0.2	37	IFCD Bhaderwah
316	Kurshari Khul	Indus	Chenab	6.7	2	4.7	18	IFCD Bhaderwah
317	Chakka Mathola	Indus	Chenab	3	1.1	1.9	20	IFCD Bhaderwah
318	Kal Bangla Khul	Indus	Chenab	1.5	1.5	0	22	IFCD Bhaderwah
319	Bokna Khul	Indus	Chenab	2.15	2.15	0	23	IFCD Bhaderwah
320	Powara malani khul	Indus	Chenab	0.9	0.9	0	16	IFCD Bhaderwah
321	Sarna Khul	Indus	Chenab	1.2	1.2	0	31	IFCD Bhaderwah
322	Kharothi Khul	Indus	Chenab	0.825	0.825	0	15	IFCD Bhaderwah
323	L.B. canal	Indus	Chenab	7.7	7.3	0.4	243	IFCD Bhaderwah

324	R.B. canal	Indus	Chenab	7.8	6.9	0.9	186	IFCD Bhaderwah
325	Berreru khul	Indus	Chenab	3.6	2.8	0.8	28	IFCD Bhaderwah
326	Panjgrain khul	Indus	Chenab	1.4	1.4	0	27	IFCD Bhaderwah
327	Gajoth Khul	Indus	Chenab	1.44	1.44	0	26	IFCD Bhaderwah
328	Gonara Khul	Indus	Chenab	1.2	1	0.2	23	IFCD Bhaderwah
329	Bhella	Indus	Chenab	3.5	1.8	1.7	25.125	IFCD Bhaderwah
330	Thellela	Indus	Chenab	2.5	0.8	1.7	8.75	IFCD Bhaderwah
331	Phagsoo	Indus	Chenab	1.3	1.1	0.2	8.75	IFCD Bhaderwah
332	Badano	Indus	Chenab	0.4	0.3	0.1	10.75	IFCD Bhaderwah
333	Malwana khul	Indus	Cheenab	4	0.15	3.85	60	IFCD Doda
334	Jathi Khul	Indus	Cheenab	3	2	1	36	IFCD Doda
335	Mohalla Khul	Indus	Cheenab	2.8	1.6	1.2	138	IFCD Doda
336	Banshall Khul	Indus	Cheenab	1.4	0.7	0.7	80	IFCD Doda
337	Pranoo Khul	Indus	Cheenab	9	2.5	6.5	43	IFCD Doda
338	Banjeer Khul	Indus	Cheenab	4.4	0.3	4.1	67	IFCD Doda
339	Dongroo Khul	Indus	Cheenab	3	0.5	2.5	80	IFCD Doda
340	Khellani Khul	Indus	Cheenab	4.5	0	4.5	36	IFCD Doda
341	Kastigarh Canal	Indus	Cheenab	20	15	5	720	IFCD Doda
342	Shai Bari Khul	Indus	Cheenab	5	2	3	82	IFCD Doda
343	Ghat Khul	Indus	Cheenab	3	2	1	53.6	IFCD Doda
344	Bhabore Khul	Indus	Cheenab	4.5	3	1.5	60	IFCD Doda
345	Trown Khul	Indus	Cheenab	4	2	2	24	IFCD Doda
346	Goha Khul	Indus	Cheenab	3	0.85	2.15	54	IFCD Doda
347	Assar Khul	Indus	Cheenab	4.5	0.5	4	54	IFCD Doda
348	Jangulwar khul	Indus	Cheenab	2.7	0	2.7	45.2	IFCD Doda
349	Ganika Khul	Indus	Cheenab	4.5	0.18	4.32	60	IFCD Doda

350	Dounli Khul	Indus	Cheenab	2	0.4	1.6	32.8	IFCD Doda
351	Bhagwah Khul	Indus	Cheenab	4.5	0.23	4.27	60	IFCD Doda
352	Gai Khul	Indus	Cheenab	2.9	2.5	0.4	60	IFCD Doda
353	Udhyanpur khul	Indus	Cheenab	2	0.16	1.84	25	IFCD Doda
354	Mandole Khul	Indus	Cheenab	5	0.9	4.1	46	IFCD Doda
355	Jatheli Khul	Indus	Cheenab	4.1	0.18	3.92	72	IFCD Doda
356	Rajal L.I.S.	Indus	Chenab	73.5	73.5	0	1433	IFCD Nowshera
357	Dabber Potha	Indus	Chenab	5.47	5.47	0	128	IFCD Nowshera
358	Langer L.I.S.	Indus	Chenab	1.978	1.978	0	120	IFCD Nowshera
359	Kalsian L.I.S.	Indus	Chenab	1.815	1.815	0	55	IFCD Nowshera
360	Qasba Bala L.I.S.	Indus	Chenab	1.6	0.9	0.7	90	IFCD Nowshera
361	Rajpura Kamila L.I.S.	Indus	Chenab	0.65	0.65	0	22	IFCD Nowshera
362	Hill Bela Plassi	Indus	Chenab	0.55	0.4	0.15	1	IFCD Nowshera
363	Sangpur Khul.	Indus	Chenab	3.6	2.2	1.4	100	IFCD Nowshera
364	Narian Khul.	Indus	Chenab	3.4	2.1	1.3	24	IFCD Nowshera
365	Hadyatpura Khul	Indus	Chenab	1.4	1.2	0.2	24	IFCD Nowshera
366	Jindapeer Khul R/S	Indus	Chenab	1.1	0.85	0.25	26	IFCD Nowshera
367	Jindapeer Khul L/S	Indus	Chenab	0.5	0.5	0	27	IFCD Nowshera
368	Utra Khetar Khul	Indus	Chenab	1.1	0.7	0.4	25	IFCD Nowshera
369	Deri Khetar Khul	Indus	Chenab	1.2	0.8	0.4	20	IFCD Nowshera
370	Sialtha Khul.	Indus	Chenab	1.4	0.4	1	4	IFCD Nowshera
371	Khabber Khul.	Indus	Chenab	4	1	3	20	IFCD Nowshera
372	Dhanwan Dalyote	Indus	Chenab	1.5	0.3	1.2	28	IFCD Nowshera
373	Chitri Khul	Indus	Chenab	0.6	0	0.6	8	IFCD Nowshera
374	Barmandal Khul	Indus	Chenab	1.1	0.7	0.4	16	IFCD Nowshera
375	Sangeri Khul	Indus	Chenab	0.6	0	0.6	5	IFCD Nowshera

376	Jatta Mallain Khul.	Indus	Chenab	0.85	0	0.85	6	IFCD Nowshera
377	Mogla Keri Khul	Indus	Chenab	3.8	0.3	3.5	46	IFCD Nowshera
378	Panjnara Khul	Indus	Chenab	1	1	0	8	IFCD Nowshera
379	Broh I & II Khul	Indus	Chenab	1.1	1.07	0.03	14	IFCD Nowshera
380	Deri Khetar to Panoti Khul.	Indus	Chenab	2.9	0.6	2.3	36	IFCD Nowshera
381	Thandapani L.I.S.	Indus	Chenab	7.6	4.2	3.4	144	IFCD Nowshera
382	Chajja L.I.S.	Indus	Chenab	1.1	1.1	0	100	IFCD Nowshera
383	Beri Pattan	Indus	Chenab	70.31	0	0	1700	IFCD Nowshera
384	Salari Khul (L/S)	Indus	Chenab	1.9	1.6	0.3	24	IFCD Nowshera
385	Nadani Khul	Indus	Chenab	2.1	1.2	0.9	24	IFCD Nowshera
386	Chalathani Khul	Indus	Chenab	0.7	0.5	0.2	24	IFCD Nowshera
387	Nallah Khul.	Indus	Chenab	2	1.68	0.32	15	IFCD Nowshera
388	Thumba Nehoti	Indus	Chenab	4.8	4.8	0	222	IFCD Nowshera
389	Bansi Khetar	Indus	Chenab	0.6	0.4	0.2	22	IFCD Nowshera
390	Dokhari Khul	Indus	Chenab	1.5	1.2	0.3	35	IFCD Nowshera
391	Bindrai Khul	Indus	Chenab	1.87	1.87	0	26	IFCD Nowshera
392	Saleri Khul R/S	Indus	Chenab	2.3	1.8	0.5	28	IFCD Nowshera
393	Neela Dub Khul	Indus	Chenab	0.75	0.3	0.45	18	IFCD Nowshera
394	Likki Talla	Indus	Chenab	0.45	0.35	0.1	27	IFCD Nowshera
395	Dangiote Khul	Indus	Chenab	1.45	1.45	0	10	IFCD Nowshera
396	Siot Canal	Indus	Chenab	16.7	12.7	4	320	IFCD Nowshera
397	Mastandara1StKhul	Indus	Chenab	0.45	0.3	0.15	80	IFCD Poonch
398	Mastandara2ndKhul	Indus	Chenab	0.74	0.57	0.17	40	IFCD Poonch
399	GunthalRightKhul	Indus	Chenab	1	6	4	30	IFCD Poonch
400	ShahiDrabaKhul	Indus	Chenab	1.5	0.6	0.9	58	IFCD Poonch
401	RightBetairKhul	Indus	Chenab	1.3	0.8	0.5	20	IFCD Poonch

402	BelaSanaiKhul	Indus	Chenab	1.5	0.8	0.7	25	IFCD Poonch
403	SeriKhawaja1StKhul	Indus	Chenab	0.5	0	0	0	IFCD Poonch
404	GunthalLeftKhul	Indus	Chenab	1.67	1.2	0.47	20	IFCD Poonch
405	SanglaMainKhul	Indus	Chenab	1.15	0.35	0.8	110	IFCD Poonch
406	ShahiKhulDistributory	Indus	Chenab	2.4	2	0.4	315	IFCD Poonch
407	SeriKhawaja2ndKhul	Indus	Chenab	0.4	0.15	0.25	48	IFCD Poonch
408	MainShahiKhul	Indus	Chenab	1.75	1.2	0.55	30	IFCD Poonch
409	GundiKhul	Indus	Chenab	2.5	1.6	0.9	210	IFCD Poonch
410	LeftBetairKhul	Indus	Chenab	0.3	0.15	0.15	25	IFCD Poonch
411	LassanaKhul	Indus	Chenab	2.2	1.6	0.6	110	IFCD Poonch
412	PothaKhul	Indus	Chenab	2.4	1.8	0.6	175	IFCD Poonch
413	KallerKattal	Indus	Chenab	1	0.8	0.2	100	IFCD Poonch
414	SeriChawanaKhul	Indus	Chenab	1.3	0.9	0.4	70	IFCD Poonch
415	MadanaKhul	Indus	Chenab	1	0.8	0.2	90	IFCD Poonch
416	KolalaKhul	Indus	Chenab	1.6	1.2	0.4	140	IFCD Poonch
417	DingoMangKhul	Indus	Chenab	1.8	1.5	0.3	100	IFCD Poonch
418	ChallianKhul	Indus	Chenab	0.72	0.6	0.12	100	IFCD Poonch
419	SanglaExtKhul	Indus	Chenab	0.9	0.6	0.3	50	IFCD Poonch
420	GunthalLowerKhul	Indus	Chenab	0.75	0.3	0.45	100	IFCD Poonch
421	SeriKhul	Indus	Chenab	1.7	1.2	0.5	38	IFCD Poonch
422	HariMarhoteKhul	Indus	Chenab	0.5	0	0	0	IFCD Poonch
423	PhaglaKhul	Indus	Chenab	0.9	0.3	0.6	50	IFCD Poonch
424	PatraSakhiMadanKhul	Indus	Chenab	0.21	0	0	0	IFCD Poonch
425	BhatadurianKhul	Indus	Chenab	0.65	0.4	0.25	12	IFCD Poonch
426	MankoteKhul	Indus	Chenab	1.28	1.1	0.18	40	IFCD Poonch
427	RightChajjlaKhul	Indus	Chenab	1.29	0.8	0.49	45	IFCD Poonch

428	Bhatakaspart2ndKhul	Indus	Chenab	0.19	0.19	0	20	IFCD Poonch
429	Bhatakaspart1stKhul	Indus	Chenab	0.35	0.25	0.1	15	IFCD Poonch
430	Kalabanpart2ndKhul	Indus	Chenab	0.61	0.5	0.11	60	IFCD Poonch
431	Kalabanistpart1stdKhul	Indus	Chenab	0.4	0.2	0.2	30	IFCD Poonch
432	ChoteyShahKhul	Indus	Chenab	0.218	0.15	0.068	25	IFCD Poonch
433	ChakbanolaKhul	Indus	Chenab	0.36	0.28	0.08	24	IFCD Poonch
434	TakiyaKhul	Indus	Chenab	0.18	0.06	0.12	25	IFCD Poonch
435	TarakoteKhul	Indus	Chenab	0.46	0.35	0.11	30	IFCD Poonch
436	UchhadPart1stKhul	Indus	Chenab	0.81	0.6	0.21	20	IFCD Poonch
437	DoomSalwahKhul	Indus	Chenab	0.16	0.14	0.02	40	IFCD Poonch
438	BelaChajjlaKhul	Indus	Chenab	0.56	0.46	0.1	30	IFCD Poonch
439	kalabanpart1stkhul	Indus	Chenab	0.86	0.75	0.11	30	IFCD Poonch
440	TattapanitoHillChowki	Indus	Chenab	0.39	0.25	0.14	45	IFCD Poonch
441	RanjaWaliKhul	Indus	Chenab	0.26	0.2	0.06	20	IFCD Poonch
442	GursaiKhul	Indus	Chenab	0.61	0.61	0	15	IFCD Poonch
443	GagarmangKhul	Indus	Chenab	0.32	0.22	0.1	20	IFCD Poonch
444	GranbanKhul	Indus	Chenab	0.48	0.35	0.13	20	IFCD Poonch
445	Patti2ndKhul	Indus	Chenab	0.19	0.19	0	10	IFCD Poonch
446	SeriHarniKhul	Indus	Chenab	0.85	0.7	0.15	20	IFCD Poonch
447	Nakamanjharid/s2ndKHul	Indus	Chenab	0.72	0.7	0.02	20	IFCD Poonch
448	NakkamanjariD/S1stKhul	Indus	Chenab	0.33	0.28	0.05	20	IFCD Poonch
449	NakamanjhariU/S2ndKHul	Indus	Chenab	0.48	0.33	0.15	40	IFCD Poonch
450	patti1stKhul	Indus	Chenab	0.16	0.16	0	10	IFCD Poonch
451	NakkamanjariU/S1stKhul	Indus	Chenab	0.26	0.26	0	40	IFCD Poonch
452	Ghani1stKhul	Indus	Chenab	0.49	0.49	0	10	IFCD Poonch
453	TatarmangKhul	TatarmangKhul	Chenab	0.88	0.72	0.16	100	IFCD Poonch

454	Mannuwalikhul	Indus	Chenab	0.31	0.31	0	22	IFCD Poonch
455	sandoteKhul	Indus	Chenab	0.62	0.52	0.1	26	IFCD Poonch
456	Galhutapart1stKhul	Indus	Chenab	1	0.9	0.1	40	IFCD Poonch
457	Galhutapart2ndKhul	Indus	Chenab	1.17	1	0.17	100	IFCD Poonch
458	Galhuta4rthKhul	Indus	Chenab	0.25	0.25	0	50	IFCD Poonch
459	Narkul	Indus	Chenab	0.25	0.25	0	30	IFCD Poonch
460	UpperAriKhul	Indus	Chenab	1.24	1.24	0	50	IFCD Poonch
461	AriKhulcauseway	Indus	Chenab	0.3	0.3	0	18	IFCD Poonch
462	LowerAriCrusherKhul	Indus	Chenab	0.56	0.56	0	40	IFCD Poonch
463	LowerArihul	Indus	Chenab	0.2	0.2	0	35	IFCD Poonch
464	Pallianpart3rdKhul	Indus	Chenab	0.71	0.65	0.06	45	IFCD Poonch
465	Ghani2ndKhul	Indus	Chenab	0.35	0.35	0	20	IFCD Poonch
466	UchhadPartpart2ndKhul	Indus	Chenab	0.87	0.77	0.1	35	IFCD Poonch
467	SagraKhul	Indus	Chenab	1.4	1.1	0.3	100	IFCD Poonch
468	Galhutapart3rdKhul	Indus	Chenab	0.29	0.29	0	50	IFCD Poonch
469	SanghioteKhul	Indus	Chenab	1.5	1	0.5	40	IFCD Poonch
470	Gohlad2ndKhul	Indus	Chenab	0.2	0.2	0	21	IFCD Poonch
471	Dabrajkhul	Indus	Chenab	1.07	1	0.07	35	IFCD Poonch
472	LeftChajjlaKhul	Indus	Chenab	1.1	0.9	0.2	20	IFCD Poonch
473	JuggalKhul	Indus	Chenab	0.08	0.08	0	0	IFCD Poonch
474	BheradharanaKhul	Indus	Chenab	1.3	0.5	0.8	12	IFCD Poonch
475	ThakurDwara	Indus	Chenab	0.1	0.1	0	15	IFCD Poonch
476	SagliadKhul	Indus	Chenab	0.75	0.45	0.3	20	IFCD Poonch
477	Mankote2ndKhul	Indus	Chenab	0.14	0.14	0	20	IFCD Poonch
478	KallarMohraKhul	Indus	Chenab	0.32	0.2	0.12	30	IFCD Poonch
479	Gohlad1stKhul	Indus	Chenab	0.14	0.14	0	20	IFCD Poonch

480	MalachjattaKhul	Indus	Chenab	0.28	0.28	0	20	IFCD Poonch
481	BhatidharKhul	Indus	Chenab	0.08	0.08	0	15	IFCD Poonch
482	Gohlad3rdKhul	Indus	Chenab	0.82	0.72	0.1	50	IFCD Poonch
483	DhargloonKhul	Indus	Chenab	0.45	0.36	0.09	19	IFCD Poonch
484	JhulassKhul	Indus	Chenab	4.27	4.27	0	280	IFCD Poonch
485	HillanKhul	Indus	Chenab	3.39	3.39	0	120	IFCD Poonch
486	KhanetarBelaandMainKhul	Indus	Chenab	5	5	0	350	IFCD Poonch
487	sararmainKhul	Indus	Chenab	4.92	4.92	0	408	IFCD Poonch
488	sararD2	Indus	Chenab	1.97	1.97	0	35	IFCD Poonch
489	SararD1	Indus	Chenab	1.72	1.72	0	30	IFCD Poonch
490	DinglaMainKhul	Indus	Chenab	5.49	5.49	0	207	IFCD Poonch
491	BijliWaliKhul	Indus	Chenab	4.55	4.55	0	120	IFCD Poonch
492	SalotriKhul	Indus	Chenab	4.19	4.19	0	150	IFCD Poonch
493	FaquirdaraKhul	Indus	Chenab	0.57	0.57	0	50	IFCD Poonch
494	SolaGravityKhul	Indus	Chenab	5.52	5.52	0	0	IFCD Poonch
495	DinglaD4	Indus	Chenab	1.36	1.36	0	25	IFCD Poonch
496	GuntrianMandharKhul	Indus	Chenab	2.71	2.71	0	300	IFCD Poonch
497	Saral salamabad D1	Indus	Chenab	0.66	0.66	0	0	IFCD Poonch
498	DinglaD2	Indus	Chenab	1.68	1.68	0	10	IFCD Poonch
499	DinglaD3	Indus	Chenab	1.16	1.16	0	14	IFCD Poonch
500	saiklooKhul	Indus	Chenab	2.58	2.58	0	120	IFCD Poonch
501	SaralSalamabadKhul	Indus	Chenab	3.6	3.6	0	140	IFCD Poonch
502	QaziMohraKhul	Indus	Chenab	3.06	3.06	0	170	IFCD Poonch
503	DungusBelaKhul	Indus	Chenab	2.15	2.15	0	166	IFCD Poonch
504	KanyuianKhul	Indus	Chenab	2.79	2.79	0	100	IFCD Poonch
505	LowersararKhul	Indus	Chenab	1.77	1.77	0	20	IFCD Poonch

506	MagnarMainKhul	Indus	Chenab	1.51	1.51	0	150	IFCD Poonch
507	MagnarD1	Indus	Chenab	0.32	0.32	0	2	IFCD Poonch
508	MagnarD2	Indus	Chenab	0.57	0.57	0	3	IFCD Poonch
509	MagnarD3	Indus	Chenab	0.6	0.6	0	7	IFCD Poonch
510	DinglaD1	Indus	Chenab	2.01	2.01	0	22	IFCD Poonch
511	ChaktrooKhul	Indus	Chenab	2.94	2.94	0	180	IFCD Poonch
512	ChandakKhul	Indus	Chenab	3.77	3.77	0	70	IFCD Poonch
513	AzmabadKhul	Indus	Chenab	1.05	1.05	0	140	IFCD Poonch
514	Jhallian khul	Indus	Chenab	1.27	1.27	0	180	IFCD Poonch
515	MarnoteKhul	Indus	Chenab	2.24	2.24	0	150	IFCD Poonch
516	JanyarKhul	Indus	Chenab	1.38	1.38	0	60	IFCD Poonch
517	KenuKulaniKhul	Indus	Chenab	3.55	3.55	0	220	IFCD Poonch
518	DalanMaltiLiftKHul	Indus	Chenab	0.05	0.05	0	0	IFCD Poonch
519	JhullasLiftKhul	Indus	Chenab	3.89	3.89	0	0	IFCD Poonch
520	SolahLiftKhul	Indus	Chenab	2.31	2.31	0	150	IFCD Poonch
521	Budhal Khul	Indus	Chenab	5	3	2	130	IFCD Rajouri
522	Chakli Khul	Indus	Chenab	1.2	0.6	0.6	14	IFCD Rajouri
523	CharaniiKhul	Indus	Chenab	0.55	0.2	0.35	10	IFCD Rajouri
524	DalhoriI Khul	Indus	Chenab	3.66	1.5	2.16	50	IFCD Rajouri
525	Dalogra Khul	Indus	Chenab	1.24	0.3	0.94	16	IFCD Rajouri
526	Danday waliI Khul	Indus	Chenab	0.5	0.1	0.4	7	IFCD Rajouri
527	Danday wali II	Indus	Chenab	0.65	0.15	0.5	7	IFCD Rajouri
528	Dhai Tanki Khul	Indus	Chenab	1.06	0.6	0.46	12	IFCD Rajouri
529	Dodasan Lower Khul	Indus	Chenab	0.95	0.8	0.15	50	IFCD Rajouri
530	Doongi Khul	Indus	Chenab	0.68	0.68	0	11	IFCD Rajouri
531	Hubbi Khul	Indus	Chenab	2.45	1.8	0.65	25	IFCD Rajouri

532	Jaglanoo Khul	Indus	Chenab	3.1	0.7	2.4	32	IFCD Rajouri
533	Kallar Khul	Indus	Chenab	0.96	0.8	0.16	24	IFCD Rajouri
534	Kandi Khul	Indus	Chenab	3.9	0.4	3.5	72	IFCD Rajouri
535	Khoriwali Khul	Indus	Chenab	3.47	0.97	2.5	88	IFCD Rajouri
536	Larkuti Khul	Indus	Chenab	3.2	2	1.2	20	IFCD Rajouri
537	Loundi Khul	Indus	Chenab	1.5	0.58	0.92	40	IFCD Rajouri
538	Lower Chicka Khul	Indus	Chenab	2.19	0.3	1.9	25	IFCD Rajouri
539	Lower KentiKhetar Khul	Indus	Chenab	0.98	0.16	0.83	12	IFCD Rajouri
540	Lower Mangota Khul	Indus	Chenab	0.58	0.21	0.37	6	IFCD Rajouri
541	Lower Potha Khul	Indus	Chenab	1.24	0.4	0.85	24	IFCD Rajouri
542	Lower Puljora Khul	Indus	Chenab	0.73	0.3	0.45	28	IFCD Rajouri
543	Lower Shungri Khul	Indus	Chenab	2.51	2.41	0.1	24	IFCD Rajouri
544	Muradpur Bela	Indus	Chenab	0.9	0.9	0	22	IFCD Rajouri
545	MuradpurMain	Indus	Chenab	1.36	0.92	0.44	25	IFCD Rajouri
546	Numb Khul	Indus	Chenab	1.14	0.21	0.93	8	IFCD Rajouri
547	Palma Lower	Indus	Chenab	1.5	0.6	0.9	16	IFCD Rajouri
548	Palma Upper	Indus	Chenab	1.2	0.2	1	7	IFCD Rajouri
549	Parthpuri Khul	Indus	Chenab	0.14	0.04	0.1	6	IFCD Rajouri
550	Peeri Danday wali Khul	Indus	Chenab	1.5	0.75	0.75	75	IFCD Rajouri
551	Phalni Khull	Indus	Chenab	3.5	1.8	1.7	45	IFCD Rajouri
552	Pharwala Khul	Indus	Chenab	0.6	0	0.6	16	IFCD Rajouri
553	Raitla Khaneerian Khul	Indus	Chenab	0.6	0.5	0.1	20	IFCD Rajouri
554	Raitla to Draman Mong Khul	Indus	Chenab	0.95	0.15	0.8	8	IFCD Rajouri
555	Rajdhani Khull	Indus	Chenab	0.72	0.34	0.38	25	IFCD Rajouri
556	Saim Samit I Khul	Indus	Chenab	0.57	0.45	0.12	25	IFCD Rajouri
557	Saim Samit III Khul	Indus	Chenab	0.3	0.1	0.2	16	IFCD Rajouri

558	Sanukote Khul	Indus	Chenab	1.1	0.8	0.3	20	IFCD Rajouri
559	Seri Khul	Indus	Chenab	1.24	0.58	0.66	32	IFCD Rajouri
560	Thakri Khul	Indus	Chenab	1.62	1.62	0	45	IFCD Rajouri
561	Tralla Upper Khul	Indus	Chenab	0.8	0.2	0.6	2	IFCD Rajouri
562	Upper Dodasan Khul	Indus	Chenab	1.32	0.62	0.7	60	IFCD Rajouri
563	Upper Kenti Khetar Khul	Indus	Chenab	0.32	0.05	0.27	5	IFCD Rajouri
564	Upper Mangota Khul	Indus	Chenab	0.82	0.1	0.72	7	IFCD Rajouri
565	UpperPeeri Khul	Indus	Chenab	1.5	1	0.5	20	IFCD Rajouri
566	Upper Potha Khul	Indus	Chenab	0.69	0.2	0.49	14	IFCD Rajouri
567	Upper Puljora Khull	Indus	Chenab	1.19	0.18	1.01	28	IFCD Rajouri
568	Upper Shungri Khul	Indus	Chenab	1.09	1	0.09	24	IFCD Rajouri
569	Upper Pathlar Khul	Indus	Chenab	2.25	1.5	0.75	40	IFCD Rajouri
570	Lower Pathlar Khul	Indus	Chenab	2.96	1.5	1.44	60	IFCD Rajouri
571	Thuddi-IIKhul	Indus	Chenab	1.48	0.55	0.93	8	IFCD Rajouri
572	Darmarth I Khul	Indus	Chenab	0.24	0	0.24	2	IFCD Rajouri
573	Darmarth II Khul	Indus	Chenab	1.34	0	1.34	8	IFCD Rajouri
574	Aitti Bagh lKhul	Indus	Chenab	1.79	0.2	1.59	21	IFCD Rajouri
575	BadalKhul	Indus	Chenab	0.8	0.2	0.6	6	IFCD Rajouri
576	Bella Mong Khul	Indus	Chenab	0.26	0	0.26	2	IFCD Rajouri
577	DabbiKhul	Indus	Chenab	0.68	0.68	0	9	IFCD Rajouri
578	Dheral Khul	Indus	Chenab	1.41	0.6	0.81	14	IFCD Rajouri
579	Dhari DharaKhul	Indus	Chenab	0.6	0.38	0.22	14	IFCD Rajouri
580	Dodaj Khul	Indus	Chenab	1.17	0.34	0.83	28	IFCD Rajouri
581	Ghambi Mughlan l Khul	Indus	Chenab	0.18	0.05	0.13	6	IFCD Rajouri
582	Ghambir Mughlan III Khul	Indus	Chenab	0.7	0.65	0.05	6	IFCD Rajouri
583	GalutimongKhul	Indus	Chenab	2.2	0.7	1.5	40	IFCD Rajouri

584	Kakora to Kakora Main Khul	Indus	Chenab	0.6	0.5	0.1	10	IFCD Rajouri
585	Kakora to Katarmal Khul	Indus	Chenab	0.33	0	0.33	15	IFCD Rajouri
586	Khetar Upper Khul	Indus	Chenab	0.55	0.15	0.4	5	IFCD Rajouri
587	KhodMongKhul	Indus	Chenab	2.2	0.5	1.7	50	IFCD Rajouri
588	Khundapher I lKhul	Indus	Chenab	1.25	0.8	0.45	10	IFCD Rajouri
589	Khundapher IIKhul	Indus	Chenab	0.96	0.7	0.26	10	IFCD Rajouri
590	Khundapher III Khul	Indus	Chenab	0.84	0.6	0.24	10	IFCD Rajouri
591	Lahwali Khul	Indus	Chenab	1.07	0.15	0.92	10	IFCD Rajouri
592	Lower Badakhana Khul	Indus	Chenab	1.2	0.6	0.6	20	IFCD Rajouri
593	MughallKhul	Indus	Chenab	0.41	0.3	0.11	3	IFCD Rajouri
594	GhambirMughlanIIKhul	Indus	Chenab	0.22	0.05	0.17	8	IFCD Rajouri
595	Nagal Dab IIKhul	Indus	Chenab	0.8	0.8	0	8	IFCD Rajouri
596	Nagal Dab IIIKhul	Indus	Chenab	0.7	0.7	0	8	IFCD Rajouri
597	Nagal Dab MainKhul	Indus	Chenab	1.44	1.44	0	8	IFCD Rajouri
598	Nagrota I Khul	Indus	Chenab	1.9	1.3	0.6	30	IFCD Rajouri
599	Nagrota II Khul	Indus	Chenab	1.15	0.9	0.25	20	IFCD Rajouri
600	Naili Kakora IIKhul	Indus	Chenab	0.7	0.2	0.5	30	IFCD Rajouri
601	Nain SukhKhul	Indus	Chenab	3.56	0.8	2.76	70	IFCD Rajouri
602	PathianKhul	Indus	Chenab	1.23	0.7	0.53	20	IFCD Rajouri
603	SailbanKhul	Indus	Chenab	2.54	0.6	1.94	60	IFCD Rajouri
604	SiddimongKhul	Indus	Chenab	1.74	1.61	0.14	80	IFCD Rajouri
605	Sidyal LowerKhul	Indus	Chenab	0.85	0.3	0.55	14	IFCD Rajouri
606	Sidyal UpperKhul	Indus	Chenab	1.7	0.7	1	14	IFCD Rajouri
607	Suthene Khul	Indus	Chenab	0.65	0.27	0.38	10	IFCD Rajouri
608	Tandwal Khul	Indus	Chenab	0.7	0.1	0.6	6	IFCD Rajouri
609	Targalote Khul	Indus	Chenab	0.77	0.1	0.67	14	IFCD Rajouri

610	Tarkula Khul	Indus	Chenab	0.81	0.31	0.5	40	IFCD Rajouri
611	Terran Drum Main Khul	Indus	Chenab	1.04	0.74	0.3	27	IFCD Rajouri
612	Upper Chicka Khul	Indus	Chenab	3.58	3.43	0.15	103	IFCD Rajouri
613	UpperPanthalKhul	Indus	Chenab	1.99	1.32	0.68	40	IFCD Rajouri
614	UpperSandalKhul	Indus	Chenab	3.2	2.8	0.4	30	IFCD Rajouri
615	Phalyana	Indus	Chenab	0.7	0.15	0.6	16	IFCD Rajouri
616	Argi-Baljarallan LIS	Indus	Chenab	4.79	3	1.79	50	IFCD Rajouri
617	Badakhana Upper Khul	Indus	Chenab	3.16	1.4	1.76	60	IFCD Rajouri
618	DandoteKhul	Indus	Chenab	2.85	1.2	1.65	60	IFCD Rajouri
619	Kabha ShahpurKhul	Indus	Chenab	0.31	0.05	0.26	10	IFCD Rajouri
620	Khania Khul	Indus	Chenab	1.6	0.8	0.8	25	IFCD Rajouri
621	Lower Sandal Khul	Indus	Chenab	2.45	1	1.45	100	IFCD Rajouri
622	SadalKhul	Indus	Chenab	2.68	1.86	0.83	55	IFCD Rajouri
623	Saranoo Old	Indus	Chenab	1	0.5	0.5	24	IFCD Rajouri
624	Sabzian MangotaKhul	Indus	Chenab	1	0.2	0.8	21	IFCD Rajouri
625	Nali Kakora Main Khull	Indus	Chenab	2.49	0.7	1.79	30	IFCD Rajouri
626	Fatehpur IIKhul	Indus	Chenab	0.54	0.02	0.52	5	IFCD Rajouri
627	Dheri Dhara Khul	Indus	Chenab	0.6	0.1	0.5	14	IFCD Rajouri
628	Mangalnarl Khul	Indus	Chenab	0.26	0.06	0.2	8	IFCD Rajouri
629	Fatehpur Khul	Indus	Chenab	0.75	0	0.75	28	IFCD Rajouri
630	Draj Draman Khul	Indus	Chenab	3.55	2	1.55	28	IFCD Rajouri
631	Samote Khul	Indus	Chenab	1.7	0.7	1	16	IFCD Rajouri
632	Charan IST Khul	Indus	Chenab	2	0.5	1.5	10	IFCD Rajouri
633	Rakhi Ban main Khul	Indus	Chenab	2.31	1.86	0.45	70	IFCD Rajouri
634	LIS Bindala khul	Indus	Chenab	0.51	0.05	0.46	12	IFCD Rajouri
635	Saranoo New	Indus	Chenab	4.5	4	0.5	80	IFCD Rajouri

636	Numbh khul	Indus	Chenab	1.14	0.21	0.93	8	IFCD Rajouri
637	Deriyian khul	Indus	Chenab	1.25	1.25	0	11	IFCD Rajouri
638	Saim Samit II	Indus	Chenab	0.68	0.3	0.38	16	IFCD Rajouri
639	Uddara khul	Indus	Chenab	0.5	0.43	0.07	15	IFCD Rajouri
640	Uppar shahdara	Indus	Chenab	1.85	0.75	1.1	17	IFCD Rajouri
641	Uppar pothlar	Indus	Chenab	1.76	0	1.76	50	IFCD Rajouri
642	Lower pothlar	Indus	Chenab	0.95	0	0.95	38	IFCD Rajouri
643	Seri mong	Indus	Chenab	1.74	0.57	1.17	17	IFCD Rajouri
644	Lower ponthal	Indus	Chenab	2.15	1.37	0.78	40	IFCD Rajouri
645	Barakh Khul	Indus	Chenab	2400	2200	200	76	MID Dharmari
646	Ransoo Khul	Indus	Chenab	1600	1200	400	60	MID Dharmari
647	Gajore	Indus	Chenab	4500	2500	2000	76	MID Dharmari
648	Gran Khul	Indus	Chenab	2000	2000	0	52	MID Dharmari
649	Pangal Chamara	Indus	Chenab	4200	4200	0	150	MID Dharmari
650	Akhli Butan Khul	Indus	Chenab	5500	5500	0	188	MID Dharmari
651	Upper Pai High Level	Indus	Chenab	2200	2000	200	80	MID Dharmari
652	Batora Kalmua	Indus	Chenab	4500	4500	0	128	MID Dharmari
653	Panasa Khul	Indus	Chenab	2900	2900	0	155	MID Dharmari
654	Pouni Khul	Indus	Chenab	3500	3500	0	300	MID Dharmari
655	Suketar Khul	Indus	Chenab	1410	1410	0	27	MID Dharmari
656	Lower Pai Canal	Indus	Chenab	6500	6000	500	402	MID Dharmari
657	Devi Garh	Indus	Chenab	1500	1200	300	60	MID Dharmari
658	Shiv Ganga Canal	Indus	Chenab	3100	3100	0	176	MID Dharmari
659	Khanyari Khul	Indus	Chenab	5000	5000	0	144	MID Dharmari
660	Kala Bagga	Indus	Chenab	3250	3250	0	106	MID Dharmari
661	Puria Khallar Khul	Indus	Chenab	4600	4600	0	180	MID Dharmari

662	Kund Khanyari Khul	Indus	Chenab	3000	3000	0	110	MID Dharmari
663	Upper Pai Canal	Indus	Chenab	3500	3500	0	159	MID Dharmari
664	Kanjali Khul	Indus	Chenab	2350	2350	0	61	MID Dharmari
665	Mari Khul	Indus	Chenab	2000	2000	0	61	MID Dharmari
666	Panthal Canal	Indus	Chenab	6900	6900	0	171	MID Dharmari
667	Suel Canal	Indus	Chenab	7474	7474	0	218	MID Dharmari
668	Dadura Khul	Indus	Chenab	1350	1350	0	15	MID Dharmari
669	Tootawali Khul	Indus	Chenab	1100	1100	0	8	MID Dharmari
670	Dadoa Khul	Indus	Chenab	400	400	0	6	MID Dharmari
671	Khumbian Bhagta Khul	Indus	Chenab	950	950	0	20	MID Dharmari
672	Kharalaid L/ S	Indus	Chenab	2200	2200	0	120	MID Dharmari
673	Sandoor Khul of Kharalaid L/S	Indus	Chenab	2000	2000	0	20	MID Dharmari
674	Ghiala L/S	Indus	Chenab	1400	1400	0	60	MID Dharmari
675	Kundra L.I.S.	Indus	Chenab	1100	1100	0	80	MID Dharmari
676	Talwara L.I.S	Indus	Chenab	2950	2950	0	160	MID Dharmari
677	Jeri Jambri LIS	Indus	Chenab	2170	2170	0	148	MID Dharmari
678	LIS Padoh	Indus	Chenab	1250	1250	0	42	MID Dharmari
679	LIS Kandyar	Indus	Chenab	1200	1200	0	32	MID Dharmari
680	Hatti Khul	Indus	Chenab	1800	1800	0	33	MID Dharmari
681	Surookote Khul	Indus	Chenab	1900	1650	250	60	MID Dharmari
682	Latti Khul	Indus	Chenab	2000	2000	0	37	MID Dharmari
683	Tringa Khul	Indus	Chenab	800	200	600	40	MID Dharmari
684	Pattian Lamsoora Khul	Indus	Chenab	2200	2200	0	20	MID Dharmari
685	Bassan Khul	Indus	Chenab	200	50	150	23	MID Dharmari
686	Chinkah Khul	Indus	Chenab	2000	2000	0	41	MID Dharmari
687	Palapari Khul	Indus	Chenab	700	400	300	40	MID Dharmari

688	Dharoot Khul	Indus	Chenab	1500	1500	0	40	MID Dharmari
689	Narloo Khul	Indus	Chenab	2500	2500	0	30	MID Dharmari
690	Dhanour Khul	Indus	Chenab	1600	1600	0	56	MID Dharmari
691	Baldanoo Khul	Indus	Chenab	800	800	0	20	MID Dharmari
692	Chauntwan Khul	Indus	Chenab	1500	1500	0	56	MID Dharmari
693	Such Sai	Indus	Chenab	2000	2000	0	105	MID Dharmari
694	Thuru Khul	Indus	Chenab	1400	800	600	82	MID Dharmari
695	Gundi to Karchak	Indus	Chenab	1200	600	600	13	MID Dharmari
696	Thakra Kote Khul	Indus	Chenab	1300	600	700	60	MID Dharmari
697	Budhan Khul	Indus	Chenab	1600	1600	0	20	MID Dharmari
698	Jamlan Khul	Indus	Chenab	3100	3100	0	60	MID Dharmari
699	Garh Khul	Indus	Chenab	2400	2150	250	81	MID Dharmari
700	Simble Nari	Indus	Chenab	1800	1800	0	90	MID Dharmari
701	Chassana Khul	Indus	Chenab	1000	1000	0	60	MID Dharmari
702	Khad Khul	Indus	Chenab	2000	500	1500	21	MID Dharmari
703	Manji Kote Khul	Indus	Chenab	750	750	0	64	MID Dharmari
704	Sarl Khul	Indus	Chenab	1600	1600	0	130	MID Dharmari
705	Shikari Khul	Indus	Chenab	3000	1900	1100	60	MID Dharmari
706	Malli kote Khul	Indus	Chenab	2300	1200	1100	71	MID Dharmari
707	Channa Neosi Khul	Indus	Chenab	1500	700	800	60	MID Dharmari
708	Chan Khul	Indus	Chenab	1500	1500	0	16	MID Dharmari
709	Chunta to Pansal Khul	Indus	Chenab	1200	1000	200	31	MID Dharmari
710	Salar Khul	Indus	Chenab	700	700	0	17	MID Dharmari
711	Debotal Khul	Indus	Chenab	1500	1500	0	18	MID Dharmari
712	Dhamani Panjera Khul	Indus	Chenab	1500	1500	0	32	MID Dharmari
713	Banjla Saroli Khul	Indus	Chenab	1500	900	600	50	MID Dharmari

714	Lalana Khul	Indus	Chenab	800	0	800	50	MID Dharmari
715	Bathoie Khul R-Side	Indus	Chenab	1100	600	500	60	MID Dharmari
716	Narbass Khul	Indus	Chenab	435	0	435	17	MID Dharmari
717	Ganjote Khul	Indus	Chenab	1100	800	300	24	MID Dharmari
718	Sanyalla Khul	Indus	Chenab	1600	800	800	39	MID Dharmari
719	Badder Khul	Indus	Chenab	1000	1000	0	72	MID Dharmari
720	Banna Khul	Indus	Chenab	1500	1500	0	80	MID Dharmari
721	Chakloor Raimang Khul	Indus	Chenab	1100	1100	0	60	MID Dharmari
722	Chinalkote Khul	Indus	Chenab	1900	1900	0	68	MID Dharmari
723	Upper Dhamni Khul	Indus	Chenab	1450	1450	0	86	MID Dharmari
724	Theral Khul	Indus	Chenab	2500	2500	0	47	MID Dharmari
725	Sarh Khul	Indus	Chenab	4200	2500	1700	100	MID Dharmari
726	Ludh Khul	Indus	Chenab	3500	250	3250	52	MID Dharmari
727	Chitta Bassan Khul	Indus	Chenab	1500	600	900	16	MID Dharmari
728	Bathoi Khul L-Side	Indus	Chenab	3000	2600	400	56	MID Dharmari
729	Mazami Khul	Indus	Chenab	1500	500	1000	43	MID Dharmari
730	Jamslan Khul	Indus	Chenab	7000	6200	800	260	MID Dharmari
731	Kund Nallah to Gota Khul	Indus	Chenab	816	816	0	57	MID Dharmari
732	Bhallar Khul	Indus	Chenab	3500	3500	0	110	MID Dharmari
733	Malanoo	Chenab	Jia Nallah	2.6	1	1.6	45	SSD Gandoh
734	LIS Sai Kalan	Indus	Chenab	2.22	2.22	0	174	TWID Jammu
735	LIS Burejal	Indus	Chenab	2.15	2.15	0	52	TWID Jammu
736	LIS Harapeer	Indus	Chenab	1.85	1.85	0	80	TWID Jammu
737	LIS Nikowal (Old)	Indus	Chenab	1.2	1.2	0	54	TWID Jammu

4.1.6. Wetlands

4.1.6.1. Subject Matter

A "wetland" (Figure 4.25) refers to a region characterized by marshes, fens, peatlands, or bodies of water, whether naturally occurring or human-made. It may be permanent or temporary, with water that is either static or flowing, and can be fresh, brackish, or saline[1]. This definition encompasses both natural and artificial wetlands, including areas with marine water whose depth at low tide does not exceed six meters. However, it excludes river channels, paddy fields, and man-made water bodies or tanks specifically designed for drinking water purposes.

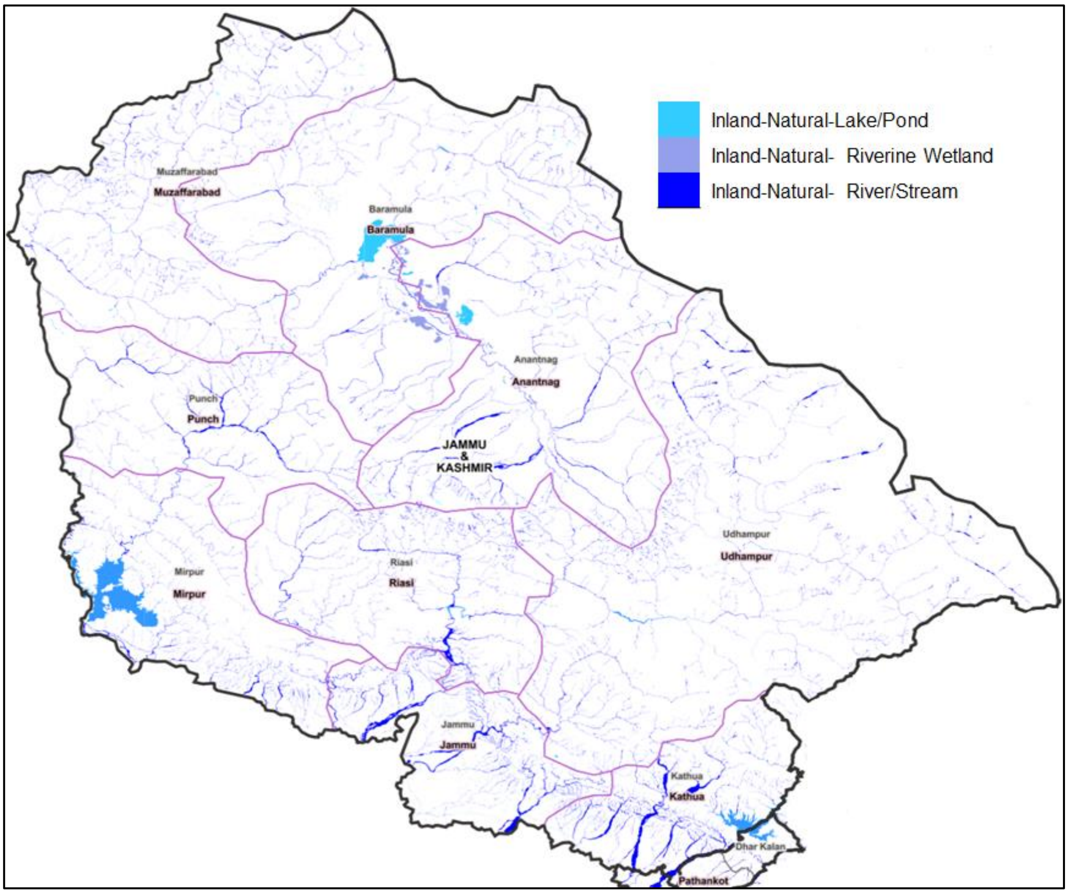


Figure 4.25. Wetlands of Jammu and Kashmir. Source: vedas.sac.gov.in

Jammu and Kashmir boast diverse wetlands, including iconic lakes like Wular and Dal, which play a pivotal role in the region's ecological balance, serving as habitats for rich biodiversity and offering essential water resources for agriculture and human settlements[2]. These wetlands are significant cultural and recreational assets, attracting tourists and holding religious importance for local communities.

[1] https://indianwetlands.in/wetlands-overview/wetland-types/
[2] https://pib.gov.in/PressReleasePage.aspx?PRID=1896499

However, they face challenges such as urbanization, pollution, and climate change. Conservation efforts, including potential Ramsar designations, are essential to safeguard these wetlands, ensuring their sustained ecological, economic, and cultural contributions to the region (Farooq et al. 2017). The UT of Jammu and Kashmir hosts 14 primary protected wetlands covering an area of 15627 Ha, which are listed in Table 4.17.

Table 4.17. Primary protected wetlands of the UT of Jammu and Kashmir.

S. No.	Number of Wetlands in Protected Areas	District
1	Hokersar	Srinagar / Budgam
2	Mirgund	Baramulla
3	Hygam	Baramulla
4	Shallabugh	Ganderbal
5	Malgam	Bandipora
6	Chatlum	Pulwama
7	Manibugh	Pulwama
8	Kranchoo	Pulwama
9	Freshkhori	Pulwama
10	Gharana	Jammu
11	Paragwal	Jammu
12	Kukarian	Jammu
13	Nanga	Samba
14	Sangral – Asa Chak	Jammu

The Convention on Wetlands, an intergovernmental treaty established on 2 February 1971 in Ramsar, Iran, along the southern Caspian Sea shore, is commonly referred to as the "Ramsar Convention." While officially named the "Convention on Wetlands (Ramsar, Iran, 1971)," it holds the distinction of being the inaugural contemporary global intergovernmental treaty dedicated to the conservation and sustainable utilization of natural resources. The detailed descripation of Ramsar Site of Jammu and Kashmir are presented in Table 4.18.

Table 4.18 The location of Ramsar Sites of Jammu and Kashmir. Source: https://indianwetlands.in/

S. No.	Name	District/Location	Area (Ha)	Wetland Type
1	Wular Lake	Srinagar	18900	Natural (Inland)
2	Hygam Wetland Conservation Reserve	Baramula	801.82	-
3	Hokera Wetland	Badgam	1375	Natural (Inland)
4	Shallabugh wetland Reserve	Ganderbal	1600	Natural (Inland)
5	Surinsar-Mansar lakes	Udhampur	350	Natural (Inland)

The National Wetlands Atlas (Romshoo 2010) reveals significant insights into the wetland landscape of Jammu & Kashmir, showcasing the region's rich biodiversity and environmental resources. According to the atlas, Jammu & Kashmir boasts a total of 2,638 wetlands, covering an expansive 1,77,926 hectares. This vast expanse of wetlands contributes to the ecological balance and supports diverse flora and fauna. A closer examination of the data highlights 848 wetlands, each exceeding 2.25 hectares, spanning a total area of 1,76,136 hectares. These larger wetlands play a crucial role in maintaining the region's environmental equilibrium, providing habitat for various species and serving as essential ecosystems that contribute to water conservation and purification. The National Wetlands Atlas serves as a valuable tool for policymakers, researchers, and conservationists, offering a comprehensive understanding of Jammu & Kashmir's wetland resources and emphasizing the need for sustainable conservation measures to preserve these critical ecosystems.[1]

Table 4.19 Area estimates of wetlands in Jammu and Kashmir with wettcode. Source: National Wetland Atlas: Jammu and Kashmir (2010).

S. No.	**Wetland code**	**Wetland Category**	**Number of Wetlands**	**Total Wetland Area**	**Percentage of wetland area**	**Open Water**	
						Post-monsoon Area	**Pre-monsoon Area**
	1100	Inland Wetlands - Natural					
1	1101	Lakes/Ponds	36	13762	3.52	3371	6821
2	1103	High altitude wetlands	1143	109170	27.88	105110	105072
3	1104	Riverine wetlands	88	9594	2.45	153	1639
4	1106	River/Stream	138	231597	59.16	170063	175550
	1200	Inland Wetlands -Man-made					
5	1201	Reservoirs/Barrages	4	25132	6.42	23115	25121
6	1202	Tanks/Ponds	2	6	0.00	6	6
		Sub-Total	1411	389261	99.43	301818	314209
		Wetlands (<2.25 Ha)	2240	2240	0.57	-	-
		Total	3651	391501	100.00	301818	314209

The wetland classification categorizes inland and coastal wetlands as Level-I followed by natural and man-made wetlands as level-II, which were further categorized using a hierarchical system into 20 types of wetlands as level-III classes,

[1] https://indianwetlands.in/wetlands-overview/interactive-wetland-map-of-india/

excludes rice fields. Each wetland type also exhibits a wide diversity in terms of shape, size, distribution, water quality etc., which are well captured on the satellite imagery[1]. The detailed description of area estimates of wetlands in Jammu and Kashmir with wettcode and District-wise are presented in Table 4.19 & Table 4.20, respectively.

Table 4.20 District-wise Wetland Area Estimates of Jammu and Kashmir. Source: National Wetland Atlas: Jammu and Kashmir (2010).

S. No.	Administrative boundary / District	Geographic Area (sq. km)	Wetland Area (Ha)	Percentage of total wetland area	Percentage of district geographic area
1	Kupwara	3028	2384	0.61	0.79
2	Baramula	5183	16360	4.18	3.16
3	Srinagar	1865	10081	2.57	5.41
4	Badgam	1267	3402	0.87	2.69
5	Pulwama	1456	3561	0.91	2.45
6	Anantnag	3986	6875	1.76	1.72
7	Doda	11683	5667	1.45	0.49
8	Udhampur	4580	8326	2.13	1.82
9	Poonch	3826	7013	1.79	1.83
10	Rajauri	2628	4910	1.25	1.87
11	Jammu	3017	19638	5.02	6.51
12	Kathua	2675	21740	5.55	8.13
13	Gilghit	34380	29844	7.62	0.87
14	Konu	2773	1547	0.40	0.56
15	Gilghit Wazara	6098	2743	0.70	0.45
16	Chilas	4276	2200	0.56	0.51
17	Muzzafarabad	3711	4105	1.05	1.11
18	Mirpur	4077	27529	7.03	6.75
	TOTAL	222111	391500	100.00	1.76

[1]https://mospi.gov.in/sites/default/files/reports_and_publication/statistical_publication/EnviStats/Chap4-Wetlands_envst22.pdf

4.1.6.2. Availability and Utilizable water temporal and spatial basis

Table 4.21 Pre-Monsoon and Post Monsoon Wetland Status of Jammu and Kashmir. Source: National Water Informatics Centre

District	WetLands Post Monsoon 1994 (Ha)	WetLands Post- Monsoon 2005 (Ha)	WetLands Pre-Monsoon 1994 (Ha)	WetLands Pre-Monsoon 2005 (Ha)
Badgam	0.000	1518.001	2661.766	0.000
Bandipore	13907.184	8087.926	9403.956	0.000
Baramula	0.000	420.321	3001.406	0.000
Jammu	0.000	118.172	767.046	25.808
Kathua	0.000	4053.545	495.449	0.000
Kishtwar	0.000	776.186	0.000	0.000
Kulgam	0.000	17.636	0.000	0.000
Reasi	0.000	777.925	0.000	0.000
Samba	0.000	110.981	209.971	57.243
Srinagar	2400.093	1970.103	2752.023	0.000

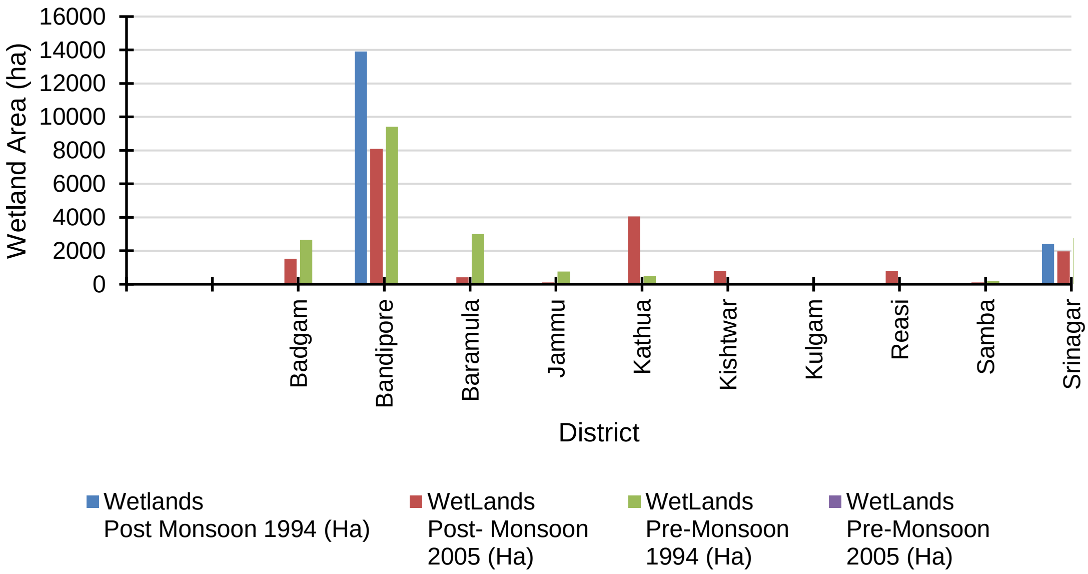


Figure 4.26 Plot of Wetland Status (Pre-monsoon & Post-Monsoon) of Jammu and Kashmir of Year 1994 & 2005. Source: National Water Informatics Centre

Amongst the major wetland bodies, the Dal and the Wular lake are the largest. The other major wetland bodies in the UT of Jammu division include the Hokersar, Mirgund, Haigam, Shallabugh, Kranchoo, Chatlam, Manibugh, Freshkori, Mansar and Surinsar. The wetland maps for these bodies are depicted in following figures with their LULC statistics. The more detailed is presented in Annexure 4.1.6.7,Table 4.23.

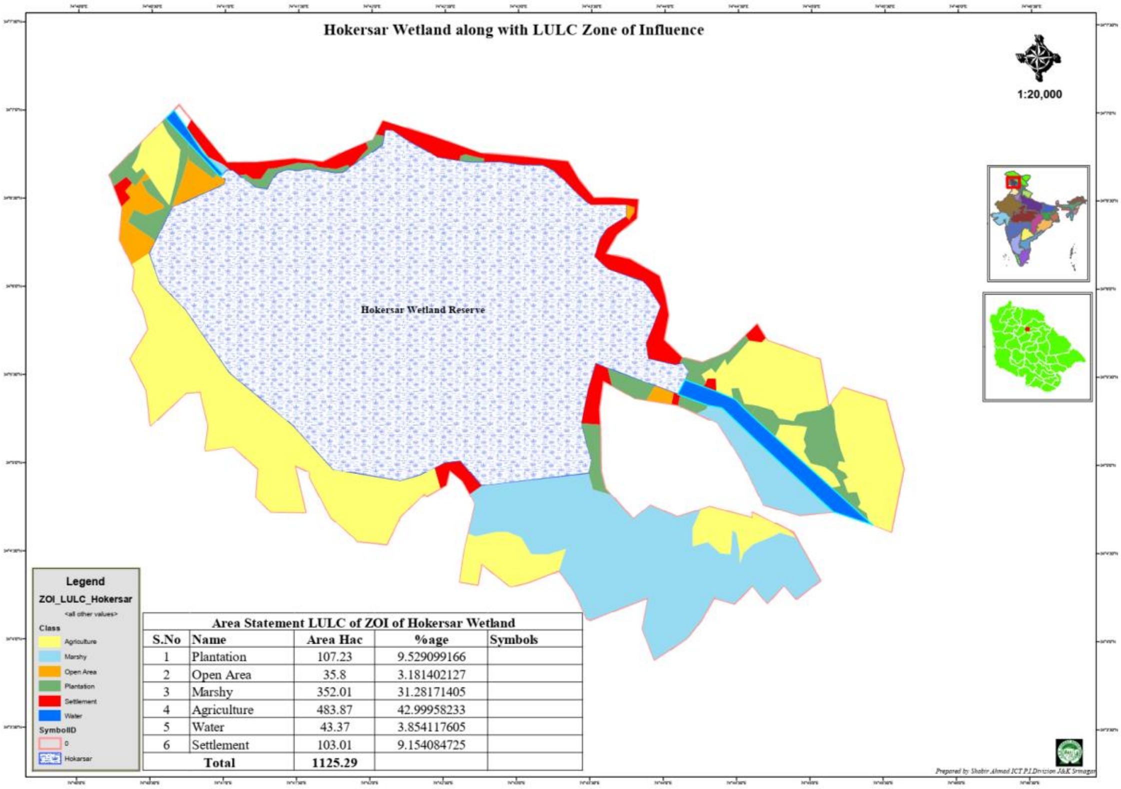


Figure 4.27. Hokersar wetland with LULC zone influence.

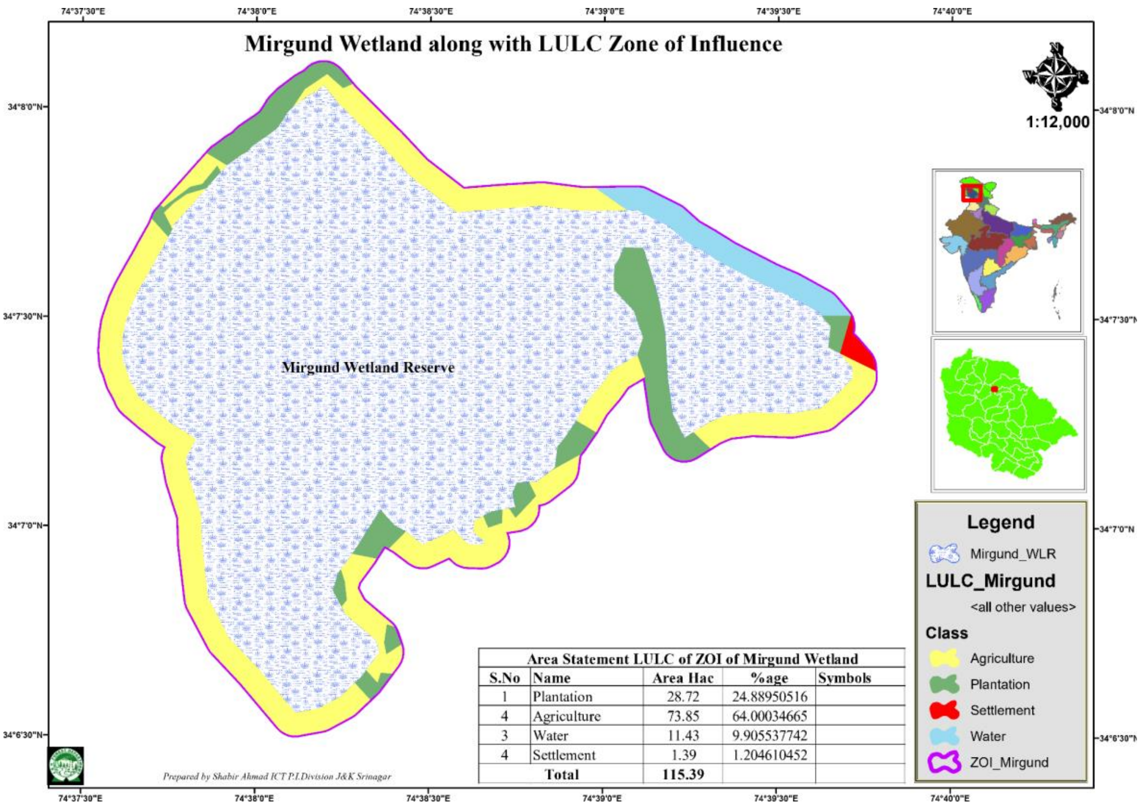
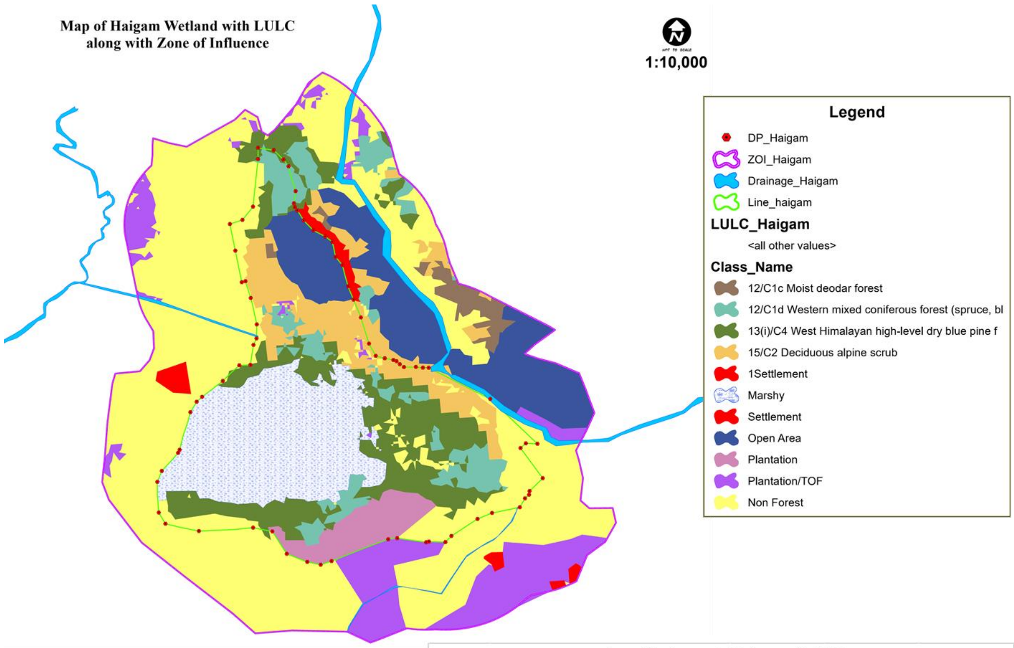
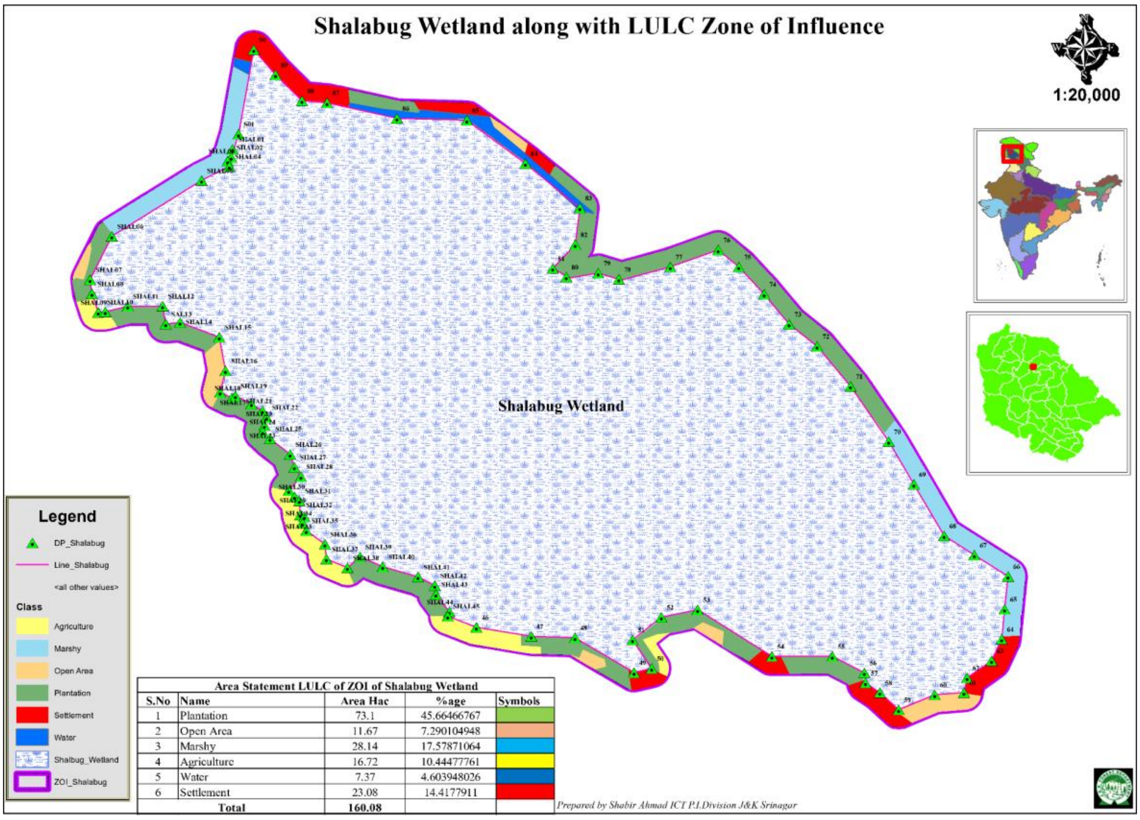


Figure 4.28. Mirgund wetland with LULC zone influence.



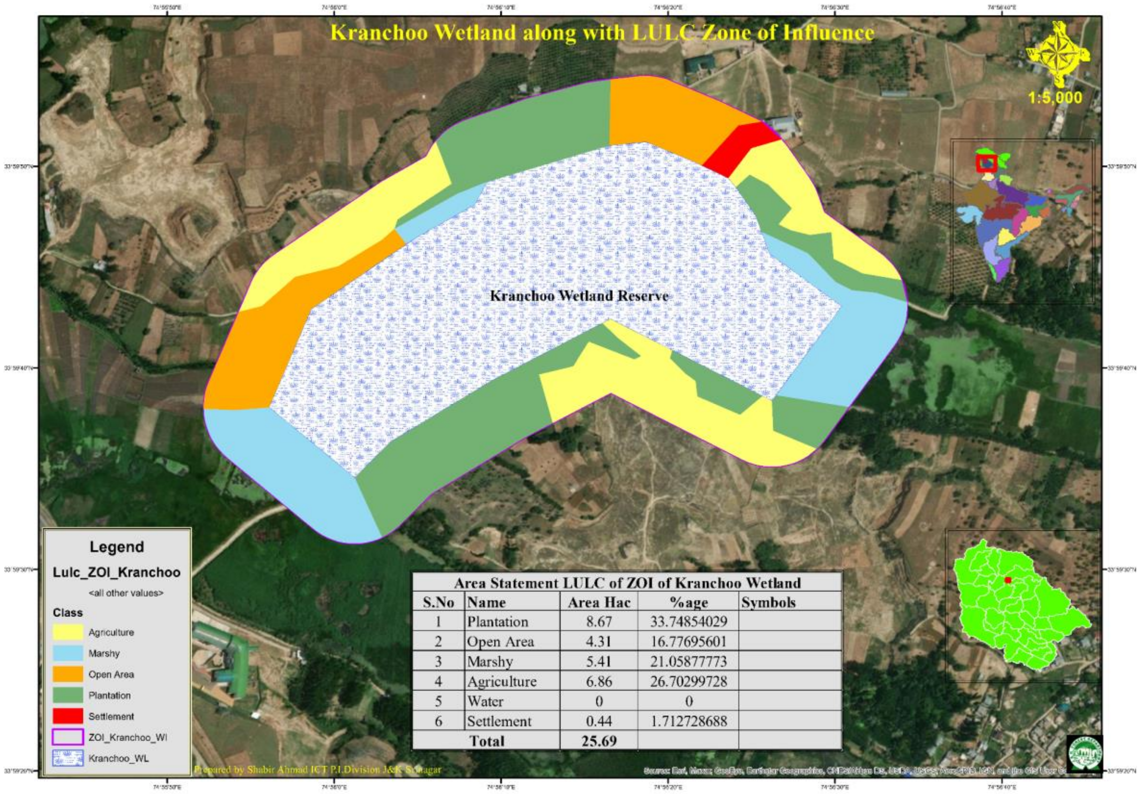
Area Statement Haigam & ZOI				
S.No	Name	Area Hac	%age	Symbols
1	Moderate to DensePlantation	330.5	15.6969095	
2	Open Plantation	316.15	15.0153644	
3	Marshy	467.92	22.2235943	
4	Agriculture	941.3	44.7065082	
5	Settlement	49.64	2.35762357	
	Total	2105.51		

Figure 4.29. Haigam wetland with LULC zone influence.



Area Statement LULC of ZOI of Shalabug Wetland				
S.No	Name	Area Hac	%age	Symbols
1	Plantation	73.1	45.66466767	
2	Open Area	11.67	7.290104948	
3	Marshy	28.14	17.57871064	
4	Agriculture	16.72	10.44477761	
5	Water	7.37	4.603948026	
6	Settlement	23.08	14.4177911	
	Total	160.08		

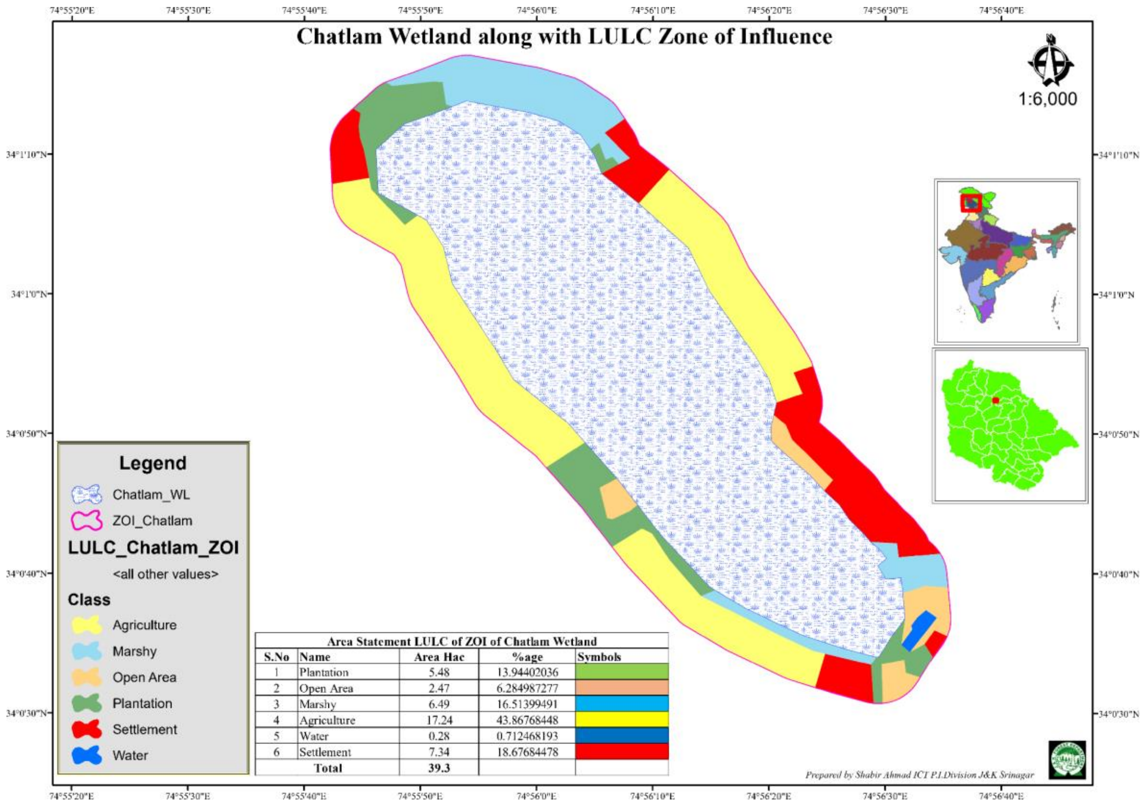
Figure 4.30. Shalabugh wetland with LULC zone influence.



Area Statement LULC of ZOI of Kranchoo Wetland

S.No	Name	Area Hac	%age	Symbols
1	Plantation	8.67	33.74854029	
2	Open Area	4.31	16.77695601	
3	Marshy	5.41	21.05877773	
4	Agriculture	6.86	26.70299728	
5	Water	0	0	
6	Settlement	0.44	1.712728688	
	Total	25.69		

Figure 4.31. Kranchoo wetland with LULC zone influence.



Area Statement LULC of ZOI of Chatlam Wetland

S.No	Name	Area Hac	%age	Symbols
1	Plantation	5.48	13.94402036	
2	Open Area	2.47	6.284987277	
3	Marshy	6.49	16.51399491	
4	Agriculture	17.24	43.86768448	
5	Water	0.28	0.712468193	
6	Settlement	7.34	18.67684478	
	Total	39.3		

Figure 4.32. Chatlam wetland with LULC zone influence.

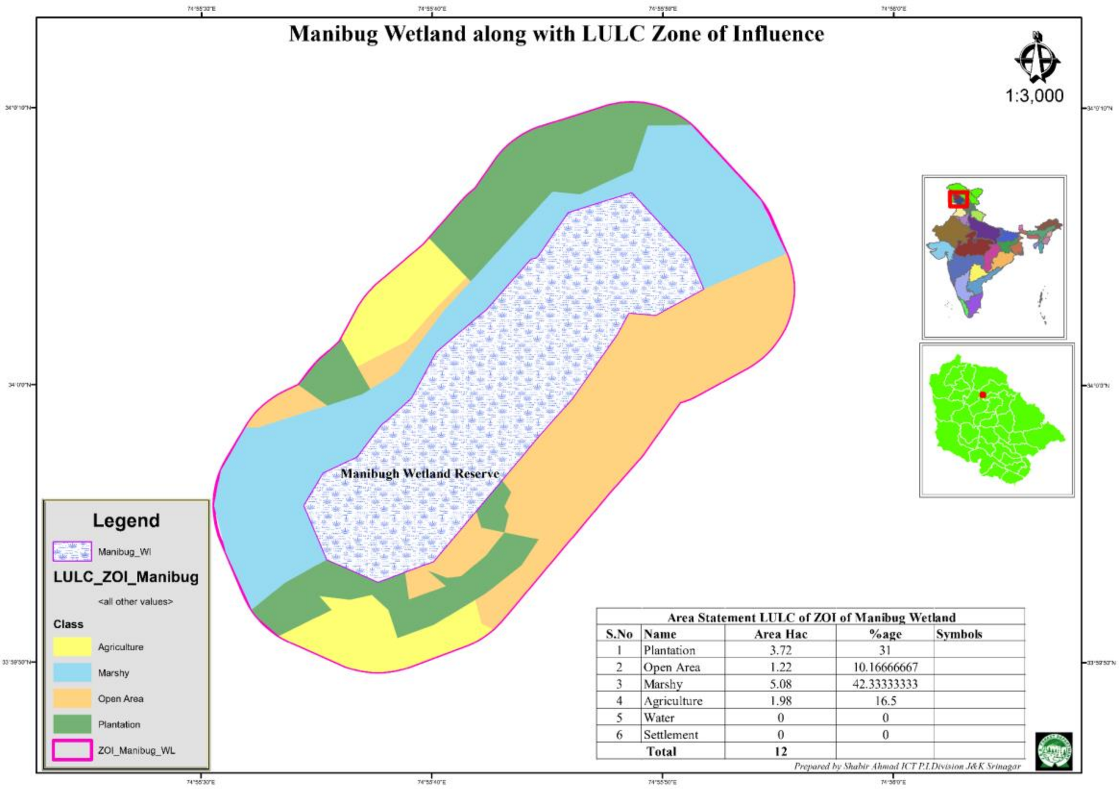


Figure 4.33. Manibugh wetland with LULC zone influence.

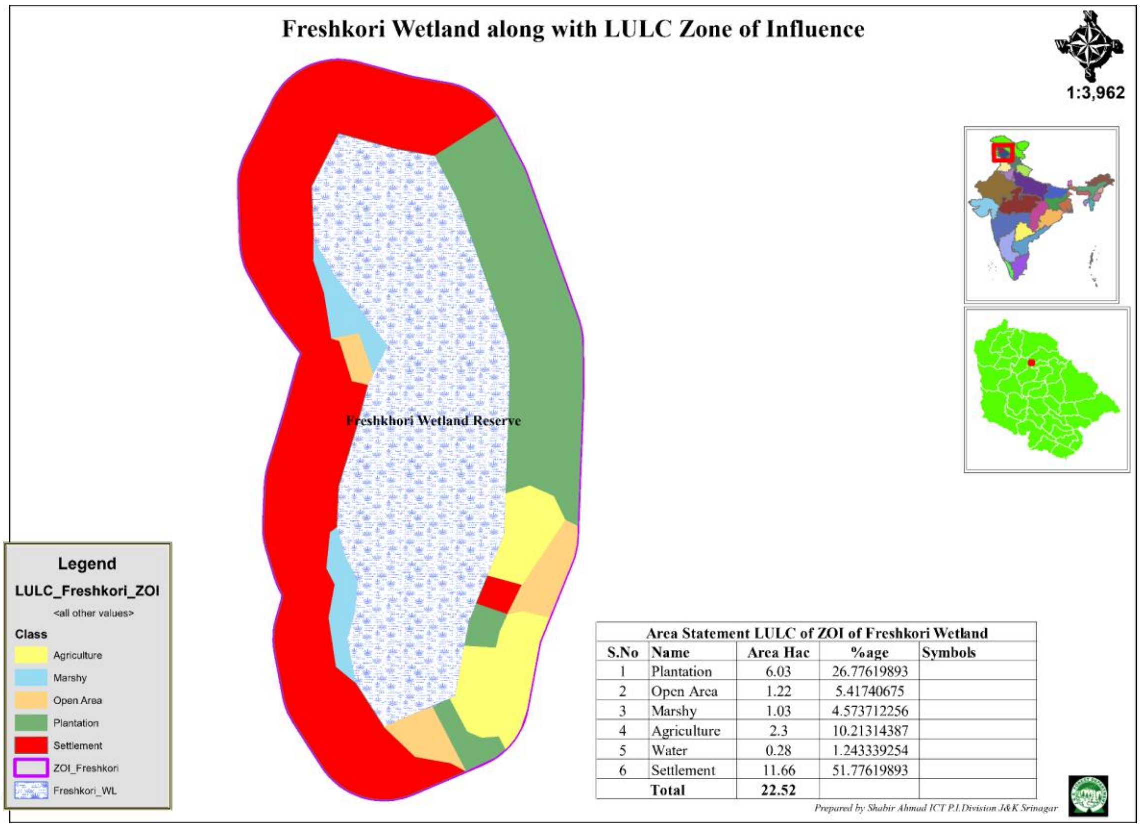


Figure 4.34. Freshkori wetland with LULC zone influence.

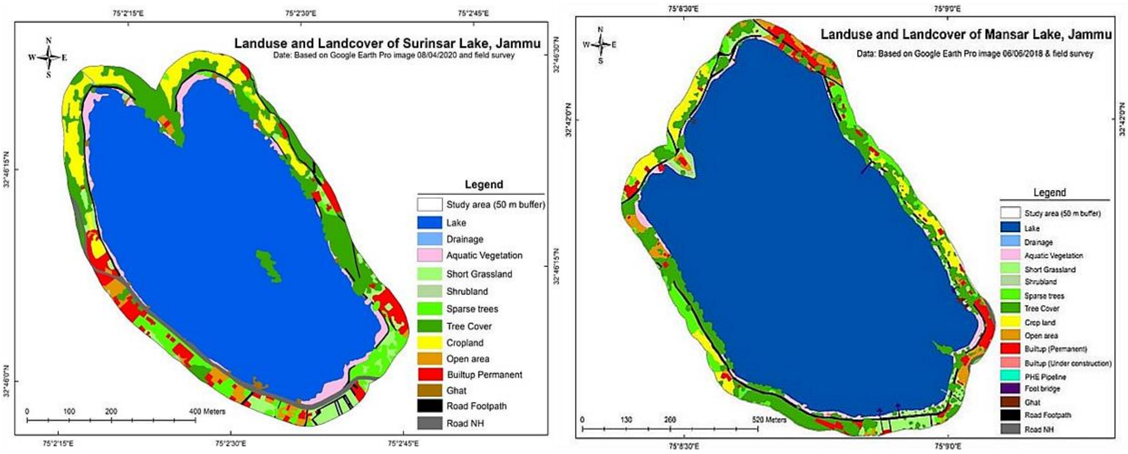


Figure 4.35. Surinsar and Mansar wetland with LULC zone influence.

4.1.6.3. Issues and Challenges

- Rapid urbanization in Jammu and Kashmir is leading to the encroachment and conversion of vital wetlands for infrastructure development, posing significant threats to their ecological balance and biodiversity.
- The rapid expansion of human settlements and industrial activities has led to a significant loss of wetland areas, affected the quality of wetlands leading to threatening biodiversity and ecological functions.
- The conversion of wetlands into agricultural land for cultivation is disrupting the natural hydrological balance, leading to significant ecological consequences.
- The accumulation of sediment and pollutants is significantly degrading the health of the wetland ecosystem.
- Altered precipitation patterns and temperature fluctuations are significantly impacting wetland habitats, leading to changes in wetland ecology and a reduction in biodiversity due to the proliferation of invasive species.
- Reduced water availability caused by upstream water extraction is significantly impacting the health and biodiversity of wetland ecosystems.
- Community-driven initiatives are essential for promoting sustainable wetland management in Jammu and Kashmir, ensuring the preservation of these vital ecosystems amidst the region's unique environmental and socio-economic challenges.

4.1.6.4. Governance/ Management

a) Statute / Law / Policy/ Regulations

a. Wetlands (Conservation and Management) Rules, 2017

b. Guidelines for National Lake Conservation Plan, 2008

c. National Plan for Conservation of Aquatic Ecosystems (NPCA), 2016
d. Provision under National Environmental Policy, 2006
e. Provision under The Forest (Conservation) Act, 1980
f. Provision under The Wildlife (Protection) Act, 1972
g. Provision under Environmental (Protection) Act, 1986
h. Construction and Demolition Waste Management Rules, 2016;
i. Manufacture, Storage and Import of Hazardous Chemical Rules, 1989
j. Rules for Manufacture, Use, Import, Export and Storage of Hazardous
k. Micro-organisms Genetically engineered organisms or cells, 1989Hazardous Wastes (Management, Handling and Trans-Boundary Movement) Rules, 2008;
l. E-Waste (Management) Rules, 2016

b) **Institutions governing / managing / monitoring the resources and Institutional structure.**

a) National Wetlands Committee (NWC) [Wetlands (Conservation and Management) Rules, 2017, Clause 6
b) Central Wetland Regulatory Authority (CWRA)
c) Lake Development Authority (LDA)
d) Lake Conservation Authority (LCA)
e) State Wetlands Authority or Union Territory Wetlands Authority
f) Irrigation and water resource Department
g) Central Pollution Control Board (CPCB)/ State Pollution Control Board (SPCB)
h) Pollution control committees (where applicable)
i) Municipal Council / Corporation
j) Forest Department/Wildlife Department
k) Local level institutions (Role of Panchayati Raj System, if any)
l) Self Help Group, NGOs
m) NABARD, ADB

c) **Area of Peoples/ Private Participation if any**

d) **Schemes and Financing**

a) Central Government schemes under National Committee on Aquatic Ecosystems (NCAE) etc.
b) State Government aid projects
c) UNDP funded projects
d) World Bank aided projects
e) Local level site-specific projects such as MGNREGA

4.1.6.5. Measurement, Monitoring and Data Constraints/ Management:

Measurement

a) Monitoring water levels, flow rates, and sedimentation patterns in wetland areas.

Monitoring:

b) Regularly assessing the overall health of the wetland ecosystem, including the condition of flora and fauna.
c) Keeping track of any changes in land use patterns around the wetlands, such as agricultural expansion or urban development.

Data Constraints/Management:

d) Ensuring that collected data, especially sensitive information, is securely managed to protect the privacy of the ecosystem and any indigenous communities.
e) Involving local communities in data collection and management, considering their traditional knowledge and practices.

4.1.6.6. Performance Indicators:

a) Bench Marks/ Norms/ Standards and deviation from the norms/bench marks/standards

Table 4.22. Performance indicator benchmarks for wetlands.

Category	**Indicator**	**Bench Mark**	
Measurement & Statute	Number of wetlands notified as protected	14	14
	% of notified wetlands geo tagged	NA	
	Number of wetlands that are covered under Integrated Management Plan [Wetlands (Conservation and Management) Rules, 2017, Clauses 2 (1) e) & 5 (4) g) and h)]	14	8
	Number of wetlands that do not have Integrated Management Plan [Wetlands (Conservation and	14	6

	Management) Rules, 2017, Clauses 2 (1) e) & 5 (4) g) and h)]		
	Number of Wetlands of the State not notified yet	0	0
	Whether Identification of lakes having area >10.0 ha is completed	Yes, the area of all the wetlands have been calculated	
	Number of wetlands in which Physical, Chemical and Microbiological parameters are being monitored as per EPA, 1986	14	9
	Number of wetlands in which biodiversity in terms of aquatic major fauna, flora and migratory water birds are monitored	14	3
Water Demand Management	Number of wetlands where abstraction exceeds inflow		
	Extraction of water from wetlands (cubic meter per annum)		
	Number of wetlands that dry-up during summer		4
Problems	Number of wetlands reported shrinkage in 'Zone of influence' due to anthropogenic causes		
	% & Number of lakes with shrinkage in catchment	14	
	0-25%		10
	25-50%		
	50-75%		
	75-100%		4
	Number of wetlands reported encroachment		4
	Number of wetlands where prohibited activities are still continued		6
	Number of Lakes where regulated activities are still not regulated.		6
Water Quality	Number of wetlands categorized on Designated Best Use (DBU)Class A	Not Evaluated	
	Number of wetlands categorized on DBU Class B	do	
	Number of wetlands categorized on DBU Class C	do	
	Number of wetlands categorized on DBU Class D	do	

	Number of wetlands categorized on DBU Class E	do	
	Number of wetlands not categorized on DBU Criteria	do	
	Number of wetlands wherein water quality have degraded from DBU Class B and C to DBU Class D or E	Not Evaluated	
Waste Water / Pollution	Number of wetlands affected by Sewage	1	
	Number of wetlands affected by Industrial effluents	Nil	0
	Number of wetlands affected by other source of wastewater i.e. *dhobi ghats*, cattle wallowing, etc.	do	1
	Number of wetlands with STPs/ sewage treatmentsystem	do	2
	Number of wetlands with solid waste managementsystem	do	0
	Number of wetlands affected due to eutrophication (Problem due to excessive nutrients)		2
	Number of wetlands with Biochemical Oxygen Demand(BOD) of 3 mg/L or less		Nil
	Number of wetlands with Dissolved Oxygen concentration of 6 mg/L or more		Nil
	Number of wetlands beyond the ideal range pH between 7.5 to 8.5		01
	% Coastal Wetlands that have shown decline in salinitysignificantly		
Status Assessment: Biodiversity	Number of wetlands where biodiversity (aquatic plants and animals) is assessed	The Asian / annual water fowl census is conducted in 3 wetlands viz, Hokersar, Hygam and Gharana	
	Number of species locally extinct due to change in waterquality and quantity	N/A	
	Number of species re-appeared due to rejuvenation ofwater quality and availability		
	No. of wetlands where population decline reported in migratory water bird congregation		4
	No. of wetlands where population increase reported inmigratory water bird congregation		4

	% and Number of Lakes where Bio-diversity (Aquatic plants and Animals) is badly affected		4
Participatory managementin aquatic ecosystem conservation	Number of wetlands where people's participation isinvolved in Conservation.		3
	Number of wetlands where mass awareness campaign isconducted		9
	Number of wetlands reclaimed/rejuvenated through participatory management		2
Source Augmentation (Restoration of wetlands)	Number of wetlands where restoration work has been taken up		9
	Number of wetlands restored as compared to totalnumber of wetlands identified for restoration.	14	9
Water economics of aquatic ecosystems	Investment per hectare in the current year for wetland restoration (Rs.)		
	Revenue generated through wetland tourism (Rs.)		
	Revenue generated out of ecosystem goods and services(Rs.)		

4.1.6.7. Annexure- Wetland

Table 4.23 Utilizable Surface water: Inland wetlands of Jammu and Kashmir (Indus Basin), Source: National Water Informatics Centre.

District	Wetland Nature	Sub Basin	Wetland Name	Area in Ha	Type of Wetland
Badgam	Natural	Jhelum		1518.00	Lake/ponds
Badgam	Natural	Jhelum		1482.28	Waterlogged
Badgam	Natural	Jhelum		614.61	Waterlogged
Badgam	Natural	Jhelum		564.87	Waterlogged
Bandipore	Natural	Jhelum	Wular lake	13907.2	Lake/ponds
Bandipore	Natural	Jhelum	Wular Lake	8087.93	Lake/ponds
Bandipore	Natural	Jhelum	Wular lake	9403.96	Lake/ponds
Baramula	Natural	Jhelum	Minsbal Lake	420.32	Lake/ponds
Baramula	Natural	Jhelum		225.28	Lake/ponds
Baramula	Natural	Jhelum		325.56	Lake/ponds
Baramula	Natural	Jhelum		1077.70	Waterlogged
Baramula	Natural	Jhelum		814.02	Waterlogged
Baramula	Natural	Jhelum		262.67	Lake/ponds
Baramula	Natural	Jhelum		178.26	Waterlogged
Baramula	Natural	Jhelum		117.90	Lake/ponds
Data Not Available	Man-made	Jhelum	Kokra Dam	1829.81	Reservoirs
Data Not Available	Natural	Upper Indus		10.10	Lake/ponds
Data Not Available	Natural	Lower Indus		58.26	Waterlogged
Data Not Available	Natural	Lower Indus		64.20	Lake/ponds
Data Not Available	Natural	Shyok		225.23	Waterlogged
Data Not Available	Natural	Gilgit		195.35	Waterlogged
Data Not Available	Natural	Gilgit		91.66	Lake/ponds
Data Not Available	Natural	Lower Indus		52.67	Lake/ponds
Data Not Available	Natural	Gilgit		159.52	Lake/ponds
Data Not Available	Natural	Chenab		153.09	Waterlogged
Data Not Available	Natural	Jhelum		24.72	Lake/ponds

Data Not Available	Natural	Upper Indus		133.09	Lake/ponds
Data Not Available	Natural	Lower Indus		21.97	Lake/ponds
Data Not Available	Natural	Upper Indus		12.81	Lake/ponds
Data Not Available	Natural	Gilgit		235.80	Lake/ponds
Data Not Available	Natural	Gilgit		117.86	Lake/ponds
Data Not Available	Natural	Jhelum		76.46	Lake/ponds
Data Not Available	Natural	Gilgit		158.32	Waterlogged
Data Not Available	Natural	Shyok		564.61	Waterlogged
Data Not Available	Natural	Upper Indus		15.45	Lake/ponds
Data Not Available	Natural	Lower Indus	Satpura Iso	131.75	Lake/ponds
Data Not Available	Natural	Lower Indus		96.85	Waterlogged
Data Not Available	Natural	Gilgit		108.38	Lake/ponds
Data Not Available	Man-made	Jhelum		49.03	Reservoirs
Data Not Available	Natural	Gilgit		130.10	Lake/ponds
Data Not Available	Natural	Lower Indus		82.61	Waterlogged
Data Not Available	Natural	Shyok		594.38	Waterlogged
Data Not Available	Natural	Jhelum		68.47	Lake/ponds
Data Not Available	Man-made	Jhelum	Jari Dam / Kokra Dam	13034.14	Reservoirs
Data Not Available	Natural	Chenab		311.85	Waterlogged
Data Not Available	Man-made	Gilgit		36.29	Tanks
Data Not Available	Man-made	Jhelum	Kokra Dam	1043.69	Reservoirs
Data Not Available	Natural	Lower Indus	Satpura Iso	178.14	Lake/ponds

Data Not Available	Man-made	Jhelum	Jari Dam	5489.67	Reservoirs
Data Not Available	Natural	Chenab		1104.99	Waterlogged
Jammu	Natural	Chenab		52.61	Waterlogged
Jammu	Natural	Chenab		26.38	Waterlogged
Jammu	Natural	Chenab		25.81	Lake/ponds
Jammu	Natural	Chenab		13.37	Lake/ponds
Jammu	Natural	Chenab		480.73	Waterlogged
Jammu	Natural	Chenab		22.96	Lake/ponds
Jammu	Natural	Chenab		220.84	Waterlogged
Jammu	Man-made	Chenab		42.52	Reservoirs
Jammu	Natural	Chenab		25.81	Lake/ponds
Kathua	Natural	Ravi		76.97	Waterlogged
Kathua	Natural	Ravi		103.38	Waterlogged
Kathua	Natural	Ravi		398.83	Waterlogged
Kathua	Man-made	Ravi		2931.09	Reservoirs
Kathua	Natural	Ravi		351.58	Waterlogged
Kathua	Natural	Ravi		191.69	Waterlogged
Kathua	Natural	Ravi		91.87	Waterlogged
Kathua	Natural	Ravi		171.28	Waterlogged
Kathua	Natural	Ravi		232.30	Waterlogged
Kishtwar	Natural	Chenab		8.53	Lake/ponds
Kishtwar	Natural	Chenab		194.87	Waterlogged
Kishtwar	Natural	Chenab		572.79	Waterlogged
Kulgam	Natural	Jhelum		17.64	Lake/ponds
Reasi	Natural	Chenab		151.01	Lake/ponds
Reasi	Man-made	Chenab		626.92	Reservoirs
Samba	Natural	Chenab		53.85	Lake/ponds
Samba	Natural	Chenab		57.14	Lake/ponds
Samba	Natural	Chenab		140.45	Waterlogged
Samba	Natural	Chenab	Mansar Lake	69.52	Lake/ponds
Samba	Natural	Chenab		57.24	Lake/ponds
Srinagar	Natural	Jhelum		2400.09	Lake/ponds
Srinagar	Natural	Jhelum		43.84	Lake/ponds
Srinagar	Natural	Jhelum	Anchar Lake	88.85	Lake/ponds
Srinagar	Natural	Jhelum		83.11	Lake/ponds
Srinagar	Natural	Jhelum	Dal Lake	1557.00	Lake/ponds
Srinagar	Natural	Jhelum		39.33	Lake/ponds
Srinagar	Natural	Jhelum		157.97	Waterlogged
Srinagar	Natural	Jhelum		351.93	Lake/ponds
Srinagar	Natural	Jhelum		2400.09	Lake/ponds

4.1.7. Tanks and Ponds

4.1.7.1. Subject matter

In the Union Territory of Jammu and Kashmir (J&K), tanks and ponds are crucial components of the local water infrastructure. These water bodies play a vital role in supporting daily activities in hilly and rural areas, including domestic use, livestock requirements, and irrigation. They typically store water sourced from springs or rainfall. The region may feature various man-made structures such as check dams, roof water harvesting tanks, irrigation tanks, and village ponds ("chal" or "khal"), all contributing to sustainable water management in the area. The district wise for Jammu and Kashmir region wells, tanks, canal and other are presented in Figure 4.36 and Figure 4.37.

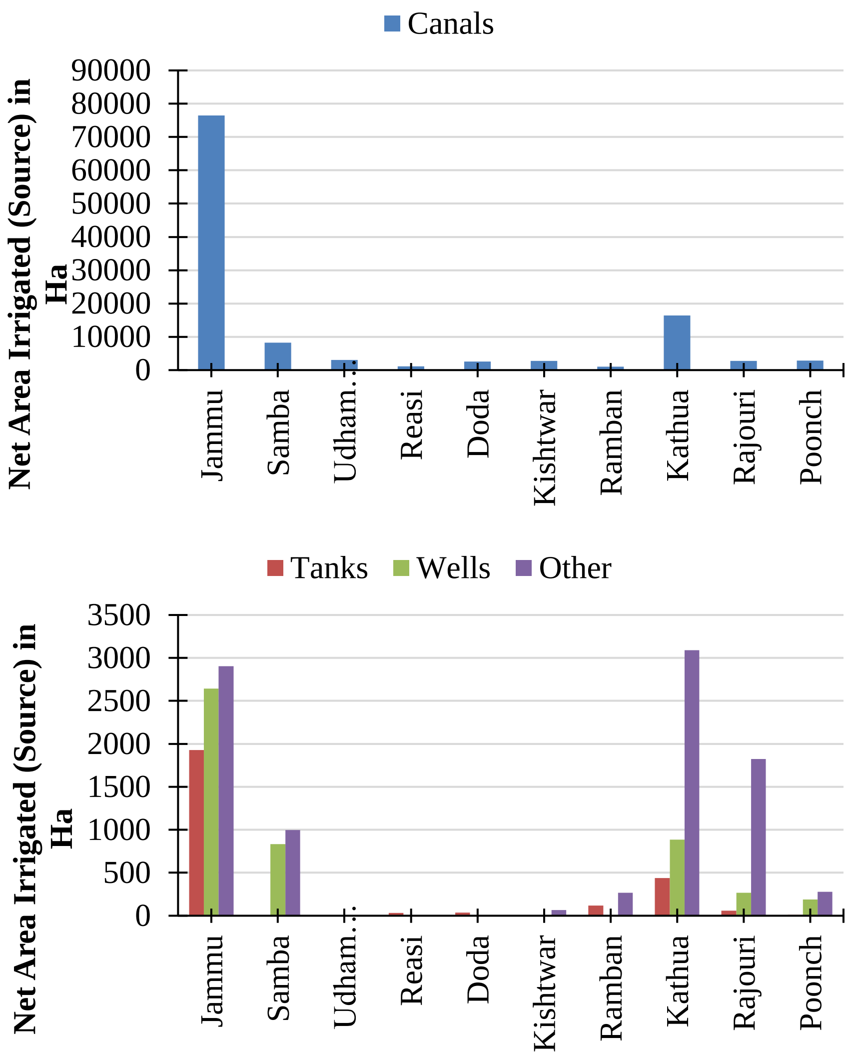
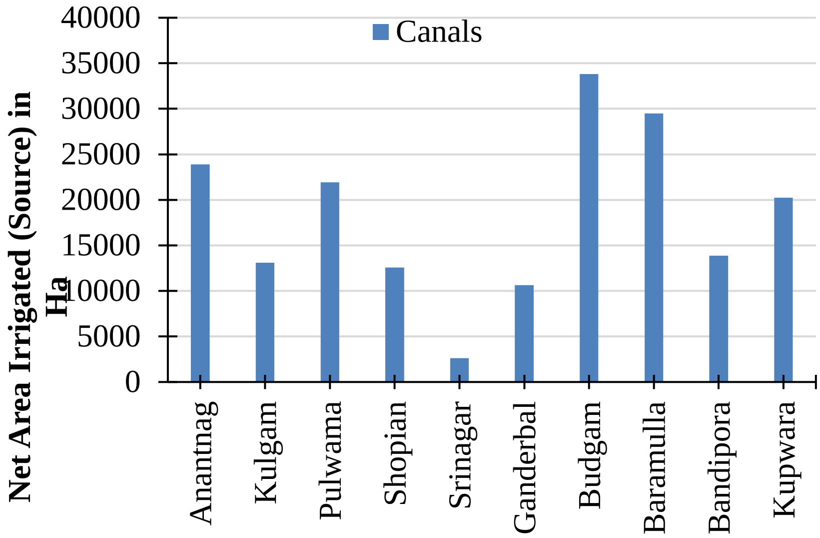


Figure 4.36. Jammu region water bodies.



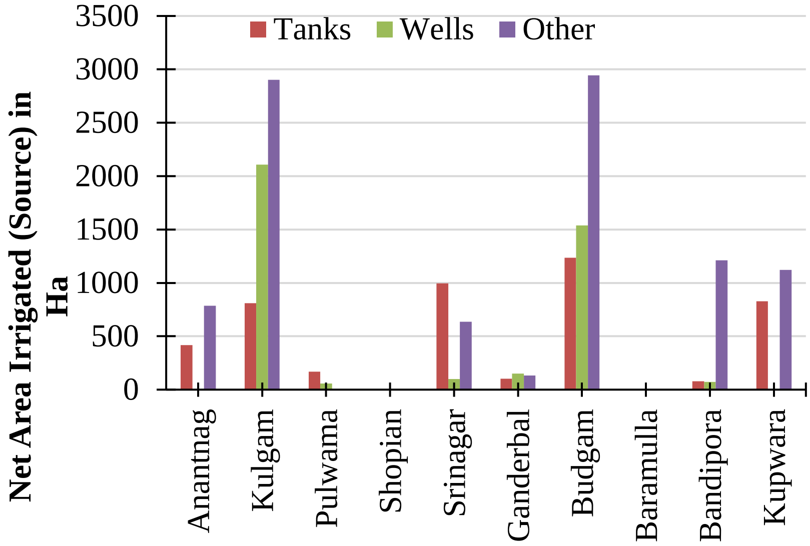


Figure 4.37. Kashmir region water bodies.

4.1.7.2. Issues and challenges:

- Accurate identification and mapping of spring sources are crucial for effectively replenishing water tanks and ponds in the hilly regions.
- The implementation of tank and pond lining techniques effectively mitigates seepage losses, thereby enhancing water conservation and storage efficiency in the region's diverse climatic and geological conditions.
- Optimized water storage efficiency and reduction of wastage of valuable water resources through the implementation of advanced tank and pond systems tailored for the unique hydrological and climatic conditions Measuring

discharge is a significant challenge in determining the consumptive use of water from tanks and ponds.

- A comprehensive survey is required to assess the reliance of communities in this region on tanks and ponds for their water supply, and alternative sources of water supply should be identified to supplement supply from tanks and ponds.
- Regular maintenance of tanks and ponds is crucial for ensuring optimal water storage and management, preventing siltation, and addressing structural integrity issues to maintain their functionality and efficiency in the region's unique climatic and topographical conditions.

4.1.7.3. Annexure- tanks

Table 4.24. Pond/Tank distribution details of Jammu district.

S. N.	Block	Panchayat	Location	No. of Ponds / Tanks	Size of each Pond / tank (L*B*H mtr)	Storage Volume	Volume of water available in Pond / Tank	Basin Area per water body (sq m)	Sub Basin area, if any	Utilization of surface water from pond/tank
1	Akhnoor	G.B.East	74.532275° 33.025501°	1	45.0x30.0x2.0	2700	1890	1350	NIL	Drinking Purpose for cattle
2	Akhnoor	Daskal	74.603826° 33.009018°	1	30.0x25.0x1.50	1125	787.5	750	NIL	Irrigation purpose/Drinking for cattle
3	Akhnoor	Dhok Jagir	74.663036° 32.9007°	1	90.0x75.0x2.50	16875	11812.5	6750	NIL	Irrigation/Drinking Purpose for cattle
4	Akhnoor	G.B.West	74.710824° 32.889439°	1	75.0x60.0x2.50	11250	7875	4500	NIL	Irrigation/Drinking Purpose for cattle
5	Akhnoor	Kotgarhi	74.693693° 33.035593°	1	15.0x10.0x1.50	225	157.5	150	NIL	Drinking Purpose for cattle
6	Akhnoor	Kotli Tanda	74.607727° 33.010740°	1	30.0x20.0x1.50	900	630	600	NIL	Irrigation/Drinking Purpose for cattle

7	Akhnoor	Pangiari	74.669136° 32.889861°	1	60.0x50.0x2.50	7500	5250	3000	NIL	Irrigation/Drinking Purpose for cattle
8	Akhnoor	Rajachak	74.558075° 33.045842°	1	60.0x60.0x3.0	10800	7560	3600	NIL	Irrigation/Drinking Purpose for cattle
9	Akhnoor	Sungal Upper	74.576757° 32.960514°	1	30.0x25.0x2.0	1500	1050	750	NIL	Irrigation/Drinking Purpose for cattle
10	Akhnoor	Bandral Khurd	74.67458° 33.046739°	1	75.0x30.0x2.0	4500	3150	2250	NIL	Irrigation/Drinking Purpose for cattle
11	Akhnoor	Gandarwan	74.67458° 33.046739°	1	75.0x60.0x2.0	9000	6300	4500	NIL	Irrigation/Drinking Purpose for cattle
12	Akhnoor	Sungal Lower B	74.67458° 33.046739°	1	90.0x75.0x3.50	23625	16537.5	6750	NIL	Irrigation/Drinking Purpose for cattle
13	Akhnoor	Targwal	74.67458° 33.046739°	1	90.0x60.0x2.50	13500	9450	5400	NIL	Irrigation/Drinking Purpose for cattle
14	Bhalwal Brahman	Gura Jagir	74.64094° 32.900145°	1	70.0x60.0x1.5	6300	6150	750	NIL	Drinking Purpose for cattle
15	Bhalwal Brahman	Chak Bhagwana	74.663036° 32.9007°	1	60.0x30.0x1.2	2160	Dry	860	NIL	Irrigation/Drinking Purpose for cattle

16	Bhalwal Brahman	Jamotian	74.636173° 32.939668°	1	75.0x15.0x1.2	1350	1270	1326	NIL	Irrigation/Drinking Purpose for cattle
17	Bhalwal Brahman	Dhok Khalsa	74.57983° 32.8766°	1	15.0x10.0x1.50	225	176	966	NIL	Drinking Purpose for cattle
18	Bhalwal Brahmna	Jadh(Thakfre Pond)	74.594107° 32.880114°	1	52.0x40.0x2.0	4160			NIL	Drinking Purpose for cattle
19	Bhalwal Brahmna	Jadh(Mahalma Pond)	74.604969° 32.882271°	1	47.0x38.0x2.0	3572			NIL	Irrigation purpose/Drinking for cattle
20	Bhalwal Brahmna	Jadh(Madkana Pond)	74.609848° 32.850105°	1	40.0x31.0x2.50	3100			NIL	Irrigation/Drinking Purpose for cattle
21	Bhalwal Brahmna	Jadh(Sylana Pond)	74.591308° 32.896665°	1	35.0x38.0x1.5	1995			NIL	Irrigation/Drinking Purpose for cattle
22	Bhalwal Brahmna	Lehar (Pond)	74.643651° 32.851772°	1	37.0x.30x2.0	2220			NIL	Drinking Purpose for cattle
23	Bhalwal Brahmna	Mawa Brahmna	74.62745° 32.941688°	1	30.0x22.0x2.0	1320			NIL	Irrigation/Drinking Purpose for cattle
24	Bhalwal Brahmna	Rajwal	74.579098° 32.876164°	1	43.0x36.0x2.0	3096			NIL	Irrigation/Drinking Purpose for cattle
25	Bhalwal Brahmna	Rajwal	74.524173° 32.830386°	1	47.0x32.0x2.3	3459			NIL	Irrigation/Drinking Purpose for cattle

26	Bhalwal Brahmna	Mawa Brahmna	74.576757° 32.960514°	1	30.0x25.0x2.0	1500			NIL	Irrigation/Drinking Purpose for cattle
27	Bishnah	Chak Avtara	Mehmoodpur	1	60x40x1.70	4080 cum	2856	2400	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
28	Bishnah	Chak Bana	Chumbian Brahmana	1	120x55x1.90	12540 cum	8778	6600	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
29	Bishnah	Chak Jagtu	Chak tara	1	70x30x1.70	3570 cum	2677.5	2100	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
30	Bishnah	Chak Murar	CHAK MURAR	1	60x40x1.90	45609 cum	3192	2400	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
31	Bishnah	Chak Murar	CHAK MURAR	1	60x45x1.75	4725 cum	3543.75	2700	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
32	Bishnah	Chorli	P S Pura	1	65x50x1.90	6175 cum	4631.25	3250	NIL	Irrigation / Agriculture / Drinking Purpose / cattle

33	Bishnah	Deoli	DEOLI	1	150x60x2.05	18450 cum	12915	9000	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
34	Bishnah	Deoli	DEOLI	1	65x60x1.60	6240 cum	4368	3900	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
35	Bishnah	Karyal Brahmana	Chak Patyara	1	60x50x1.80	5400 cum	4050	3000	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
36	Bishnah	Khojipur	KHOJIPUR	1	60x50x1.95	5850 cum	4095	3000	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
37	Bishnah	Laswara	LASWARA	1	63x52x1.85	6060.6 cum	4545.45	3276	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
38	Bishnah	Majua Uttmi	Majua Laxmi	1	80x30x1.95	4680 cum	3510	2400	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
39	Bishnah	Majua Uttmi	MAJUA UTTMI	1	70x30x2.00	4200 cum	3150	2100	NIL	Irrigation / Agriculture / Drinking Purpose / cattle

40	Bishnah	Pandorian	PANDORIAN	1	65x55x1.95	6971.25 cum	5228.43	3575	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
41	Bishnah	Pandorian	Pandorian Manhasan	1	67x60x1.80	7236 cum	5427	4020	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
42	Bishnah	Pandorian	Pandorian Brahmana	1	60x55x1.90	6270 cum	4389	3300	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
43	Bishnah	Pasgal	PASGAL	1	40x30x1.85	2220 cum	1665	1200	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
44	Bishnah	Rattnal	Chak Hasel	1	65x55x1.95	6971.25 cum	4879.75	3375	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
45	Bishnah	Rehal Dhamalian	REHAL DHAMALIAN	1	48x49x2	4704 cum	3528	2352	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
46	Bishnah	Rehal Kalindrian	REHAL KALINDRIAN	1	55x30x1.90	3135 cum	2351.25	1650	NIL	Irrigation / Agriculture / Drinking Purpose / cattle

47	Bishnah	Said Garh	Chak Chimna	1	67x60x1.80	7236 cum	5065.2	4020	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
48	Bishnah	Sarore	SARORE Upper	1	50x60x2.05	6150 cum	4612.5	3000	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
49	Bishnah	Sarore Lower	SARORE	1	50x30xx1.90	2850 cum	2137.5	1500	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
50	Bishnah	Sehoura B	Kanjkan di Chapri	1	55x45x2.00	4950 cum	3712.5	2475	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
51	Bhalwal	Domana	Near pyt. Ghar	1	72x57x1.21	4965.84	4855.84	cum	NIL	Agriculture / cattle
52	Bhalwal	Kote Upper	Ragani Pond	1	105x76x1.50	11970	11860	cum	NIL	Agriculture / cattle
53	Bhalwal	Kote Upper	w.no 04	1	73x70x1	5110	5000	cum	NIL	Agriculture / cattle
54	Bhalwal	Kote Upper	Bagani talab	1	71x77x1.21	6615.07	6505.07	cum	NIL	Agriculture / cattle
55	Bhalwal	Kote Upper	w.no 02	1	40x43x1	1720	1610	cum	NIL	Agriculture / cattle
56	Bhalwal	Kote Upper	Near Graveyard	1	51x82x0.76	3178.32	3068.32	cum	NIL	Agriculture / cattle

57	Bhalwal	Kote Lower A Khass	manda talab	1	38x47x0.76	1357.36	1247.36	cum	NIL	Agriculture / cattle
58	Bhalwal	Raipur Upper A	near middle school	1	30x66x0.60	1188	1078	cum	NIL	Agriculture / cattle
59	Bhalwal	Raipur Upper A	near shiv mandir	1	42x64x1	2688	2578	cum	NIL	Agriculture / cattle
60	Bhalwal	Raipur Upper A	Bagani talab	1	79x80x0.76	4803.2	4693.2	cum	NIL	Agriculture / cattle
61	Bhalwal	Raipur Upper A	Jeel pond w.no 1	1	75x90x1	6750	6640	cum	NIL	Agriculture / cattle
62	Bhalwal	Raipur Upper B	Sang Talab	1	76x85x1.50	9690	9580	cum	NIL	Agriculture / cattle
63	Bhalwal	Raipur Upper B	nardani talab	1	64x47x.76	2286.08	2176.08	cum	NIL	Agriculture / cattle
64	Bhalwal	Raipur Upper B	Patti Talab	1	59x60x0.60	2124	2014	cum	NIL	Agriculture / cattle
65	Bhalwal	Raipur Upper B	near Center Jail	1	46x50x0.60	1380	1270	cum	NIL	Agriculture / cattle
66	Bhalwal	Raipur Upper B	Ghaink Upper	1	20x18x0.60	216	106	cum	NIL	Agriculture / cattle
67	Bhalwal	Raipur Upper B	w.no 4	1	40x36x0.60	864	754	cum	NIL	Agriculture / cattle
68	Bhalwal	Raipur Upper B	w.no 7	1	50x60x0.60	1800	1690	cum	NIL	Agriculture / cattle
69	Bhalwal	Bhalwal Upper A	w.no 9 dev sthan	1	49x61x.90	2690.1	2580.1	cum	NIL	Agriculture / cattle
70	Bhalwal	Bhalwal Upper A	w.no 9	1	72x62x.76	3392.64	3282.64	cum	NIL	Agriculture / cattle

71	Bhalwal	Bhalwal Upper A	Domorwn tlab	1	49x42*.90	1852.2	1742.2	cum	NIL	Agriculture / cattle
72	Bhalwal	Bhalwal Upper A	near shimshan ghat	1	32x54x1.20	2073.6	1963.6	cum	NIL	Agriculture / cattle
73	Bhalwal	Bhalwal Upper A	Karmanda	1	100x145x1.90	27550	27440	cum	NIL	Agriculture / cattle
74	Bhalwal	Bhalwal Upper A	agwani Pond	1	95x74x1.5	10545	10435	cum	NIL	Agriculture / cattle
75	Bhalwal	Bhalwal Lower	Aswaran	1	69x80x1	5520	5410	cum	NIL	Agriculture / cattle
76	Bhalwal	Ghaink	Sajwal Pond	1	71x57x1	4047	3937	cum	NIL	Agriculture / cattle
77	Bhalwal	Ghaink	Mandorwan pond	1	68x56x1	3808	3698	cum	NIL	Agriculture / cattle
78	Bhalwal	Ghaink	satorma talab	1	55x50x1	2750	2640	cum	NIL	Agriculture / cattle
79	Bhalwal	Ghaink	Kalorma	1	45x60x1.5	4050	3940	cum	NIL	Agriculture / cattle
80	Bhalwal	Ghaink	nawa talab	1	50x45x1	2250	2140	cum	NIL	Agriculture / cattle
81	Bhalwal	Ghaink	Raj dai Pond	1	37x30x1	1110	1000	cum	NIL	Agriculture / cattle
82	Bhalwal	Ghaink	near nadwal school	1	26x22x1	572	462	cum	NIL	Agriculture / cattle
83	Bhalwal	Ghaink	w.no 1	1	24x23x1	552	442	cum	NIL	Agriculture / cattle
84	Bhalwal	Ghaink	w.no 1	1	33x20x1	660	550	cum	NIL	Agriculture / cattle

85	Bhalwal	Seri Panditan	Pagwani Pond	1	45x30x1	1350	1240	cum	NIL	Agriculture / cattle
86	Bhalwal	Seri Panditan	Chak Pond	1	70x68x1.5	7140	7030	cum	NIL	Agriculture / cattle
87	Bhalwal	Seri Panditan	Lohan Talab	1	42x44*1	1848	1738	cum	NIL	Agriculture / cattle
88	Bhalwal	Seri Panditan	Rowali Pond w-02	1	53x57x1.20	3625.2	3515.2	cum	NIL	Agriculture / cattle
89	Bhalwal	Seri Panditan	Rowali Pond w-06	1	29x19x1.20	661.2	551.2	cum	NIL	Agriculture / cattle
90	Bhalwal	Seri Panditan	near Panchayat Ghar	1	36x75x1.5	4050	3940	cum	NIL	Agriculture / cattle
91	Bhalwal	Seri Panditan	Doomki	1	24x35x1.5	1260	1150	cum	NIL	Agriculture / cattle
92	Mandal Phalliana	Sohanjana	Sohanjana	1	97x25x1.95	4728.75 Cum	3546.56	2425	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
93	Mandal Phalliana	Khandwal	Nandwal	1	10x22x2.00	440 cum	308	220	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
94	Mandal Phalliana	Sohanjana	Sohanjana	1	97x25x1.95	4728.75 Cum	3546.56	2425	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
95	Mandal Phalliana	Khandwal	Nandwal	1	10x22x2.00	440 cum	308	220	NIL	Irrigation / Agriculture /

										Drinking Purpose / cattle
96	Mandal Phalliana	Sohanjana	Sohanjana	1	97x25x1.95	4728.75 Cum	3546.56	2425	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
97	Mandal Phalliana	Khandwal	Nandwal	1	10x22x2.00	440 cum	308	220	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
98	Rs Pura	Chak Bala	Chak Bala	1	25x30x1.90	1425 Cum	990	750	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
99	Rs Pura	Deblehar	Dableher	1	40x30x1.85	2220 cum	1554	1200	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
100	Rs Pura	Fatehpur Brahmana	Fathey Pur Brahmana	1	41x32x1.92	1312 cum	984	1312	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
101	Rs Pura	Gagian	Gagiana	1	55x40x2.05	4510 cum	3157	2200	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
102	Rs Pura	Jessore	Jassore	1	26x32x1.95	1622.40 cum	1216.8	832	NIL	Irrigation / Agriculture /

										Drinking Purpose / cattle
103	Rs Pura	Rangpur Sidhrey	Khamb	1	35x34x1.90	2261 cum	1582.7	1190	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
104	Suchetgarh	Badyal Quazian	Badyal Quazian near Hanuman Temple	1	25*25*1.6	1000	98	750	NIL	Irrigation
105	Suchetgarh	Gharana	Devsthan Gharana	1	45*36*2.50	4050	358	2835	NIL	Irrigation/Worship
106	Suchetgarh	Magowali	Vill Seer Pyt Magowali near dispensery	1	28*14*1.60	588	98	410	NIL	Irrigation
107	Suchetgarh	Sai Khurd	Sai khurd	1	25*40*1.5	1500	800	1065	NIL	Irrigation
108	Suchetgarh	Sai Khurd	Sai khurd	1	90*55*3	14850	1750	10300	NIL	Irrigation
109	Suchetgarh	Suchetgarh	near Temple Suchetgarh	1	62*55*2	6820	1000	4770	NIL	Irrigation
110	Suchetgarh	Talhar	vill. Jangowal	1	19*20*1.6	570	400	399	NIL	Irrigation
111	Khour	Kaleeth	Kaleeth	1	110x93x2.5	25575 cum	15345	10230	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
112	Khour	Naryana Lower	Naryana Lower	1	69x42x2.0	5796 cum	3478	2898	NIL	Irrigation / Agriculture / Drinking Purpose / cattle

113	Khour	Naryana Lower	Naryana Upper	1	83x65x2.4	12948 cum	6733	5395	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
114	Khour	Phariwala Lower	Phariwala Lower	1	46x40x1.8	3312 cum	2153	1840	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
115	Khour	Pallanwala Lower	Pallanwala Lower	1	70x54x1.8	6804 cum	3742	3780	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
116	Khour	Sainth	Sainth	1	44x33x1.5	2178 cum	1742	1452	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
117	Khour	Bhagwan Chak	Romali	1	69x48x2.5	8280 cum	4968	3312	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
118	Khour	Kotmaira Phariwala Upper	Kotmaira Phariwala Upper	1	53x30x1.9	3021 cum	1964	1590	NIL	Irrigation / Agriculture / Drinking Purpose / cattle
119	Khour	Kotmaira Lower	Kotmaira Lower	1	41x39x2.1	3358 cum	1847	1599	NIL	Irrigation / Agriculture / Drinking Purpose / cattle

120	Maira Mandrian	Nardi	Nardi	1	3.14*63.0*63.0*1.9/4	5919.73	0	3115.6 6	Nil	Irrigation/Drinking purpose for cattle
121	Maira Mandrian	Maira Mandrian	Rehani	1	45.75*70.25*1.8	5785.08	4049.55	3213.9 3	Nil	Irrigation/Drinking purpose for cattle
122	Maira Mandrian	Maira Mandrian	Maira Talab Sarovar	1	3.14*82.5*82.5*2.4/4	12822.97	8976.07	5342.9	Nil	Irrigation/Drinking purpose for cattle
123	Maira Mandrian	Maira Mandrian	Amritsarovar maira Mandrian	1	3.14*72.6*72.6*2.5/4	10343.86	7240.7	4137.5 4	Nil	Irrigation/Drinking purpose for cattle
124	Maira Mandrian	Balgara	Payan	1	110.1*55.4*1.90	11589.12	8112.38	6099.5 4	Nil	Irrigation/Drinking purpose for cattle
125	Maira Mandrian	Maira Mandrian	Mandrean Sarovar	1	3.14*75*75*1.7/4	7506.56	5250	4415.6 2	Nil	Irrigation/Drinking purpose for cattle
126	Maira Mandrian	Balgara	Targah	1	3.14*78.75*78.75*2.1 /4	10223.27	6645	4868.2 2	Nil	Irrigation/Drinking purpose for cattle
127	Maira Mandrian	Nardi	Amla chapri	1	3.14*46.9*46.9*1.7/4	2935.37	0	1726.6 9	Nil	Irrigation/Drinking purpose for cattle
128	Maira Mandrian	Baruie	Badola	1	44.8*39.60*2.2	3902.97	2732.08	1774.0 8	Nil	Irrigation/Drinking purpose for cattle

129	Maira Mandrian	Baruie	Baruie	1	70*102*2.4	17136	13708	7140	Nil	Irrigation/Drinking purpose for cattle
130	Maira Mandrian	Ghrattal	Goshan	1	42.8*71.5*1.7	5202.34	3641.63	3060.25	Nil	Irrigation/Drinking purpose for cattle
131	Maira Mandrian	Queer	Queer	1	33*32*1.4	1478.4	1034.88	1056	Nil	Irrigation/Drinking purpose for cattle
132	Maira Mandrian	Ghrattal	Ghrattal	1	32*30*1.2	1152	0	960	Nil	Irrigation/Drinking purpose for cattle
133	Maira Mandrian	Ghrattal	Jakh	1	33*31*1.1	1125.3	0	1023	Nil	Irrigation/Drinking purpose for cattle
134	Dansal	Badsoo	w.no 6	1	33*12*1.3	514.8	360.36	396	Nil	Irrigation/Drinking purpose for cattle
135	Dansal	Jindrah	seagola	1	30*20*1.5	1176	823.2	600	Nil	Irrigation/Drinking purpose for cattle
136	Dansal	Kathar Upper	Maneh w.no 6	1	32*28*1.25	1120	784	896	Nil	Irrigation/Drinking purpose for cattle
137	Dansal	Pounthal	w.no 2	1	30*25*1.25	937.5	656.25	750	Nil	Irrigation/Drinking purpose for cattle

138	Dansal	Pounthal	Challana	1	15*15*1	225	157.5	225	Nil	Irrigation/Drinking purpose for cattle
139				1					Nil	Irrigation/Drinking purpose for cattle
140	Nagrota	Bajalta	W.no 2	1	33*30*2.5	2475	1732.5	990	Nil	Irrigation/Drinking purpose for cattle
141	Nagrota	Dhok Waziran	w.no 1	1	35*20*2.0	1400	980	700	Nil	Irrigation/Drinking purpose for cattle
142	Nagrota	Kc Lower	w.no 3	1	13*15*1.75	241.25	238.87	195	Nil	Irrigation/Drinking purpose for cattle
143	Nagrota	Marh	w.no 1	1	20*22*1.75	770	539	440	Nil	Irrigation/Drinking purpose for cattle
144	Nagrota	Nadore	near shiv temple	1	25*30*1.74	1305	913.5	750	Nil	Irrigation/Drinking purpose for cattle
145	Nagrota	Pargalta	near Masjid	1	33*66*1.5	3267	2286.9	2178	Nil	Irrigation/Drinking purpose for cattle
146	Pargwal	Pargwal Lower	Pargwal Lower	1	35*22*2.45	1886.5	650	770	Nil	Irrigation/Drinking purpose for cattle

147	Pargwal	Pindi	Pindi	1	32*12*2.15	825	750	384	Nil	Irrigation/Drinking purpose for cattle
148	Pargwal	Pargwal Upper	Pargwal Upper	1	46*19*2.15	1879.1	1315.37	874	Nil	Irrigation/Drinking purpose for cattle
149	Chowki Choura	Salyote	Salanger	1	20*12*1.5	360	252	240	Nil	Irrigation/Drinking purpose for cattle
150	Chowki Choura	Ghar	Ghar	1	20*15*1.6	480	360	300	Nil	Irrigation/Drinking purpose for cattle
151	Chowki Choura	Choura	w.no 2	1	16*10*2.0	320	224	160	Nil	Irrigation/Drinking purpose for cattle
152	Chowki Choura	Chowki	w.no 4	1	45*30*2.0	2700	1890	1350	Nil	Irrigation/Drinking purpose for cattle
153	Chowki Choura	Gangal	w.no 6	1	25*15*1.8	675	405	375	Nil	Irrigation/Drinking purpose for cattle
154	Chowki Choura	Kaneri	w.no 4	1	17*12*1.5	306	230	204	Nil	Irrigation/Drinking purpose for cattle
155	Chowki Choura	Majoor	Majoor	1	20*10*1.2	240	19.2	200	Nil	Irrigation/Drinking purpose for cattle

156	Chowki Choura	Rah	Hardoo Malara	1	10*6*1.3	78	62	60	Nil	Irrigation/Drinking purpose for cattle
157	Chowki Choura	Dhanna Jhallara	Moh Sushil Kumar	1	20*15*1.6	480	336	300	Nil	Irrigation/Drinking purpose for cattle
158	Chowki Choura	Juthal Balsaroo	Juthal	1	30*25*1.2	900	630	750	Nil	Irrigation/Drinking purpose for cattle

Table 4.25. Pond/Tank distribution details of Kishtwar district.

SN	**Block**	**Panchayat**	**Location**	**No**	**Size of each Pond / tank (L*B*H mtr)**	**Storage Volume**	**Volume of water available in Pond / Tank**	**Basin Area per water body (sq m)**	**Sub Basin area, if any**	**Utilization of surface water from pond/tank**	**Rem.**
1	Inderwal	Lower Chatroo-A	W.no. 1,2,3,4	8	2.5 * 3.05 * 1.5	91.50 cum	60	7.6	NIL	Irrigation / Agriculture / Drinking Purpose / cattle	NIL
2	Inderwal	Lower Chatroo-A	TRC	1	50.44 * 50.44 * 2.0	5088.38 cum	3500	2544.19	NIL	Irrigation / Agriculture / Drinking	NIL

										Purpose / cattle	
3	Kishtwar	Matta A	Matta A	1	18.4*18.4*1.5	507.84 cum	169	338.56	NIL	Irrigation / Agricultur e / Drinking Purpose / cattle	NIL
4	Mughal-maidan	Loidhar-B	sheikpura, malikpura, ratherpura, thalaran, lowerkurya	17	3.70 * 3.05 * 2.0	383.69 cum	260	11.28	NIL	Irrigation / Agricultur e / Drinking Purpose / cattle	NIL
5	Mughal-maidan	Daedpth	w.no 1,2,3,	11	3.05 * 3.65 * 1.50	183.68 cum	130	11.13	NIL	Irrigation / Agricultur e / Drinking Purpose / cattle	NIL
6	Kishtwar	BT 1st	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
7	Kishtwar	BT 2nd	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
8	Kishtwar	Lachkhazana	Indra Nagar	1	4*3*1.5	18 cum	11	12	NIL	Agricultur e	NIL
9	Kishtwar	Matta B	Sarkoot	1	1.95*0.95*0.40	0.74	0.5	1.85	NIL	Agricultur e	NIL
10	Kishtwar	Hidyal	Hidyal	1	6.5*5.5*2	71.5	48	35.75	NIL	Agricultur e	NIL

11	Kishtwar	Matta A	Matta	2	0.40*2*2.75	2.2	1.5	0.8	NIL	Agricultur e	NIL
12	Thakrie	Pakalan	butwara	1	4.60 * 3.70 * 2.0	34.04 cum	20	17.02	NIL	Irrigation / Agricultur e / Drinking Purpose / cattle	NIL
13	Thakrie	Dharbdan	Near FCI Store	1	7.6*4.5*1.2	41.04cum	30	34.2	NIL	Irrigation / Agricultur e / Drinking Purpose / cattle	NIL
14	Thakrie	Filler A	Shanjran	1	6.1*4.8*1.2	35.1 cum	28	29.28	NIL	Irrigation / Agricultur e / Drinking Purpose / cattle	NIL
15	Thakrie	Filler B	Hadadpora	1	6.4*5.1*1.2	39.1 cum	31	32.64	NIL	Irrigation / Agricultur e / Drinking Purpose / cattle	NIL
16	Trigam	Trigam A	Ramli	1	3.04*3.04*1.50	13.86 cum	5	9.24	NIL	Irrigation / Agricultur	NIL

										e / Drinking Purpose / cattle	
17	Trigam	Trigam B	Banjras	1	4.5*2.4*1.5	16.20 cum	0	10.8	NIL	Irrigation / Agriculture / Drinking Purpose / cattle	NIL
18	Trigam	Trigam C	Galigad	2	3.04*3.04*1.50	27.72 cum	5.54	9.24	NIL	Irrigation / Agriculture / Drinking Purpose / cattle	NIL
19	Trigam	Janwas	Janwas	1	3.04*3.04*1.50	13.86 cum	8	9.24	NIL	Irrigation / Agriculture / Drinking Purpose / cattle	NIL
20	Trigam	Drab	Drab	1	3.04*3.04*1.50	13.86 cum	0	9.24	NIL	Irrigation / Agriculture / Drinking Purpose / cattle	NIL

21	Trigam	Agral	Lawa	1	3.04*3.65*1.50	16.64 cum	0	12.41	NIL	Irrigation / Agricultur e / Drinking Purpose / cattle	NIL
22	Dachhan	Loharna A	Loharna	1	3.65*2.4*1.21	10.59 cum	3.2	8.76	NIL	Irrigation	NIL
23	Dachhan	Loharna B	Hanzar	1	3.04*3.04*1.52	14.04 cum	4.1	9.24	NIL	Irrigation	NIL
24	Palmar	Lower Palmar A	Razna	1	3.65*4.26*1.21	18.81 cum	6.2	15.54	NIL	Irrigation	NIL
25	Palmar	Lower Palmar B	Bhata	1	3.04*3.04*1.52	14.04 cum	4.2	9.24	NIL	Irrigation	NIL
26	Palmar	Lower Palmar C	Boharna	1	3.35*2.74*1.21	11.10 cum	5.5	9.17	NIL	Irrigation	NIL
27	Palmar	Upper Palmar	Lotna	1	3.65*3.04*1.21	13.42 cum	6.3	11.09	NIL	Irrigation	NIL
28	Mughalmaida n	Sigdi A	Balan	1	3.04*3.04*1.52	14.04 cum	7	9.24	NIL	Agricultur e	NIL
29	Mughalmaida n	Sigdi A	Bhata	1	3.04*2.74*1.52	12.66 cum	3	8.32	NIL	Agricultur e	NIL
30	Mughalmaida n	Sigdi B1	Sigdi	1	2.43*2.43*1.52	8.97 cum	4.5	5.9	NIL	Agricultur e	NIL
31	Mughalmaida n	Mulchitter	Mulchitter	1	3.04*2.43*1.52	11.22 cum	4.2	7.38	NIL	Agricultur e	NIL
32	Mughalmaida n	Tagood	Heya	1	4.57*3.04*1.52	21.11 cum	7	13.89	NIL	Agricultur e	NIL
33	Mughalmaida n	Horna	Horna	1	3.04*3.04*1.21	11.18 cum	4.19	9.24	NIL	Agricultur e	NIL
34	Nagseni	Bhagna B	W. No 7	2	1.80*2.50*1.80	16.20 cum	16.2	4.5	NIL	Drinking	NIL

35	Nagseni	Bhagna B	W. No 2	1	1.80*2.50*1.8	8.10 cum	8.1	4.5	NIL	Drinking	NIL
36	Nagseni	Bhagna B	W. No 3	7	1.80*2.50*1.8	56.7 cum	56.7	4.5	NIL	Drinking	NIL
37	Nagseni	Bhagna B	W. No 5	4	1.80*2.50*1.8	32.4 cum	32.4	4.5	NIL	Drinking	NIL
38	Nagseni	Bhagna B	W. No 6	7	1.80*2.50*1.8	56.70 cum	56.7	4.5	NIL	Drinking	NIL
39	Nagseni	Bhagna B	W. No 7	2	3*4.5*1.20	32.40 cum	24	13.5	NIL	Irrigation / Agriculture / Drinking Purpose / cattle	NIL
40	Nagseni	Bhagna B	W. No 4	1	6*12*1.20	86.40 cum	60	72	NIL	Irrigation / Agriculture / Drinking Purpose / cattle	NIL
41	Nagseni	Bhagna B	W. No 5	2	3*6*1.20	43.20 cum	30	18	NIL	Irrigation / Agriculture / Drinking Purpose / cattle	NIL
42	Nagseni	Bhagna B	W. No 6	1	3*4.5*1.20	16.20 cum	12	13.5	NIL	Irrigation / Agriculture / Drinking Purpose / cattle	NIL

43	Paddar	Atholi	Opposite to GDC Atholi	1	7*4.5*3	65	8	31.5	NIL	Irrigation / Agriculture / Drinking Purpose / cattle	NIL
44	Paddar	Ishtyari	Bastoon Ishtyari	1	8.5*7.5*2	84	16	63.75	NIL	Irrigation / Agriculture / Drinking Purpose / cattle	NIL
45	Paddar	Kundal	Chabb Laddar	1	9*9*1.5	101	20	81	NIL	Irrigation / Agriculture / Drinking Purpose / cattle	NIL
46	Paddar	Machail	Dhak Machail	1	6*5*1.5	37	11	30	NIL	Irrigation / Agriculture / Drinking Purpose / cattle	NIL
47	Paddar	Pallali	Banitha Pallali	1	7*5.5*2	55	13	38.5	NIL	Irrigation / Agriculture / Drinking	NIL

										Purpose / cattle	
48	Paddar	Sohal	Padhri Dhar Ungaie	1	7*6*2	60	12	42	NIL	Irrigation / Agricultur e / Drinking Purpose / cattle	NIL
49	Paddar	Tun	Khadaang Tun	1	7*7*1.5	64	10	49	NIL	Irrigation / Agricultur e / Drinking Purpose / cattle	NIL
50	Paddar	Gulabgarh	Hassana Leoundi	3	4.50*3.65*1.80	88.69	28	16.42	NIL	Irrigation / Agricultur e / Drinking Purpose for cattle	NIL
51	Paddar	Gulabgarh	Haryangawar i	1	3*3*2.10	18.9	8	9	NIL	Irrigation / Agricultur e / Drinking Purpose for cattle	NIL
52	Paddar	Gulabgarh	Haryangawar i	1	4.5*3*1.5	20.25	6	13.5	NIL	Irrigation / Agricultur	NIL

										e / Drinking Purpose for cattle	
53	Paddar	Gulabgarh	Lacholi Matti	1	3*3.65*3	32.85	22	10.95	NIL	Irrigation / Agricultur e / Drinking Purpose for cattle	NIL
54	Paddar	Gulabgarh	Lacholi Matti	1	4.30*3*1.5	19.35	9.5	12.9	NIL	Irrigation / Agricultur e / Drinking Purpose for cattle	NIL
55	Paddar	Gulabgarh	Charass	1	2.10*2.40*1.80	9.07	3.3	5.04	NIL	Irrigation / Agricultur e / Drinking Purpose for cattle	NIL
56	Paddar	Gulabgarh	Charass	1	4.60*4.60*1.80	38.08	12.5	21.16	NIL	Irrigation / Agricultur e / Drinking Purpose for cattle	NIL

57	Paddar	Gulabgarh	Jaktan Gowari Matti	1	3.65*3.65*1.80	23.98	23.98	13.32	NIL	Irrigation / Agriculture / Drinking Purpose for cattle	NIL
58	Paddar	Gulabgarh	SC Basti Matti	1	2.40*2.40*1.50	8.64	8.64	5.76	NIL	Irrigation / Agriculture / Drinking Purpose for cattle	NIL
59	Paddar	Gulabgarh	Gulabgarh	2	3*3*2.10	37.8	37.8	9	NIL	Irrigation / Agriculture / Drinking Purpose /cattle	NIL
60	Paddar	Gulabgarh	Gulabgarh	1	4.50*3.65*2.40	39.42	21	16.42	NIL	Irrigation / Agriculture / Drinking Purpose / cattle	NIL
61	Paddar	Gulabgarh	Dadoo Sanyas	1	2.40*2.40*2.10	12.09	12.09	5.76	NIL	Irrigation / Agriculture / Drinking	NIL

										Purpose / cattle	
62	Paddar	Gulabgarh	Dadoo Sanyas	1	4.50*3*2.10	28.35	12	13.5	NIL	Irrigation / Agricultur e / Drinking Purpose for cattle	NIL
63	Paddar	Gulabgarh	Sanyas	1	6*4.50*2.10	56.7	38	27	NIL	Irrigation / Agricultur e / Drinking Purpose for cattle	NIL
64	Marwah	Dherna A	Dherna A	1	9.10*9.75*1.50	133.09	70	88.72	NIL	Drinking	NIL
65	Marwah	Dherna B	Dherna B	1	12.1*10.6*1.40	179.56	97	128.26	NIL	Drinking	NIL
66	Marwah	Tiller	Tiller	1	10.6*9.10*1.20	115.75	60	96.46	NIL	Drinking	NIL
67	Marwah	Changer	Changer	1	9.10*9.10*1.15	95.23	50	82.81	NIL	Drinking	NIL
68	Marwah	Nowpachi A	Nowpachi A	1	10.6*12.20*1.10	142.25	101	129.32	NIL	Drinking	NIL
69	Marwah	Nowpachi B	Nowpachi B	1	12.20*7.60*1.30	120.54	89	92.72	NIL	Drinking	NIL
70	Marwah	Yourdoo	Yourdoo	1	12.20*12.20*1.20	178.61	90	148.84	NIL	Drinking	NIL
71	Marwah	Pethgam	Pethgam	1	12.20*11.0*1.00	134.20	76	134.2	NIL	Drinking	NIL
72	Marwah	Qaderna A	Qaderna A	1	7.60*6.00*1.20	54.72	32	45.6	NIL	Drinking	NIL
73	Marwah	Qaderna B	Qaderna B	1	3.65*5.50*1.20	24.09	12	20.07	NIL	Drinking	NIL
74	Marwah	Ranai A	Ranai A	1	9.15*8.50*1.15	89.44	41	77.77	NIL	Drinking	NIL
75	Marwah	Ranai B	Ranai B	1	7.60*6.00*1.15	52.44	24	45.6	NIL	Drinking	NIL
76	Warwan	Mulwarwan	Mulwarwan	2	3.65*3.65*1.20	31.98	18	13.32	NIL	Drinking	NIL

77	Warwan	Inshan	Inshan	2	10.70*6.70*1.80	258.08	192	71.69	NIL	Drinking	NIL
78	Warwan	Basmeena	Basmeena	1	3.65*3.65*1.20	15.99	7	13.32	NIL	Drinking	NIL
79	Warwan	Choidraman	Choidraman	2	3.65*4.60*1.20	40.30	22	16.79	NIL	Drinking	NIL
80	Warwan	Afti	Afti	2	12.20*12.20*0.90	267.92	189	148.84	NIL	Drinking	NIL
81	Warwan	Margi	Margi	1	12.20*10.70*1.00	130.54	60	130.54	NIL	Drinking	NIL
82	Warwan	Sukhnaie	Sukhnaie	3	3.65*4.60*0.90	45.33	24	16.69	NIL	Drinking	NIL
83	Nagseni	Bhagna-A	Ward No-3	1	2*2*1.20	4.80	2	4	NIL	Irrigation / Agriculture / Drinking Purpose for cattle	NIL
84	Nagseni	Bhagna-B	Ward No-4	1	12*30*1.50	540.00	302	360	NIL	Irrigation / Agriculture / Drinking Purpose for cattle	NIL
85	Nagseni	Bhagna-C	Lower Bidda	1	5*3*1.20	18.00	12	15	NIL	Irrigation / Agriculture / Drinking Purpose for cattle	NIL
86	Nagseni	Bhagna-C	Lower Bidda	1	3*2*1.20	7.20	5	6	NIL	Irrigation / Agriculture / Drinking	NIL

										Purpose for cattle	
87	Nagseni	Bhagna-C	Drahan	1	4*2.5*1.20	12.00	7	10	NIL	Irrigation / Agricultur e / Drinking Purpose for cattle	NIL
88	Nagseni	Bhagna-C	Goran	1	3*2*1.20	7.20	2	6	NIL	Irrigation / Agricultur e / Drinking Purpose for cattle	NIL
89	Nagseni	Bhagna-C	Gujjar Basti	1	3*2*1.20	7.20	2.1	6	NIL	Irrigation / Agricultur e / Drinking Purpose for cattle	NIL
90	Nagseni	Bhagna-C	L/Bidda	1	3.5*2.5*1.20	10.50	5	8.75	NIL	Irrigation / Agricultur e / Drinking Purpose for cattle	NIL
91	Nagseni	Cherji	Dendna	1	2.5*1.5*1.20	4.50	2.1	3.75	NIL	Irrigation / Agricultur	NIL

										e / Drinking Purpose for cattle	
92	Nagseni	Chicha	L/Tekra	1	5*2.5*1.30	16.25	7	12.5	NIL	Irrigation / Agricultur e / Drinking Purpose for cattle	NIL
93	Nagseni	Chicha	Ward No-2	1	3.5*2*1.20	8.40	3.05	7	NIL	Irrigation / Agricultur e / Drinking Purpose for cattle	NIL
94	Nagseni	Chicha	Ward No-1	1	3*2*1.20	7.20	2	6	NIL	Irrigation / Agricultur e / Drinking Purpose for cattle	NIL
95	Nagseni	Dool-A	Wangna	1	6*4*1.40	33.60	21.5	24	NIL	Irrigation / Agricultur e / Drinking Purpose for cattle	NIL

96	Nagseni	Dool-B	Kiralpora	1	3*2*1.20	7.20	2.2	6	NIL	Irrigation / Agriculture / Drinking Purpose for cattle	NIL
97	Nagseni	Dool-B	Buttpora	1	2.5*2*1.20	6.00	1.9	5	NIL	Irrigation / Agriculture / Drinking Purpose for cattle	NIL
98	Nagseni	Sumna Bhata	Ajna	1	3*2*1.20	7.20	2.7	6	NIL	Irrigation / Agriculture / Drinking Purpose for cattle	NIL

Table 4.26. Pond/ Tank distribution details of Samba district.

S. No.	Block	Panchayat	Location	No. of Ponds / Tanks	Size of each Pond / tank (L*B*H mtr)	Storage Volume	Volume of water available in Pond / Tank	Basin Area per water body (sq m)	Sub Basin area, if any	Utilization of surface water from pond/tank	Remarks

1	Samba	Rehian	Upgradation of Pond at Panjtila	1	π*(95/2)^ 2 *4.5	24794	14876			Agriculture/household utilization/cattle	Nil
2	Samba	Badheri	development/renovation of pond alongwith allied works near govt. Primary school Langth	1	30*28*2	1680	420			Agriculture/household utilization/cattle	Nil
3	Samba	Glard	Renovation alongwith allied works of pond near pyt Ghar Glard	1	60*70*4	16800	10080			Agriculture/household utilization/cattle	Nil
4	Samba	Katli	Renovation of Pond near auto stand at katli alongwith allied works	1	45*35*2.5	3937.5	800			Agriculture/household utilization/cattle	Nil
5	Samba	Rakh Amb Talli	renovation of pond near GMS Rakh Amb Talli w.NO.4 alongwith allied works	1	30*30*3	2700	900			Agriculture/household utilization/cattle	Nil

6	Samba	pangdour	Beautification of pond at Chargun alongwith allied works	1	40*40*2.5	4000	0			Agriculture/household utilization/cattle	Nil
7	Samba	Supwal	Constt. of Pond at Pyt supwal block Samba	1	π*(65/2)^2 *3.5	11600	4975			Agriculture/household utilization/cattle	Nil
8	Ramgarh	Channi Fatwal	Improvement/Renovation of Pond at naryanpur near BSF Post	1	55*65*2.5	8937.5	2681			Agriculture/household utilization/cattle	Nil
9	Ramgarh	Chak Chattakan	Improvement/Renovation of Pond near Bua Datti Devsthan at Kotli Matkalian	1	80*70*4.5	25200	8300			Agriculture/household utilization/cattle	Nil
10	Ramgarh	Trindi	Development of Pond near Mata Mangla Devi	1	π*(75/2)^2 *4	17662	6625			Agriculture/household utilization/cattle	Nil
11	Ramgarh	Mahal Shah	Improvement/Renovation of Pond near Datti Dev Sthan at Mahal Kalandrian	1	35*30*3	3150	630			Agriculture/household utilization/cattle	Nil

12	Ramgarh	Chak Nazir	Improvement/Renovation of Pond at Chak Nazir w.no.02	1	30*25*2.5	1875	1125			Agriculture/household utilization/cattle	Nil
13	Ramgarh	Chang	Improvement/Renovation of of Pond at Chak Goran	1	π*(40/2)^2 *4	5025	1500			Agriculture/household utilization/cattle	Nil
14	Ramgarh	Gho Brahmana	Beautification of Pond at Gho Brahmana	1	50*100*3.5	17500	10000			Agriculture/household utilization/cattle	Nil
15	Ramgarh	nanga	Improvement/Renovation of pond at Chak Bakhan kani near Peer Baba	1	40*75*2.5	7500	0			Agriculture/household utilization/cattle	Nil
16	Ramgarh	Swankha	Improvement/Renovation of Pond at Radwan	1	45*85*3	11475	0			Agriculture/household utilization/cattle	Nil
17	Sumb	Blater	Beautification and allied work of pond at w.no.4 Blater	1	25*45*2.5	2812	1687			Agriculture/household utilization/cattle	Nil
18	Sumb	Kard	Repair/beautification of Amrit Sarovar at Rayour	1	90*40*4.5	16200	10800			Agriculture/household utilization/cattle	Nil

19	Sumb	Patyari	Repair of Pond at w.no.1 patyari	1	25*20*5	2500	750			Agriculture/household utilization/cattle	Nil
20	Sumb	Samlah	Repair/Beautification of Amrit Sarovar at at samlah	1	π*(75/2)^2 *3.5	15455	2200			Agriculture/household utilization/cattle	Nil
21	Sumb	Taloor	Beautification and allied work of pond at w.no.3 Taloor	1	25*25*5	3125	1250			Agriculture/household utilization/cattle	Nil
22	Sumb	Kard	Renovation/Beautification of Pond at Jeed near Primary School	1	50*40*3	6000	4000			Agriculture/household utilization/cattle	Nil
23	Sumb	Amli	Renovation of /Beautification of Makoda Pond at penthi	1	35*25*3	2625	0			Agriculture/household utilization/cattle	Nil
24	Nud	Mananu	const/renovation of pond near baba ambunath dev sthan	1	40 x 35 x 6	8400	0			Agriculture/household utilization/cattle	Nil
25	Nud	Sarna	renovation of pond at village nangal	1	63 x 57 x 6	21546	0			Agriculture/household utilization/cattle	Nil

26	Nud	motlian kalan	constt/Development of pond at village lovely	1	40 x 35 x 6	8400	0			Agriculture/household utilization/cattle	Nil
27	Nud	Dhora	construction/development of pond at village kaloha	1	50 x 50 x 6	15000	0			Agriculture/household utilization/cattle	Nil
28	Nud	Druee	construction/development of pond at village lalrian w.no.5	1	40 x 35 x 6	8400	0			Agriculture/household utilization/cattle	Nil
29	Bari Brahmana	Palli	Renovation of Pond at w/.no.9	1	75x45x3	10125	5000			Agriculture/household utilization/cattle	Nil
30	Bari Brahmana	Palli	Renovation of Chappri /Pond at w.no.1	1	60x30x2	3600	1500			Agriculture/household utilization/cattle	Nil
31	Bari Brahmana	Birpur Upper	Repair/Renovation of Pond at w.no.4 Birpur Upper	1	60x60x4	14400.00	2500			Agriculture/household utilization/cattle	Nil
32	Bari Brahmana	kartholi lower	Beautification and Repair/Renovation of Pond at w.no. 7 Kartholi	1	30x30x2.5	2250	1500			Agriculture/household utilization/cattle	Nil

33	Bari Brahmana	Rajpur Koular	Repauir/Renovation of Pond at Senarki w.no.5 near Graveyard pyt Rajpur Koular	1	45x30x2.5	3375	500			Agriculture/household utilization/cattle	Nil
34	Bari Brahmana	Tarore	Beautification and Repair/Renovation of Bua lado Pond at tarore	1	20x18x2.5	900	250			Agriculture/household utilization/cattle	Nil
35	Bari Brahmana	Birpur lower	Renovation of pond at W.no.1 near house of Bua Ditta	1	30x25x2	1500	0			Agriculture/household utilization/cattle	Nil
36	Bari Brahmana	Pali	Upgradation of Amrit sarovar and installation of Open Gym at Panchayat palli, Blcok Bari Barhmana)	1	60x60x2	7200	3600			Agriculture/household utilization/cattle	Nil
37	Vijaypur	Gurha Slathia upper	Beautification/renovation of main pond near Bus Stand Gurha Slarhia Upper	1	80 x 80 x 2.5	16000	3000			Agriculture/household utilization/cattle	Nil

38	Vijaypur	Dabuz Shahazada	Beautification/renovation of Pond at Kullian w.NO.6	1	50 x 45 x 2	4500	3600			Agriculture/household utilization/cattle	Nil
39	Vijaypur	Bagla Suchani	Beautification of pond at Khu talab at w.no.3	1	105 x 75 x 2	15750	7700			Agriculture/household utilization/cattle	Nil
40	Vijaypur	Gudwal-A	Repair/renovation alongwith beautificatoion of pond at Rampur	1	45 x 35 x 1.5	2362.5	200			Agriculture/household utilization/cattle	Nil
41	Vijaypur	Bagla Dhamore	Beautification of Beri Bur pond at w.no.4	1	30 x 25 x 1.5	1125	150			Agriculture/household utilization/cattle	Nil
42	Vijaypur	Gudwal-B	Constt/renovation of Pond at koulpur	1	30 x 15 x 2	900	0			Agriculture/household utilization/cattle	Nil
43	Vijaypur	harminder	Constt./Renovation of Pond near Sahmshan Ghat W.No.3	1	35 x 35 x 1.5	1837.5	0			Agriculture/household utilization/cattle	Nil
44	Vijaypur	Jakh	Renovation of Jakh Pond panchyat Bagla Jakh, Block Vijaypur	1	50 x 55 x 2.10	5775	1800			Agriculture/household utilization/cattle	Nil

45	Vijaypur	Patti	Construction/Repair of Rand Wali Chappri Panchayat patti, Block Vijaypur	1	63 x 53 x 2.25	7512	150			Agriculture/household utilization/cattle	Nil
46	Vijaypur	Suchani	Beautification of kangwal Talab at upper Patti Panchayat Suchani, Block Vijaypur	1	75 x 75 x 2.5	14062	8437			Agriculture/household utilization/cattle	Nil
47	Purmandal	Purmandal	Repair and Renovation of pond at sangar Mohalla Shah talab w.no.7	1	28 x 22 x 2	1232	462			Agriculture/household utilization/cattle	Nil

Table 4.27. Pond/ Tank distribution details of Poonch district.

S. No.	**Block**	**Panchayat**	**Location/Name of Work**	**No of Ponds/ Tanks**	**Size of each Pond/Tank (LxBxH mtr.)**	**Storage Volume (In ltrs)**	**Volume of water available in the Pond/Tank**	**Basin Area**	**Sub Baisan Area, if any**	**Utilization of Surface Water from Pond/Tank**	**Remarks**

1	Loran	Arigam	Upgradation and Beautification of Amrit at Moh. Danna Pasvalan	1	6.40x4.80x 0.60	18432	Nil	Surroundi ng Area	Nil	For Ground Water Recharge	
2	Loran	Arigam	Upgradation and Beautification of Amrit at Chanuwali Angam	1	6.50x5.50x 1.20	42900	Nil	Surroundi ng Area	Nil	For Ground Water Recharge	
3	Loran	Kharapa	Upgradation and Beautification of Amrit at Ghat at Kharapa	1	10x5x1.20	60000	Nil	Surroundi ng Area	Nil	For Ground Water Recharge	
4	NSSB	Chandak-B	Upgradation and Beautification Pound at Narhad at Narhad W.No. 6 Moh. Bhattian	1	13.70x10.6 0x1.80	261396	Nil	Surroundi ng Area	Nil	For Ground Water Recharge	
5	Poonch	Karmara	Amrit Sarovar at Faqeer Dhara	1	45x18x1.20	972000	Nil	Surroundi ng Area	Nil	For Ground Water Recharge	
6	Poonch	Noorkote	Construction of Amrit Sarover at W.No. 5 Moh. Sarol Noorkote	1	13.70x13.7 0x1.80	337842	Nil	Surroundi ng Area	Nil	For Ground Water Recharge	
7	Poonch	Shahpur Lower	Construction of Amrit Sarovar at Moh Phambran W. No. 7	1	12.20x10.6 0x1.50	193980	Nil	Surroundi ng Area	Nil	For Ground Water Recharge	

8	Poonch	Khanater Dalera	Amrit Sarovar Peer Sheru Shah Zairat Makhyala W.No. 4	1	9x10.50x1.0	113400	Nil	Surrounding Area	Nil	For Ground Water Recharge	
9	Poonch	Khanater Dalera	Amrit Sarovar Moh. Jabbar	1	19X11.50X2	437000	Nil	Surrounding Area	Nil	For Ground Water Recharge	
10	Loran	Battalkote	Amrit Sarovar Sain Ilahi Baksh	1	9x4x1.20	43200	Nil	Surrounding Area	Nil	For Ground Water Recharge	
11	Loran	Loran Lower B	Amrit Sarovar Sayed Zaman Shah	1	16x19x1.4	425600	Nil	Surrounding Area	Nil	For Ground Water Recharge	
12	Mandi	Gagrian B	Amrit Sarovar at Gali W.No. 9	1	9X9X1.20	97200	Nil	Surrounding Area	Nil	For Ground Water Recharge	
13	NSSB	Saral	Amrit Sarovar at Moh. Doba Jabar Saral	1	9.75x8.80x1.20	102960	Nil	Surrounding Area	Nil	For Ground Water Recharge	
14	Poonch	Dara Dullian Upper	Construction of Construction of Amrit Sarover W.No.4	1	12x12x2	288000	Nil	Surrounding Area	Nil	For Ground Water Recharge	

15	Mandi	Arai Malkan	Upgradation/Beautification Amrit Sarovar at Tanvi Arai Malkan	1	17.50x9.50x1.30	216125	Nil	Surrounding Area	Nil	For Ground Water Recharge	
16	Mandi	Donugam	Amrit Sarovar at Donugam	1	8.50x14x1.30	154700	Nil	Surrounding Area	Nil	For Ground Water Recharge	
17	Mandi	Chamber Kinari	Amrit Sarovar at Chamber Kinari	1	8.80x14.50x1.20	153120	Nil	Surrounding Area	Nil	For Ground Water Recharge	
18	Sathra	Saloonia	Upgradation/Beautification Hafiz Naik Mohd Amrit Sarovar at Noor Pur Dana	1	14x16x1.50	336000	Nil	Surrounding Area	Nil	For Ground Water Recharge	
19	NSSB	Mandhar	Construction of Amrit Sarovar at Gandam wala Pani Moh Khawaja W. No. 2	1	12x10.60x1.80	258960	Nil	Surrounding Area	Nil	For Ground Water Recharge	
20	NSSB	Qasba Upper	Construction of Amrit Sarovar at Ziarat Kho Peer W. No. 3	1	14.60x12.20x1.20	213744	Nil	Surrounding Area	Nil	For Ground Water Recharge	
21	NSSB	Chandak-A	Construction of Amrit Sarovsar at Bella Upper W. No. 6	1	12x10.60x1.80	258960	Nil	Surrounding Area	Nil	For Ground Water Recharge	

22	NSSB	Noonabandi	Amrit Sarovar Moh. Doda Wali Nr. PHE Tank	1	10.50x9.x1.50	141750	Nil	Surrounding Area	Nil	For Ground Water Recharge	
23	NSSB	Noonabandi	Amrit Sarovar Moh. Tada Wali	1	18x15x1.50	405000	Nil	Surrounding Area	Nil	For Ground Water Recharge	
24	Sathra	Timbra	Construction of Amrit Sarovar at Timbra W.No. 4	1	17.50x5.30 x1.60	148400	Nil	Surrounding Area	Nil	For Ground Water Recharge	
25	Sathra	Gali Pindi	WHT at Moh. Dedadaan W.No. 5 NLO Mohd Yaqoob	1	4.50x4.50x 1.50	30375	Nil	Surrounding Area	Nil	For Ground Water Recharge	
26	Sathra	Saloonia-B	WHT at W.No. 4 NLO Mirza Bilal Ahmed	1	4.50x4.50x 1.50	30375	Nil	Surrounding Area	Nil	For Ground Water Recharge	
27	Sathra	Saloonia-B	WHT at W.No. 4 NLO Shehnaaz Khan	1	4.50x4.50x 1.50	30375	Nil	Surrounding Area	Nil	For Ground Water Recharge	
28	Sathra	Jandrolla	WHT at W.No. 3 Moh Saruwala NLO Khadam Hussain	1	4.50x4.50x 1.50	30375	Nil	Surrounding Area	Nil	For Ground Water Recharge	

29	Mandi	Baila	WHT Mohalla Trichal W.No. 4 NLO Rashid Khan	1	4.50x4.50x 1.50	30375	Nil	Surrounding Area	Nil	For Ground Water Recharge	
30	Sathra	Sathra	WHT at W.No. 1 Moh. Saydaan NLO Nazim shah	1	4.50x4.50x 1.50	30375	Nil	Surrounding Area	Nil	For Ground Water Recharge	
31	Sathra	Chakrara	WHT at Moh. Miran W.No. 8 NLO Mohd Safeer	1	4.50x4.50x 1.50	30375	Nil	Surrounding Area	Nil	For Ground Water Recharge	
32	Balakote	Balakote	Upgradation/Beautification Amrit Sarovar at Khala Draman	1	15x13.20x1.80	356400	Nil	Surrounding Area	Nil	For Ground Water Recharge	
33	Mankote	Mankote Lower	Upgradation/Beautification Amrit Sarovar at Shiv Mandir Mankote Lower	1	40.80X17.30X1.80	1270512	Nil	Surrounding Area	Nil	For Ground Water Recharge	
34	Mankote	Mankote Upper	Upgradation/Beautification Zairat Main Sarsu Tain Amrit Sarovar at Mankote Upper	1	33.50X13.70X1.80	826110	Nil	Surrounding Area	Nil	For Ground Water Recharge	
35	Surankote	Dhundak	Construction of Mahant Shri Narotam	1	27.40x21.30x1.50	875430	Nil	Surrounding Area	Nil	For Ground	

			Dass Ji Amrit Sarovar Pushkami Dhundak							Water Recharge	
36	Surankote	Marhote Upper	Construction of Amrit Sarovar at Moh. Pathana	1	12.10X16.70X1.50	303105	Nil	Surrounding Area	Nil	For Ground Water Recharge	
37	Surankote	Marhote Lower Left	Construction of Amrit Sarovar at Thanda Chowa W.No 2	1	30X24X0.90	648000	Nil	Surrounding Area	Nil	For Ground Water Recharge	
38	Surankote	Marhote Lower Right	Construction of Amrit Sarovar at Gatti Wala	1	13.50X9.10X1.20	147420	Nil	Surrounding Area	Nil	For Ground Water Recharge	
39	Buffliaz	Draba Khatain	Amrit Sarovar at Draba Khatain W.No. 5	1	12x10.60x1.38	165600	Nil	Surrounding Area	Nil	For Ground Water Recharge	
40	Mendhar	Chungan Choudharian	Construction of Manzoor Ch. Amrit Sarovar at Hundian Gali	1	15.20X15.20X1.50	346560	Nil	Surrounding Area	Nil	For Ground Water Recharge	
41	Mendhar	Salwah Upper	Construction of Shaheed Mohd Azam Ch. Amrit Sarovar at Salwah	1	9.10X6.70X1.50	91455	Nil	Surrounding Area	Nil	For Ground Water Recharge	
42	Mendhar	Gursai Moori	Construction of Shaheed Maqbool	1	12.19X12.19X1.50	222894	Nil	Surrounding Area	Nil	For Ground	

			H.Shah Amrit Sarovar at Moori							Water Recharge	
43	Mendhar	Gursai Tanvi	Construction of Shaheed Liaqat Ali Amrit Sarovar at Tanvi	1	10.67X9.14 X1.50	146285	Nil	Surrounding Area	Nil	For Ground Water Recharge	
44	Buffliaz	Sailan	Upgradation/Beautification of Amrit Sarovar at Said Bakar Sailan	1	10.60x12.20x1.35	174582	Nil	Surrounding Area	Nil	For Ground Water Recharge	
45	Buffliaz	Sanglani	Upgradation/Beautification of Amrit Sarovar at Sanglani	1	15x12.20x1.50	274500	Nil	Surrounding Area	Nil	For Ground Water Recharge	
46	Surankote	Surankote Upper	Amrit Sarovar at Besi Dhara Surankote Upper	1	37X18.30X 1.50	1015650	Nil	Surrounding Area	Nil	For Ground Water Recharge	
47	Surankote	Gunthal Upper	Amrit Sarovar at Moh. Gallon	1	21.30X24.30X1.20	621108	Nil	Surrounding Area	Nil	For Ground Water Recharge	
48	Balakote	Balakote	Construction of Amrit Sarovar Moh. Rafeed Khan W.No. 4	1	16.70x8.50 x1.20	170340	Nil	Surrounding Area	Nil	For Ground Water Recharge	
49	Balakote	Balakote	Construction of Amrit Sarovar Moh. Naseeb	1	15.20x9.15 x1.20	166896	Nil	Surrounding Area	Nil	For Ground	

			Ullah Khan Basooni W. No. 02							Water Recharge	
50	Balakote	Nar	Amrit Sarovar Upgradation Pond Tota Gali	1	7.70X7.50X 1.20	69210	Nil	Surroundi ng Area	Nil	For Ground Water Recharge	
51	Mankote	Uchhad Upper	Amrit Sarovar at Moh. Charan Ganchara	1	18.20X12.1 0X1.60	352352	Nil	Surroundi ng Area	Nil	For Ground Water Recharge	
52	Mendha r	Kalaban Faizabad	Amrit Sarovar at Dhanga Wala Pani W.No. 01	1	9.14X7.62X 1.50	104470	Nil	Surroundi ng Area	Nil	For Ground Water Recharge	
53	Mendha r	Ari Plaser	Amrit Sarovar at Moh. Bajjran Numberdaran	1	12.90X9.10 X1.50	176085	Nil	Surroundi ng Area	Nil	For Ground Water Recharge	
54	Mendha r	Gohlad Malikpur	Baba Shed Amrit Sarovar at Malikpur	1	12.95X11.2 8X1.82	265858	Nil	Surroundi ng Area	Nil	For Ground Water Recharge	
55	Mendha r	Ari Qasab	Amrit Sarovar at Moh. Nazampura	1	6.40x6.40x 1.50	61440	Nil	Surroundi ng Area	Nil	For Ground Water Recharge	

56	Lassana	Madana	Construction of Amrit Sarovar at W. No. 8 Moh. Tandi Nr. Gali	1	17x8x1.50	204000	Nil	Surroundi ng Area	Nil	For Ground Water Recharge	
57	Lassana	Malhan	Construction of Amrit Sarovar at Moh. Katha	1	7x20x1.50	210000	Nil	Surroundi ng Area	Nil	For Ground Water Recharge	
58	Lassana	Seri Chowana	Construction of Amrit Sarovar at W.No. 3 Bela	1	15x15x1.50	337500	Nil	Surroundi ng Area	Nil	For Ground Water Recharge	

Table 4.28.Pond/ Tank distribution details of Rajouri district.

Sn	Name Of Amrit Sarovar	Block	Panchayat	Length	Breadth	Depth	Size Of Pond (L X Bx H)	Storage Volum e	Volume Of Water Availabl e In Pond
1	Constt. Of Pond,at Draj B2 , Budhal	Budhal Old	Draj	15.24	15.24	2.10	15.24 X 15.24 X 2.1	488.47	244.23
2	Constt. Of Pond,at Draj B1 , Budhal	Budhal Old	Draj	15.24	15.24	2.10	15.24 X 15.24 X 2.1	488.47	244.23
3	Constt. Of Pond,at Draj A1 , Budhal	Budhal Old	Draj A	15.24	15.24	2.10	15.24 X 15.24 X 2.1	488.47	244.23
4	Constt. Of Pond,at Draj A2 , Budhal	Budhal Old	Draj A	15.24	15.24	2.10	15.24 X 15.24 X 2.1	488.47	244.23

5	Constt. Of Pond,at Draj B , Budhal	Budhal Old	Draj B	15.24	15.24	2.10	15.24 X 15.24 X 2.1	488.47	244.23
6	Constt. Of Pond,at Loorkote,at Upper Kandi , Budhal	Budhal Old	Kandi Upper	23.47	12.19	1.50	23.47 X 12.19 X 1.5	429.15	214.57
7	Constt. Of Pond,at Khadyoon , Budhal	Budhal Old	Khadyoon	23.17	16.76	2.13	23.17 X 16.76 X 2.13	827.14	413.57
8	Constt. Of Pond,at Khadyoon 1 , Budhal	Budhal Old	Khadyoon 1	14.93	10.67	1.20	14.93 X 10.67 X 1.2	191.16	95.58
9	Constt. Of Pond,at Khah 2 , Budhal	Budhal Old	Khah A	15.00	15.00	1.50	15 X 15 X 1.5	337.50	168.75
10	Constt. Of Pond,at Khah 1 , Budhal	Budhal Old	Khah A	15.24	15.24	1.80	15.24 X 15.24 X 1.8	418.06	209.03
11	Constt. Of Pond,at Prori , Darhal	Budhal Old	Prori	14.00	7.50	1.00	14 X 7.5 X 1	105.00	52.50
12	Constt. Of Pond, at Kothra Nr. Maal (Amrit Sarovar) , Darhal	Darhal	Kothra	13.72	13.72	1.83	13.72 X 13.72 X 1.83	344.05	172.02
13	Constt. Of Pond,at Balote Simbly , Darhal	Darhal	Thanamang B	12.80	30.00	2.13	12.8 X 30 X 2.13	819.40	409.70
14	Constt. Of Pond,at Argi (Amrit Sarovar) , Rajauri	Dhangri	Argi	21.34	19.81	1.37	21.34 X 19.81 X 1.37	579.79	289.89
15	Constt. Of Pond,at Dalhori Ii (Amrit Sarovar) , Rajauri	Dhangri	Dalhori	21.00	21.00	1.50	21 X 21 X 1.5	661.50	330.75
16	Constt. Of Pond,at Dalhori (Amrit Sarovar) , Rajauri	Dhangri	Dalhori	17.00	12.00	1.50	17 X 12 X 1.5	306.00	153.00

17	Constt. Of Pond,at Ghoder Peer Pharada (Amrit Sarovar) , Rajauri	Dhangri	Ghoder	13.72	10.97	1.98	13.72 X 10.97 X 1.98	298.18	149.09
18	Constt. Of Pond,at Godher Bhatta , Rajauri	Dhangri	Godher	19.51	18.29	2.29	19.51 X 18.29 X 2.29	815.53	407.76
19	Constt. Of Pond,at Kalalkass , Rajauri	Dhangri	Kalalkass	25.00	21.00	1.83	25 X 21 X 1.83	960.12	480.06
20	Constt. Of Pond,at Kalalkass B , Rajauri	Dhangri	Kalalkass B	19.81	17.37	1.83	19.81 X 17.37 X 1.83	629.48	314.74
21	Constt. Of Pond,at Saranoo , Rajauri	Dhangri	Saranoo	11.28	29.00	1.83	11.28 X 29 X 1.83	598.11	299.05
22	Constt. Of Amrit Sarovar Pond,at Loorkote Doongi , Rajauri	Doongi	Loorkote	18.28	24.38	1.83	18.28 X 24.38 X 1.83	815.57	407.78
23	Constt. Of Pond, at Tharathi Nr. Masjid , Rajauri	Doongi	Nadyala	18.28	24.38	1.83	18.28 X 24.38 X 1.83	815.57	407.78
24	Constt. Of Pond,at Gali Nadyala , Nowshehra	Doongi	Nadyala	27.43	21.34	2.44	27.43 X 21.34 X 2.44	1428.27	714.13
25	Constt. Of Pond, at Rachwa Nr. Middle School , Rajauri	Doongi	Nadyala	18.28	15.24	1.83	18.28 X 15.24 X 1.83	509.81	254.91
26	Constt. Of Pond,at Broh , Nowshehra	Kalakote	Broh	18.30	10.00	1.50	18.3 X 10 X 1.5	274.50	137.25
27	Constt. Of Pond,at Salyar Chatta , Kalakote	Kalakote	Dali B	20.00	20.00	1.50	20 X 20 X 1.5	600.00	300.00
28	Constt. Of Pond,at Dalyote , Kalakote	Kalakote	Dalyote A	14.00	12.00	1.50	14 X 12 X 1.5	252.00	126.00

29	Constt. Of Pond,at Udhrani , Rajauri	Kalakote	Kothian	25.00	15.00	1.30	25 X 15 X 1.3	487.50	243.75
30	Constt. Of Pond,at W No 8 Khawas , Budhal	Khawas	Khwas	15.00	9.00	1.70	15 X 9 X 1.7	229.50	114.75
31	Constt. Of Pond,at Lamberi Lower , Nowshehra	Lamberi	Lamberi Lower	25.00	25.00	1.30	25 X 25 X 1.3	812.50	406.25
32	Constt. Of Pond,at Chinariya , Nowshehra	Lamberi	0	10.00	10.00	1.50	10 X 10 X 1.5	150.00	75.00
33	Constt. Of Pond,at Galhuti Lower , Rajauri	Manjakote	Galhuti Lower	55.78	12.00	2.00	55.78 X 12 X 2	1338.68	669.34
34	Constt. Of Pond,at Galhutti Mohrian , Rajauri	Manjakote	Galhutti Upper	18.00	12.00	2.00	18 X 12 X 2	432.00	216.00
35	Constt. Of Pond,at Ghambir Mughlan B , Rajauri	Manjakote	Ghambir Mughlan B	18.00	9.00	2.00	18 X 9 X 2	324.00	162.00
36	Constt. Of Pond,at Ghambir Muglain D , Rajauri	Manjakote	Ghambir Muglain D	18.00	12.00	2.00	18 X 12 X 2	432.00	216.00
37	Constt. Of Pond,at Harichumma , Kalakote	Moughla	Harichumma	13.72	20.00	1.52	13.72 X 20 X 1.52	416.97	208.48
38	Constt. Of Pond,at Malhurian , Kalakote	Moughla	Malhurian	30.00	24.00	1.50	30 X 24 X 1.5	1080.00	540.00
39	Repair/Development Of Pond,at Babia Gala Malurian Moughla , Kalakote	Moughla	Malurian	12.00	8.00	1.50	12 X 8 X 1.5	144.00	72.00

40	Constt. Of Pond,at Palullian , Rajauri	Panjgrain	Palullian	14.00	12.00	1.60	14 X 12 X 1.6	268.80	134.40
41	Constt. Of Pond,at Panjgrain Lower A , Rajauri	Panjgrain	Panjgrain Lower A	15.00	10.00	2.00	15 X 10 X 2	300.00	150.00
42	Constt. Of Pond,at Panjgrain Lower B , Rajauri	Panjgrain	Panjgrain Lower B	14.00	10.00	1.90	14 X 10 X 1.9	266.00	133.00
43	Constt. Of Pond,at Thandapani , Rajauri	Panjgrain	Panjgrian Upper B	15.00	7.00	2.45	15 X 7 X 2.45	257.25	128.63
44	Constt. Of Pond,at Tasyala , Rajauri	Panjgrain	0	12.00	10.00	2.00	12 X 10 X 2	240.00	120.00
45	Constt. Of Pond,at Lah , Thanamandi	Planger	Lah	23.47	12.19	3.70	23.47 X 12.19 X 3.7	1058.72	529.36
46	Construction/Upgradation Of Ponds at 1 Bagla Top Near Patli And 2 Bagla Top Near Panchayat Ghar	Qila Darhal	Bagla	12.00	12.00	2.00	12 X 12 X 2	288.00	144.00
47	Repair/Renovation Of Pond,at W No 4 Thal Rajpu Kamila , Nowshehra	Qila Darhal	Thal Rajpu Kamila	12.19	30.00	1.50	12.19 X 30 X 1.5	548.64	274.32
49	Constt. Of Pond,at Charan , Rajauri	Rajouri	Charan	21.34	15.24	2.01	21.34 X 15.24 X 2.01	654.12	327.06
50	Constt. Of Pond,at Chawa , Rajauri	Rajouri	Chawa	21.34	13.72	1.98	21.34 X 13.72 X 1.98	579.79	289.89

51	Construction Of Pond at Dassal Gali	Rajouri	Dassal	17.07	14.02	1.40	17.07 X 14.02 X 1.4	335.54	167.77
52	Constt. Of Pond,at Fatehpur Danna , Thanamandi	Rajouri	Fatehpur Danna	12.19	28.00	2.10	12.19 X 28 X 2.1	717.95	358.98
53	Construction Of Pond at Fatehpur Khaas	Rajouri	Fatehpur Khass	12.19	15.24	2.13	12.19 X 15.24 X 2.13	396.44	198.22
54	Constt. Of Pond,at Nagrota Saldhar , Rajauri	Rajouri	Nagrota Saldhar	22.56	14.02	2.13	22.56 X 14.02 X 2.13	674.73	337.37
55	Construction Of Pond,at Dharat Seri , Nowshehra	Seri	Dharat	12.19	20.00	1.50	12.19 X 20 X 1.5	365.76	182.88
56	Constt. Of Pond,at W No 3 Mangal Devi B , Nowshehra	Seri	Mangal Devi B	20.00	15.00	1.50	20 X 15 X 1.5	450.00	225.00
57	Constt. Of Pond,at W No 1 Mangal Devi B , Nowshehra	Seri	Mangal Devi B	30.00	30.00	1.50	30 X 30 X 1.5	1350.00	675.00
58	Repair / Renovation Of Pond,at W No 06 Marchola , Sunderbani	Siot	Marchola	15.24	10.67	2.00	15.24 X 10.67 X 2	325.16	162.58
59	Constt. Of Pond,at Larya , Sunderbani	Sunderbani	Upper Bhajwal A	25.00	12.00	1.50	25 X 12 X 1.5	450.00	225.00
60	Constt. Of Pond,at Ainpur , Sunderbani	Sunderbani	0	9.75	12.00	1.80	9.75 X 12 X 1.8	210.68	105.34
61	Constt. Of Pond,at Talla Seri , Sunderbani	Sunderbani	0	30.00	15.00	1.50	30 X 15 X 1.5	675.00	337.50
62	Constt. Of Pond,at Saim Samit , Thanamandi	Planger	Saim Samit	18.29	25.00	3.50	18.29 X 25 X 3.5	1600.20	800.10

63	Construction Of Amrit Sarovar at Sawani	Rajouri	Sawani	15.24	15.24	2.13	15.24 X 15.24 X 2.13	495.54	247.77
64	Construction Of Pond at Marchola Near Banquet Hall	Siot	Marchola	15.24	10.67	2.00	15.24 X 10.67 X 2	325.16	162.58

Table 4.29.Pond/ Tank distribution details of Reasi district.

S. No.	Block	Panchayat	Location/Name of Work	No of Ponds/ Tanks	Size of each Pond/Tank (LxBxH mtr.)	Storage Volume (In ltrs)	Volume of water available in the Pond/Tank in litres	Basin Area	Sub Baisan Area, if any	Utilization of Surface Water from Pond/Tank
1	Pouni	Dadowa	Renovation of Pond at Namberdar Mohalla Dadowa Pouni	1	13x13x1.8	304200	60000	Surrounding Area	Nil	For Ground Water Recharge
2	Pouni	Dadowa	Renovation of Pond at Nallah, ward No. 09 Dadowa Pouni	1	12x12x1.8	259200	96800	Surrounding Area	Nil	For Ground Water Recharge
3	Pouni	Bhambla	Pond at Godhar Khalsa near Samunder Singh House Bambla Pouni	1	21x13x2	546000	nil	Surrounding Area	Nil	For Ground Water Recharge

4	Pouni	Dub khalsa	Pond at Ondera Mohalla NHO Ajay Kumar, Ward No. 04 Dubkhalsa Pouni	1	20x12x1.8	432000	nil	Surrounding Area	Nil	For Ground Water Recharge
5	Pouni	Dub khalsa	Pond at Patta Mohalla NHO Rattan Lal Dubkhalsa Pouni	1	21x12x1.8	453600	126000	Surrounding Area	Nil	For Ground Water Recharge
6	Pouni	Laiter Maghai	Const of amrit sarovar near samadhi w.no. 7	1	11x8x1.5	132000	nil	Surrounding Area	Nil	For Ground Water Recharge
7	Pouni	Allya	Renov. of Pond Near Pyt Ghar, Allya	1	12x10x1.5	180000	30000	Surrounding Area	Nil	For Ground Water Recharge
8	Pouni	Bharakh	Upgradation/Renov. of Pond at Chandan moh Pyt Bharakh	1	14x8x1.8	201600	nil	Surrounding Area	Nil	For Ground Water Recharge
9	Pouni	Gajore	Renov./Upgradation of Pond at Rolkian Pyt Gajore	1	6x5x1.5	54000	nil	Surrounding Area	Nil	For Ground Water Recharge
10	Pouni	Kahna	Renov. of Pond at Rajput Moh Ward no. 01.	1	7x7x1.2	58800	nil	Surrounding Area	Nil	For Ground Water Recharge

11	Pouni	Porakotla	Renov. of Pond Tarula Gala W.no.03 Porakotla	1	15x18x1.2	324000	97200	Surrounding Area	Nil	For Ground Water Recharge
12	Pouni	Saloon	Renov/ Upgradation of Pond near Dev Raj Moh Dhanwa W.no.04	1	11x11x1.5	181500	nil	Surrounding Area	Nil	For Ground Water Recharge
13	Pouni	Sangar	Renov. of Pond at Bansoti w.no.04 Sangar .	1	22x14x1.2	369600	100000	Surrounding Area	Nil	For Ground Water Recharge
14	Pouni	Kheral	Renov /Upgradation of Pond near Masjid Moh W.no.07 Jadh	1	12x12x1.0	144000	28800	Surrounding Area	Nil	For Ground Water Recharge
15	Pouni	Kheralair	Renovation of Amrit Sarovar near Ashram Beaullian W.No. 5	1	14x9x1.2	151200	90700	Surrounding Area	Nil	For Ground Water Recharge
16	Pouni	Pouni	Upgradation of pond near Bairo mandir kota yard Amrit Sarovar ward no 1	1	6x5x1	30000	nil	Surrounding Area	Nil	For Ground Water Recharge

Table 4.30. Pond/ Tank distribution details of Udhampur district.

S. N.	Block	Panchayat	Location	Name Of Ponds/ Tanks	Size of each pond (lxbxh) m	Storage volume	Volumne of water available in the pond /tank	Basin area	Sub basin area, if any	Utilization of surface water from pond /tank
1	Chanunta	Badole	Udhampur	Destlting/ Restoration Of Pond Androth	9.80x8.40x 1.95	160520	56.87	82.32	nil	irrigation/agriculture /drinking purpose for cattle
2	Chanunta	Badole	Udhampur	Amrit Sarovar at Androth Pyt Badhole	8.50x9.70x 2.10	173140	76.87	82.45	nil	irrigation/agriculture /drinking purpose for cattle
3	Chanunta	Bhughtrain	Udhampur	Amritsarovar at Bhugtrain Khas NHO Sunder W. No. 1 Pyt Bhugtrian	4.5x5.60x2 .43	61230	11.64	25.2	nil	irrigation/agriculture /drinking purpose for cattle
4	Chanunta	Chanunta	Udhampur	Amrit Sarovar W.No.9 at Pyt Chanunta	11.40x10.5 0x1.80	215460	119.7	119.7	nil	irrigation/agriculture /drinking purpose for cattle
5	Chanunta	Dalsar	Udhampur	Amrit Sarovar Near House Of Shukar Ali Pyt Dalsar	7.20x6.30x 1.97	89360	43.89	45.36	nil	irrigation/agriculture /drinking purpose for cattle

6	Chanunta	Pangrain	Udhampur	Constt. Of Well at Manal NHO Miraj Deen	dia=2.74,h =7.0	40050	22.89	5.72	nil	drinking purpose
7	Chanunta	Ser Manjla	Udhampur	Const. Of Drainage Channel at Nall Nho Bodh Raj House W.No 5	l=213.4, b=0.92, h=0.50	460	dry		nil	drain out excess water/irrigation
8	Chanunta	Surni	Udhampur	Amrit Sarovar Near Panchayat Ghar Pyt Surni	10.76x9.68 x1.98	206230	62.49	104.1 5	nil	irrigation/agriculture /drinking purpose for cattle
9	Chenani	BAIN	Udhampur	Amrit Sarovar at Ward.No.2 Upper Bain Pyt Bain	9 x9 x1.80	145800	56.7	81	nil	irrigation/agriculture /drinking purpose for cattle
10	Chenani	BUPP	Udhampur	Amrit Sarovar at Kandhari Ward No. 2 In Pyt Bupp	12 x 10.70 x 1.20	154080	77.04	128.4	nil	irrigation/agriculture /drinking purpose for cattle
11	Chenani	Jig Gashand	Udhampur	Amrit Sarovar Near Bowli In Mohalla Jadal Ward No. 5 Pyt Jig Gasand	10 x 10 x1.80	180000	90	100	nil	irrigation/agriculture /drinking purpose for cattle
12	Chenani	KUD-UPPER	Udhampur	Amrit Sarovar Near Swami Bowli Ward.No.1 Pyt Kud Upper	10 x 10 x1.80	180000	72	100	nil	irrigation/agriculture /drinking purpose for cattle
13	Chenani	MADHA	Udhampur	Amrit Sarovar Near Primary School	18 x12 x1.60	345600	172.8	216	nil	

		UPPER A		Thandi Pani Ward No. 4 Pyt Madha Upper A						irrigation/agriculture /drinking purpose for cattle
14	Chenani	MADHA- UPPER	Udhampur	Amrit Sarovar Near Devsthan Ward No. 5 Pyt Madha Upper	13.40 x 10.60 x 1.80	255672	106.5 3	142.0 4	nil	irrigation/agriculture /drinking purpose for cattle
15	Chenani	MATLOA-A	Udhampur	Amrit Sarovar at Chajj W.No.6 Pyt Matlowa A	12 x 10 x1.5	180000	72	120	nil	irrigation/agriculture /drinking purpose for cattle
16	Chenani	SUDHMAH AD EV	Udhampur	Amrit Sarovar at Tala Dabbar W No 7 Pyt Sudhmahdev	10 x 8 x 1.5	120000	54	80	nil	irrigation/agriculture /drinking purpose for cattle
17	Dudu	Balota Upperla	Udhampur	Renovation Of Water Bowli at Nali W No 6 NHO Vjiay Kumar	1.50 x 1.50 x 1.50	3250	1.35	2.25	nil	irrigation/agriculture /drinking purpose for cattle
18	Dudu	Basantgarh	Udhampur	Renovation Of Water Bowli at SC Mohalla W No 2 NHO Della	1.50 x 1.50 x 1.00	1320	0.5	2.25	nil	irrigation/agriculture /drinking purpose for cattle
19	Dudu	Mong	Udhampur	Amrit Sarovar at Takrar Near Pry School, W No.06, Pyt Mong	9.00 x 2.00 x 1.2	75200	42.3	18	nil	irrigation/agriculture /drinking purpose for cattle
20	Dudu	Mong	Udhampur	Renovation Of Water Bowli at Gumal Nallah W No 2 Mong	1.30 x 1.30 x 0.90	1520	0.4	1.69	nil	irrigation/agriculture /drinking purpose for cattle

				Zuzbi						
21	Dudu	Rasli Gadhren	Udhampur	Renovation Of Water Bowli at Bajeti W No 5	1.50 x 1.50 x 1.00	2250	1.5	2.25	nil	irrigation/agriculture /drinking purpose for cattle
22	Dudu	RASLI THAKRAI	Udhampur	Renovation Of Water Bowli at Chandla W No 5 NHO Brij Lal	1.50 x 1.50 x 1.00	2250	1.56	2.25	nil	irrigation/agriculture /drinking purpose for cattle
23	Ghordhi	Barmeen (Upper)	Udhampur	Amrit Sarovar at Talo Talab W No 8 Pyt Barmeen Upper	55' x 40' x 6'.0"		4'.5"		nil	irrigation/agriculture /drinking purpose for cattle
24	Ghordhi	Barmen (Lower)	Udhampur	Amrit Sarovar at Khodu Moh Near Pyt Ghar Pyt Barmeen Lower	30 x 35 x 5'.0"		4'.0"		nil	irrigation/agriculture /drinking purpose for cattle
25	Ghordhi	Bindla	Udhampur	Const. Of Bowli ST Gujjar Moh. Near Frid And Abdul W. No. 05	2.43 x 2.43 x 1.21	7140	7.14	5.9	nil	irrigation/agriculture /drinking purpose for cattle
26	Ghordhi	Bindla	Udhampur	Const. Of Bowli In The Way Of Shamshaan Ghat Ganga Ban W. No. 07	1.95 x 1.82 x 1.06	3760	3.76	3.54	nil	irrigation/agriculture /drinking purpose for cattle
27	Ghordhi	Bindla	Udhampur	Amrit Sarovar Near Narsingh Mandir W No 4 Pyt Bindla	6.09 x 4.57 x 1.50	41740	10.26	27.83	nil	irrigation/agriculture /drinking purpose for cattle

28	Ghordhi	Birnoo	Udhampur	Amrit Sarovar at Morha Ladda W.No.1 Pyr Birnoo	12.19 x 9.14 x 1.50	167120	20.5	111.4 1	nil	irrigation/agriculture /drinking purpose for cattle
29	Ghordhi	Ghordi Jagir	Udhampur	Amrit Sarovar at Loharran Mohalla Wno 3 Pyt Ghordi Jagir	18.29 x 18.29 x 1.50	501780	100	334.5 2	nil	irrigation/agriculture /drinking purpose for cattle
30	Ghordhi	Ghordi Khas (East)	Udhampur	Amrit Sarovar Near PS Sleta Ward No 1 Pyt Ghordi Khas East	3.65 x 4.57 x 1.50	25020	-	16.68	nil	irrigation/agriculture /drinking purpose for cattle
31	Ghordhi	Hartaryan	Udhampur	Amrit Sarovar Hartaryan Mora Sadotra W.No.7	11.90 x 8.50 x 1.83	185100	91	101.1 5	nil	irrigation/agriculture /drinking purpose for cattle
32	Ghordhi	Larh	Udhampur	Renovation Of Pond at Gurhi W No 6 Panchayat Larh	15.24 x 18.29 x 1.50	418100	370	278.7 3	nil	irrigation/agriculture /drinking purpose for cattle
33	Ghordhi	Larh	Udhampur	Const Of Pond at Chida Dabber Wno6	6.09 x 6.09 x 1.50	55630	-	37.08	nil	irrigation/agriculture /drinking purpose for cattle
34	Ghordhi	Mani	Udhampur	Const Of Bowli at Village Parka Pyt Mani	2.43 x 2.43 x 1.52	8970	8.97	5.9	nil	irrigation/agriculture /drinking purpose for cattle
35	Ghordhi	NALLA GHOURAN B	Udhampur	Amrit Sarovar at Puns Pyt Nalla Ghouran B	10.0 x 7.60 x 1.40	106400	Nil	76	nil	irrigation/agriculture /drinking purpose for cattle

36	Ghordhi	Nallah Ghourian	Udhampur	Amrit Sarovar at Kalma W No 2	9.15 x 7.60 x 1.50	104310	20.9	69.5	nil	irrigation/agriculture /drinking purpose for cattle
37	Ghordhi	Rassain	Udhampur	Amrit Sarovar Pond at Thupla Pyt Rassian	9.15 x 8.50 x 1.50	116660	17.4	77.77	nil	irrigation/agriculture /drinking purpose for cattle
38	Ghordhi	Ser Balla	Udhampur	Amrit Sarovar Morha Matti Ward No 4 Pyt Serbala	8.350 x 7.62 x 1.21	78370	64.77	30	nil	irrigation/agriculture /drinking purpose for cattle
39	Ghordhi	Ser Balla	Udhampur	Const.Of Drainage Channel at Mohalla Raina	300 x 6.0 x 0.45	81000	-	180	nil	irrigation/agriculture /drinking purpose for cattle
40	Jaganoo	SATAINI	Udhampur	Amrit Sarovar at Priyan Satani Pyt Satani	10.67x8.50 x1.52	137850	27.2	90.69	Nil	Irrigation/Agricultur e/Drinking purpose for cattle
41	Jaganoo	SUNAL	Udhampur	Amrit Sarovar at Sunal NHO Balbir Singh W.No.5 Pyt Sunal	13.71x13.7 1x1.82	342090	84.58	187.9 6	Nil	Irrigation/Agricultur e/Drinking purpose for cattle
42	Khoon	Babbey	Udhampur	Const Of Pond at Mankotia Moh W.O. 03 Tilsh Khasra No 57 (Amrit Sarover)	9.10x5.50x 1.52	76070	30.03	50.05	nil	irrigation/agriculture /drinking purpose for cattle
43	Khoon	Bilaspur	Udhampur	Const Of Pond at Wno 05	19.10x12.3 5x1.67	393920	212.2 9	235.8 8	nil	irrigation/agriculture /drinking purpose for cattle

44	Khoon	Ghar Samnabang	Udhampur	Renovation Of Pond Surara at W.No. 04(Amrit Sarover)	16.10x14.20x1.82	416080	171.46	228.62	nil	irrigation/agriculture /drinking purpose for cattle
45	Khoon	Mottu	Udhampur	Const Of Pond at Dayalian W.No.07 Moh Sansar Singh(Amrit Sarover)	12.80x6.65x1.82	154910	51.07	85.12	nil	irrigation/agriculture /drinking purpose for cattle
46	Khoon	Nakki	Udhampur	Const Of Pond at Moh Sourth W.No. 07 Khasara No 300(Amrot Sarover)	23.50x20.10x2.10	991930	425.11	472.35	nil	irrigation/agriculture /drinking purpose for cattle
47	Khoon	Palnoo	Udhampur	Renovation Of Pond at W.No. 07 NHO Hans Raj (Amrit Sarover)	29x14.10x1.67	682860	368.01	408.9	nil	irrigation/agriculture /drinking purpose for cattle
48	Khoon	Thial	Udhampur	Const Of Pond Moh Thakur Hattli Wno 04	24.10x17.20x1.82	754420	373.06	414.52	nil	irrigation/agriculture /drinking purpose for cattle
49	Kulwanta	Amroh	Udhampur	Desilting/Restoration Of Pond at W.No.6	8.10x8.50x1.52	104650	41.31	68.85	nil	irrigation/agriculture /drinking purpose for cattle
50	Kulwanta	Amroh	Udhampur	Desilting/Restoration Of Pond NHO Prem Chand W.No.5	8.50x9.14x1.52	118080	31.07	77.69	nil	irrigation/agriculture /drinking purpose for cattle

51	Kulwanta	Amroh	Udhampur	Amrit Sarovar NHO Krishan Lal	8.0x8.0x1.52	97280	32.9	67.9	nil	irrigation/agriculture /drinking purpose for cattle
52	Kulwanta	Balota Chigla	Udhampur	Amrit Sarovar at W.No.3 Pyt Balota Chigla	7.62x9.14x 1.82	126750	41.78	69.64	nil	irrigation/agriculture /drinking purpose for cattle
53	Kulwanta	Balota Chigla	Udhampur	Desilting/Restoration Of Pond at Droad W.No.1	6.09x3.65x 1.52	33780	10	22.22	nil	irrigation/agriculture /drinking purpose for cattle
54	Kulwanta	Bari	Udhampur	Desilting/Restoration Of Pond at Devi Dabbar W.No.3	9.0x9.67x1 .20	483560	113.3 3	251.8 5	nil	irrigation/agriculture /drinking purpose for cattle
55	Kulwanta	Bari	Udhampur	Desilting/Restoration Of Pond W.No.4 NR Post Office	6.56x5.34x 1.20	439770	92.16	263.3 4	nil	irrigation/agriculture /drinking purpose for cattle
56	Kulwanta	Bari	Udhampur	Amrit Sarovar at Dirlla	24.38x21.3 4x1.82	946880	416.2 1	520.2 6	nil	irrigation/agriculture /drinking purpose for cattle
57	Kulwanta	Bari	Udhampur	Desilting/Restoration Of Pond Baska Dera W.No.2	18.29x15.2 4x1.82	507300	dry	278.7 3	nil	irrigation/agriculture /drinking purpose for cattle
58	Kulwanta	Chatrari	Udhampur	Amrit Sarovar at Rindlu W.No.6	6.70x7.62x 1.82	92910	30.63	51.05	nil	irrigation/agriculture /drinking purpose for cattle
59	Kulwanta	Incha	Udhampur	Desilting/Restoration Of Pond NHO Choudhary Ram W.No.2	4.57x5.48x 1.52	38060	15.87	25.04	nil	irrigation/agriculture /drinking purpose for cattle

60	Kulwanta	Incha	Udhampur	Amrit Sarovar at Katora W.No.5 Pyt In Ha	6.09x6.09x 1.52	56370	21.56	37.08	nil	irrigation/agriculture /drinking purpose for cattle
61	Kulwanta	Joffeer	Udhampur	Amrit Sarovar at Bid NHO Parma	6.0x7.50x1 .52	68400	27.86	45	nil	agriculture/drinking purpose for human/cattle
62	Kulwanta	Joffeer	Udhampur	Desilting/Restoration Of Pond at Malli Parla Joffer	6.50x8.15x 1.52	80520	16.31	52.97	nil	agriculture/drinking purpose for human/cattle
63	Kulwanta	Keya	Udhampur	Restoration Of Bowli NHO Sagar Chand W.No.2	1.52x1.52x 1.52	1700	1.7	2.31	nil	agriculture/drinking purpose for human/cattle
64	Kulwanta	Keya	Udhampur	Const Of Pond NHO Babu Ram W.No.3	6.09x7.62x 1.82	84450	50.67	46.4	nil	irrigation/agriculture /drinking purpose for cattle
65	Kulwanta	Ladana	Udhampur	Repair Of Pond at Upper Kanala	9.14x8.53x 1.52	118500	38.98	77.97	nil	irrigation/agriculture /drinking purpose for cattle
66	Kulwanta	Ladana	Udhampur	Amrit Sarovar at W.No.3 Pyt Ladana	7.62x6.45x 1.82	89450	22.11	49.14	nil	irrigation/agriculture /drinking purpose for cattle
67	Kulwanta	Ladana	Udhampur	Desilting/Restoration Of Pond at Kanala W.No.6	9.14x8.53x 1.2	93550	27.28	77.96	nil	irrigation/agriculture /drinking purpose for cattle
68	Kulwanta	Lehair	Udhampur	Amrit Sarovar at Batli Band W.No.6 Pyt Lehair	5.48x7.62x 1.52	63470	21.87	41.75	nil	irrigation/agriculture /drinking purpose for cattle

69	Majalta	Bharnara	Udhampur	Const. Of Amrit Sarovar at Backside of Sawmill W No 9, Pyt. Bharnara	30X30X3	2700000	800	900	NIL	IRRIGATION / AGRICULTURE / DRINKING PURPOSE FOR CATTLES
70	Majalta	Bhatti Barigarh	Udhampur	Const. Of D/Channel Nho Kuldeep Singh And Others W.No. 2 Pyt Bhatti Barigarh	23X13X2.4	717600	179.4	299	NIL	IRRIGATION / AGRICULTURE / DRINKING PURPOSE FOR CATTLES
71	Majalta	Chani Mansar	Udhampur	Const. Of Amrit Sarovar at Moh. Nai W No 2, Pyt. Chani Mansar	15X15X2.4	540000	135	225	NIL	IRRIGATION / AGRICULTURE / DRINKING PURPOSE FOR CATTLES
72	Majalta	Devi Bani Thalora	Udhampur	Const. Of Amrit Sarovar NHO Kuldeep Singh, Subash Singh and Others, Pyt. Devi Bani Thalora	30X23X2.4	1656000	414	690	NIL	IRRIGATION / AGRICULTURE / DRINKING PURPOSE FOR CATTLES
73	Majalta	Dhamma	Udhampur	Repair Of Pondnear Pyt Ghar Dhamma	8.5X8.2X1.3	90610	DRY	69.7	NIL	IRRIGATION / AGRICULTURE / DRINKING PURPOSE FOR CATTLES

74	Majalta	Jansal	Udhampur	Repair Of Pond Moh Basotra W.No6	23X23X1.8	952200	318	529	NIL	IRRIGATION / AGRICULTURE / DRINKING PURPOSE FOR CATTLES
75	Majalta	Majalta	Udhampur	Const Of Amrit Sarovar at Shatral W.No5	30*23*1.8	1242000	414	690	NIL	IRRIGATION / AGRICULTURE / DRINKING PURPOSE FOR CATTLES
76	Majalta	Mansar	Udhampur	Const. Of Amrit Sarovar NHO Shambu Dutt W No 6, Pyt. Mansar	23X13X1.8	538200	180	299	NIL	IRRIGATION / AGRICULTURE / DRINKING PURPOSE FOR CATTLES
77	Majalta	Peoni	Udhampur	Renovation of Historical Pond at W No 6, Pyt. Peoni	15X15X3	675000	DRY	225	NIL	IRRIGATION / AGRICULTURE / DRINKING PURPOSE FOR CATTLES
78	Majalta	Satrari	Udhampur	Const Of Well NHO Roshan Lal And Others W No1	3.14X1.8X 7.6	42950	16.95	5.65	NIL	IRRIGATION / AGRICULTURE / DRINKING PURPOSE FOR CATTLES
79	Majalta	Satrari	Udhampur	Const Of Amrit Sarovar at Satrari W.No5	12X9X1.8	194400	65	108	NIL	IRRIGATION / AGRICULTURE / DRINKING

										PURPOSE FOR CATTLES
80	Majalta	Satrari	Udhampur	Const Of Well at W No 4	3.14X1.8X 9	50860	20.34	5.65	NIL	IRRIGATION / AGRICULTURE / DRINKING PURPOSE FOR CATTLES
81	Majalta	Satrari	Udhampur	Const Of Well at Moh Majal	3.14X1.8X 7.6	42950	16.95	5.65	NIL	IRRIGATION / AGRICULTURE / DRINKING PURPOSE FOR CATTLES
82	Majalta	Sumwal	Udhampur	Const of Amrit Sarovar at W No 2, Pyt. Sumwal	12X9X1.5	129600	54	108	NIL	IRRIGATION / AGRICULTURE / DRINKING PURPOSE FOR CATTLES
83	Majalta	Thalora	Udhampur	Const. Of Amrit Sarovar at Gardadi, Pyt. Thalora	12X9X1.5	129600	60	108	NIL	IRRIGATION / AGRICULTURE / DRINKING PURPOSE FOR CATTLES
84	Narsoo	Bali Upper	Udhampur	Amrit Sarovar at Bali Upper Pyt Bali Upper	15*10*1.5	225000	110	150	nil	irrigation / agriculture /drinking purpose for cattle
85	Narsoo	KITHER	Udhampur	Amrit Sarovar at Kither Pyt Kither	10*8*1.5	120000	55	80	nil	irrigation / agriculture /drinking purpose for cattle

86	Narsoo	NARSOO	Udhampur	Amrit Sarovar at Narsoo Pyt Narsoo	15*12*1.5	270000	140	180	nil	irrigation / agriculture /drinking purpose for cattle
87	Narsoo	NARSOO	Udhampur	Const Of Pond NHO Meer Ahmed Wno 4	8*8*1.5	96000	42	64	nil	irrigation / agriculture /drinking purpose for cattle
88	Narsoo	Sarmoli	Udhampur	Amrit Sarovar at Samroli Pyt Samroli	10 * 12 * 1.5	180000	85	120	nil	irrigation / agriculture /drinking purpose for cattle
89	Panchari	Badhota	Udhampur	Amrit Sarovar at Dunan Gali Wno1 Pyt Badhota	11x9x1.5	130000	20	70	nil	irrigation / agriculture /drinking purpose for cattle
90	Panchari	Galiote	Udhampur	Amrit Sarovar at Upper Junal Wno7 Pyt Galiote	10.4x8.4x1 .45	126670	40	230	nil	irrigation / agriculture /drinking purpose for cattle
91	Panchari	Latyar	Udhampur	Amrit Sarovar Chakod Sui Wno 9 Pyt Latyar	11x10x1.5	143000	60	120	nil	irrigation / agriculture /drinking purpose for cattle
92	Panchari	Mali	Udhampur	Amrit Sarovar at Near Bhim Devita Tasander Wno 1 Pyt Mali	11.5X10X1 .5	172500	25	110	nil	irrigation / agriculture /drinking purpose for cattle
93	Panchari	Meer Lower	Udhampur	Amrit Sarovar Nora Wno3 Pyt Lower Meer B	15x10x1.4	210000	180	300	nil	irrigation / agriculture /drinking purpose for cattle
94	Panchari	Suman	Udhampur	Amrit Sarovar at Dhanti Wno-7 Pyt Summan	10x10x1.2	120000	15	135	nil	irrigation / agriculture /drinking purpose for cattle

95	Parli Dhar	Baryalta	Udhampur	Amrit Sarovar at Taser Ward No 3 Pyt Baryalta	7.5 x 5.5 x 1.5	618700	30.93	41.25	NIL	irrigation / agriculture /drinking purpose for cattle
96	Parli Dhar	Blandh	Udhampur	Amrit Sarovar at Phurgal Pyt Blandh	7.5 x 6.7 x 1.5	753700	37.68	50.25	NIL	irrigation / agriculture /drinking purpose for cattle
97	Parli Dhar	Dhanwalt	Udhampur	Amrit Sarovar at Reala Mohalla Ward No 4 Pyt Dhanwalt	7 x 5.7 x 1.5	598500	28	39.9	NIL	irrigation / agriculture /drinking purpose for cattle
98	Parli Dhar	Dheeran	Udhampur	Amrit Sarovar at Kulda Pyt Dheeran	6 x 5.5 x1.5	495000	22	33	NIL	irrigation / agriculture /drinking purpose for cattle
99	Parli Dhar	Kogar Marh	Udhampur	Amrit Sarovar Near Narsingh Temple at Ward No 1 Pyt Kogar Marh	11.50 x 10.70 x 1.5	1845000	92	123.0 5	NIL	irrigation / agriculture /drinking purpose for cattle
100	Parli Dhar	Rang	Udhampur	Amrit Sarovarat Duha Phat Pyt Rang	11.5 x 10.3 x 1.5	1776700	95	118.4 5	NIL	irrigation / agriculture /drinking purpose for cattle
101	Ramnagar	Dehari	Udhampur	Pond at Mohalla Sullan NHO Kuldeep Kumar And Others W.No.4	9.16 x 9.16 x 1.3	16780	16.78	81	NIL	irrigation / agriculture /drinking purpose for cattle
102	Ramnagar	Kaghote	Udhampur	Amrit Sarovar at Mohalla Kougha Panchayat Kaghote	14.30 x 10 x 25	288000	Dry	128.7 8	NIL	irrigation / agriculture /drinking purpose for cattle

103	Ramnagar	Kaghote B	Udhampur	Amrit Sarovar at W.No.6 Jallow NHO Bansi Lal Jallow Pyt Kaghote B	10.50 x 10 x 1.60	148000	Dry	98.94	NIL	irrigation / agriculture /drinking purpose for cattle
104	Ramnagar	Katheel Ganju	Udhampur	Amrit Sarovar at Tatodi Ward No 7 Panchayat K.Ganju East	10.67 x 10.67 x 1.5	105000	105	100	NIL	irrigation / agriculture /drinking purpose for cattle
105	Ramnagar	Kathil Ganju West	Udhampur	Amrit Sarovar at SC Moh. Ward No.7 Panchayat K.Ganju West	25.9 x 10.6 x 1.8	164720	164.72	274	NIL	irrigation / agriculture /drinking purpose for cattle
106	Ramnagar	Kela	Udhampur	Amrit Sarovar at Rouni Near Raja Bask Mandir Panchayat Kela	11.50 x 11.50 x 1.80	188000	125	1188.8	NIL	irrigation / agriculture /drinking purpose for cattle
107	Ramnagar	Kutwalt	Udhampur	Amrit Sarovar at Nakkar Pyt Katwalt	11.20 x 9.40 x 1.80	158000	112	93.28	NIL	irrigation / agriculture /drinking purpose for cattle
108	Ramnagar	Sullan	Udhampur	Constt Of Amrit Sarovar at Choadian Ward No 6	9.00 x 7.50 x 1.80	100000	65	57.96	NIL	irrigation / agriculture /drinking purpose for cattle
109	Ramnagar	Sunetar A	Udhampur	Amrit Sarovar at Paddar Pattian Ward No. 5	9.10 x 8.80 x 1.50	95000	Dry	75.4	NIL	irrigation / agriculture /drinking purpose for cattle

				Panchayat Sunetar A						
110	Ramnagar	Sunetar B	Udhampur	Amrit Sarovar at Kalag Ward No.3 Panchayat Sunetar B	8.10 x 6.00 x 1.50	50000	38.2	41.8	NIL	irrigation / agriculture /drinking purpose for cattle
111	Ramnagar	Thaplal	Udhampur	Constt Of Pond In The Land Of Suram Chand So Prag Ram Ward No 3	6.50 x 6.50 x 2.0	70000	20	34.81	NIL	irrigation / agriculture /drinking purpose for cattle
112	Ramnagar	Thaplal	Udhampur	Amrit Sarovar at Dhalani Mohra Ward No.2 Panchayat Thaplal	9.0 x 9.0 x 1.80	121000	90	70.56	NIL	irrigation / agriculture /drinking purpose for cattle
113	Tikkri	Dhanoo	Udhampur	Amrit Sarover at Seri W.No4 (Improvement)	10.67x7.62 x1.82	147980	70	81.3	NIL	irrigation / agriculture /drinking purpose for cattle
114	Tikkri	Jadsarkote	Udhampur	Const Of Pond at Banzula W.No5 Amirt Sarover	7.62x7.62x 1.82	105670	60	58.06	NIL	irrigation / agriculture /drinking purpose for cattle
115	Tikkri	Ladda-C	Udhampur	Amritsarover at Gundi Lerh W No 3 at Panchayat Ladda C	12.19x6.09 x1.82	135110	40	74.24	NIL	irrigation / agriculture /drinking purpose for cattle
116	Tikkri	Mand East	Udhampur	Amrit Sarover at Pyt Mand East (Improvement)	27.43x18.2 8x1.82	912580	450	501.4 2	NIL	irrigation / agriculture /drinking purpose for cattle

117	Tikkri	Muttal	Udhampur	Const Of Amrit Sarovar Lahan W No 3 at Panchayat Muttal	12.19x12.19x1.52	225860	158	148.59	NIL	irrigation / agriculture /drinking purpose for cattle
118	Tikkri	Seen Brahmna	Udhampur	Const Of Amrit Sarovar Rajpura W No 6 at Panchayat Seen Brahmana	16.76x10.67x2.13	380910	290	178.83	NIL	irrigation / agriculture /drinking purpose for cattle
119	Tikkri	Sundrani	Udhampur	Amrit Sarover Kanukanu Talabward No3 at Panchyat Sundrani	12.19x6.09x1.82	135110	30	74.24	NIL	irrigation / agriculture /drinking purpose for cattle
120	Tikkri	Tikri	Udhampur	Amrit Sarover Ward No 2 Chakhar at Panchyat Tikria	12.19x7.62x1.82	169060	38	92.88	NIL	irrigation / agriculture /drinking purpose for cattle
121	Tikkri	Tikri B	Udhampur	Pond at Baba Mahadev at Barnek W No 1	10.67x10.67x1.82	207210	48	113.85	NIL	irrigation / agriculture /drinking purpose for cattle
122	Udhampur	Ballian	Udhampur	Amrit Sarovar at W.No.4 Thakur Dwara Pyt Ballian	24 x 15 x 1.50	540000	Dry	360	NIL	irrigation / agriculture /drinking purpose for cattle
123	Udhampur	Battal	Udhampur	Amrit Sarovar at W.No.7 Kharang Pyt Battal	15 x 7.5 x 1.30	146250	Dry	112.15	NIL	irrigation / agriculture /drinking purpose for cattle

124	Udhampur	Bredian	Udhampur	Amrit Sarovar at W.No.7 Thill Pyt Bredian	40 x 29 x 1.50	1740000	870	1160	NIL	irrigation / agriculture /drinking purpose for cattle
125	Udhampur	Chak Rakhwalan	Udhampur	Amrit Sarovar at W.No.4 Nambal Pyt Chak Rakhwalan	8*8*1 5	96000	50		NIL	irrigation / agriculture /drinking purpose for cattle
126	Udhampur	Dabreh	Udhampur	Renovation Of Bowli Near Shiv Mandir Lower Dabreh W No 2 Pyt Dabreh	1 5*1 5*1.2	2700	0.9		NIL	irrigation / agriculture /drinking purpose for cattle
127	Udhampur	Dabreh	Udhampur	Amrit Sarovar at W.No.6 Beli Pyt Dabreh	40*45*1.8	324000	100		NIL	irrigation / agriculture /drinking purpose for cattle
128	Udhampur	Darsoo	Udhampur	Amrit Sarovar at Jeda Near H/O Bishandass Pyt Darsoo	13.40 x 12.0 x 1.82	292650	204.9	160.8	NIL	irrigation / agriculture /drinking purpose for cattle
129	Udhampur	Gandala	Udhampur	Amrit Sarovar at W.No.3 Pyt Gandala	13.0 x 12.520 x 1.82	295750	190.3	162.5	NIL	irrigation / agriculture /drinking purpose for cattle
130	Udhampur	Hartaryan	Udhampur	Amrit Sarovar at W.No.2 Near Mahadev Mandir Pyt Hartaryan	17.0x15.0x 1.25	318750	30	255	NIL	irrigation / agriculture /drinking purpose for cattle

131	Udhampur	Jakher	Udhampur	Amrit Sarovar at W.No.6 Near House Of Omparkash Pyt Jakher	8*8*1.5	96000	50		NIL	irrigation / agriculture /drinking purpose for cattle
132	Udhampur	Kambal Danga	Udhampur	Amrit Sarovar Near Peer Baba Pyt Kambal Danga	8*8*1.5	96000	50		NIL	irrigation / agriculture /drinking purpose for cattle
133	Udhampur	Kambal Danga	Udhampur	Renovation Of Well NHO Raj Kumar Wno2 Pyt Kambal Danga	8*8*1 5	96000	50		NIL	irrigation / agriculture /drinking purpose for cattle
134	Udhampur	KHROONI	Udhampur	Amrit Sarovar at W.No.4 Pyt Kharooni	30 x 12 1.5	540000	220	360	NIL	irrigation / agriculture /drinking purpose for cattle
135	Udhampur	KOTLI-BALA	Udhampur	Amrit Sarovar at Kaldi W.No.4 Near Narsingh Mandir Pyt Kotli Bala	25*25*1 8	1125000	850		NIL	irrigation / agriculture /drinking purpose for cattle
136	Udhampur	Lower Rehmbal	Udhampur	Amrit Sarovar at Aspadi W.No.3 Pyt Rehmbal Lower I	15*15*2	450000	250		NIL	irrigation / agriculture /drinking purpose for cattle
137	Udhampur	Patta	Udhampur	"Construction Of Diversion Drain From The Land Of Jaswant Singh	90.0x0.30x 0.40	Nil	Nil	20	NIL	irrigation / agriculture /drinking purpose for cattle

				To Land Of Shamsher Sing And Jogind						
138	Udhampur	Patta	Udhampur	Amrit Sarovar at W.No 01,Patta Khu Pyt Patta	9.0x12.0x1 .80	194400	30	108	NIL	irrigation / agriculture /drinking purpose for cattle
139	Udhampur	Patta	Udhampur	Amrit Sarovar at Roda Talab To Wno3 Patta	15.0x13.0x 1.85	360750	10	195	NIL	irrigation / agriculture /drinking purpose for cattle
140	Udhampur	REHMBAL LOWER II	Udhampur	Amrit Sarovar at Rehmabal Lower-2 Pyt Rehmbal Lower II	15*15*2	450000	250		NIL	irrigation / agriculture /drinking purpose for cattle
141	Udhampur	Roun	Udhampur	Amrit Sarovar at W.No.2 Pyt Roun - I	15.20 x 7.20 x 1.602	175100	109.4 4	95.9	NIL	irrigation / agriculture /drinking purpose for cattle
142	Udhampur	Sambal	Udhampur	Amrit Sarovar at W.No.3 Lower Sambal Pyt Sambal	8*8*1.5	96000	70		NIL	irrigation / agriculture /drinking purpose for cattle
143	Udhampur	Seen Thakran	Udhampur	Amrit Sarovar at Thall W.No.7 Pyt Seen Thakran	21 x 12 x 1.5	378000	180	252	NIL	irrigation / agriculture /drinking purpose for cattle
144	Udhampur	Sounthan	Udhampur	Amrit Sarovar at W.No.7 Pyt Sounthan	8.0 x 7.0 x 1.82	101920	30.65	56	NIL	irrigation / agriculture /drinking purpose for cattle
145	Udhampur	Sunari	Udhampur	Amrit Sarovar Near Middle School	14 x 14 x 1.20	235200	683.6	196	NIL	irrigation / agriculture /drinking purpose for cattle

				Mathan W.No 06 Pyt Sunari						
146	Udhampur	Upper Rehmbal	Udhampur	Amrit Sarovar at W.No.4 Panchkheda Pyt Rehmbal Upper Chopra Shop	15.0x12.0x 1.80	324000	20	180	NIL	irrigation / agriculture /drinking purpose for cattle

Table 4.31. Pond/ Tank distribution details of Doda district.

SN.	Panchayat	Location	No. Ponds/Tanks	Size of each Pnd/Tank (LxBxH) m	Storage Volume (m³)	Volume of water avaiable in the Pond/Tank	Basin Area	Sub Basin area,if any	Utilization of surface water from ground/tank (m³)
1	Assar	Gram Panchayat	Pond at W.No 1	10x6x1.50	90	Nil	Nil		90
2	Assar	Gram Panchayat	WHT at upper Nansala	10x6x1.50	90	Nil	Nil		90
3	Assar	Gram Panchayat	WHT at Banjer Ginota	12x9x1.50	162	Nil	Nil		162
4	Assar	Gram Panchayat	WHT at Neecha	10x6x1.50	90	Nil	Nil		90
5	Assar	Gram Panchayat	Water Tank at Parihar moh. Ginota	12x9x1.50	162	Nil	Nil		162
6	Assar	Gram Panchayat	Rep. of Pond at Molvi Hatti	10x6x1.50	90	Nil	Nil		90

7	Assar	Gram Panchayat	Pond at Grera	10x6x1.50	90	Nil	Nil		90
8	Assar	Gram Panchayat	Pond ILO Anchal Singh	10x6x1.50	90	Nil	Nil		90
9	Assar	Gram Panchayat	WHT at Ward No. 1	10x6x1.50	90	Nil	Nil		90
10	Assar	Gram Panchayat	WHT at Kut	10x6x1.50	90	Nil	Nil		90
11	Balandpur	Gram Panchayat	Constt of pond at Traman	10x6x1.50	90	Nil	Nil		90
12	Balandpur	Gram Panchayat	Pond at Shampni	10x6x1.50	90	Nil	Nil		90
13	Balandpur	Gram Panchayat	Cattle pond at Kalotha	10x6x1.50	90	Nil	Nil		90
14	Balandpur	Gram Panchayat	Pond at Kunkhad	10x6x1.50	90	Nil	Nil		90
15	Balandpur	Gram Panchayat	Pond at Draman	10x6x1.50	90	Nil	Nil		90
16	Balandpur	Gram Panchayat	Pond at Lowhar Mohalla	10x6x1.50	90	Nil	Nil		90
17	Bibrota	Gram Panchayat	Pond at Drasher	12x9x1.50	90	Nil	Nil		90
18	Bibrota	Gram Panchayat	Pond at Nadrichack Malik Mohalla	10x6x1.50	90	Nil	Nil		90
19	Bibrota	Gram Panchayat	Pond reparing at Dhankla	10x6x1.50	90	Nil	Nil		90
20	Bibrota	Gram Panchayat	Spring Pond at Drubyalla	10x6x1.50	90	Nil	Nil		90
21	Bibrota	Gram Panchayat	Pond a Marwan	10x6x1.50	90	Nil	Nil		90

22	Bibrota	Gram Panchayat	Pond at ST Mohalla Bateen	10x6x1.50	90	Nil	Nil		90
23	Bibrota	Gram Panchayat	Pond at Thanote	10x6x1.50	90	Nil	Nil		90
24	Bibrota	Gram Panchayat	Pond at Lagsarn	10x6x1.50	90	Nil	Nil		90
25	Bibrota	Gram Panchayat	Rep of Pond at Ochla	10x6x1.50	90	Nil	Nil		90
26	Bibrota	Gram Panchayat	Pond at kumar mohallah ILO mamdoo kumar	12x9x1.50	162	Nil	Nil		162
27	Bibrota	Gram Panchayat	Spring pond at lower bolote	10x6x1.50	90	Nil	Nil		90
28	Bibrota	Gram Panchayat	Reparig of spring pond at sarnasool	10x6x1.50	90	Nil	Nil		90
29	Bibrota	Gram Panchayat	Pond at Kushla	10x6x1.50	90	Nil	Nil		90
30	Bibrota	Gram Panchayat	Pond at Bani Sharma mohalla	10x6x1.50	90	Nil	Nil		90
31	Bibrota	Gram Panchayat	Pond at Rather Mohalla Shadani	10x6x1.50	90	Nil	Nil		90
32	Bibrota	Gram Panchayat	Pond at Draman	10x6x1.50	90	Nil	Nil		90
33	Bibrota	Gram Panchayat	Pond at Dugga	12x9x1.50	162	Nil	Nil		162
34	Bibrota	Gram Panchayat	Spring at soola draman	12x9x1.50	162	Nil	Nil		162
35	Bibrota	Gram Panchayat	Reparig of spring pond at upper sarnasool	10x6x1.50	90	Nil	Nil		90

36	Bibrota	Gram Panchayat	Rep of Pond at Bhatta	10x6x1.50	90	Nil	Nil		90
37	Bibrota	Gram Panchayat	WHT at Bibrota	10x6x1.50	90	Nil	Nil		90
38	Bibrota	Gram Panchayat	WHT at Balote	10x6x1.50	90	Nil	Nil		90
39	Bibrota	Gram Panchayat	Fish Pond at Pandit Mohalla Banjir	10x6x1.50	90	Nil	Nil		90
40	Chakaa1	Gram Panchayat	Beowli at Bagi Naal	10x6x1.50	90	Nil	Nil		90
41	Chakaa1	Gram Panchayat	Chak Dam Ghoru	10x6x1.50	90	Nil	Nil		90
42	Chakaa1	Gram Panchayat	Pond at Gowari	10x6x1.50	90	Nil	Nil		90
43	Chakaa1	Gram Panchayat	Pond at new Grari	10x6x1.50	90	Nil	Nil		90
44	Chakaa1	Gram Panchayat	Pond at Baag	10x6x1.50	90	Nil	Nil		90
45	Chakaa1	Gram Panchayat	Pond at Sheri Dramyal	10x6x1.50	90	Nil	Nil		90
46	Chakaa1	Gram Panchayat	Pond at Banji	10x6x1.50	90	Nil	Nil		90
47	Chakaa1	Gram Panchayat	Pond at upper Rena	10x6x1.50	90	Nil	Nil		90
48	Chaka-A2	Gram Panchayat	Pond at Kansala Butt Mohalla	10x6x1.50	90	Nil	Nil		90
49	Chaka-A2	Gram Panchayat	Pond at Ban Thakur Mohalla	10x6x1.50	90	Nil	Nil		90
50	Chaka-A2	Gram Panchayat	Rep of Pond Chapri	10x6x1.50	90	Nil	Nil		90
51	Chaka-A2	Gram Panchayat	Rep of Pond at Navalla	10x6x1.50	90	Nil	Nil		90

52	Chaka-A2	Gram Panchayat	Pand at Dalroo	10x6x1.50	90	Nil	Nil		90
53	Chaka-A2	Gram Panchayat	WHT Khurshali NHO chunil Lal	10x6x1.50	90	Nil	Nil		90
54	Chaka-A2	Gram Panchayat	WHT at TramnalBudni	10x6x1.50	90	Nil	Nil		90
55	Chaka-A2	Gram Panchayat	WHT upper Guwari Near water point W.No.5	10x6x1.50	90	Nil	Nil		90
56	Chaka-A2	Gram Panchayat	WHT Masjid Mohalla Bhatta	10x6x1.50	90	Nil	Nil		90
57	Chaka-A2	Gram Panchayat	Reparing of Poind Tryal Maion choke	10x6x1.50	90	Nil	Nil		90
58	Chaka-A2	Gram Panchayat	WHT at Kulamdaf Banjer Bhartund	10x6x1.50	90	Nil	Nil		90
59	Chaka-A2	Gram Panchayat	Reparing of Pond NHO MH Chapri	10x6x1.50	90	Nil	Nil		90
60	Chaka-A2	Gram Panchayat	Pond at Khalel Nho Dina Pond at Khalel Nho Dina Nath & Rustam Ali& Rustam Ali	10x6x1.50	90	Nil	Nil		90
61	Chaka-A2	Gram Panchayat	Reparing of Pond at Gal pani	10x6x1.50	90	Nil	Nil		90

62	Chaka-A2	Gram Panchayat	WHTat Sarkundi NHO Mohd Anwar Shaan	10x6x1.50	90	Nil	Nil		90
63	Chaka-A2	Gram Panchayat	Pond at Thatha Khoie	10x6x1.50	90	Nil	Nil		90
64	Chaka-A2	Gram Panchayat	Pond/WHT Gujjar Mohalla W.No.1	10x6x1.50	90	Nil	Nil		90
65	Chaka-B	Gram Panchayat	Pond at Lumi	10x6x1.50	90	Nil	Nil		90
66	Chaka-B	Gram Panchayat	Constt. Of Spring at Main Road Harmili	10x6x1.50	90	Nil	Nil		90
67	Chaka-B	Gram Panchayat	Constt. Of WHT NLO Mohd Sharief Lohar	10x6x1.50	90	Nil	Nil		90
68	Chaka-B	Gram Panchayat	WHT at Shalwa Wani Mohalla	10x6x1.50	90	Nil	Nil		90
69	Charota-A	Gram Panchayat	pond at Dugri upper Jathar	10x6x1.50	90	Nil	Nil		90
70	Charota-A	Gram Panchayat	Pond at Kanwari	10x6x1.50	90	Nil	Nil		90
71	Charota-A	Gram Panchayat	Pond at upper Chirota	10x6x1.50	90	Nil	Nil		90
72	Charota-A	Gram Panchayat	Pond at Khandi	10x6x1.50	90	Nil	Nil		90
73	Charota-A	Gram Panchayat	Pond at Mohte	10x6x1.50	90	Nil	Nil		90
74	Charota-A	Gram Panchayat	Pond at chamyar Kut	10x6x1.50	90	Nil	Nil		90

75	Charota-A	Gram Panchayat	Constt of Pond at fath charota	10x6x1.50	90	Nil	Nil		90
76	Charota-A	Gram Panchayat	Constt of Pond at wno 2 marhi	10x6x1.50	90	Nil	Nil		90
77	Charota-A	Gram Panchayat	Constt of Pond at ranto	10x6x1.50	90	Nil	Nil		90
78	Charota-A	Gram Panchayat	Constt of Pond at dral nlo shiv lal	10x6x1.50	90	Nil	Nil		90
79	Charota-A	Gram Panchayat	Pond at W.No 4	10x6x1.50	90	Nil	Nil		90
80	Charota-A	Gram Panchayat	Constt of F/Pond at thanda pani	10x6x1.50	90	Nil	Nil		90
81	Charota-B	Gram Panchayat	Pond at Bray	12x9x1.50	162	Nil	Nil		162
82	Charota-B	Gram Panchayat	Pond at uper Hallyan	12x9x1.50	162	Nil	Nil		162
83	Charota-B	Gram Panchayat	Pond at Tali Dabru	10x6x1.50	90	Nil	Nil		90
84	Charota-B	Gram Panchayat	Pond at Dabru Nagwas	10x6x1.50	90	Nil	Nil		90
85	Charota-B	Gram Panchayat	Pond at Masha Mohalla Wno 5	10x6x1.50	90	Nil	Nil		90
86	Charota-B	Gram Panchayat	Pond at upper hallyan	10x6x1.50	90	Nil	Nil		90
87	Charota-B	Gram Panchayat	Pond at Khallro	10x6x1.50	90	Nil	Nil		90
88	Charota-B	Gram Panchayat	Pond at Kharyas Kulthayaro	12x9x1.50	162	Nil	Nil		162
89	Charota-B	Gram Panchayat	Pond at Upper Patta	12x9x1.50	162	Nil	Nil		162

90	Chill	Gram Panchayat	WHT Banjer	10x6x1.50	90	Nil	Nil		90
91	Chill	Gram Panchayat	WHT at Bal	10x6x1.50	90	Nil	Nil		90
92	Chill	Gram Panchayat	WHT at Hana Saroo	10x6x1.50	90	Nil	Nil		90
93	Chill	Gram Panchayat	WHT Gowari at Bateli	10x6x1.50	90	Nil	Nil		90
94	Chill	Gram Panchayat	Pond at Panyal	10x6x1.50	90	Nil	Nil		90
95	Chill	Gram Panchayat	WHT at Burkhandoo	10x6x1.50	90	Nil	Nil		90
96	Chill	Gram Panchayat	WHT at Hanna Saroo	10x6x1.50	90	Nil	Nil		90
97	Chill	Gram Panchayat	WHT at Chill Pani	10x6x1.50	90	Nil	Nil		90
98	Chill	Gram Panchayat	WHT at Lower Mohalla	10x6x1.50	90	Nil	Nil		90
99	Chill	Gram Panchayat	WHT at Barkhandoo	10x6x1.50	90	Nil	Nil		90
100	Chill	Gram Panchayat	WHT at Kundli	10x6x1.50	90	Nil	Nil		90
101	Chill	Gram Panchayat	WHT at Teli Banjer	10x6x1.50	90	Nil	Nil		90
102	Kuthyara	Gram Panchayat	WHT at Sheryatla	10x6x1.50	90	Nil	Nil		90
103	Kuthyara	Gram Panchayat	WHT at Chopan Mohalla	10x6x1.50	90	Nil	Nil		90
104	Kuthyara	Gram Panchayat	WHT at Kudgran	10x6x1.50	90	Nil	Nil		90
105	Kuthyara	Gram Panchayat	WHT at Thansu upper	10x6x1.50	90	Nil	Nil		90
106	Kuthyara	Gram Panchayat	Roof water Harvesting at	10x6x1.50	90	Nil	Nil		90

			Bhagat Mohalla Halyara						
107	Kuthyara	Gram Panchayat	Roof water Harvesting W.No 1	10x6x1.50	90	Nil	Nil		90
108	Kuthyara	Gram Panchayat	WHT at upper Oll Banjer	10x6x1.50	90	Nil	Nil		90
109	Kuthyara	Gram Panchayat	WHT at Charmal	10x6x1.50	90	Nil	Nil		90
110	Kuthyara	Gram Panchayat	WHT at Firna	10x6x1.50	90	Nil	Nil		90
111	Kuthyara	Gram Panchayat	WHT at Kut Baboo	10x6x1.50	90	Nil	Nil		90
112	Kuthyara	Gram Panchayat	WHT at Chak Babboo	10x6x1.50	90	Nil	Nil		90
113	Kuthyara	Gram Panchayat	WHT Charmal	10x6x1.50	90	Nil	Nil		90
114	Kuthyara	Gram Panchayat	Pond at Khandru	10x6x1.50	90	Nil	Nil		90
115	Kuthyara	Gram Panchayat	WHT Kuthyara	10x6x1.50	90	Nil	Nil		90
116	Kuthyara	Gram Panchayat	Rep of Cattle Pond at Kunda	10x6x1.50	90	Nil	Nil		90
117	Kuthyara	Gram Panchayat	WHT ILO Budhi Singh	10x6x1.50	90	Nil	Nil		90
118	Kuthyara	Gram Panchayat	Rep of Cattle Pond at banjer	10x6x1.50	90	Nil	Nil		90
119	Kuthyara	Gram Panchayat	WHT at Makula	10x6x1.50	90	Nil	Nil		90
120	Kuthyara	Gram Panchayat	WHT Khandi	10x6x1.50	90	Nil	Nil		90
121	Kuthyara	Gram Panchayat	Pond at Dawari Kuthyara	10x6x1.50	90	Nil	Nil		90

122	Kuthyara	Gram Panchayat	Amrit sarover at Shilote Pyt Kuthyara	12x9x1.50	162	Nil	Nil		162
123	Ramgarh/Kurmail	Gram Panchayat	WHT upper Tandal	10x6x1.50	90	Nil	Nil		90
124	Ramgarh/Kurmail	Gram Panchayat	WHT Lone Mohalla	10x6x1.50	90	Nil	Nil		90
125	Ramgarh/Kurmail	Gram Panchayat	WHT at Saldi	10x6x1.50	90	Nil	Nil		90
126	Ramgarh/Kurmail	Gram Panchayat	WHT ILO Shanker Dass	10x6x1.50	90	Nil	Nil		90
127	Ramgarh/Kurmail	Gram Panchayat	WHT Dugg Chakker	10x6x1.50	90	Nil	Nil		90
128	Ramgarh/Kurmail	Gram Panchayat	WHT at Kutra	10x6x1.50	90	Nil	Nil		90
129	Ramgarh/Kurmail	Gram Panchayat	Pond at Ludiyal	10x6x1.50	90	Nil	Nil		90
130	Ramgarh/Kurmail	Gram Panchayat	WHT at Par Darwal	10x6x1.50	90	Nil	Nil		90
131	Ramgarh/Kurmail	Gram Panchayat	WHT at Darwal	10x6x1.50	90	Nil	Nil		90
132	Ramgarh/Kurmail	Gram Panchayat	Pond Banjer NHO Gypsum Kanda	10x6x1.50	90	Nil	Nil		90
133	Ramgarh/Kurmail	Gram Panchayat	Pond at Wani Ilo Satish	10x6x1.50	90	Nil	Nil		90
134	Ramgarh/Kurmail	Gram Panchayat	pond at Snote	12x9x1.50	162	Nil	Nil		162
135	Ramgarh/Kurmail	Gram Panchayat	WHt at Jula	10x6x1.50	90	Nil	Nil		90
136	Ramgarh/Kurmail	Gram Panchayat	WHT Lower Chakker	10x6x1.50	90	Nil	Nil		90
137	Ramgarh/Kurmail	Gram Panchayat	WHT lower Dugga	10x6x1.50	90	Nil	Nil		90

138	Ramgarh/Kurmail	Gram Panchayat	WHT at Saldi	10x6x1.50	90	Nil	Nil		90
139	Ramgarh/Kurmail	Gram Panchayat	Constt. of Pond Mughal Mohalla (Nittu)	10x6x1.50	90	Nil	Nil		90
140	Ranka	Gram Panchayat	pond at Parlla Kanser Uper	12x9x1.50	162	Nil	Nil		162
141	Ranka	Gram Panchayat	WHT at banjir kotro	10x6x1.50	90	Nil	Nil		90
142	Ranka	Gram Panchayat	pond at Mardi	10x6x1.50	90	Nil	Nil		90
143	Ranka	Gram Panchayat	pond at upperDandyas near narender moh	10x6x1.50	90	Nil	Nil		90
144	Ranka	Gram Panchayat	WHT at manhas moh.	10x6x1.50	90	Nil	Nil		90
145	Ranka	Gram Panchayat	pond at Banjir Padralla ward No.1	10x6x1.50	90	Nil	Nil		90
146	Ranka	Gram Panchayat	pond at upper Dravity	10x6x1.50	90	Nil	Nil		90
147	Ranka	Gram Panchayat	Pond at khuie ward no.2	10x6x1.50	90	Nil	Nil		90
148	Ranka	Gram Panchayat	pond at kanser gowari	10x6x1.50	90	Nil	Nil		90
149	Ranka	Gram Panchayat	Amrit Sarover at upper Badyass WNo 5 Pyt Ranka	10x6x1.50	90	Nil	Nil		90
150	Shamthi	Gram Panchayat	Pond Dawrow	12x9x1.50	162	Nil	Nil		162

151	Shamthi	Gram Panchayat	WHT Soli	10x6x1.50	90	Nil	Nil		90
152	Shamthi	Gram Panchayat	WHT upper Wani Mohalla	10x6x1.50	90	Nil	Nil		90
153	Topneel	Gram Panchayat	Water Storage Tank at Mudak	10x6x1.50	90	Nil	Nil		90

4.1.8. Ground water Resources

4.1.8.1. General Introduction:

Groundwater serves as a crucial resource to fulfill the water needs of diverse sectors such as agriculture, domestic use, and industries. If not properly regulated, the uncontrolled utilization of groundwater may result in significant conflicts between these sectors (Dangar et al. 2021). Therefore, the progress in agriculture and industry hinges on how effectively India can oversee its groundwater reservoirs, especially the aquifers in various regions. Achieving sustainable development of groundwater resources demands a meticulous quantitative evaluation grounded in scientifically sound principles. The cornerstone for effective groundwater management lies in a comprehensive comprehension of aquifers and the current status of groundwater accumulation and movement within these aquifers (CGWB 2023).

The Significant portions of the Jammu and Kashmir State feature elevated and rugged mountainous terrain (Romshoo et al. 2020). The state is geographically divided into two administrative divisions: The Kashmir Division and the Jammu Division. Monitoring under the National Hydrograph Station (NHS) program focuses on the valley areas (Alluvium area) of six districts in the Jammu region (Jammu, Samba, Kathua, Rajouri, Reasi, and Udhampur) and five districts in the Kashmir Region (Kupwara, Baramulla, Pulwama, Anantnag, and Srinagar). As a result, groundwater estimation primarily relies on the rainfall infiltration method. Currently, Jammu & Kashmir monitors 336 Hydrograph Network Stations annually, spanning both pre-monsoon and post-monsoon periods (CGWB 2023). 240 NHS stations are situated in the Jammu Region, while the remaining 62 are located in the Kashmir Region. The density of observation wells has consistently increased over the years. Initially, groundwater monitoring was conducted through a network of open wells, primarily dug wells designed for drinking purposes, extracting water from shallow aquifers. Recognizing the significance of future groundwater development, the monitoring network was subsequently fortified through the construction of purpose-built piezometers. Currently, a total of 302 dug wells are under surveillance for groundwater monitoring purposes in Jammu and Kashmir.

The state of Jammu and Kashmir features a diverse range of geological formations spanning from the Pre-Cambrian era to the Recent period. These formations can be broadly categorized into three types (Romshoo et al. 2020). The first category consists of hard and consolidated rocks, including granites, slates, quartzite, Panjal traps, limestone, and similar materials. The second category encompasses semi-consolidated rocks such as claystone, siltstone, and sandstone. The third category involves unconsolidated formations dating from the Quaternary to the Recent age, which include materials like clay, silt, sand, gravel, pebbles, and boulders. This geological diversity contributes to the varied landscape and composition of the region. The distribuation of groundwater well as per disctrics in Jammu region and

Kashmir region are presents in Figure 4.38 & Figure 4.39 respectively.

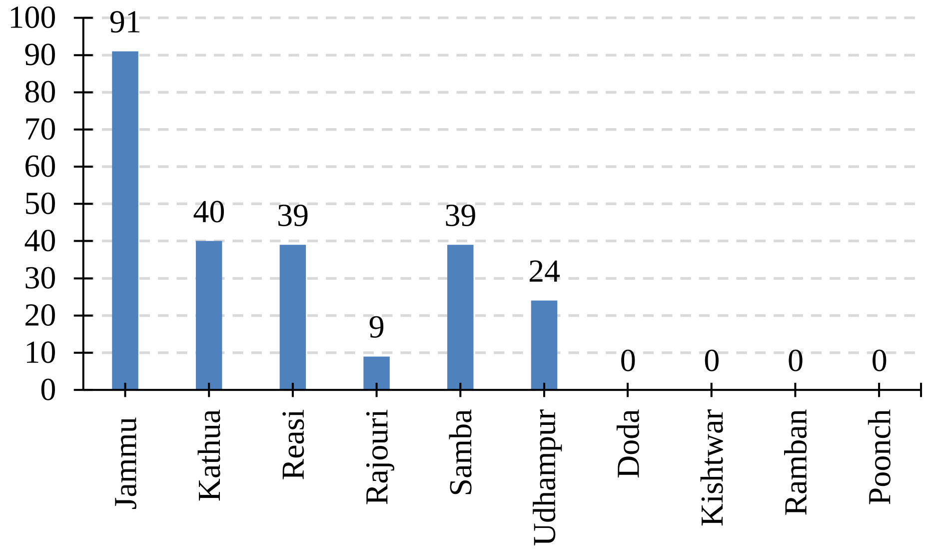


Figure 4.38 Distribution of groundwater wells as per disctrics in Jammu region. Source: Ground Water Year Book 2022–23 Jammu & Kashmir.

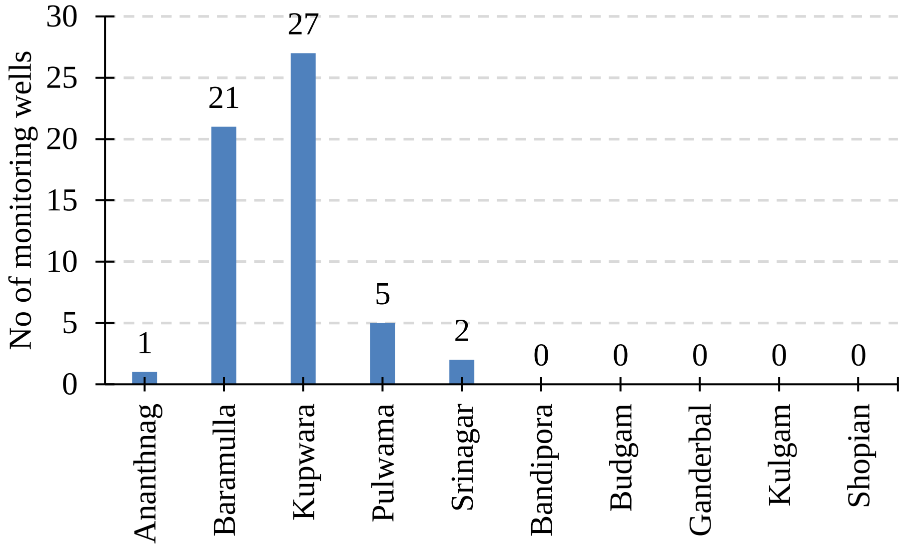


Figure 4.39. Distribution of groundwater wells as per disctrics in Kashmir region. Source: Ground Water Year Book 2022–23 Jammu & Kashmir.

In the Jammu region, an analysis of water level data for May 2022 from 206 wells revealed a varied depth to the water table. Depths ranged from 0.10 meters below ground level (bgl) in Sanoora, Samba District, to 36.57 meters bgl in Taryai, Jammu District (CGWB 2023). Notably, 5.3 % of the wells recorded a water level of less than 2.0 meters bgl, indicating shallow water levels. Furthermore, approximately 53.6% of the total wells analysed displayed water levels in the range of 2-5 meters bgl, reflecting a moderate depth. Meanwhile, 30% of the wells exhibited water levels in the range of 5-10 meters bgl, indicating a deeper water table for this segment. A smaller percentage, 7.2%, registered even deeper water levels in the range of 10-20 meters bgl. Moreover, 3.9% of the total wells analysed showed water levels exceeding 20 meters bgl, suggesting a considerable depth to the water table in these cases (CGWB 2023). This comprehensive analysis provides valuable insights into the distribution and variability of groundwater levels in the Jammu region during the specified period.

In the Kashmir region, an analysis of water level data from 51 wells for the month of May 2022 revealed variations in the depth to the water table, ranging from 0.10 meters below ground level (bgl) to 15.40 meters bgl. Notably, the majority of wells, 47.1% (24 wells), recorded water levels less than 2.0 meters bgl, indicating relatively shallow depths. Approximately 25% of the total wells analysed (51 wells) showed water levels in the range of 2-5 meters bgl, suggesting a moderate depth to the water table for this segment. Additionally, 13.9% (2 wells) of the wells exhibited water levels in the range of 5-10 meters bgl, indicating a deeper water table in these cases. Interestingly, 01 wells (2.0%) registered water levels in the range of 10-15 meters bgl, signifying that, during the specified period, all wells-maintained depths above this threshold (CGWB 2023).

4.1.8.2. Dynamic Groundwater Water Resources

The assessment of the Dynamic Ground Water Resource in the Union Territory (UT) of Jammu and Kashmir follows the GEC-2015 Methodology with the district as the primary unit of analysis. The UT is currently composed of 20 districts, covering its entire geographical area. For the calculation of average monsoon recharge, water level data from 2017 to 2022 has been utilized and normalized according to the GEC-2015 guidelines (CGWB 2022).

The unit draft for the year 2020-21 has been provided on a pro-rata basis by the Agriculture and Irrigation & Flood Control Department, along with data from the Digest of Statistics of UT of Jammu and Kashmir for the same period. Population at the block level, sourced from the Census Department of the Government of India for the year 2011, have been employed. The per capita water consumption, set at 100 liters per day (lpd), has been determined through detailed deliberations in various meetings to assess domestic groundwater use requirements (CGWB 2022).

The percentage increase in district-wise population relative to the 2011 census has been applied to calculate both present and future domestic water requirements. The district-wise water uses requirement figures for Industry for the year 2020, provided by the Department of Industries, Jammu and Kashmir, have been utilized. This data is projected on a pro-rata basis, considering a population growth rate of 1.5% per annum.

The value of Specific Yield, a critical parameter for calculating the Dynamic

Ground Water Resource, is assumed to range from 02% to 20%, in accordance with the norms outlined in the GEC-2015 guidelines issued by the Ministry of Water Resources, River Development, and Ganga Rejuvenation, Government of India. This parameter is essential for estimating the amount of water that can be extracted from the ground under different conditions (CGWB 2022).

The valley areas of Jammu, Samba, and Kathua districts, situated below the Kandi Sirowal contact, exhibit water levels ranging from 2-5 meters below ground level (bgl), with a few patches indicating levels between 0-2 meters bgl. In the Sirowal area of outer plains, most water levels fall within the 2-10 meters bgl range, except for small patches showing levels below 2 meters and above 10 meters bgl. The Kandi belt reports deeper water levels, varying between 5-20 meters bgl, with certain patches in northern and northwestern Jammu, central and parts of Samba, as well as northwestern parts of Kathua, revealing levels exceeding 20 meters bgl. In the Kashmir Region's valley areas, water levels span across all ranges, predominantly within 2 meters bgl in Kupwara and Baramulla districts. Northern Baramulla, a few patches in Kupwara, and regions in Srinagar and Pulwama districts show levels above 2 but below 5 meters. Deeper water levels are observed in the northern and northeastern parts of Pulwama and Anantnag districts. The depth to water levels, recorded in August 2022 for the Jammu and Kashmir region, is depicted in Figure 4.40(CGWB 2023).

In the Jammu region, an analysis of seasonal water level fluctuations between November 2022 and May 2022 at 206 National Hydrograph stations reveals that 199 stations experienced a rise in water levels, with only 7 stations showing a decline. The fluctuations ranged from 0-2 meters, 2-4 meters, to over 4 meters. The minimum recorded rise was 0.02 meters, and the maximum was 12.25 meters, while the decline ranged from 0.09 meters to a maximum of 1.85 meters. The impact of rainfall is evident across the monitored area during November 2022, with nearly all valley areas indicating a rise in water levels, except for small patches in each district that registered a fall within 0-5 meters below ground level. In the Kashmir region, an analysis of seasonal water level fluctuations between November 2022 and May 2022 at 50 National Hydrograph Stations indicates that 25 stations experienced a rise, while 25 stations showed a decline in water levels within the ranges of 0-2 meters, 2-4 meters, and over 4 meters. The minimum rise recorded was 0.10 meters, with a maximum rise of 2.27 meters. The minimum decline was 0.04 meters, while the maximum decline was 5.96 meters. Out of the 50 stations with a rise in water levels, 24 wells showed a rise of less than 2 meters, 1 well showed a rise of 2-4 meters, and no wells showed a rise exceeding 4 meters. Additionally, 20 wells experienced a decline between 0-2 meters, 4 wells showed a decline between 2-4 meters, and 1 well exhibited a decline exceeding 4 meters. The seasonal fluctuation of water levels reported for November-May 2022 in the Jammu and Kashmir region is illustrated in Figure 4.41(CGWB 2023).

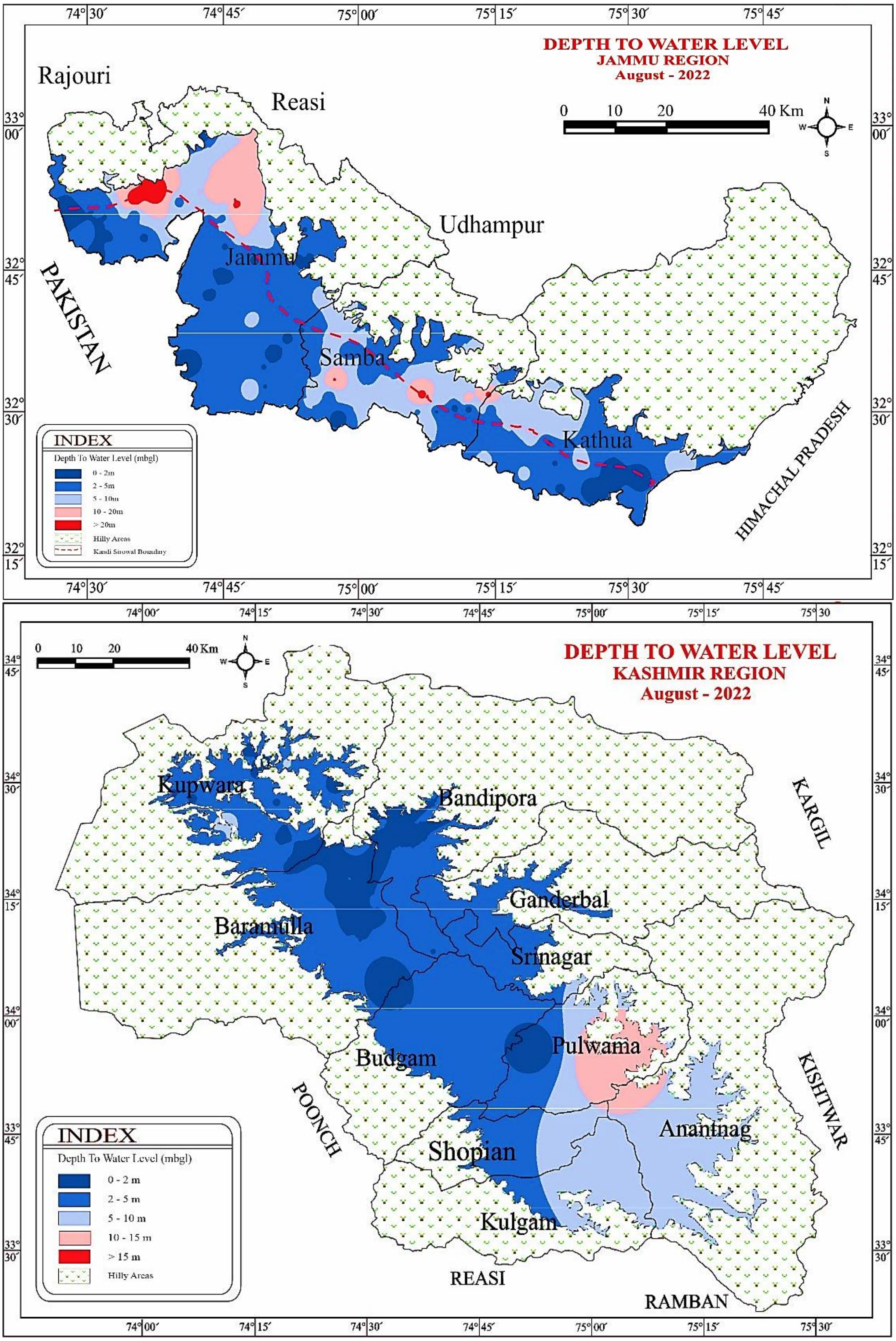


Figure 4.40. Depth to water levels reported in August 2022 for the Jammu and Kashmmir region. Source: CGWB Year book 2022-23

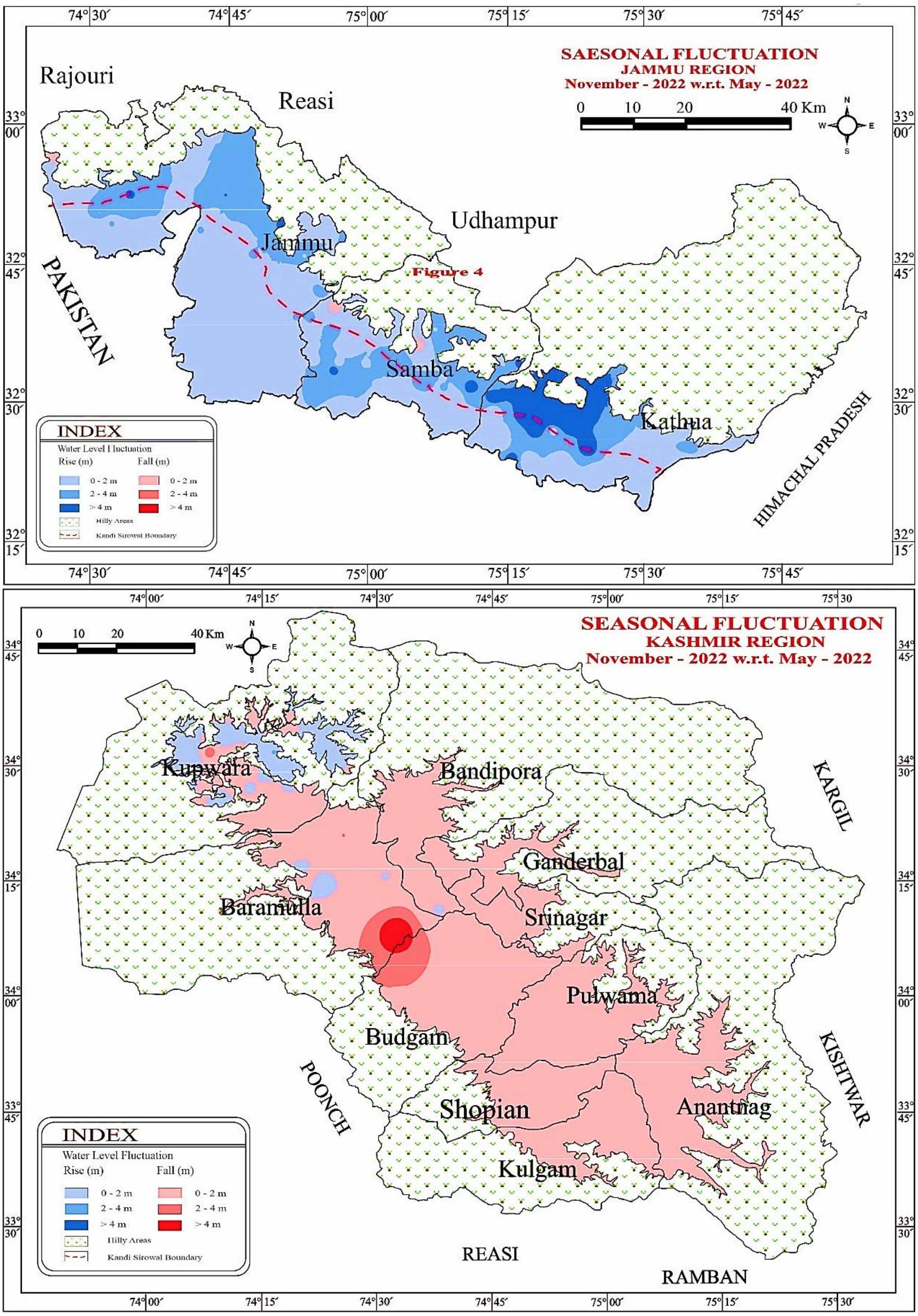


Figure 4.41. Seasonal fluctuation of water levels reported November-May 2022 for the Jammu and Kashmir region. Source: CGWB Year book 2022-23

4.1.8.3. Groundwater quality

The groundwater quality in the Union Territory of Jammu & Kashmir is comprehensively evaluated through various parameters, shedding light on its suitability for diverse applications such as drinking, irrigation, and industrial purposes. The Electrical Conductivity (EC) values serve as a pivotal metric, predominantly showcasing low values across the region.

A substantial majority, approximately 66.8% of the collected samples, exhibit specific conductance below 750 µS/cm at 25°C, indicative of fresh and potable groundwater. Another 33.2% fall within the range of 750-3000 µS/cm, with specific conductance varying between 204 and 1953 µS/cm. Notably, no sample registers an EC exceeding 3000 µS/cm (CGWB 2023).

The pH levels of the groundwater in Jammu & Kashmir range from 6.15 to 9.04, signaling a neutral to alkaline nature. Alkaline characteristics are prevalent in shallow groundwater, with 37.6% of samples dominated by carbonate type. Chloride, a highly soluble element, aligns with the EC pattern, presenting concentrations ranging from 5.4 to 216.8 mg/l. Crucially, all chloride concentrations are within the maximum permissible limit of 1000 mg/l prescribed by the Bureau of Indian Standards (BIS) for drinking water. Fluoride, essential in limited quantities but hazardous in excess, is within acceptable limits (1.0 mg/l) in the majority of samples (93.2%). A small percentage (4.8%) falls between 1.01 and 1.50 mg/l, still within permissible limits, while a few samples exceed 1.50 mg/l. Nitrate concentrations in 88.8% of samples are relatively low, yet a noteworthy 11.2% exhibit higher values, indicating potential contamination sources such as excessive fertilizer application and seepage from waste. Sulphate concentrations, ranging from 2.8 to 181.5 mg/l, adhere to the permissible limit of 400 mg/l for drinking water. Hardness, attributed to calcium and magnesium salts, presents a spectrum: 3 samples exceed 600 mg/l (very hard), 175 fall within 200-600 mg/l (hard), and 70 samples are below 200 mg/l (soft). BIS standards of 200 and 600 mg/l serve as acceptable and permissible limits, respectively, for total hardness in drinking water. Calcium concentrations (10.2 to 158 mg/l) are consistently within the permissible limit of 200 mg/l as specified by BIS (CGWB 2023).

Uranium analysis across all 250 samples indicates concentrations below the World Health Organization permissible limit of 30 ppb, affirming the absence of uranium contamination in shallow water levels. The Sodium Adsorption Ratio (SAR) plays a crucial role in assessing the potential sodium hazard and its impact on soil. However, specific SAR values for Jammu & Kashmir groundwater are not explicitly provided in the given information (Gupta and Arora 2016). When water containing high bicarbonate levels and reduced calcium and magnesium is employed for irrigation, it induces the precipitation of calcium and magnesium as carbonates, resulting in an elevated sodium content with sodium bicarbonate in the remaining solution. In the Union Territory of Jammu & Kashmir, the average Sodium Adsorption Ratio (SAR) is recorded at 0.814, and the average Residual Sodium Carbonate (RSC) value is -0.28. The data consistently indicates that the groundwater in Jammu & Kashmir is exceptionally well-suited for irrigation purposes, emphasizing its overall excellence for such applications

4.1.8.4. Issues and challenges

- The rapid development of urban and industrial areas demands heightened vigilance and quality surveillance from state government authorities. Specifically, acute monitoring of trace elements in key industrial zones such as Bari-Brahmana, Gangyal, and other areas in the Kashmir Valley is imperative. To achieve this, the establishment of a comprehensive monitoring network along the nalas and drains transporting industrial effluents is essential. This proactive approach should ensure that potential environmental and water quality issues in fast-growing urban and industrial centers are identified promptly and addressed effectively by the state government authorities.
- The UT heavily depends on groundwater from springs, shallow, and deep sources, which serves as a primary resource even for surface water bodies during lean periods. To safeguard this essential resource, it is imperative to implement effective protection measures to prevent groundwater contamination. These measures are vital to ensure the continued availability of clean and reliable water for the residents of the region.
- Micro-level planning, informed by comprehensive data on aquifer geometry, parameters, and water resources, is essential for their effective development. In the Kashmir Valley, deeper aquifers contain iron and marshy gases, requiring appropriate treatment before water supply. To mitigate the iron contamination issue, it is advisable to identify iron-free aquifers using advanced scientific groundwater exploration techniques, coupled with modern geophysical methods. Construction of tube wells should focus on tapping only iron-free aquifers, employing cement sealing and gravel pack exclusively around these aquifers while avoiding those with iron content. This approach should ensure a sustainable and treated water supply while addressing the specific challenges associated with deeper aquifers in the Kashmir Valley.
- In hilly regions, water supply heavily relies on springs, yet their discharges are diminishing significantly. To address this challenge, there is a pressing need for a systematic enumeration and inventory of springs, encompassing assessments of their quality, as well as the exploration of snow water harvesting techniques and other available methods.
- In Jammu city and certain areas of Srinagar city, where water supplies predominantly rely on groundwater, it is crucial to implement effective

wellhead protection measures. These measures are essential to prevent bacteriological contamination, including coliform bacteria and E. coli. By prioritizing the safeguarding of wellheads, the risk of bacterial contamination in the groundwater, which serves as a primary water source for these regions, can be significantly reduced. This preventive approach is vital to ensuring the continued supply of safe and clean water to the residents of Jammu and Srinagar cities.

- The pervasive absence of adequate sewage and sanitation infrastructure across the UT has led to widespread contamination of both groundwater and surface water. Proper disposal of village sewage after thorough treatment is essential to curbing contamination and ensuring environmental health. In waterlogged areas, where polluted surface water jeopardizes groundwater quality, the creation of proper drainage systems becomes crucial to mitigate waterlogging conditions and prevent further contamination.
- The issue of groundwater contamination due to inadequate disposal of domestic and industrial solid wastes is also a significant concern that warrants special attention. Addressing this problem requires targeted efforts, such as establishing a comprehensive and unified database that will facilitate a more holistic understanding of water quality, enabling informed decision-making and coordinated actions to combat groundwater contamination arising from improper waste disposal practices.
- Immediate initiation of scientific research projects focused on groundwater contamination, particularly geo-genic issues such as iron, gases, and fluoride, is imperative. To address these challenges, comprehensive management strategies must be devised, emphasizing the establishment of cost-effective community-level treatment plants. The hard to very hard nature of the groundwater, containing iron, proper treatment becomes essential before utilizing the water for irrigation.

4.1.8.5. Ground water Management and regulation and Governance

I) **Assessment and Measurement:**

a) **Aquifer Mapping:** Conducting detailed aquifer mapping to understand the distribution and characteristics of groundwater resources in different regions of Jammu and Kashmir.

b) **Water Table Monitoring:** Regularly measuring and monitoring the water table levels to assess the groundwater recharge and withdrawal rates.

2) Monitoring Groundwater Quality:

a) **Water Quality Testing:** Regularly monitoring and testing groundwater quality to identify and address potential contamination issues. In Jammu & Kashmir, at present, 336 Hydrograph Network Stations are being monitored during pre-monsoon and post-monsoon periods. The geographical map locating the Groundwater monitoring wells in Alluvial Aquifers in Jammu & Kashmir are presented in Figure 4.42.

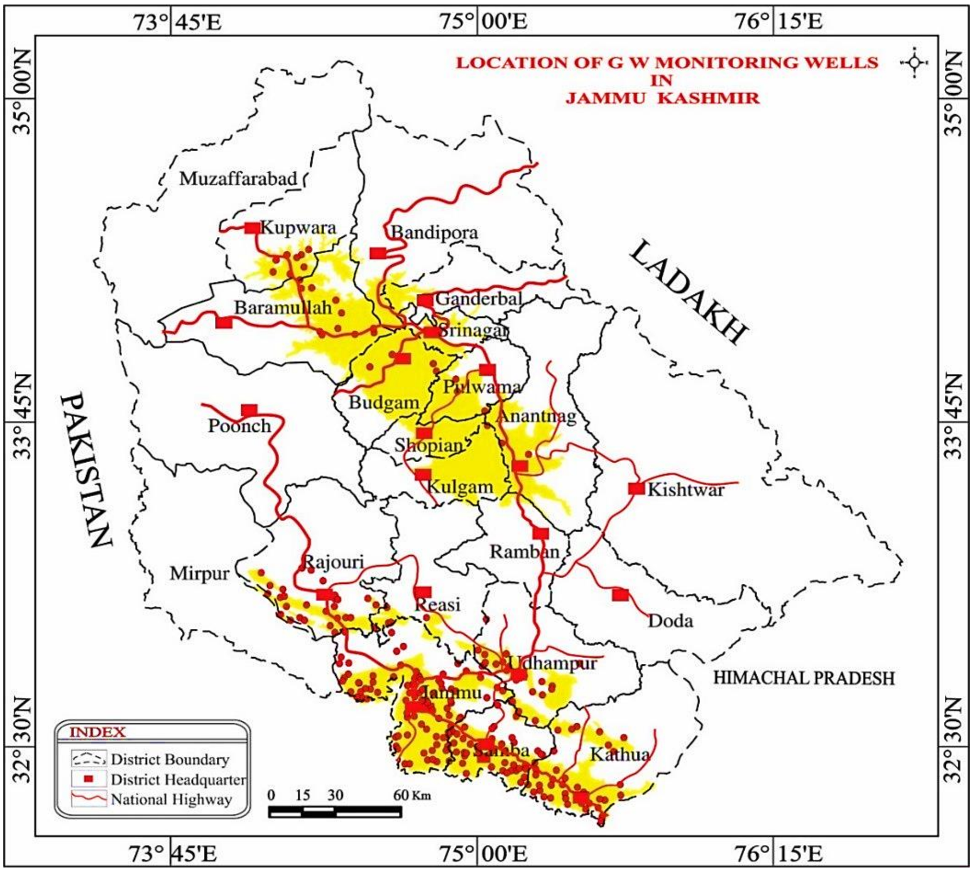


Figure 4.42. Location Map of Groundwater monitoring wells in Alluvial Aquifers in Jammu & Kashmir. Source: CGWB Year book 2022-23

4.1.8.6. Annexure- Ground Water

Table 4.32. Depth to Water Level Data of Dug Wells (in m) for all Seasons (Jammu Region)

Sl No.	Location	District	Long	Lat	May-22	Aug-22	Nov-22	Jan-23
1	Agre Chak	Jammu	74.716	32.622	4.31	2.27	3.99	4.29
2	Akhnoor (Batera)	Jammu	74.751	32.86	17.28	11.6	13.13	14.41
3	Allah	Jammu	74.837	32.518	4.14	2.54	3.15	3.36
4	Arnia	Jammu	74.799	32.523	10.17	8.12	9.12	9.51
5	Badsoo	Jammu	75.019	32.853	3.65	0.35	1.05	2.1
6	Bakore	Jammu	74.563	32.806	4.95		3.5	4.21
7	Baradow	Jammu	74.436	32.908	7.19	4.73	6	6.28
8	Batera	Jammu	74.746	32.848	11.02	5.92	7.97	9.02
9	Bega	Jammu	74.668	32.615	3.15	2.37	2.8	2.97
10	Bera	Jammu	74.677	32.619	3.15		3.09	
11	Bhagwanachak	Jammu	74.575	32.86	31.86	27.76	27.46	27.38
12	Bishnah	Jammu	74.864	32.613	3.56	1.67	2.27	2.84
13	Chatta	Jammu	74.934	32.693	6.7	3.75	6	6.25
14	Chowki chowra	Jammu	74.65	33.031	7.78	0.86	1.02	2.43
15	Devipur	Jammu	74.658	32.856	7.18	3.72	6.06	6.83
16	Dhanpur	Jammu	74.541	32.807	5.96	3.31	3.85	5.05
17	Dharam Khu	Jammu	74.763	32.86	25.11	20.51	21.61	23.16
18	Dhora	Jammu	75.14	32.613	4.6	2.53	2.92	2.93
19	Gajansoo	Jammu	74.711	32.761	3.71	2.35	3.23	3.24
20	Garhi (Jammu)	Jammu	74.77	32.79	8.69	5.69	7.52	7.94
21	Gho-Manhasan	Jammu	74.739	32.723	1.57	0.81	1.13	1.36
22	Gigrial	Jammu	74.482	32.795	3.95	2.68	3.36	3.41
23	Greater Kailash	Jammu	74.931	32.686	14.15	9.05	10.6	11.27
24	Gura	Jammu	74.706	32.795	14.43	10.33	12.33	13.53
25	Hamirpur Kohna	Jammu	74.549	32.767	4.46	2.46	3.58	3.58
26	Hamirpur Sidhar	Jammu	74.526	32.776	4.2	2.44	3.2	3.68
27	Jagati	Jammu	74.896	32.806	2.32	1.85	1.3	1.55
28	Jaswan	Jammu	74.726	32.791		3.45	4.58	
29	Jhiri	Jammu	74.738	32.825	5.7	4.5	4.96	6.33
30	Jindrah	Jammu	75.086	32.813				
31	Jogwan	Jammu	74.442	32.934	3.4	1.92	5.25	5.78
32	Jourian	Jammu	74.575	32.833	5.59	1.9	2.76	4.07
33	Kachrial	Jammu	74.472	32.866	3.93	2.94	2.77	3.61
34	Kalah	Jammu	74.475	32.911	2.91	2.42	2.41	2.7
35	Kaluchak	Jammu	74.894	32.657	6.82	3.64	6.18	5.5
36	Kamila	Jammu	75.065	32.609	6.3	4.25	4.83	4.83
37	Kana Chak	Jammu	74.717	32.821		2.33	3.76	4.36
38	Kangar	Jammu	74.846	32.84	16.79	3.64	10.97	18.85
39	Karnaile Chak	Jammu	74.822	32.789		6.9		Dry
40	Katcha-Pind Dansal	Jammu	74.862	32.866	2.4	0.35	2.15	2.15
41	Khairi (Raipur)	Jammu	74.858	32.808	8.05	3.38	3.03	4.88
42	Khanpur Nagrota	Jammu	74.892	32.791	0.1	2.92	0.3	1.91
43	Khour	Jammu	74.517	32.829	4.38	1.57	2.52	3.71
44	Kot Kaswal	Jammu	75.108	32.799	4.3	0.4	1.1	2.5
45	Kothey Saini	Jammu	74.882	32.577	5.37	3.55	3.85	4.25
46	Kotli Charkan	Jammu	74.834	32.616	4.99	2.23	3.38	4.25

47	Kunihala	Jammu	75.033	32.904	2.86	1.45	1.65	1.7
48	Lalyal	Jammu	74.774	32.664	4.12	2.59	3.44	3.56
49	Lam	Jammu	74.514	32.832	5.27	2.21	2.21	2.21
50	Laswara	Jammu	74.837	32.585	2.64	1.09	2.27	2.63
51	Leherian	Jammu	74.688	32.903	10.17	7.52	8.82	8.72
52	Lower Barnai	Jammu	74.792	32.763				Locked
53	Makwal	Jammu	74.717	32.693	3.32	1.54	2.35	2.27
54	Marh	Jammu	74.746	32.776	2.65	1.4	2.4	2.43
55	Marjholi	Jammu	74.767	32.85		25.11		27.43
56	Miran Sahib	Jammu	74.795	32.646	7.27	6.65	6.72	7.15
57	Mothlian Kalan	Jammu	75.074	32.657			5.6	6.56
58	Muthi	Jammu	74.8	32.753	5.15	1.22	2.89	2.22
59	Nagbani	Jammu	74.778	32.761	4.92	2.78	3.76	3.73
60	Nagrota (Kandoli)	Jammu	74.921	32.804	4.45	2.97	3.15	3.8
61	Nagrota (Uttarbani)	Jammu	75.065	32.624	7.16	0.75	5.6	14.1
62	Nandpur	Jammu	74.889	32.518			3.08	3.58
63	Nikowal	Jammu	74.706	32.508	5.67	2.9	4.83	5.74
64	Painthi	Jammu	75.156	32.593	9.07	4.9	5.93	6.8
65	Palatan	Jammu	74.449	32.837	2.65	1.13	2.09	2.29
66	Pallanwala	Jammu	74.454	32.85		1.16	1.86	2.28
67	Pangli Colony	Jammu	74.524	32.794	3.48	0.77	2.14	3.11
68	Pata Khu	Jammu	74.771	32.842	22.97	18.56	19.26	21.56
69	Patyale Chak	Jammu	74.776	32.761	4.63	2.99	3.52	3.9
70	Poal	Jammu	74.82	32.526	4.03	1.75	2.97	NA
71	Purkhoo	Jammu	74.778	32.803		13.96	3.52	18.26
72	Rangoora	Jammu	74.896	32.751	2.5	0.45	0.76	2.4
73	Rehal	Jammu	74.876	32.561	6.42	3.5	4.49	5.12
74	Sajwal	Jammu	74.593	32.792	3.46	1.36	3.11	3.3
75	Salehar	Jammu	74.818	32.56	4.34	1.9	3.32	4.02
76	Sandhwan	Jammu	74.714	32.71		2.87	3.44	3.58
77	Satwari	Jammu	74.846	32.689			11.08	Dry
78	Sei Khurd	Jammu	74.725	32.508	4.6	3.25	3.53	4.39
79	Senth	Jammu	74.508	32.774	3.04	1.53	3.13	3.39
80	Shame Chak	Jammu	74.742	32.828	6.89	3.28	4.73	5.78
81	Sidhra	Jammu	74.895	32.76	6.75	2.2	2.6	3.2
82	Sobka	Jammu	74.753	32.875		19.49	20.8	22.31
83	Sohanjana	Jammu	74.743	32.697	4.24	2.41	3.19	3.61
84	Suchetgarh-II	Jammu	74.676	32.568	2.59	0.89	2.57	2.05
85	Sugetar	Jammu	74.958	32.879	6.4	1.9	2.5	2.4
86	Sumah	Jammu	74.672	32.957	3.26	3.08	3.16	3.25
87	Surinsar	Jammu	75.043	32.773			1.75	1.65
88	Tanda Sheoda	Jammu	74.7	32.975	2.4	0.5	0.8	1.79
89	Taryai	Jammu	74.614	32.874	36.575	34.06	32.86	33.51
90	Trikuta Nagar	Jammu	74.88	32.712	4.45	3.38	3	5.01
91	Upperla kanhal	Jammu	74.883	32.633	5.7	2.63	3.2	4.02
92	Uttarbani	Jammu	75.064	32.648	2.3	1.83	1.66	1.56
93	Barni	Kathua	75.594	32.424	6.85	4.58	6.25	6.35
94	Bhagwal	Kathua	75.367	32.45	25.12	8.32	14.92	20.71
95	Billawar	Kathua	75.608	32.613			0.6	0.85
96	Chak hariya	Kathua	75.367	32.389		1.68	1.5	2.88
97	Chakara	Kathua	75.259	32.418	5.1	2.81	3.4	3.48
98	Chan ranga	Kathua	75.331	32.483	16.8	9.19	10.02	13.35

99	Chann Khatrian	Kathua	75.246	32.488	13.65	3.27	7.1	9.84
100	Chapki Kalan	Kathua	75.315	32.447	20.88	10.22	8.63	13.19
101	Feru chak	Kathua	75.279	32.375	9.09	1.82	3.04	3.72
102	Gangu chak	Kathua	75.263	32.401	3.05	2.01	2.07	2.11
103	Gond	Kathua	75.5	32.333				
104	Gond More	Kathua	75.5	32.333		2.17	1.97	2.19
105	Hore	Kathua	75.291	32.423	4.5	2.61	2.4	2.14
106	Jandi	Kathua	75.246	32.463	4.35	3.84	4.1	4.32
107	Jindore	Kathua	75.598	32.393	12.05	6.55	8.14	8.49
108	Karol Krishna	Kathua	75.236	32.396	8.95	7.91	7.1	7.56
109	Kathua	Kathua	75.529	32.364	2.24	0.59	0.79	1.53
110	Kerian Gandyal-II	Kathua	75.519	32.297		2.95		Dry
111	Kerian Ramnagar	Kathua	75.514	32.281		2.42	3.3	2.7
112	Khanpur	Kathua	75.356	32.425	2.72	1.51	1.5	0.25
113	Khukhial	Kathua	75.467	32.35	1.81	1.31	1.38	2.75
114	Konthal	Kathua	75.26	32.424	5.75	5.03	4.88	5.27
115	Kote punnu	Kathua	75.376	32.346	2.29	1.56	1.72	1.62
116	Kothian	Kathua	75.508	32.367			0.48	1.75
117	Lakhanpur	Kathua	75.594	32.382	6.3	5.33	6.3	6.1
118	Lakri	Kathua	75.415	32.656	3.95	1.95	1.85	2.95
119	Londi	Kathua	75.213	32.425	6.17	4.08	4.74	5.59
120	Mandli	Kathua	75.508	32.636	5.55	1.2	1.75	3.1
121	Mukandpur	Kathua	75.369	32.369	4.1	4	3.85	3.88
122	Nagri	Kathua	75.433	32.35	2.5	0.96	1.7	2.39
123	Nagrota-Gujaroo	Kathua	75.394	32.646	6.5	1.58	3.99	5.73
	Nanke Chak		75.468		2.98	0.76		1.77
124	(Sherpur)	Kathua		32.381			1.18	
125	Pallan	Kathua	75.566	32.556	1.4	0.35	0.45	0.95
126	Pansar	Kathua	75.306	32.372	6.08	6.1	6.08	5.91
127	Patyari	Kathua	75.44	32.4		3.43	5.2	8.05
128	Patyari II	Kathua	75.265	32.547	4.87	2.62	3.02	2.87
129	Phinter	Kathua	75.544	32.583	7.85	1.6	3.8	6.05
130	Ramkot	Kathua	75.336	32.642	6.5	0.85	5.25	6.2
131	Saida	Kathua	75.293	32.551	7.1	2.1	2.1	3.01
132	Sumwan	Kathua	75.42	32.394	14.55	8.41	9.12	11.68
133	Ainpur	Rajouri	74.447	33.042	3.6	0.9	0.8	1.58
134	Bagnoti	Rajouri	74.3	33.142	6.4	2.28	2.3	7.78
135	Bajabain	Rajouri	74.411	33.054	4.1	2.27	3.35	2.48
136	Bakhar	Rajouri	74.428	33.088	2.2	1.3	3.22	1.9
137	Banpari	Rajouri	74.458	33.033	4.2	0.6	0.6	2
138	Bareri	Rajouri	74.194	33.104	3.9	1.5	2.3	3.85
139	Bhatta Mohra	Rajouri	74.201	33.203	4	0.6	1.05	2.98
140	Channi Parat	Rajouri	74.461	33.09	4.16	1.81	1.8	2.5
141	Chittiar	Rajouri	74.281	33.289	3.5	0.96	2.35	3.36
142	Chowki Handa	Rajouri	74.192	33.172	3.3	1.04	3	4.45
143	Darhal Quila	Rajouri	74.15	33.219	5.15	2.25	3.25	4.55
144	Dharamsal	Rajouri	74.414	33.135	3.8	0.9	3.03	4.33
145	Dhok Baniar	Rajouri	74.417	33.032	3.87	1.98	2.33	2.98
146	Ding	Rajouri	74.276	33.088	4.85	2.1	3.29	2.19
147	Dyala	Rajouri	74.369	33.237	3.65	1.25	2.48	2.92
148	Gagrote	Rajouri	74.273	33.09		2.26	4.97	6.21
149	Jabah	Rajouri	74.334	33.068	4.25	1.55	2.53	3.6
150	Jhangar	Rajouri	74.047	33.242	5.87	4.92	5.42	5.62

151	Kalal	Rajouri	74.233	33.081	5.2	0.45	2.27	4.6
152	Kalsian	Rajouri	74.142	33.186	3.8	0.4	0.95	2.2
153	Kangri (Grid Station)	Rajouri	74.397	33.058	3	1.87	2.9	4.2
154	Lam Rajouri	Rajouri	74.127	33.25		2.07	2.95	4.25
155	Laroka	Rajouri	74.097	33.236		1.25	1.15	1.35
156	Lower Kharak	Rajouri	74.416	33.166	1.77	0.81	1.04	1.29
157	Marchola	Rajouri	74.482	33.09	3.85	2.2	0.6	1.22
158	Narian	Rajouri	74.28	33.503	4.9	4.48	4.8	5.4
159	Naunihal	Rajouri	74.208	33.175		0.6	2.2	3.8
160	Panja	Rajouri	74.416	33.18	2.79	0.65	1.83	1.52
161	Potha	Rajouri	74.318	33.281	5.05	1.35	2.1	2.95
162	Pukharni	Rajouri	74.113	33.27	2.08	0.88	0.98	1.18
163	Rumli Dara	Rajouri	74.217	33.136	4.75	1.05	3.05	4.05
164	Salote	Rajouri	74.524	33.05	2.7	0.35	1.12	2.1
165	Seri	Rajouri	74.292	33.081	4.15	2.5	3.18	1.87
166	Sial	Rajouri	74.317	33.072	2.85	1.15	1.52	1.97
167	Siot	Rajouri	74.381	33.117	4.1	2.05	2.14	2.65
168	Solki	Rajouri	74.431	33.164	3.05	0.62	2.19	2.76
169	Thanda Paani	Rajouri	74.487	33.067	2.25	1.04	0.85	2.19
170	Aliyah	Reasi	74.553	33.167	2.27	0.66	1.84	2.09
171	Bhamla	Reasi	74.581	33.05	7.14	3.84	5.5	6.32
172	Dadua	Reasi	74.637	33.069	2.47	1.43	1.85	1.92
173	Garan Jagir	Reasi	74.649	33.071		2.05	2.34	1.83
174	Katra	Reasi	74.925	32.908			1.55	1.95
175	Nanora	Reasi	74.632	33.131	5.45	2.21	2.72	2.48
176	Riasi	Reasi	74.833	33.092		24.92	24.93	24.95
177	Talwara	Reasi	74.794	33.092	4.6	3.7	5	5.5
178	Thangrot	Reasi	74.586	33.142	4.75	0.85	1.25	3
179	Bassi Kalan	Samba	74.901	32.637	6.43	2.23	3.52	4.34
180	Bengular	Samba	75.06	32.49	8.23	7.4	7.24	7.02
181	Birpur	Samba	74.952	32.539	18.86	21.03	13.7	15.35
182	Channi Mansar	Samba	75.164	32.697	3.4	0.65	0.9	1.6
183	Daboh	Samba	75.105	32.586	4.81	3.61	6	4.02
184	Didyal	Samba	74.958	32.47	2.48	0.31	1.73	2.6
185	Dulme Chak	Samba	75.183	32.433	4.1	3.19	3.33	3.79
186	Gho-Brahamna	Samba	74.958	32.55	8.56	8.05	7.4	6.71
187	Gho-Rakwalan	Samba	74.949	32.552			3.37	3.39
188	Gudwal	Samba	75.01	32.55	4.7	2.45	2.75	3.6
189	Jasath	Samba	75.203	32.504	17.05	12.83	11.2	13.08
190	Kainthpur	Samba	74.975	32.588	4.9	2.8	3.88	4.81
191	Khairi (Bishnah)	Samba	74.906	32.591	5.5	2.9	3.74	4.71
192	Kootah	Samba	75.242	32.511	26.68	22.35	23.51	25.05
193	Lale Chak	Samba	75.198	32.454	3.27	2.12	2.47	3.05
194	Lokli	Samba	75.273	32.544	7.38	2.55	4.23	4.99
195	Madun	Samba	75.164	32.48	3.2	2.15	2.22	2.28
	Mahal Shah		74.943		6.9	3.28		3.79
196	Kalandrian	Samba		32.51			3.38	
197	Maheen Charkan	Samba	74.952	32.656	6.75	6.66	7.7	9
198	Majua Laxmi	Samba	74.918	32.555	5.09	3.65	3.27	4.36
199	Naran	Samba	75.154	32.504	9.07	7.22	6.87	7.37
200	Nauni	Samba	75.302	32.558	3.78	2.15	1.61	1.45
201	Nilcha	Samba	75.254	32.56	11.8	10.36	10.98	11.53

202	Nud	Samba	75.148	32.613	6.4	2.25	2.73	2.87
203	Palli	Samba	74.889	32.627	2.78	1.6	1.99	2.4
204	Pangdour	Samba	75.108	32.481	4.85	4.31	4.53	4.33
205	Patli	Samba	74.946	32.608	10.52	7.12	7.82	8.65
206	Phalora	Samba	75.143	32.478	2.83	1.46	2.16	2.25
207	Raghu chak	Samba	75.204	32.486	4.15	0.53	1.88	2.88
208	Raiyan	Samba	75.117	32.511	22.89	23.59	19.51	20.75
209	Sadoh	Samba	75.126	32.472	9.17	9.17	9.05	9.55
210	Sagoon	Samba	75.088	32.742	3.4	NA	2.55	2.55
211	Samba	Samba	75.119	32.558			16.84	17.68
212	Sanoora	Samba	75.178	32.488	1.4	0.93	0.93	0.6
213	Supwal	Samba	75.067	32.558	8.25	3.16	4.23	6.5
214	Swankha More	Samba	75.006	32.571				Dry
215	Badola	Udhampur	75.035	32.944	4.6	1.65	0.85	2.6
216	Battal Ballian	Udhampur	75.126	32.88	6.4	4.7	5.4	6.85
217	Birmah	Udhampur	75.109	32.915	2.6	1.4	2.45	2.05
218	Dalsar	Udhampur	75.313	32.819	1.05	5.3	1	0.55
219	Dehari	Udhampur	75.273	32.781	6.85	1.32	2.57	9.07
220	Dhanu Kanal	Udhampur	75.007	32.962	1.47	0.57	0.62	0.97
221	Eastern Mand	Udhampur	75.024	32.897	4.5	2	2.65	2.85
222	Garhi (Udh)	Udhampur	75.083	32.905	1.9	0.4	0.7	1.25
223	Jallow	Udhampur	75.232	32.796	2.45	1.09	1.44	2.29
224	Jhakkar	Udhampur	75.123	32.946	6.45	0.7	2.65	4.33
225	Kahpotha	Udhampur	75.042	32.834	4.9		1.7	2.2
226	Kotli Pain Megaini	Udhampur	75.425	32.909	2.15	0.55	0.63	0.75
227	Kuperlah	Udhampur	75.182	32.85	2.39	0.62	0.82	1.42
228	Manwall	Udhampur	75.15	32.756	9.6	5.35	5.68	7
229	Nagrota Panjgarain	Udhampur	75.271	32.836	1.65	5.45	0.75	1
230	Phangyal	Udhampur	75.135	32.896	6.2	1.3	2.1	4.3
231	Rakh Badali	Udhampur	75.109	32.915	4.85	2	3.3	3.55
232	Ramnagar	Udhampur	75.31	32.806	5.5	3.4	4.7	4.95
233	Ritti	Udhampur	75.163	32.842	2.25	0.35	0.47	0.8
234	Salabra	Udhampur	75.175	32.717	2.93	1.33	1	1.53
235	Seen Thakaran	Udhampur	75.038	32.913	3.53	2.25	1.38	2.8
236	Sunal	Udhampur	75.243	32.679	3.7	0.8	1.55	2.25
237	Talpad	Udhampur	75.199	32.859	2.1	1.73	1.5	1.7
238	Upper Ban	Udhampur	74.855	32.829	6.15	1.6	3.5	5.65

Table 4.33. Depth to Water Level Data of Dug Wells (in m) for all Seasons (Kashmir Region)

Sl No.	Location	District	Long	Lat	May-22	Aug-22	Nov-22
1	Authoora	Baramula	74.47	34.21	0.76	1.2	0.8
2	Badran	Baramula	74.58	34.24	3.28	3.3	4.15
3	Binner	Baramula	74.36	34.23	1.92	2.32	1.47
4	Bomai	Baramula	74.42	34.36	0.92	1.21	1.19
5	Dusilpora	Baramula	74.61	34.17	3.4	3.8	4
6	Hadipora	Baramula	74.39	34.29	4.3	4.6	5.4
7	Ibrahim Colony (Sopore)	Baramula	74.47	34.30	1.33	2.05	2.15
8	Jambazpora	Baramula	74.36	34.22	1.53	2.28	1.98
9	Lolipora	Baramula	74.54	34.22	2.9	1.85	2.8
10	Mandji	Baramula	74.47	34.36	1.7	2.95	3.7
11	Mazbugh (Sopore)	Baramula	74.43	34.28	0.25	0.85	0.9
12	Mirgund Silk Centre	Baramula	74.65	34.14	2.4	1.97	2.3
13	Najar Mohalla Dangerpora	Baramula	74.46	34.34	0.85	1.32	1.1
14	Saidpora	Baramula	74.46	34.32	0.6	0.75	1.1
15	Sopore Model Town D	Baramula	74.44	34.31	0.29	1.29	2.44
16	Uplna	Baramula	74.40	34.20	3.7	4.3	3.1
17	Waripora	Baramula	74.56	34.09	0.84	1.45	6.8
18	Batpora Bala	Kupwara	74.09	34.49	2.2	3.1	1
19	Bramri	Kupwara	74.28	34.47	3	2.5	2.65
20	Chanjmul	Kupwara	74.18	34.39	4.7	4.4	3.55
21	Cherkot	Kupwara	74.33	34.54	2.29	5.51	2.68
22	Chowgal	Kupwara	74.32	34.41	1.5	1.85	1.3
23	Dohama	Kupwara	74.15	34.49	3.8	5.2	7.2
24	Dolipora	Kupwara	74.16	34.47	2.78	4.53	3.33
25	Drugmulla	Kupwara	74.29	34.49	4.97	3.9	2.7
26	Goose - II	Kupwara	74.28	34.54		1.04	2.09
27	Gulgam	Kupwara	74.22	34.54	3.61	3.71	3.41
28	Guloora	Kupwara	74.32	34.39	1.1	1.6	1.9
29	Halmathpora Chota Mohalla	Kupwara	74.24	34.57	0.5	1.6	1.4
30	Hampora	Kupwara	74.33	34.36	1.97	2.3	2.4
31	Handwara Almustafa colony	Kupwara	74.28	34.40	2.04	2.4	2.8
32	Khanpora	Kupwara	74.27	34.44	2.64	3.71	2.26
33	Kunel	Kupwara	74.29	34.33	0.3	1.3	0.7
34	Kupwara Main Chowk	Kupwara	74.26	34.53	2.4	1.15	1.8
35	Lalpora Shalgund	Kupwara	74.43	34.50	1.7	1.4	1.6
36	Lassipora	Kupwara	74.38	34.51	5.45	4.3	4.2
37	Magam	Kupwara	74.23	34.46	3.3	4	4.6
38	Mir Mohalla (Katyanwali)	Kupwara	74.38472	34.54444	2.75	2	2.2
39	Palpoora	Kupwara	74.35778	34.34111	0.1	0.7	0.7
40	Panipora Sagipora	Kupwara	74.36444	34.41222	1.8	2.65	1.8

41	Panzgam - II	Kupwara	74.07667	34.48278	2.2	1.7	0.95
42	Radbug	Kupwara	74.3025	34.46056	1.92	1.6	1.4
43	Taratpura	Kupwara	74.11694	34.46972	1.3	1.35	0.5
44	Tarich	Kupwara	74.32556	34.43556	2.95	3	2.6
45	Trehgam	Kupwara	74.17528	34.51667	3.94	3.29	3.04
46	Wadipora	Kupwara	74.23333	34.40972	3.55	3.45	3.25
47	Wasarkhoto	Kupwara	74.10611	34.50639	2.93	2.8	2.1
48	Zachaldara	Kupwara	74.1975	34.40722	7.2	8.45	9.2
49	Tral	Pulwama	75.03472	33.91389	15.04	15.56	15.24
50	Urwan (Warwan)	Pulwama	74.885	33.93083	0.35	0.5	0.35
51	Regal Chowk,Srinagar	Srinagar	74.83472	34.07278	2.2		2.8

Table 4.34 The time series data (2013-2022) of Groundwater level for Jammu and Kashmir.

Lon.	Lat,	Locations	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013
74.716	32.622	Agre Chak (Jammu)	3.2	2.7	2.5	2.6	3.0	2.5	3.3	2.2	2.4	-
74.751	32.86	Akhnoor (Batera), Jammu	14.4	11.7	14.6	15.1	13.8	13.9	14.6	12.3	6.1	-
74.837	32.518	Allah, Jammu	3.3	3.8	3.3	3.3	3.4	3.1	3.6	2.7	2.9	-
74.799	32.523	Arnia, Jammu	8.9	9.4	9.6	9.0	9.3	9.4	9.0	8.2	8.1	-
75.019	32.853	Badsoo, Jammu	1.3	2.5	1.0	1.2	0.9	1.2	3.3	1.0	0.7	-
74.563	32.806	Bakore, Jammu	4.0	4.0	3.1	4.1	3.7	3.3	4.4	3.5	3.6	-
74.436	32.908	Baradow, jammu	6.0	6.0	7.0	6.9	6.1	5.9	6.3	5.0	4.2	-
74.746	32.848	Batera, Jammu	8.5	9.0	8.9	8.4	8.2	7.4	8.9	6.8	8.1	-
74.668	32.615	Bega, Jammu	2.7	2.9	2.6	7.7	4.6	4.4	2.9	2.4	2.4	-
74.677	32.619	Bera, Jammu	2.8	2.5	2.5	6.7	4.1	1.9	3.5	2.2	2.4	-
74.575	32.86	Bhagwanachak, Jammu	28.1	26.0	28.1	30.6	28.3	25.6	29.2	25.5	25.9	-
74.864	32.613	Bishnah, Jammu	2.3	2.5	2.4	2.4	2.7	2.4	2.9	1.8	2.1	2.1
74.934	32.693	Chatta, Jammu	5.2	5.7	6.4	5.8	5.8	5.5	14.6	4.3	3.9	-
74.65	33.031	Chowki chowra, jammu	3.2	2.9	3.5	3.3	1.9	2.7	2.8	0.9	2.9	-
74.658	32.856	Devipur,jammu	5.9	6.6	6.4	6.9	6.4	5.7	8.2	5.2		-
74.541	32.807	Dhanpur, Jammu	4.4	5.0	4.5	5.3	4.9	4.3	5.9	4.1	4.7	-
74.763	32.86	Dharam Khu, jammu	22.8	21.1	24.3	23.7	24.5	20.5	21.9	23.1		-
75.14	32.613	Dhora, Jammu	3.6	4.0	2.2	2.7	2.7	2.7	3.0	2.3	1.5	-
74.711	32.761	Gajansoo, jammu	3.1	3.0	4.0	6.3	2.7	2.8	2.5	2.4	2.6	-
74.77	32.79	Garhi (Jammu)	7.2	7.1	5.6	3.3	7.7	6.3	3.2	-	-	-
74.739	32.723	Gho-Manhasan, jammu	1.2	1.5	2.3	2.3	1.9	1.6	2.0	2.8	1.9	-

74.482	32.795	Gigrial,jammu	3.7	3.2	2.8	3.6	3.4	3.5	3.3	3.2	3.1	-
74.931	32.686	Greater Kailash,jammu	11.4	11.2	9.4	10.0	10.2	8.4	7.7	5.6	6.4	-
74.706	32.795	Gura, jammu	12.5	12.9	12.1	13.2	11.8	9.0	-	11.4	11.3	-
74.549	32.767	Hamirpur Kohna,Jammu	3.4	3.1	2.8	3.5	2.9	2.9	3.5	2.5	-	-
74.526	32.776	Hamirpur Sidhar, jammu	3.3	4.0	3.1	3.6	3.3	3.1	2.9	2.6	3.0	-
74.896	32.806	Jagati, jammu	1.4	1.5	0.6	0.7	1.1	0.7	2.0	1.2	0.7	-
74.726	32.791	Jaswan, jammu	4.0	4.2	3.9	4.4	4.3	3.2	4.6	3.8	4.4	-
74.738	32.825	Jhiri, jammu	5.0	4.9	5.2	6.2	5.1	5.0	3.9	3.9	4.7	-
75.086	32.813	Jindrah, jammu	11.9				13.4	12.4	11.1	11.9	6.4	-
74.442	32.934	Jogwan, jammu	3.4	5.0	5.0	5.7	5.4	3.4	5.3	4.0	3.9	-
74.575	32.833	Jourian, jammu	3.5	3.7	3.5	4.0	3.6	3.3	4.8	3.1	3.3	-
74.472	32.866	Kachrial, jammu	2.8	2.8	3.3	3.1	2.7	1.8	1.7	1.3	2.0	-
74.475	32.911	Kalah, jammu	2.4	2.8	2.0	3.0	2.4	2.4	2.1	2.1	1.7	-
74.894	32.657	Kaluchak, jammu	5.5	5.5	4.7	5.1	4.5	3.8	4.3	3.5	4.4	-
75.065	32.609	Kamila, jammu	5.1	4.9	5.3	5.2	4.8	4.7	5.2	4.6	2.4	-
74.717	32.821	Kana Chak, jammu	3.3	3.5	3.2	3.1	3.4	3.4	3.8	3.1	3.2	-
74.846	32.84	Kangar, jammu	11.7	13.2	14.1	11.2	9.0	9.4	12.4	7.5	6.8	-
74.822	32.789	Karnaile Chak, jammu	6.9	8.0	-	7.5	7.5	6.7	7.6	6.3	6.6	-
74.862	32.866	Katcha-Pind Dansal, jammu	1.7	2.4	2.2	2.8	2.4	2.4	2.3	2.6	2.4	-
74.858	32.808	Khairi (Raipur),jammu	5.9	9.4	5.5	4.0	6.7	7.0	7.8	3.0	4.4	-
74.892	32.791	Khanpur Nagrota,jammu	2.4	3.8	3.0	3.0	6.6	-	5.1	4.9	3.0	-

74.517	32.829	Khour,jammu	3.0	2.7	2.9	3.7	2.7	3.1	4.5	3.0	0.9	-
75.108	32.799	Kot Kaswal, jammu	1.5	1.7	1.0	1.2	1.9	1.8	3.5	1.9	4.0	-
74.882	32.577	Kothey Saini, jammu	4.2	4.8	3.6	4.1	5.0	4.3	4.1	3.7	4.0	-
74.834	32.616	Kotli Charkan,jammu	3.3	2.7	3.5	3.2	3.7	3.0	2.7	2.2	2.6	-
75.033	32.904	Kunihala,jammu	1.7	1.7	1.3	1.9	1.8	1.8	2.8	1.8	1.6	-
74.774	32.664	Lalyal,jammu	3.3	3.7	3.2	3.4	3.5	3.3	2.6	3.2	3.4	-
74.514	32.832	Lam,jammu	2.8	2.5	1.8	2.5	2.1	1.1	2.2	1.6	2.7	-
74.837	32.585	Laswara,jammu	1.8	1.5	1.6	1.6	2.0	1.7	5.6	1.4	1.4	-
74.688	32.903	Leherian	8.9	9.1	8.8	9.0	8.9	8.5	7.4	7.3	7.7	-
74.792	32.763	Lower Barnai	-	-	0.3	-	5.4	5.0	4.7	4.3	4.3	-
74.717	32.693	Makwal	2.3	2.9	2.8	3.2	3.6	3.2	2.4	2.8	3.3	-
74.746	32.776	Marh	2.3	2.1	2.1	2.9	2.1	2.1	12.5	2.9	2.1	-
74.767	32.85	Marjholi	25.1	-	-	25.8	-	24.7	26.3	25.0	26.8	-
74.795	32.646	Miran Sahib	6.9	7.7	4.4	5.9	7.5	7.2	6.9	6.3	-	-
75.074	32.657	Mothlian Kalan	5.6	-	6.4	7.8	8.7	-	13.2	-	3.2	-
74.8	32.753	Muthi	2.7	2.9	1.4	1.9	1.8	2.1	3.2	1.5	1.5	-
74.778	32.761	Nagbani	3.9	3.7	3.5	3.7	3.1	3.1	3.3	3.0	-	-
74.921	32.804	Nagrota (Kandoli)	3.5	4.2	-	3.8	3.2	-	-	-	-	-
75.065	32.624	Nagrota (Uttarbani)	5.0	6.6	5.2	6.0	7.0	-	-	-	-	-
74.889	32.518	Nandpur,jammu	3.1	2.9	2.4	3.2	2.8	2.8	2.8	2.4	3.0	-
74.706	32.508	Nikowal,jammu	4.6	4.7	4.2	4.9	3.7	4.7	5.3	3.9	4.8	-
75.156	32.593	Painthi,jammu	7.2	7.9	-	-	6.1	8.2	7.6	-	6.2	-
74.449	32.837	Palatan,jammu	1.8	2.1	1.8	2.2	1.9	1.6	2.2	1.8		-
74.454	32.85	Pallanwala,jammu	1.4	1.3	1.4	1.7	1.9	1.5	2.2	1.4	1.4	-
74.524	32.794	Pangli Colony,jammu	2.2	2.1	2.2	2.6	2.3	2.0	3.0	2.1	-	-
74.771	32.842	Pata Khu,jammu	20.7	21.6	22.1	22.5	21.0	18.6	21.0	18.8	20.2	-
74.776	32.761	Patyale Chak,jammu	3.8	3.8	3.3	3.8	3.1	3.3	3.9	3.2	3.6	-

74.82	32.526	Poal,jammu	2.6	2.6	2.5	3.2	8.5	17.0	3.3	2.4	2.6	-
74.778	32.803	Purkhoo,jammu	11.8	19.8	17.5	15.4	13.9	2.8	17.3	15.4	16.8	-
74.896	32.751	Rangoora,jammu	1.2	1.9	0.9	1.6	2.0	3.2	2.8	1.1	1.0	-
74.876	32.561	Rehal,jammu	5.0	5.9	3.6	4.9	4.8	4.7	5.2	3.9	4.6	-
74.593	32.792	Sajwal,jammu	2.7	2.2	2.6	2.7	2.2	2.0	2.6	2.3	2.2	-
74.818	32.56	Salehar,jammu	2.8	3.2	2.2	3.7	3.3	3.2	3.9	2.8	2.9	-
74.714	32.71	Sandhwan,jammu	3.2	3.2	3.1	3.6	3.0	2.9	3.3	3.0	3.1	-
74.846	32.689	Satwari,jammu	11.1	11.8	10.4	10.8	10.2	9.7	10.4	8.7	9.9	-
74.725	32.508	Sei Khurd,jammu	3.9	4.0	3.7	4.4	4.5	3.7	4.7	3.0	3.8	-
74.508	32.774	Senth,jammu	2.4	2.7	1.4	2.4	2.3	2.3	2.4	2.0	2.4	-
74.742	32.828	Shame Chak,jammu	5.3	5.1	6.1	5.3	5.0	4.4	5.2	3.8	4.8	-
74.895	32.76	Sidhra,jammu	3.8	4.8	3.8	8.7	3.8	4.5	3.9	2.5	2.9	-
74.753	32.875	Sobka,jammu	21.0	21.2	22.2	21.8	21.4	16.3	22.4	20.8	20.9	-
74.743	32.697	Sohanjana,jammu	3.3	3.8	2.9	3.4	3.6	3.3	3.6	3.2	3.4	-
74.676	32.568	Suchetgarh-II,jammu	1.7	3.9	1.7	3.6	1.6	2.5	2.6	1.6	2.4	-
74.958	32.879	Sugetar,jammu	3.4	4.2	2.7	3.5	2.2	2.6	1.3	1.4	0.8	-
74.672	32.957	Sumah,jammu	3.1	3.6	3.5	3.3	3.4	3.1	3.5	3.2	3.0	-
75.043	32.773	Surinsar,jammu	1.1	1.4	0.2	0.6	0.9	1.1	1.4	1.0		-
74.7	32.975	Tanda Sheoda,jammu	1.3	2.8	1.6	3.8	1.7	3.2	4.0	2.7	3.5	-
74.614	32.874	Taryai,jammu	34.7	34.2	31.4	36.5	35.2	31.2	34.5	32.4	33.2	-
74.88	32.712	Trikuta Nagar,jammu	3.4	4.3	-	-	-	-	-	2.5	2.9	-
74.883	32.633	Upperla kanhal,jammu	3.7	4.0	2.3	3.5	2.9	2.8	3.5	2.1	2.4	-
75.064	32.648	Uttarbani,jammu	1.9	2.0		1.9	1.9	2.8	1.6		1.8	-
75.594	32.424	Barni,Kathua	6.5	6.3	4.7	5.1	6.2	6.8	6.4	5.5	5.5	-
75.367	32.45	Bhagwal,Kathua	16.7	13.4	19.5	16.1	19.5	12.0	20.4	14.1	14.3	-
75.608	32.613	Billawar,Kathua	0.6	-	-	1.0	1.8	1.1	0.7	1.5	1.0	-
75.367	32.389	Chak hariya,Kathua	1.8	1.3	1.6	2.1	3.6	2.1	2.7	1.9	2.0	-

75.259	32.418	Chakara,Kathua	3.8	3.6	2.5	7.1	7.8	-	8.9	-	-	-
75.331	32.483	Chan ranga,Kathua	12.1	10.0	11.0	11.9	9.0	9.4	8.3	7.4	6.9	-
75.246	32.488	Chann Khatrian,Kathua	8.6	7.5	6.8	6.9	9.5	5.7	5.6	4.3	4.5	-
75.315	32.447	Chapki Kalan,Kathua	13.2	12.1	11.7	11.9	12.4	11.7	14.3	8.9	-	-
75.279	32.375	Feru chak,Kathua	5.1	2.9	2.4	4.1	3.9	2.7	4.5	4.4	3.4	-
75.263	32.401	Gangu chak,Kathua	2.3	2.2	2.0	2.5	2.6	-	2.5	2.3	2.4	-
75.5	32.333	Gond,Kathua	-	-	-	-	-	2.6	-	5.0	2.9	-
75.5	32.333	Gond More,Kathua	2.2	1.8	1.6	1.9	1.4	-	-	-	-	-
75.291	32.423	Hore,Kathua	2.7	1.9	0.9	1.3	1.6	1.8	-	-	-	-
75.246	32.463	Jandi,Kathua	4.5	4.3	2.8	3.7	3.9	4.3	5.1	4.1	-	-
75.598	32.393	Jindore,Kathua	8.9	8.8	9.4	8.5	12.8		7.9	6.6	4.8	-
75.236	32.396	Karol Krishna,Kathua	8.2	8.0	6.8	8.1	7.9	8.3	4.4	1.4	-	-
75.529	32.364	Kathua	1.2	1.5	1.0	1.1	1.1	1.0	2.6	3.0	-	-
75.519	32.297	Kerian Gandyal-II,Kathua	3.0	2.9	2.9	3.2	4.0	2.6	3.7	2.9	2.7	-
75.514	32.281	Kerian Ramnagar,Kathua	3.0	2.8	2.0	2.5	2.4	2.4	3.8	2.9	2.6	-
75.356	32.425	Khanpur,Kathua	1.8	1.5	1.6	1.8	1.9	1.5	1.9	1.6	-	-
75.467	32.35	Khukhial,Kathua	1.5	1.3	1.2	1.3	1.2	1.6	1.6	1.7	-	-
75.26	32.424	Konthal,Kathua	5.3	5.2	4.3	5.2	5.0	5.2	4.8	3.6	1.9	-
75.376	32.346	Kote punnu,Kathua	1.7	1.7	1.5	2.1	2.0	2.0	2.2	1.7	0.9	-
75.508	32.367	Kothian,Kathua	0.8	1.0	1.0	1.0	0.8	1.1	1.8	0.9	-	-
75.594	32.382	Lakhanpur,Kathua	6.3	5.5	6.2	6.2	4.0	3.7	5.1	4.0	4.3	-
75.415	32.656	Lakri,Kathua	2.5	2.4	2.3	2.6	2.8	2.7	3.0	2.7	2.6	-
75.213	32.425	Londi,Kathua	5.2	5.7	4.7	5.5	5.5	4.9	5.8	4.7	5.2	-
75.508	32.636	Mandli,Kathua	2.5	1.8	1.9	2.2	1.7		2.0	1.8	2.0	-
75.369	32.369	Mukandpur,Kathua	4.0	3.8	3.8	4.3	3.1	2.2	4.0	3.9	3.9	-

75.433	32.35	Nagri,Kathua	1.7	1.4	1.7	2.4	2.6	4.1	2.3	2.2	1.9	-
75.394	32.646	Nagrota-Gujaroo,Kathua	3.9	5.3	1.2	6.1	5.0	2.1	8.3	6.8	5.7	-
75.468	32.381	Nanke Chak,(Sherpur) Kathua	1.9	0.9	4.5	1.4	2.1	5.7	6.5	4.7	-	-
75.566	32.556	Pallan,Kathua	0.9	1.0	0.5	1.0	1.5	1.4	1.8	1.6	0.9	-
75.306	32.372	Pansar,Kathua	2.0	5.9	5.7	4.8	2.2	5.7	5.5	5.7	5.9	-
75.44	32.4	Patyari,Kathua	6.6	4.9	6.4	4.5	6.0	2.5	5.7	4.3	1.6	-
75.265	32.547	Patyari II,Kathua	3.8	2.9	1.9	2.7	3.4	6.2	8.9			-
75.544	32.583	Phinter,Kathua	3.6	5.9	5.0	4.2	4.1	4.8	6.8	3.4		-
75.336	32.642	Ramkot,Kathua	4.5	7.1	4.6	5.4	5.2	5.7	6.5	4.5	5.7	-
75.293	32.551	Saida,Kathua	3.8	1.6	0.5	4.4	4.8	2.1	-	-	-	-
75.42	32.394	Sumwan,Kathua	5.1	11.2	10.1	10.2	9.8	-	-	-	-	-
74.447	33.042	Ainpur,Rajouri	8.1	2.0	0.7	2.7	3.1	-	-	-	-	-
74.3	33.142	Bagnoti,Rajouri	2.5	5.3	5.3	6.3	4.5	5.3	5.7	4.5	4.1	-
74.411	33.054	Bajabain,Rajouri	2.8	3.6	1.8	2.9	3.4					-
74.428	33.088	Bakhar,Rajouri	2.8	1.5	0.5	1.7	2.0	1.5	2.8	1.2	1.5	-
74.458	33.033	Banpari,Rajouri	2.1	2.3	1.0	3.4	3.5	2.4	3.3	2.0	2.5	-
74.194	33.104	Bareri,Rajouri	2.2	3.8	1.4	3.6	1.7	3.5	2.7	2.5	2.2	-
74.201	33.203	Bhatta Mohra,Rajouri	2.5	1.7	0.6	1.7	1.8	1.6	1.8	1.7	1.6	-
74.461	33.09	Channi Parat,Rajouri	2.1	1.9	2.2	3.6	3.3	3.7	5.0	5.1	6.7	-
74.281	33.289	Chittiar,Rajouri	2.3	1.3	0.5	2.6	2.1	2.5	1.6	1.7	1.7	-
74.192	33.172	Chowki Handa,Rajouri	2.8	2.6	2.1	3.4	2.6	2.7	2.3	1.8	1.9	-
74.15	33.219	Darhal Quila,Rajouri	3.0	3.2	2.5	3.5	2.9	3.1	3.6	3.1	2.7	-
74.414	33.135	Dharamsal,Rajouri	3.5	2.5	1.0	3.9	3.8	3.7	3.8	2.6	2.8	2.2
74.417	33.032	Dhok Baniar,Rajouri	2.2	2.0	2.0	3.3	4.0	3.4	4.7	2.9	2.8	-

74.276	33.088	Ding,Rajouri	2.5	4.1	3.0	3.9	4.2	-	-	-	-	-
74.369	33.237	Dyala,Rajouri	3.2	2.5	2.1	2.8	2.9	2.7	2.7	2.2	2.2	-
74.273	33.09	Gagrote,Rajouri	3.1	4.3	3.7	4.5	4.9	4.8	4.5	2.1	2.1	-
74.334	33.068	Jabah,Rajouri	3.3	2.3	0.8	5.1	4.0	-	-	-	-	-
74.047	33.242	Jhangar,Rajouri	3.4	4.9	4.7	5.1	5.2	5.4	5.0	4.8		-
74.233	33.081	Kalal,Rajouri	4.8	4.8	1.3	5.2	4.8	4.4	3.6	2.3	3.7	-
74.142	33.186	Kalsian,Rajouri	2.6	1.2	0.9	1.9	1.9	1.3	1.2	1.3	1.0	-
74.397	33.058	Kangri (Grid Station),Rajouri	1.6	2.4	1.1	5.0	3.1	2.3	2.9	2.9	2.7	-
74.127	33.25	Lam Rajouri,Rajouri	3.3	4.4	4.0	5.0	3.9		3.5	2.2	-	-
74.097	33.236	Laroka,Rajouri	2.3	1.5	0.8	2.2	1.7	1.9	3.3	2.2	-	-
74.416	33.166	Lower Kharak,Rajouri	0.9	1.0	0.4	2.0	2.0	0.6	0.9	1.2	-	-
74.482	33.09	Marchola,Rajouri	1.2	2.5	1.1	2.5	2.1	3.7	2.5	1.2	2.2	-
74.28	33.503	Narian,Rajouri	2.2	5.5	4.6	4.9	4.1		4.6	2.6		-
74.208	33.175	Naunihal,Rajouri	4.7	2.0	0.9	2.6	2.3	1.2	2.9	1.6	2.0	-
74.416	33.18	Panja,Rajouri	1.5	1.2	1.1	1.6	1.6	1.9	1.5	1.3	1.4	-
74.318	33.281	Potha,Rajouri	1.8	2.4	1.4	2.0	1.7	1.3	1.5	1.7	1.8	-
74.113	33.27	Pukharni,Rajouri	2.5	1.1	-	1.8	1.6	-		1.3	1.2	-
74.217	33.136	Rumli Dara,Rajouri	1.7	3.4	-	3.1	3.8	-	3.5	2.4	2.8	-
74.524	33.05	Salote,Rajouri	2.4	1.6	1.0	1.9	2.3	4.0	-	-	-	-
74.292	33.081	Seri,Rajouri	1.6	2.3	2.6	3.5	3.3	3.5	3.5	2.5	2.5	-
74.317	33.072	Sial,Rajouri	2.5	1.4	0.1	2.0	1.7	2.4	0.8	0.8	1.0	-
74.381	33.117	Siot,Rajouri	2.1	2.9	0.8	3.1	3.5	2.2	4.3	1.6	1.8	-
74.431	33.164	Solki,Rajouri	2.7	2.2	1.3	2.2	2.3	3.3	4.6	1.6	1.4	-
74.487	33.067	Thanda Paani,Rajouri	2.0	1.8	0.8	1.6	1.8	1.4	1.8	3.2	1.1	-
74.553	33.167	Aliyah,Reasi	1.5	1.8	1.4	1.9	2.0	1.7	2.2	1.7	1.5	-
74.581	33.05	Bhamla,Reasi	1.8	2.7	1.5	4.1	4.4	3.9	6.0	2.0	3.2	-
74.637	33.069	Dadua,Reasi	4.9	2.2	1.7	2.7	2.6	2.0	2.9	1.6	1.8	-

74.649	33.071	Garan Jagir,Reasi	2.1	3.6	2.4	3.3	2.9	2.8	3.6	2.1	-	-
74.925	32.908	Katra,Reasi	2.2	-	-	-	2.1	2.9	3.1	2.0	-	-
74.632	33.131	Nanora,Reasi	2.0	2.8	2.2	2.4	2.5	2.4	3.6	2.3	-	-
74.833	33.092	Riasi,Reasi	8.8	25.6	29.5	26.4	26.1	24.7	25.1	24.9	-	-
74.794	33.092	Talwara,Reasi	18.5	5.2	5.0	4.6	4.7	3.5	5.0	3.8	-	-
74.586	33.142	Thangrot,Reasi	3.7	2.2	0.7	1.8	1.0	-	3.5	0.9	-	-
74.901	32.637	Bassi Kalan,Samba	2.9	4.1	4.0	3.9	4.6	3.3	4.0	3.1	-	-
75.06	32.49	Bengular,Samba	4.9	7.6	6.2	7.1	7.1	6.8	7.1	-	-	-
74.952	32.539	Birpur,Samba	9.3	15.2	12.7	20.5	18.4	14.3	13.4	10.4	-	-
75.164	32.697	Channi Mansar,Samba	13.4	1.7	0.4	1.0	2.1	1.4	2.6	1.4	-	-
75.105	32.586	Daboh,Samba	2.4	4.1	3.7	4.2	2.4	3.6	4.1	3.3	-	-
74.958	32.47	Didyal,Samba	4.0	1.8	1.4	2.5	2.9	1.3	2.8	1.3	-	-
75.183	32.433	Dulme Chak,Samba	1.5	3.6	-	1.9	1.7	-	3.2	2.9	-	-
74.958	32.55	Gho-Brahamna,Samba	4.8	8.6	6.7	7.6	5.4	3.5	8.1	7.8	-	-
74.949	32.552	Gho-Rakwalan,Samba	7.0	4.6	2.6	3.6	5.3	7.9	4.4		-	-
75.01	32.55	Gudwal,Samba	3.6	3.9	1.4	2.8	3.3	3.4	3.1	2.1	-	-
75.203	32.504	Jasath,Samba	3.3	13.1			4.0	3.8			-	-
74.975	32.588	Kainthpur,Samba	11.2	4.3	3.2	4.2	3.5	4.9	3.6	3.1	-	-
74.906	32.591	Khairi (Bishnah),Samba	4.0	4.5	3.4	3.1	2.9	#DIV/0!	3.1	2.7	-	-
75.242	32.511	Kootah,Samba	9.1	23.6	26.7	24.8	-	-	-	-	-	-
75.198	32.454	Lale Chak,Samba	18.8	2.2	1.6	1.9	-	-	-	-	-	-
75.273	32.544	Lokli,Samba	3.4	6.2	3.1	4.0	-	-	-	-	-	-
75.164	32.48	Madun,Samba	4.1	2.4	1.8	2.7	-	-	-	-	-	-

74.943	32.51	Mahal Shah Kalandrian ,Samba	3.3	5.8	3.0	4.3	3.6	4.0	6.8	3.8	-	-
74.952	32.656	Maheen Charkan ,Samba	6.5	8.4	7.2	8.6	9.8	8.0	7.4	3.9	-	-
74.918	32.555	Majua Laxmi,Samba	4.1	5.8	2.5	3.3	3.4	3.2	6.7	7.4	-	-
75.154	32.504	Naran,Samba	7.2	7.2	4.8	5.7	-	-	2.4	3.6		
75.302	32.558	Nauni,Samba	3.3	3.3	1.1	2.8	-	-	-	-	-	-
75.254	32.56	Nilcha,Samba	8.6	10.5	-	-	-	-	-	-	-	-
75.148	32.613	Nud,Samba	2.9	3.9	2.0	3.2	3.0	3.2	2.9	2.3	-	-
74.889	32.627	Palli,Samba	8.7	2.4	1.7	2.2	2.1	2.2	2.4	1.7	-	-
75.108	32.481	Pangdour,Samba	4.0	4.4							-	-
74.946	32.608	Patli,Samba	2.7	8.8	6.7	8.3	7.5	6.9	7.7	6.0	-	-
75.143	32.478	Phalora,Samba	3.9	1.9							-	-
75.204	32.486	Raghu chak,Samba	7.0	1.5							-	-
75.117	32.511	Raiyan,Samba	6.8	20.9	16.1	17.8	15.4	20.3	19.5	19.1	-	-
75.126	32.472	Sadoh,Samba	3.8	8.7	6.9	7.7	8.0	8.4	7.9	7.4	-	-
75.088	32.742	Sagoon,Samba	16.9	3.1	2.0	2.3	2.0	2.2	3.0	3.4	-	-
75.119	32.558	Samba,Samba	9.1	17.4	15.9	17.2	16.6	18.3	15.9	15.2	-	-
75.178	32.488	Sanoora,Samba	2.2	0.9		5.4	5.0	4.1			-	-
75.067	32.558	Supwal,Samba	11.1	6.1	4.3	9.5	18.8	20.1	7.1	3.6	-	-
75.006	32.571	Swankha More,Samba	1.2	2.9	20.0	20.1			19.8	17.8	-	-
75.035	32.944	Badola,Udhampur	4.3	2.9	-	-	1.9	3.3	3.2	2.4	2.2	-
75.126	32.88	Battal Ballian,Udhampur	5.1	5.2	-	-	4.7	3.8	5.4	7.0	6.2	-
75.109	32.915	Birmah,Udhampur	2.3	2.4	-	-	2.9	2.8	2.5	1.5	2.3	-
75.313	32.819	Dalsar,Udhampur	4.2	0.7	-	-	0.7	0.8	0.8	0.9	0.4	-
75.273	32.781	Dehari,Udhampur	1.7	2.5	-	-	1.5	2.2	4.2	2.9	0.7	-

75.007	32.962	Dhanu Kanal,Udhampur	2.0	1.2	-	-	0.9					-
75.024	32.897	Eastern Mand,Udhampur	3.0	3.5	-	-	2.7	3.5	4.9	2.3	1.8	-
75.083	32.905	Garhi (Udh),Udhampur	0.8	1.4	-	-	1.5	1.4	1.4	1.1	0.8	-
75.232	32.796	Jallow,Udhampur	2.3	1.8	-	-	1.5	1.5	3.7	1.3	1.0	-
75.123	32.946	Jhakkar,Udhampur	0.9	3.1			4.6	4.6	5.0	3.5	2.9	-
75.042	32.834	Kahpotha,Udhampur	1.4	2.2	-	-	-	-	-	-	-	-
75.425	32.909	Kotli Pain Megaini,Udhampur	2.6	0.9	-	-	0.9	1.0	1.1	1.5	0.9	-
75.182	32.85	Kuperlah,Udhampur	2.6	2.7	-	-	2.2	2.1	3.4	2.2	1.5	-
75.15	32.756	Manwall,Udhampur	2.8	8.1	-	-	5.6	6.6	8.3	6.5	6.5	-
75.271	32.836	Nagrota Panjgarain,Udhampur	1.3	1.7	-	-	1.6	1.7	1.9	1.7	1.6	-
75.135	32.896	Phangyal,Udhampur	5.5	3.9	-	-	2.7	3.0	6.1	2.3	2.5	-
75.109	32.915	Rakh Badali,Udhampur	2.3	3.4	-	-	5.0	4.4	-	-	-	-
75.31	32.806	Ramnagar,Udhampur	3.3	5.2	-	7.0	3.4	1.2	5.4	5.0		-
75.163	32.842	Ritti,Udhampur	2.6	1.8	-		0.8	1.7	1.2	2.0	4.7	-
75.175	32.717	Salabra,Udhampur	3.7	2.6	-	1.6	2.2	2.8	2.2	1.4	0.5	-
75.038	32.913	Seen Thakaran,Udhampur	1.4	3.0	-	-	2.4	2.1	3.3	2.6	2.0	-
75.243	32.679	Sunal,Udhampur	1.6	2.4	-	-	2.5		4.2	1.9	1.5	-
75.199	32.859	Talpad,Udhampur	1.9	1.6	-	-	0.9	1.4	3.1	2.0	0.8	-
74.855	32.829	Upper Ban,Udhampur	1.8	4.9	-	-	5.3	4.5	-	-	0.8	-
74.466	34.214	Authoora	0.9	0.7	-	-					0.0	-

74.576	34.243	Badran	3.6	5.4	-	-	3.6	6.0		3.6		-
74.355	34.232	Binner	1.9	2.5	-	-	3.9	4.1	1.8	1.6	2.7	-
74.421	34.356	Bomai	1.1	1.2	-	-	1.7	2.1	1.1	1.1	2.1	-
74.613	34.17	Dusilpora	3.7	2.7	-	-			-	-	-	-
74.391	34.291	Hadipora	4.8	3.6	-	-		2.8	-	-	-	-
74.467	34.297	IbrahimColony (Sopore)	1.8	1.4	-	-	-	-	1.0	-	-	-
74.363	34.219	Jambazpora	1.9	1.8	-	-	2.4	-		-	-	-
74.536	34.216	Lolipora	2.5	3.0	-	-	-	-	-	-	-	-
74.472	34.36	Mandji	2.8	2.6	-	-	-	-	-	-	-	-
74.429	34.278	Mazbugh (Sopore)	0.7	0.9	-	-	-	-	-	-	-	-
74.653	34.141	Mirgund Silk Centre	2.2	2.0	-	-	-	-	-	-	-	-
74.462	34.339	Najar Mohalla Dangerpora	1.1	1.4	-	-	-	-	-	-	-	-
74.463	34.321	Saidpora	0.8	0.8	-	-	-	-	-	-	-	-
74.444	34.305	Sopore Model Town D	1.3	0.6	-	-	-	-	-	5.6	0.8	-
74.398	34.201	Uplna	3.7		-	-		-				
74.561	34.091	Waripora	3.0	2.2	-	-	3.7	-		2.6		
74.089	34.494	Batpora Bala	2.1	2.6	-	-		-	-	-	-	-
74.278	34.466	Bramri	2.7	2.5	-	-		-	-	-	-	-
74.182	34.392	Chanjmul	4.2	5.5	-	-	5.6	-	-	-	-	-
74.326	34.544	Cherkot	3.5		-	-	6.0	-	-	-	-	-
74.321	34.406	Chowgal	1.6	2.2	-	-	2.0	-	-	-	-	-
74.148	34.488	Dohama	5.4	3.8	-	-	4.0	-	-	-	-	-
74.162	34.469	Dolipora	3.5	3.1	-	-	3.8	-	1.8	-	-	-
74.289	34.489	Drugmulla	3.9	5.3	-	-	3.8	-	2.0	2.6	5.1	-
74.28	34.539	Goose - II	1.6	11.5	-	-	2.2	-		2.4		-

74.219	34.537	Gulgam	3.6	3.8	-	-	2.2	3.8		3.6	4.6	-
74.316	34.388	Guloora	1.5		-	-	-	-	-	-	-	-
74.236	34.571	Halmathpora Chota Mohalla	1.2	1.9	-	-	-	-	-	-	-	-
74.327	34.356	Hampora	2.2	3.1	-	-	3.5	-	-	-	-	-
74.278	34.404	Handwara Almustafa colony	2.4	-	-	-	2.3	-	-	-	2.5	-
74.273	34.439	Khanpora	2.9	2.4	-	-	2.5	-	2.3	1.5		
74.285	34.332	Kunel	0.8		-	-	-	-	-	-	-	-
74.259	34.528	Kupwara Main Chowk	1.8	3.2	-	-	3.2	3.8	2.4	1.5	3.0	-
74.428	34.502	Lalpora Shalgund	1.6		-	-	2.0	-	-	-	-	-
74.383	34.508	Lassipora	4.7		-	-	3.7	-	-	-	-	-
74.233	34.461	Magam	4.0	2.4	-	-	2.9	3.8	1.2	1.7		
74.385	34.544	Mir Mohalla (Katyanwali)	2.3		-	-	2.1	-	-	-	-	-
74.358	34.341	Palpoora	0.5	1.6	-	-	1.1	-	-	-	-	-
74.364	34.412	Panipora Sagipora	2.1		-	-		-	-	-	-	-
74.077	34.483	Panzgam - II	1.6	2.3	-	-		-	-	-	-	-
74.303	34.461	Radbug	1.6	3.4	-	-	1.5	-	-	-	-	-
74.117	34.47	Taratpura	1.1	1.6	-	-		-	-	-	-	-
74.326	34.436	Tarich	2.9	2.9	-	-	2.9	-	-	-	-	-
74.175	34.517	Trehgam	3.4	4.2	-	-	3.2	4.3	-	3.2		-
74.233	34.41	Wadipora	3.4	4.3	-	-	4.3	8.2	2.5	-	3.6	-
74.106	34.506	Wasarkhoto	2.6	2.5	-	-	2.4	-	1.3	-	-	-
74.198	34.407	Zachaldara	8.3	6.5	-	-	6.6	-	-	-	-	-
75.035	33.914	Tral	15.3	15.3	-	-	15.7	16.5	-	15.1	14.9	-
74.885	33.931	Urwan(Warwan)	0.4	1.0	-	-	0.7	-	-			-

74.835	34.073	Regal Chowk,Srinagar	2.5	3.9	-	-	3.1	3.4	4.4	2.3	2.8	-

4.1.9. Waster Water- Domestic

4.1.9.1. Subject Matter

Waste water generation, waste water treatment infrastructure and performance of the water treatment (sector-wise and source wise): In Jammu and Kashmir, domestic wastewater primarily originates from residential buildings, institutions, and hotel industries.

1. **Status of Sewage generation**

   The status of Sewage generation in Jammu and Kashmir domestic sewage is collected in various septic tanks, treatment plants or sent to rivers through sewer network and various manholes.

2. **Status of sewage collection**

   The status of sewage collection in Jammu and Kashmir is detailed in Table 4.35 Table 4.35 to Table 4.38.

3. **Status of sewage treatment:**

   The status of sewage treatment in Jammu and Kashmir is detailed in Table 4.39 to Table 4.41.

4. **Status of treatment capacity utilization**

   The Status of Sewage Treatment Capacity Utilization and performance is detailed Table 4.42 to Table 4.46.

4.1.9.2. Issues and Challenges

a) Limited access to sanitation facilities, especially in rural and certain urban areas, poses a significant public health challenge. In many regions, inadequate sanitation infrastructure leads to the spread of diseases, impacting the overall well-being of communities. The lack of proper toilets and waste disposal systems exacerbates this issue, particularly in underserved areas where resources and funding for such facilities are scarce. Addressing this challenge requires a multi-faceted approach, including investment in sanitation infrastructure, public health education, and policies that prioritize the needs of vulnerable populations.

b) Rapid urbanization is significantly straining existing wastewater infrastructure. This challenge is compounded by the increased volume of wastewater generated, leading to frequent overflows, contamination of water bodies, and health risks for urban populations. The existing systems, often outdated and undersized, struggle to keep pace with the rapid growth, necessitating urgent upgrades and innovative solutions to ensure sustainable urban water management.

c) The increasing population is contributing to higher volumes of domestic wastewater, posing significant challenges for wastewater management systems. As urban areas expand and population density rises, the capacity of existing infrastructure is often exceeded, leading to overflows and contamination of natural water bodies. This escalation in wastewater generation necessitates the development of more efficient and sustainable treatment solutions to protect public health and the environment. Additionally, the strain on resources highlights the need for innovative approaches to wastewater reuse and recycling, ensuring the long-term viability of urban water systems.
d) The limited availability and adoption of advanced wastewater treatment technologies present significant issues and challenges in achieving sustainable water management. Despite the proven efficacy of these technologies in reducing pollutants and protecting water resources, their implementation remains hindered by factors such as high costs, lack of infrastructure, and insufficient regulatory support. Addressing these barriers is crucial for enhancing water quality and ensuring the health and safety of ecosystems and communities.
e) Limited monitoring and reporting mechanisms for identifying non-compliance pose significant challenges. Inadequate oversight hinders the ability to detect and address violations, leading to potential risks and inefficiencies. This issue underscores the need for improved systems and protocols to ensure compliance and accountability in various sectors.

4.1.9.3. Governance / Management:

i. Institutions governing / managing / monitoring the resources and Institutional structure.

Directorate of Rural Sanitation, J&K: The Department of Rural Development and Panchayati Raj administers the Swachh Bharat Mission with a primary focus on enhancing rural sanitation. The objective is to elevate the quality of life for rural communities, ensuring improved sanitation facilities that not only provide basic necessities but also uphold the dignity and privacy of women.

4.1.9.4. Annexure- Waste Water Domestic

Table 4.35. A: Sewerage Network coverage area and collection: Rural and Urban areas

District/ Basin	Area (Km²)	Urban Area including Metro cities	Rural Area	Sewer network coverage (in Km) of Urban and Rural	Uncovered Sewerage Area of Urban and Rural
Anantnag	3574.00	15.72	3505.97	32.00	
		8.00			
		10.00			
		5.31			
		10.00			
		4.00			
		5.00			
		4.00			
		3.00			
		3.00			
Bandipora	345.00	3.00	332.33	0.00	345.00
		4.67			
		5.00			
Baramulla	4243.00	8.00	4188.30	0.00	4243.00
		15.00			
		6.00			
		5.00			
		6.13			
		13.07			
		1.50			
Budgam	1361.00	5.00	1343.75	5.56	
		2.75			
		3.00			
		3.50			
		1.50			
		1.50			
Doda	8912.00	7.00	8898.00	0.00	8912.00
		5.50			
		1.50			
Ganderbal	259.00	3.00	256.00	0.00	259.00
Jammu	2342.36	262.93	2079.43	394.00	
Kathua	2502.00	16.00	2470.41	0.00	2502.00
		4.00			
		1.14			
		7.00			
		1.20			

		2.25			
Kishtwar	1644.00	5.00	1639.00	0.00	1644.00
Kulgam	410.00	12.82 8.22 9.00 4.29	375.67	0.00	410.00
Kupwara	2379.00	4.00 6.67 3.00	2365.33	0.00	2379.00
Poonch	1674.00	2.00 2.05	1669.95	0.00	1674.00
Pulwama	1398.00	8.00 6.00 3.00 3.00 4.00	1374.00	0.00	1398.00
Rajouri	2630.00	7.00 4.50 1.00 2.00 2.75	2612.75	0.00	2612.75
Ramban	1329.00	3.00 7.00 1.00	1318.00	0.00	1329.00
Reasi	1719.00	2.00 5.76	1711.24	0.00	1719.00
Samba	904.00	2.00 2.00 0.50 2.00	897.50	0.00	904.00
Shopian	312.00	8.00	304.00	0.00	312.00
Srinagar	1979.00	246.00 5.90	1727.10	396.00	
Udhampur	2367.00	24.00 4.00 0.70	2338.30	110.00	

Table 4.36. Sewerage Network coverage area and collection: Urban Area of Class I & II cities / Towns

District/ Basin	Area (Km²)	Total Urban Area of Class I & II cities / Towns	Sewer network coverage (in Km)	Uncovered Sewerage Area	Operational Sewerage/ Conveyance System
Srinagar, Srinagar Municipal Corporation	1979.00	246.00	396.00		396.00
Jammu, Jammu Municipal Corporation	2342.00	240.00	384.00		384.00
Anantnag, Anantnag ULB	3574.00	15.72	19.00		19.00
Udhampur, Udhampur ULB	2367.00	24.00	110.00		110.00
Baramulla, Sopore ULB	4243.00	8.00	0.00	8.00	
Kathua, Kathua ULB	2502.00	16.00	0.00	16.00	
Baramulla, Baramulla ULB	4243.00	15.00	0.00	15.00	

Table 4.37 Sewerage Network coverage area and collection: Urban Area other than Class I & II cities / Towns and Metros.

District/ Basin	Area (Km²)	Total Urban Areas (Other than class I & II)	Sewer network coverage (in Km)	Uncovered Sewerage Area	Operational Sewerage / Conveyance System
Dooru Verinag ULB	8.00	8.00	0.00	8.00	0.00
Bijbehara ULB	10.00	10.00	0.00	10.00	0.00
Qazigund ULB	5.31	5.31	0.00	5.31	0.00
Pahalgam ULB	10.00	10.00	13.00		13.00
Mattan ULB	4.00	4.00	0.00	4.00	0.00
Seer Hamdan ULB	5.00	5.00	0.00	5.00	0.00
Ashmuqam ULB	4.00	4.00	0.00	4.00	0.00
Kokernag ULB	3.00	3.00	0.00	3.00	0.00
Achabal ULB	3.00	3.00	0.00	3.00	0.00
Bandipora ULB	3.00	3.00	0.00	3.00	0.00
Sumbal ULB	4.67	4.67	0.00	4.67	0.00

Hajin ULB	5.00	5.00	0.00	5.00	0.00
Pattan ULB	6.00	6.00	0.00	6.00	0.00
Uri ULB	5.00	5.00	0.00	5.00	0.00
Wattergam ULB	6.13	6.13	0.00	6.13	0.00
Gulmarg/Tangmarg ULB	13.07	13.07	0.00	13.07	0.00
Kunzar ULB	1.50	1.50	0.00	1.50	0.00
Budgam ULB	5.00	5.00	0.00	5.00	0.00
Chrar-i-Sharief ULB	2.75	2.75	5.56		0.00
Beerwah ULB	3.00	3.00	0.00	3.00	0.00
Chadoora ULB	3.50	3.50	0.00	3.50	0.00
Magam ULB	1.50	1.50	0.00	1.50	0.00
Khansahib ULB	1.50	1.50	0.00	1.50	0.00
Doda ULB	7.00	7.00	0.00	7.00	0.00
Bhaderwah ULB	5.50	5.50	0.00	5.50	0.00
Thathri ULB	1.50	1.50	0.00	1.50	0.00
Ganderbal ULB	3.00	3.00	0.00	3.00	0.00
Jagti Township	0.00	0.00	0.00	0.00	0.00
Cantonment Board Jammu	10.05	10.05	0.00	10.05	0.00
Akhnoor ULB	1.50	1.50	0.00	1.50	0.00
R S Pura ULB	1.00	1.00	0.00	1.00	0.00
Bishnah ULB	2.00	2.00	0.00	2.00	0.00
Arnia ULB	1.50	1.50	0.00	1.50	0.00
Khour ULB	3.38	3.38	0.00	3.38	0.00
Ghoumanhasan ULB	2.00	2.00	0.00	2.00	0.00
Jourian ULB	3.50	3.50	0.00	3.50	0.00
Hiranagar ULB	4.00	4.00	0.00	4.00	0.00
Parole ULB	1.14	1.14	0.00	1.14	0.00
Basholi ULB	7.00	7.00	0.00	7.00	0.00
Billawar ULB	1.20	1.20	0.00	1.20	0.00
Lakhanpur ULB	2.25	2.25	0.00	2.25	0.00
Kishtwar ULB	5.00	5.00	0.00	5.00	0.00
Kulgam ULB	12.82	12.82	0.00	12.82	0.00
Yaripora ULB	8.22	8.22	0.00	8.22	0.00
Devsar ULB	9.00	9.00	0.00	9.00	0.00
Frisal ULB	4.29	4.29	0.00	4.29	0.00
Kupwara ULB	4.00	4.00	0.00	4.00	0.00
Handwara ULB	6.67	6.67	0.00	6.67	0.00
Langate ULB	3.00	3.00	0.00	3.00	0.00
Poonch ULB	2.00	2.00	0.00	2.00	0.00
Surankote ULB	2.05	2.05	0.00	2.05	0.00
Pampore ULB	8.00	8.00	0.00	8.00	0.00
Pulwama ULB	6.00	6.00	0.00	6.00	0.00

Tral ULB	3.00	3.00	0.00	3.00	0.00
Awantipora ULB	3.00	3.00	0.00	3.00	0.00
Khrew ULB	4.00	4.00	0.00	4.00	0.00
Rajouri ULB	7.00	7.00	0.00	7.00	0.00
Nowshera ULB	4.50	4.50	0.00	4.50	0.00
Sunderbani ULB	1.00	1.00	0.00	1.00	0.00
Thannamandi ULB	2.00	2.00	0.00	2.00	0.00
Kalakote ULB	2.75	2.75	0.00	2.75	0.00
Batote ULB	3.00	3.00	0.00	3.00	0.00
Banihal ULB	7.00	7.00	0.00	7.00	0.00
Ramban ULB	1.00	1.00	0.00	1.00	0.00
Katra ULB	2.00	2.00	0.00	2.00	0.00
Reasi ULB	5.76	5.76	0.00	5.76	0.00
Bari Brahmana ULB	2.00	2.00	0.00	2.00	0.00
Samba ULB	2.00	2.00	0.00	2.00	0.00
Vijaypur ULB	0.50	0.50	0.00	0.50	0.00
Ramgarh ULB	2.00	2.00	0.00	2.00	0.00
Shopian ULB	8.00	8.00	0.00	8.00	0.00
Cantonment Board Badamibagh Srinagar	5.90	5.90	0.00	5.90	0.00
Ramnagar ULB	4.00	4.00	0.00	4.00	0.00
Chenani ULB	0.70	0.70	0.00	0.70	0.00

Table 4.38 Sewerage Network coverage area and collection: Rural Area.

District/ Basin	**Area (Km^2)**	**Total Rural Area**	**Sewer network coverage (in Km)**	**Uncovered Sewerage Area**	**Operational Sewerage / Conveyance System**
Anantnag	3574.00	3505.97	0.00	3505.97	0.00
Bandipora	345.00	332.33	0.00	332.33	0.00
Baramulla	4243.00	4188.30	0.00	4188.30	0.00
Budgam	1361.00	1343.75	0.00	1343.75	0.00
Doda	8912.00	8898.00	0.00	8898.00	0.00
Ganderbal	259.00	256.00	0.00	256.00	0.00
Jammu	2342.36	2077.07	10.00	2076.71	10.00
Kathua	2470.41	2470.41	0.00	2470.41	0.00
Kishtwar	1639.00	1639.00	0.00	1639.00	0.00
Kulgam	375.67	375.67	0.00	375.67	0.00
Kupwara	2365.33	2365.33	0.00	2365.33	0.00

Poonch	1669.95	1669.95	0.00	1669.95	0.00
Pulwama	1374.00	1374.00	0.00	1374.00	0.00
Rajouri	2612.75	2612.75	0.00	2612.75	0.00
Ramban	1318.00	1318.00	0.00	1318.00	0.00
Reasi	1711.24	1711.24	0.00	1711.24	0.00
Samba	897.50	897.50	0.00	897.50	0.00
Shopian	304.00	304.00	0.00	304.00	0.00
Srinagar	1727.10	1727.10	0.00	1727.10	0.00
Udhampur	2338.30	2338.30	0.00	2338.30	0.00

Table 4.39 Sewage Treatment Capacity in Million Litres per Day (MLD) in Urban areas Class I & II Cities and Towns.

District/ Basin	**Total sewage generation MLD from Class I & II cities / Towns**	**Sewage treatment capacity**	**Treatment capacity gap**	
			Quantity	**%**
Anantnag ULB	14.99	4.00	10.99	73.31
Sopore ULB	8.37	0.00	8.37	100.00
Baramulla ULB	7.95	0.00	7.95	100.00
Jammu Municipal Corporation	79.87	71.00	8.87	11.10
Kathua ULB	8.20	0.00	8.20	100.00
Srinagar Municipal Corporation	163.55	56.13	107.42	65.68
Udhampur ULB	11.51	13.60	0.00	0.00

Table 4.40 Sewage Treatment Capacity in Urban areas other than Class I & II Cities and Towns.

District/ Basin	**Total sewage generation MLD from other than class I & II cities**	**Sewage treatment capacity**	**Treatment capacity gap**	
			Quantity	**%**
Dooru Verinag ULB	3.15	0.00	3.15	100.00
Bijbehara ULB	3.12	0.00	3.12	100.00
Qazigund ULB	1.35	0.00	1.35	100.00
Pahalgam ULB	2.00	2.00	0.00	0.00
Mattan ULB	1.27	0.00	1.27	100.00

Seer Hamdan ULB	1.13	0.00	1.13	100.00
Ashmuqam ULB	0.90	0.00	0.90	100.00
Kokernag ULB	0.90	0.00	0.90	100.00
Achabal ULB	0.87	0.00	0.87	100.00
Bandipora ULB	5.08	0.00	5.08	100.00
Sumbal ULB	2.06	0.00	2.06	100.00
Hajin ULB	1.81	0.00	1.81	100.00
Pattan ULB	2.68	0.00	2.68	100.00
Uri ULB	1.28	0.00	1.28	100.00
Wattergam ULB	0.96	0.00	0.96	100.00
Gulmarg/Tangmarg ULB	0.27	0.00	0.27	100.00
Kunzar ULB	0.26	0.00	0.26	100.00
Budgam ULB	2.10	0.00	2.10	100.00
Chrar-i-Sharief ULB	1.58	0.00	1.58	100.00
Beerwah ULB	1.12	0.00	1.12	100.00
Chadoora ULB	0.89	0.00	0.89	100.00
Magam ULB	0.75	0.00	0.75	100.00
Khansahib ULB	0.36	0.00	0.36	100.00
Doda ULB	2.96	0.00	2.96	100.00
Bhaderwah ULB	1.52	0.00	1.52	100.00
Thathri ULB	0.19	0.00	0.19	100.00
Ganderbal ULB	3.87	0.00	3.87	100.00
Jagti Township	2.16	2.16	0.00	0.00
Cantonment Board Jammu	3.46	0.00	3.46	100.00
Akhnoor ULB	2.84	0.00	2.84	100.00
R S Pura ULB	2.08	0.00	2.08	100.00
Bishnah ULB	1.47	0.00	1.47	100.00
Arnia ULB	1.23	0.00	1.23	100.00
Khour ULB	0.95	0.00	0.95	100.00
Ghoumanhasan ULB	0.54	0.00	0.54	100.00
Jourian ULB	0.54	0.00	0.54	100.00
Hiranagar ULB	1.14	0.00	1.14	100.00
Parole ULB	1.05	0.00	1.05	100.00
Basholi ULB	0.74	0.00	0.74	100.00
Billawar ULB	0.68	0.00	0.68	100.00
Lakhanpur ULB	0.47	0.00	0.47	100.00
Kishtwar ULB	2.04	0.00	2.04	100.00
Kulgam ULB	3.23	0.00	3.23	100.00
Yaripora ULB	1.66	0.00	1.66	100.00
Devsar ULB	1.34	0.00	1.34	100.00
Frisal ULB	0.70	0.00	0.70	100.00

Kupwara ULB	2.98	0.00	2.98	100.00
Handwara ULB	1.86	0.00	1.86	100.00
Langate ULB	0.90	0.00	0.90	100.00
Poonch ULB	3.68	0.00	3.68	100.00
Surankote ULB	0.92	0.00	0.92	100.00
Pampore ULB	2.97	0.00	2.97	100.00
Pulwama ULB	2.53	0.00	2.53	100.00
Tral ULB	2.44	0.00	2.44	100.00
Awantipora ULB	1.73	0.00	1.73	100.00
Khrew ULB	1.35	0.00	1.35	100.00
Rajouri ULB	4.04	0.00	4.04	100.00
Nowshera ULB	1.43	0.00	1.43	100.00
Sunderbani ULB	0.95	0.00	0.95	100.00
Thannamandi ULB	0.75	0.00	0.75	100.00
Kalakote ULB	0.32	0.00	0.32	100.00
Batote ULB	0.59	0.00	0.59	100.00
Banihal ULB	0.53	0.00	0.53	100.00
Ramban ULB	0.49	0.00	0.49	100.00
Katra ULB	1.23	0.00	1.23	100.00
Reasi ULB	1.07	0.00	1.07	100.00
Bari Brahmana ULB	2.12	0.00	2.12	100.00
Samba ULB	1.74	0.00	1.74	100.00
Vijaypur ULB	1.10	0.00	1.10	100.00
Ramgarh ULB	0.77	0.00	0.77	100.00
Shopian ULB	2.24	0.00	2.24	100.00
Cantonment Board Badamibagh Srinagar	2.70	0.00	2.70	100.00
Ramnagar ULB	0.86	0.00	0.86	100.00
Chenani ULB	0.36	0.00	0.36	100.00

Table 4.41 Sewage Treatment Capacity in Rural areas.

District/ Basin	**Total sewage generation MLD from Rural Areas**	**Sewage treatment capacity**	**Treatment capacity gap**	
			Quantity	%
Anantnag	62.96	0.00	62.96	100.00
Bandipora	20.57	0.00	20.57	100.00
Baramulla	47.02	0.00	47.02	100.00
Budgam	39.18	0.00	39.18	100.00
Doda	23.22	0.00	23.22	100.00
Ganderbal	18.55	0.00	18.55	100.00
Jammu	42.65	4.00	38.65	90.62
Kathua	29.61	0.00	29.61	100.00

Kishtwar	10.76	0.00	10.76	100.00
Kulgam	17.65	0.00	17.65	100.00
Kupwara	54.74	0.00	54.74	100.00
Poonch	27.34	0.00	27.34	100.00
Pulwama	29.46	0.00	29.46	100.00
Rajouri	38.65	0.00	38.65	100.00
Ramban	17.56	0.00	17.56	100.00
Reasi	18.13	0.00	18.13	100.00
Samba	14.85	0.00	14.85	100.00
Shopian	15.02	0.00	15.02	100.00
Srinagar	1.57	0.00	1.57	100.00
Udhampur	26.07	0.00	26.07	100.00

Table 4.42 Sewage Treatment Capacity Utilization Urban and Rural Areas

District/ Basin	Total sewage generation MLD Urban + Rural	Sewage treatment capacity	Treatment capacity gap	
			Quantity	%
Anantnag	92.63	6.00	86.63	93.52
Bandipora	29.53	0.00	29.53	100.00
Baramulla	68.79	0.00	68.79	100.00
Budgam	45.98	0.00	45.98	100.00
Doda	27.89	0.00	27.89	100.00
Ganderbal	22.41	0.00	22.41	100.00
Jammu	135.62	75.00	60.62	44.70
Kathua	41.90	0.00	41.90	100.00
Kishtwar	12.80	0.00	12.80	100.00
Kulgam	24.59	0.00	24.59	100.00
Kupwara	60.49	0.00	60.49	100.00
Poonch	31.94	0.00	31.94	100.00
Pulwama	40.48	0.00	40.48	100.00
Rajouri	46.14	0.00	46.14	100.00
Ramban	19.17	0.00	19.17	100.00
Reasi	20.43	3.6	20.43	100.00
Samba	20.57	0.00	20.57	100.00

Shopian	17.26	0.00	17.26	100.00
Srinagar	167.82	66.99	111.69	100.00
Udhampur	38.80	14.8	25.20	100.00

Table 4.43 Sewage Treatment Capacity Utilization Class I & II Cities and Towns – Urban body wise.

District/ Basin	**Sewage Generation (in MLD) from Class I & II**	**Number of STPs**	**STP Installed Capacity (in MLD)**	**Actual capacity utilization (in MLD)**	
				Quantity	**%**
Anantnag ULB	14.99	1	4.00	4.00	100.00
Sopore ULB	8.37	0	0.00	0.00	0.00
Baramulla ULB	7.95	0	0.00	0.00	0.00
Jammu Municipal Corporation	79.87	4	71.00	27.00	38.03
Kathua ULB	8.20	0	0.00	0.00	0.00
Srinagar Municipal Corporation	163.55	10	56.13	51.03	90.91
Udhampur ULB	11.51	3	13.60	5.00	36.76

Table 4.44. Sewage Treatment Capacity Utilization Urban Areas other than Class I&II Cites and Towns.

District/ Basin	**Sewage Generation (in MLD) from other than Class I & II**	**Number of STPs**	**STP Installed Capacity (in MLD)**	**Actual capacity utilization (in MLD)**	
Dooru Verinag ULB	3.15	0	0	0	0
Bijbehara ULB	3.12	0	0	0	0
Qazigund ULB	1.35	0	0	0	0
Pahalgam ULB	2	1	2	2	100
Mattan ULB	1.27	0	0	0	0
Seer Hamdan ULB	1.13	0	0	0	0

Ashmuqam ULB	0.90	0	0	0	0
Kokernag ULB	0.90	0	0	0	0
Achabal ULB	0.87	0	0	0	0
Bandipora ULB	5.08	0	0	0	0
Sumbal ULB	2.06	0	0	0	0
Hajin ULB	1.81	0	0	0	0
Pattan ULB	2.68	0	0	0	0
Uri ULB	1.28	0	0	0	0
Wattergam ULB	0.96	0	0	0	0
Gulmarg/Tangmarg ULB	0.27	0	0	0	0
Kunzar ULB	0.26	0	0	0	0
Budgam ULB	2.10	0	0	0	0
Chrar-i-Sharief ULB	1.58	0	0	0	0
Beerwah ULB	1.12	0	0	0	0
Chadoora ULB	0.89	0	0	0	0
Magam ULB	0.75	0	0	0	0
Khansahib ULB	0.36	0	0	0	0
Doda ULB	2.96	0	0	0	0
Bhaderwah ULB	1.52	0	0	0	0
Thathri ULB	0.19	0	0	0	0
Ganderbal ULB	3.87	0	0	0	0
Cantonment Board Jammu	3.46	0	0	0	0
Akhnoor ULB	2.84	0	0	0	0
R S Pura ULB	2.08	0	0	0	0
Bishnah ULB	1.47	0	0	0	0
Arnia ULB	1.23	0	0	0	0
Khour ULB	0.95	0	0	0	0
Ghoumanhasan ULB	0.54	0	0	0	0
Jourian ULB	0.54	0	0	0	0
Hiranagar ULB	1.14	0	0	0	0
Parole ULB	1.05	0	0	0	0
Basholi ULB	0.74	0	0	0	0
Billawar ULB	0.68	0	0	0	0
Lakhanpur ULB	0.47	0	0	0	0
Kishtwar ULB	2.04	0	0	0	0
Kulgam ULB	3.23	0	0	0	0
Yaripora ULB	1.66	0	0	0	0
Devsar ULB	1.34	0	0	0	0
Frisal ULB	0.70	0	0	0	0
Kupwara ULB	2.98	0	0	0	0
Handwara ULB	1.86	0	0	0	0
Langate ULB	0.90	0	0	0	0
Poonch ULB	3.68	0	0	0	0
Surankote ULB	0.92	0	0	0	0

Pampore ULB	2.97	0	0	0	0
Pulwama ULB	2.53	0	0	0	0
Tral ULB	2.44	0	0	0	0
Awantipora ULB	1.73	0	0	0	0
Khrew ULB	1.35	0	0	0	0
Rajouri ULB	4.04	0	0	0	0
Nowshera ULB	1.43	0	0	0	0
Sunderbani ULB	0.95	0	0	0	0
Thannamandi ULB	0.75	0	0	0	0
Kalakote ULB	0.32	0	0	0	0
Batote ULB	0.59	0	0	0	0
Banihal ULB	0.53	0	0	0	0
Ramban ULB	0.49	0	0	0	0
Katra ULB	1.23	0	0	0	0
Reasi ULB	1.07	0	0	0	0
Bari Brahmana ULB	2.12	0	0	0	0
Samba ULB	1.74	0	0	0	0
Vijaypur ULB	1.10	0	0	0	0
Ramgarh ULB	0.77	0	0	0	0
Shopian ULB	2.24	0	0.00	0.00	0.00
Cantonment Board Badamibagh Srinagar	2.70	0	0.00	0.00	0.00
Ramnagar ULB	0.86	0	0.00	0.00	0.00
Chenani ULB	0.36	0	0.00	0.00	0.00

Table 4.45. Sewage Treatment Capacity Utilization Rural Areas.

District/ Basin	**Sewage Generation (in MLD) from Rural**	**Number of STPs**	**STP Installed Capacity (in MLD)**	**Actual capacity utilization (in MLD)**	
				Quantity	**%**
Anantnag	62.96	0	0	0	0
Bandipora	20.57	0	0	0	0
Baramulla	47.02	0	0	0	0
Budgam	39.18	0	0	0	0
Doda	23.22	0	0	0	0
Ganderbal	18.55	0	0	0	0
Jammu	42.65	1	4	2.16	54
Kathua ULB	29.61	0	0	0	0
Kishtwar	10.76	0	0	0	0
Kulgam	17.65	0	0	0	0
Kupwara	54.74	0	0	0	0
Poonch	27.34	0	0	0	0
Pulwama	29.46	0	0	0	0
Rajouri	38.65	0	0	0	0

Ramban	17.56	0	0	0	0
Reasi	18.13	0	0	0	0
Samba	14.85	0	0	0	0
Shopian	15.02	0	0	0	0
Srinagar	1.57	0	0	0	0
Udhampur	26.07	0	0	0	0

Table 4.46 Sewage Treatment Capacity Utilization Urban and Rural Areas.

District/ Basin	Sewage Generation (in MLD) from Urban + Rural	Number of STPs	STP Installed Capacity (in MLD)	Actual capacity utilization (in MLD)	
				Quantity	%
Anantnag	92.63	2	6.00	6.00	100.00
Bandipora	29.53	0	0.00	0.00	0.00
Baramulla	68.79	0	0.00	0.00	0.00
Budgam	45.98	0	0.00	0.00	0.00
Doda	27.89	0	0.00	0.00	0.00
Ganderbal	22.41	0	0.00	0.00	0.00
Jammu	135.62	4	75.00	29.16	38.88
Kathua	41.90	0	0.00	0.00	0.00
Kishtwar	12.80	0	0.00	0.00	0.00
Kulgam	24.59	0	0.00	0.00	0.00
Kupwara	60.49	0	0.00	0.00	0.00
Poonch	31.94	0	0.00	0.00	0.00
Pulwama	40.48	0	0.00	0.00	0.00
Rajouri	46.14	0	0.00	0.00	0.00
Ramban	19.17	0	0.00	0.00	0.00
Reasi	20.43	0	0.00	0.00	0.00
Samba	20.57	0	0.00	0.00	0.00
Shopian	17.26	0	0.00	0.00	0.00
Srinagar	167.82	10	56.13	51.03	90.91
Udhampur	38.80	3	13.60	5.00	36.76

4.1.10. Waste Water- Industrial

4.1.10.1. Subject Matter:

Effluent from the organized sector in Jammu and Kashmir, typically characterized by larger industrial establishments, is subject to stringent environmental regulations and guidelines. These industries are mandated to implement wastewater treatment processes to ensure that the discharged effluents comply with prescribed quality standards, employing various methods such as physical, chemical, and biological treatments. On the other hand, the unorganized sector, consisting of smaller and often informal industries, may lack the same level of resources and adherence to environmental standards. In some instances, smaller enterprises may not have advanced wastewater treatment facilities, leading to the potential discharge of untreated or inadequately treated effluents directly into water bodies. To obtain specific and current information on effluent management practices in Jammu and Kashmir, it is advisable to consult the State Pollution Control Board or relevant government agencies responsible for environmental oversight.

4.1.10.2. Issues and Challenges

- Industrial activities in Jammu and Kashmir result in the generation of significant volumes of wastewater. This presents a pressing issue due to the potential environmental hazards and health risks associated with untreated or improperly managed wastewater. One of the main challenges is the lack of adequate wastewater treatment facilities, which leads to the contamination of water bodies and soil, impacting local ecosystems and communities.
- There is a need for stringent regulations and effective enforcement to ensure industries comply with wastewater management standards, while further emphasising on developing capabilities for waster water reuse. Addressing these challenges requires a coordinated effort between government agencies, industries, and the community to implement sustainable wastewater treatment solutions and mitigate the adverse effects on the environment and public health.
- Untreated or inadequately treated industrial wastewater poses a significant threat to local water bodies and ecosystems. The issue lies in the discharge of harmful pollutants, including heavy metals, chemicals, and organic compounds, which can contaminate water sources, harm aquatic life, and disrupt the balance of ecosystems. Moreover, the challenge is compounded by the lack of stringent regulations, inadequate enforcement, and insufficient infrastructure for wastewater treatment in many regions. Addressing this issue requires a comprehensive approach involving stricter environmental regulations, advanced treatment technologies, and increased awareness and cooperation among industries, government bodies, and local communities.

- Enforcing environmental regulations is crucial to holding industries accountable for proper wastewater treatment and discharge practices. A significant issue in this area is the lack of stringent monitoring and enforcement mechanisms, which often leads to non-compliance by industries. Despite existing regulations, many industries bypass proper treatment protocols due to insufficient penalties and oversight. Additionally, the challenge of outdated infrastructure and limited financial resources further complicates the implementation of effective wastewater treatment systems. This gap between regulation and practice poses severe environmental and public health risks, highlighting the urgent need for more robust enforcement and support measures.
- The implementation of advanced wastewater treatment technologies is crucial to mitigate environmental impacts and improve effluent quality. Implementing advanced wastewater treatment technologies presents several challenges. These include the high costs associated with the installation and maintenance of sophisticated treatment systems, the need for skilled personnel to operate and manage these technologies, and potential resistance from stakeholders due to the increased expenses. Additionally, integrating these advanced systems into existing infrastructure can be complex and time-consuming. Despite these challenges, overcoming them is essential to protect the environment and ensure the quality of effluents released into natural water bodies.
- Prioritizing environmentally friendly practices and minimizing the ecological footprint of industrial activities is essential for achieving sustainable development in the region.

4.2. Demand / Consumption Side:

4.2.1. Forestry & Wildlife

4.2.1.1. Subject Matter

A. Forestry:

The Union Territory (UT) of Jammu & Kashmir shares its western borders with Pakistan, while the UT of Ladakh is situated to the north and east. To the south, the states of Himachal Pradesh and Punjab are adjacent. Additionally, the UT of Ladakh has international boundaries with Pakistan, Afghanistan, and China. It shares its western border with the UT of Jammu & Kashmir and its southern border with Himachal Pradesh. The region experiences an average annual rainfall ranging from approximately 600 mm to about 800 mm, and the average annual temperature varies from sub-zero to 40°C.The UTs are intersected by several significant rivers, including Jhelum, Chenab, Indus, Ravi, and Tawi (Romshoo et al. 2020). All 20 districts in the UT of Jammu & Kashmir are designated as hill districts, and neither has any tribal districts. The rural and urban populations constitute 72.62% and 27.38%, respectively, with the tribal population making up 11.91% of the UTs' total population. The average population density in the two UTs is 125 persons per sq km, which is lower than the national average.

According to the Champion & Seth Classification of Forest Types (1968), the forests in the Union Territory (UT) of Jammu & Kashmir are categorized into eight Type Groups, further divided into 42 Forest Types, representing the highest diversity in the country. The Jammu & Kashmir Forest Act, 1987, stands as the sole state-specific legislation pertaining to forests and wildlife within the UTs. To enforce forest laws and ensure the protection of forests and wildlife, UT maintain a Forest Protection Force.

The Recorded Forest Area (RFA) in the UT spans 20,230 sq km, with 17,643 sq km designated as Reserved Forests, 2,551 sq km as Protected Forest, and 36 sq km as Unclassed Forests. Notably, from January 1, 2015, to February 5, 2019, there were no instances of forest land diversion for non-forestry purposes under the Forest Conservation Act, 1980, in the UT of Jammu & Kashmir. Figure 4.43 shows the forest cover inside and outside the Recorded Forest Area in Jammu and Kashmir and the Forest Cover Map of Jammu & Kashmir, UT are presented in Figure 4.44 (FSI 2019).

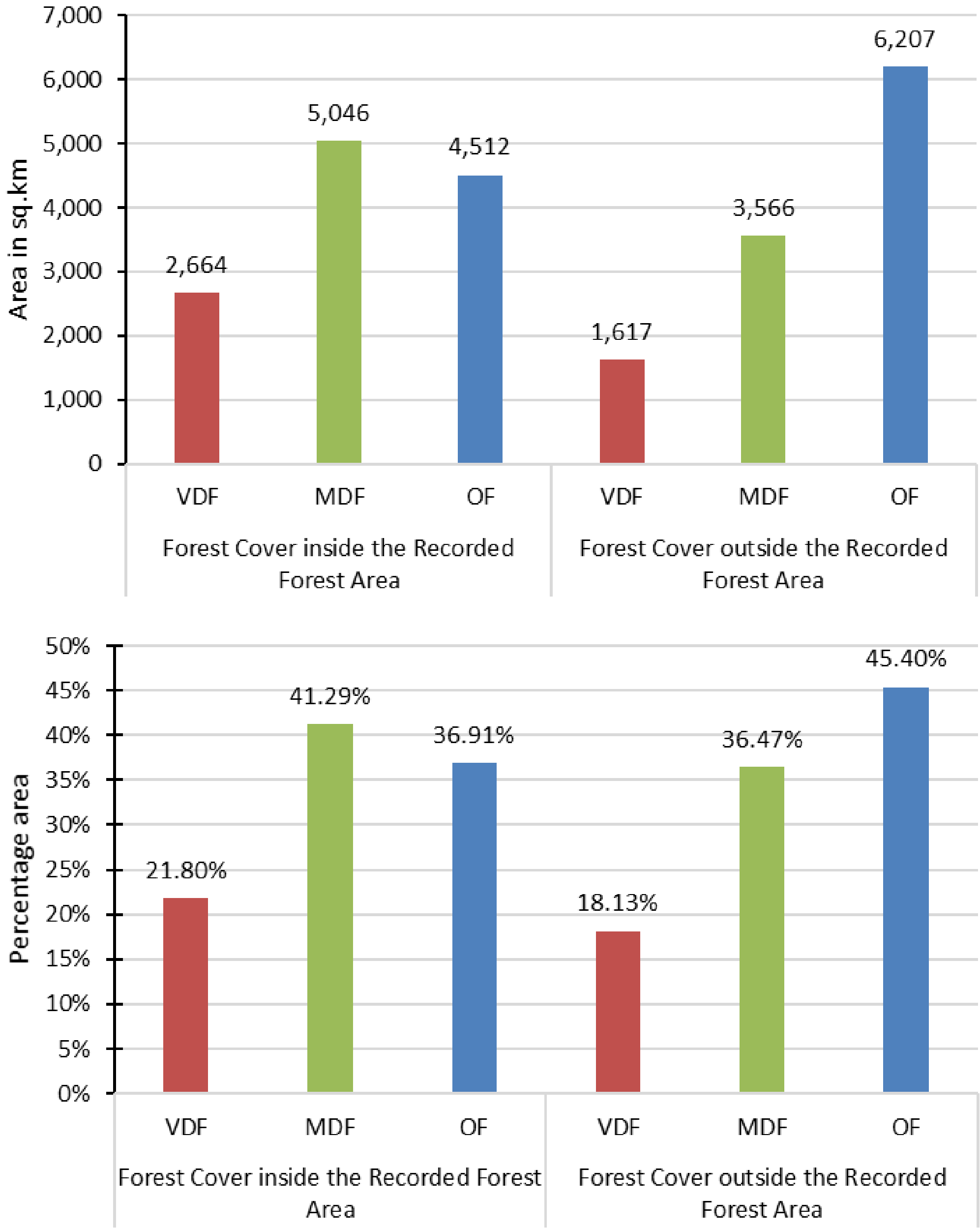


Figure 4.43. Forest Cover inside and outside RFA in UT of Jammu & Kashmir. Source: India State of forest report 2019.

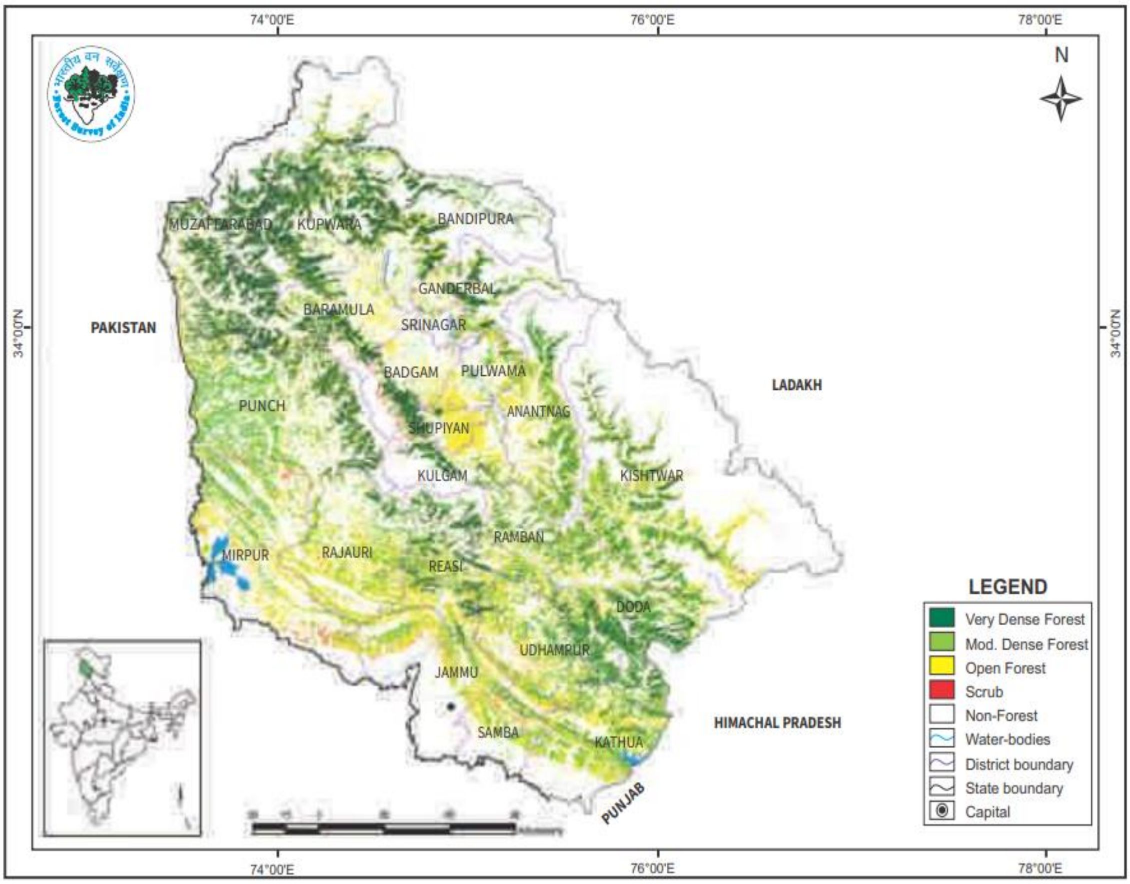


Figure 4.44 Forest Cover Map of Jammu & Kashmir, UT. Source: India State of forest report 2019

Forest cover Status: The forest cover Status of Jammu and Kashmir are listed in Table 4.47 (JKFD 2019).

Table 4.47 The forest cover Status of Jammu and Kashmir.

S. No.	**Type**	**Area (Sq. Km)**
1	Very dense forest	4280.48
2	Moderately dense forest	8612.36
3	Open forest	10719.05
Total	23611.89	

Number of Nurseries and their area: The Number of Nurseries and their area for Jammu and Kashmir are listed in Table 4.48.

Table 4.48 The Number of Nurseries and their area for Jammu and Kashmir

S. No.	**Number of Nurseries and their area for Jammu and Kashmir**	
1	No. of Nurseries	190
2	Area Under Nurseries (Ha)	247.43
3	Plants Produced (Lakh No.s)	79.12

4	Plants Supplied (Lakh No.s)	21.23

Plantations Raised: The Number of Plantations raised in Jammu and Kashmir are listed in Table 4.49.

Table 4.49 The Number of Plantations raised in Jammu and Kashmir.

S. No.	Region	Plants Planted (No.s)
1	Jammu	97230
2	Kashmir	111462
Total	208692	

B. Wildlife:

The Himalayan range, standing as the highest, youngest, and largest chain of mountains globally, captivates with its natural wonders. Beyond its breathtaking scenery, it harbors a remarkable diversity of animal life, hosting nearly one-third of the world's mammalian species adapted to mountainous environments.

Jammu and Kashmir, with its diverse geographical regions, climates, and vegetation, is a haven for wildlife enthusiasts. The elusive snow leopard, an iconic survivor from the Pleistocene era, thrives in the high ranges of these mountains. Another rarity is the Hangul or Kashmir stag, among the most endangered species of red deer globally. The Bharal, a mysterious mammal, sparks ongoing debates about its classification as a sheep or goat. The state also boasts unique species of antelope, goat, and sheep. During winter, high-altitude bird species migrate to lower valleys, offering tourists glimpses of cinnamon sparrows, black and yellow grosbeaks, black bulbuls, and splendidly colored Monal Pheasants. Winter also witnesses the impressive Himalayan gray Langur troops visiting the region.

Spring and summer bring the foothills and valleys to life, accompanied by the emergence of the Himalayan black bear and the return of summer birds, including the enchanting golden oriole. Langurs and Hanguls migrate to higher valleys, adding to the vibrant spectacle. Jammu and the Kashmir valley have taken strides in wildlife conservation. The state proudly hosts several National Parks and Sanctuaries, contributing to the preservation of its rich biodiversity.

The brief details the wildlife national parks and sanctuaries (Romshoo 2017) are given in the following:

I. Dachigam national Park: Dachigam National Park, encompassing an expanse of 141 square kilometers, was initially established as a sanctuary in 1910, under the administration of the Maharaja of Jammu and Kashmir. In 1981, the sanctuary received an elevation in status to that of a national park. Renowned for its Hangul, also known as the Kashmiri Stag, the park showcases a diverse landscape ranging from gently sloping grasslands to rugged rocky outcrops and cliffs. The mountainsides are adorned with coniferous forests, interspersed with alpine pastures, cascading meadows, waterfalls, and scrub vegetation. Marsar Lake, traversing the Dachigam Wildlife Sanctuary in Kashmir, offers an ideal location for trout fishing. The Park is adorned with a variety of wild trees, including Oak, Apricot, Poplar, Wild Cherry, Birch, Walnut, Pear, Elm, Plum, Apple, Chestnut, Willow, Chinar, Pine, and Peach. The park's wildlife includes Musk Deer, Langur, Himalayan Brown Bear, Himalayan Black Bear, Leopard, and Himalayan Marmot, among others. Dachigam National Park provides a habitat for around 150 species of birds, with notable ones such as the Black Bulbul, Golden Eagle, Bearded Vulture, Griffon Vulture, Peregrine Falcon, Paradise Flycatcher, Western Yellow-Billed Blue Magpie, Golden Oriole, Grey Heron, and Koklas. Gifted with perennial streams, nallahs, springs, and glaciers, the park's main Dachigam nallah, originating from Marsar Lake, is a perennial stream that ensures a constant water supply throughout the year, ultimately entering Dal Lake through Telbal.

II. Salim Ali National Park (City Forest): This Park has been named after the famous Indian Bird watcher and Naturalist named Salim Moizuddin AbdulAli and was acknowledged as a national park in 1992. Salim Ali National Park is located in Srinagar andcovers an area of 9.07 km^2. The Mangrove Shrubbery is what forms the flora of the Salim Ali National Park. The Park features a number of wildlife species such as Hangul, Musk Deer, Himalayan Black Bear and Seventy species of birds including Paradise fly catcher, Himalayan Snow Cock. It was transformed into Royal Spring Golf Course during the period of 1998 to 2001 despite being a national park in violation of all the environmental laws.

III. Kazinag National Park: Kazinag: The National Park is located on the north bank of the Jhelum River near the Line of Control in the Baramulla district, approximately 70 kilometers away from the capital city of Srinagar. It was formed by merging the Limber and Lachipora wildlife sanctuaries and the Nagnari conservation reserve. This National Park, known as Kazinag, is renowned for hosting the Markhor (Capra falconeri) and the Himalayan Musk Deer (Maschus crysogater). It also serves as a habitat for 120 species of birds and 20 species of mammals. The vegetation in Kazinag is characterized by coniferous forests dominated by deodar (Cedrus deodara) at lower altitudes, fir (Abies pindrow), and spruce (Picea smithiana) at middle to upper elevations. The widely distributed kail (Pinus Wallichiana) spans from lower to upper elevations. The National Park is home to around 20 species of mammals, including rare and endangered species such as Markhor, Himalayan Musk Deer, Himalayan Brown Bear, Himalayan Black Bear, common leopard, Yellow-Throated Martin, Himalayan Marmot, and Small Kashmir Flying Squirrel.Kazinag National Park supports a rich avian diversity with about 120 species of birds belonging to 36 families. Notable bird species include the Golden Eagle (Aquila chrysaetos), Impeyan or Monal Pheasant (Lophophorus impejanus), Koklas Pheasant (Catreus wallichii), Sparrow Hawk (Accipiter nisus melaschistos), Snow Pigeon (Columba leuconota), and The Cuckoo (Cuculus canorus).

IV. Gulmarge Wildlife Sanctuary: Covering an expanse of 180 square kilometers, the Gulmarg Wildlife Sanctuary is renowned for its preservation of numerous rare and endangered species. Situated 28 kilometers away from Srinagar, the sanctuary boasts a lush vegetation cover, with conifers dominating over 90% of the forested area. The principal tree species include Cedrus Deodara, Pinus Griffithii, Abies Pindrow, Aesculus Indica, and more. Shrubs such as Indigofera Heterantha and Sorbaria Tomentosa are prevalent in the region. Nature has endowed this wildlife sanctuary with a diverse array of rare, endangered, and protected species. Among the notable inhabitants are the Hangul, Musk Deer, Serow, Brown Bear, Leopard, Black Bear, and Red Fox. The Gulmarg Wildlife Sanctuary stands as a vital refuge for these species, contributing to their conservation and protection.

V. Limber wildlife Sanctuary: Limber wildlife sanctuary is situated in Lower Jhelum sub-watershed of Jhelum Basin.It is about 22 kms away from Baramulla. It is the part of Kazinag National Park was notified in 1987 and encompasses an area of about 44 km^2 in Lower Jhelum sub-watershed. It is bounded to the north by Bhurji forest in Langet Forest Division to the south by the Jhelum River, east by Katha Forest. Along the west, it is connected with the Lachipora wildlife sanctuary and along the east with Naganari Conservation Reserve. Limber wildlife sanctuary is fed by two main nallahs, Mithwani and Gamalitter, which drain into theLimber nallah, which in turn drains into River Jhelum.The wildlife sanctuary is famous for Markhor (Capra falconeri). Vegetation in Limber wildlife sanctuary is dominated by coniferous forests with deodar (Cedrus deodara), fir (Abies pindrow), spruce (Picea smithiana) and kail (Pinus Wallichiana).

VI. Lachipora wildlife sanctuary: Named after the village of 'Lachipora' situated in its catchment area on the northern banks of the Jhelum River, Lachipora Wildlife Sanctuary is enveloped by Maidan Forests to the south, the Line of Control to the west, Kakau Forest in Langet Forest Division to the north, and Limber and Bagna Forests to the east. The topography of this sanctuary exhibits a wide range, from gentle to steep slopes, interspersed with significant rocky cliffs. Established with the primary objective of preserving the Markhor, a species of wild goat found in parts of Kashmir and neighboring countries, Lachipora Wildlife Sanctuary encompasses various types of forests, including Coniferous Forests, Broadleaf Forests, and meadows of Alpine pastures. The sanctuary is adorned with a variety of trees such as Birch, Horse Chestnut, West

Himalayan Fir, and Persian.Home to several species of birds, Lachipora Wildlife Sanctuary is particularly notable for housing the Western Tragopan, classified as a 'Vulnerable Species' by the International Union for Conservation of Nature (IUCN). The diverse landscape and rich biodiversity make this sanctuary a vital area for conservation efforts.

VII. Overa- Aru wildlife Sanctuary: Named after the hutment areas of Overa and Aru within its boundaries, as well as the two prominent snowmelt freshwater and perennial streams of Overa and Lidder, the Overa-Aru Wildlife Sanctuary is among the largest wildlife sanctuaries in Jammu and Kashmir, spanning an area of 457 square kilometers. The sanctuary showcases a rich diversity of vegetation due to variations in altitude, aspect, and soil composition. The Overa-Aru Forest encompasses riverine vegetation, coniferous forests, alpine scrubs, and lush green pastures. The predominant vegetation includes Fir (Abies pindrow) and Kail (Pinus griffithi). The sanctuary is home to a variety of wildlife, including the Kashmiri Stag, Musk Deer, Himalayan Mouse Hare, Kashmiri Flying Squirrel, Serow, Red Fox, Jackal, Leopard, Langur, Himalayan Black Bear, Brown Bear, and other similar fauna. The Overa-Aru Wildlife Sanctuary is a haven for avifauna, boasting over 27 species of birds such as the Black Eared Kite, Monal, White-Backed Vulture, Blue Rock Pigeon, Ring Dove, Asiatic Cuckoo, Rufous-Backed Shrike, and Large Spotted Nutcracker. This sanctuary serves as a vital habitat for a diverse range of flora and fauna, contributing to the conservation efforts in the region.

VIII. Hirpora Wildlife Sanctuary: Hirpora Wildlife Sanctuary, situated in the Shopian district of Kashmir, is positioned 70 kilometers south of Srinagar, covering an expansive area of 341 square kilometers. Its boundaries are defined by Gumsar Lake to the north, Hirpora village to the northeast, Rupri to the east, Saransar to the south, and the Pir Panjal pass to the west. The sanctuary showcases diverse vegetation types, including western mixed coniferous forests, deciduous sub-alpine scrub forests, and subalpine pastures. This sanctuary serves as a habitat for a variety of wildlife, including the Himalayan brown bear, Himalayan black bear, musk deer, leopard, Tibetan wolf, and the critically endangered Pir Panjal markhor, with an estimated population of around 50 individuals. Additionally, the sanctuary hosts a rich avian diversity, boasting 130 species of birds such as the spotted forktail, western tragopan, rock bunting, rufous-breasted accentor, Himalayan woodpecker, blue rock thrush, white-capped redstart, Himalayan griffon, common stonechat, and grey wagtail. The Mughal Road traverses through the Hirpora Wildlife Sanctuary, potentially impeding the movement of animals, particularly the critically endangered Pir Panjal markhor. Unfortunately, the sanctuary has faced disturbances due to deforestation, excessive livestock grazing, and the construction of permanent huts by the Gujjars, Bakerwals, and local shepherds.

Efforts are crucial to mitigate these threats and preserve the unique biodiversity of the Hirpora Wildlife Sanctuary.

IX. Rajparian Wildlife Sanctuary: Rajparian Wildlife Sanctuary is situated 100 kilometers from Srinagar in Jammu and Kashmir, positioned in the extreme southwestern corner of the state along the catchment of Jhelum. This wildlife sanctuary has been safeguarded since the era of Maharajas ruling the valley and attained the status of a National Park in 1981 under the Wildlife Protection Act. Also known as Daksum Wildlife Reserve, it derives its name from Rajparian Nallah, which drains the region in the Bringi sub-watershed.

Encompassing an area of 20 square kilometers, Rajparian Wildlife Sanctuary is considered one of the most challenging wildlife sanctuaries for travelers to explore. It harbors a diverse range of flora and fauna, with vegetation featuring Kail pine, coniferous trees, spruce, juniper, deodar, fir, and birch. The sanctuary serves as a habitat for various wildlife, including musk deer, hangul (Kashmiri stag), Himalayan black bear, and other species, contributing to the preservation of the region's unique biodiversity.

X. Thajiwas wildlife sanctuary: Thajiwas Wildlife Sanctuary is located in the Sindh sub-watershed of the Jhelum basin, with the Sindh River serving as a significant water source for the Jhelum River. The sanctuary is renowned for the Thajiwas glacier, a popular tourist attraction in the Kashmir valley. Extensive meadows characterize the sanctuary, providing a habitat for the snow leopard, black bear, and Hangul (Kashmiri stag).

4.2.1.2. Issues and Challenges:

- Illegal logging and timber smuggling.
- Expansion of agriculture leading to clearing of forests.
- Infrastructure development causing habitat destruction.
- Insufficient data on the status of wildlife and forests.
- Lack of comprehensive research for effective conservation strategies. e.t.c.

4.2.1.3. Problem Tree/ Root Cause Analysis: Causes, effect and Conservations:

- Depletion in Forest Cover.
- Drying of water streams and springs.
- Siltation in rivers, lakes, ponds
- Reduction in Water Quality and quantity.
- Water Allocation Issues.

- Changes in Life Patterns.

4.2.1.4. Governance/ Management:

i. **Statute/ Law/Policy/ Regulations, if any**[1]

- The J&K Forest Act, 1987 (1930 CE)
- The Jammu and Kashmir Forest (Amendment) Act, 2018
- The J&K State Forest Corporation Act, 1978
- The J&K State Forest Corporation Rules, 1981
- The J&K Biological Diversity Rules, 2015
- The Biological Diversity Act, 2002
- The J&K Biological Diversity Rules, 2015
- The J&K Wildlife (Protection) Act, 1974 and Rules, 1975

ii. **Institutions governing/managing/monitoring the resources and Institutional structures,**

- Forest department Jammu and Kashmir
- Forest, Ecology and Environment Department

iii. **Areas of People/ Private Participation**

iv. **Schemes & Financing in the Area**

[1] https://www.jkforest.gov.in/acts_rules.html

4.2.2. Farm Sector

4.2.2.1. Subject Matter

A. Agriculture and irrigation- Assessment of current demand, efficiencies, challenges[1]:

Jammu and Kashmir, a Union Territory known for its diverse landscapes and rich culture, heavily depends on agriculture for its economy. About 70% of the population relies on agriculture for their livelihood, and even those in other industries depend on it for raw materials. The region's varied topography and climate, including Cold-Arid, Temperate, Intermediate, and Sub-Tropical Zones, highlight its vast agricultural potential. However, challenges like difficult terrain and poor accessibility hamper input supply, product distribution, and knowledge sharing. A significant portion of cultivated land lacks irrigation, leading to lower productivity. Issues in productivity extend to all crops, with deficits in food-grains, oilseeds, and vegetables. Agricultural viability faces obstacles like capital shortages and inadequate storage and sales infrastructure. Declining water resources exacerbate challenges, with only 32.36% of the cultivated area under irrigation. The hilly terrain hinders mechanical farming and transportation, especially in horticulture. Fragile soils in hilly areas are prone to erosion, and high-altitude regions allow for only a single cropping season.

The agricultural landscape varies between Jammu and Kashmir. Jammu, similar to Punjab, undergoes multiple crop harvests, while Kashmir typically follows a single cropping pattern, focusing on crops like rice, maize, and wheat. The potential growth in horticulture is evident, with fruit production reaching 14 lakh Mts, showcasing the region strength in this sector. Abundant perennial rivers provide a foundation for hydroelectric power generation, boasting a potential of 20 thousand HWs. However, the scarcity of resources has hindered significant exploitation of this potential to date.

In the Jammu division of JKUT, the annual average rainfall is around 1200 mm. While the total rainfall is substantial, its distribution is uneven, with 80% occurring during the four months from June to September. Efficient water harvesting and judicious use are crucial to enhance crop productivity and diversify the cultivation of cash crops. Hill soils in the region are generally light-textured with a shallow to medium soil profile. The low water use efficiency (25-50%) is attributed to flood irrigation and the soil's limited water-holding capacity. Traditional irrigation methods are not suitable for hilly areas, leading to significant water losses. Micro-irrigation systems, offering controlled water delivery, prove to be more efficient, with a water use efficiency exceeding 80%. However, the economic constraints of small and marginal farmers hinder their ability to afford these systems. The land use pattern J&K UT is briefly given in Table 4.50.

[1] https:/jkapd.nic.in/PDF/agenda.pdf

Table 4.50 The land use pattern Jammu & Kashmir UT , 2022 .

Particulars	Units	J&K UT	Jammu	Kashmir
Gross Cropped Area	(lac Ha.)	11.77	7.48	4.29
Net Cropped Area	(lac Ha.)	7.57	4.14	3.43
Net Irrigated Area	(lac Ha.)	3.36 (44.38%)	1.34 (32.36%)	2.02 (58.59%)
Un irrigated Area	(lac Ha.)	4.21	2.80 (67.64%)	1.41 (41.11%)
Av. Land Holding	(Ha)	0.62	0.81	0.55
No. of Operational Holdings	(lakhs)	14.49	6.44	8.05
Small and Marginal farmers	% age	94.70	90.20	4.5
Cultivable waste land	(lac Ha.)	1.39	1.01	0.38
Double Cropped Area	(lac Ha.)	8.40	3.338	5.062

Major agricultural crops such as Wheat, Maize, and Rice are cultivated throughout the Jammu and Kashmir Union Territory. In the Jammu region, Basmati Rice and Rajmash (Pulses) are particularly valuable cash crops. On the other hand, Kashmir is renowned for Mushakbugdi (a type of Rice), along with the cultivation of Vegetables, Condiments (like Saffron), and Spices.In the realm of horticulture, Kashmir stands out for its production of Apples, Cherries, Walnuts, Almonds, and more. Meanwhile, in the Jammu region, fruits like Mangoes, Citrus fruits, Ber, Anola, Guava, and Strawberries find their place. The cultivation areas for various crops are summarized in Table 4.51.

Table 4.51 The cultivation areas for various crops of Jammu region.

Crop / Season	Area in (in '000 Ha)
Paddy (Kharif)	137.83
Maize (Kharif)	231.66
Wheat (Rabi)	294.30
Pulses (Kharif & Rabi)	13.439
Oilseeds (Kharif & Rabi)	12.354
Fodder (Kharif & Rabi)	16.937
Vegetables (Kharif & Rabi)	28.865
Others (Kharif & Rabi)	12.60
Net Area Cropped	414.00
Gross Cropped Area (Kharif & Rabi)	748.00

Understanding the water requirements of crops is vital, as it varies depending on factors such as climate, soil type, cultivation methods, and effective rainfall. The total amount of water needed for a crop, from sowing to harvest, varies across different regions of the country. This total water requirement is not uniformly distributed over the crop entire life span, known as the crop period. The time span from the first irrigation during sowing to the last one before harvest is referred to as the base period, which is slightly shorter than the crop period.

The measurement of the total water depth required to cultivate a crop over a unit area is known as delta. Different crops in various regions of India exhibit specific delta values. For instance, common crops like rice may require 1000mm to 1500mm for heavy soils or high-water tables, 1500 mm to 2000 mm for medium soils, and 2000mm to 2500mm for light soils or deep-water tables, with 1600mm for upland conditions. Wheat, on the other hand, may need 250mm to 400mm in northern India and 500mm to 600mm in Central India, while barley requires 450mm. Maize's water needs vary from 100mm during the rainy season to 900mm during the summer season, with cotton requiring 400 – 500mm. These values serve as essential guidelines for farmers to efficiently manage water resources based on the specific requirements of different crops in diverse environmental conditions. The Water Requirement, Yield and Production of different crops and Net Irrigation requirement of different crops for Jammu and Kashmir is listed Table 4.52 & Table 4.53,respectively.

Table 4.52 The Water Requirement, Yield and Production of different crops of Jammu and Kashmir.

S.No.	Crop (New Strains)	Water Requirement (mm)	Yield (Kg/Ha)	Production/ mm of water (Kg/Ha)
1.	Rice	1200	4500	3.7
2.	Sorghum	500	4500	9.0
3.	Pearl Millet	500	4000	8.0
4.	Maize	625	5000	8.0
5.	Wheat	400	5000	12.8

Table 4.53 Soil moisture Availability of Jammu and Kashmir.

S. No.	Crop (New Strains)	Root Zone (Cm)	Water Requirement (mm)	Soil Moisture Availability (%)
1	Rice	50	1500-1825	100-50
2	Wheat	50-70	420	100-50
3	Barley	60-75	375	100-40
4.	Maize	40-60	350	100-60
5.	Oil Seeds	30-100	265-295	100-50
6.	Pulses	30-150	260-335	100-50
7.	Forage Crops	40-100	340-1010	100-75
8.	Vegetables	30-50	500-735	100-70
9.	Potato	30	540	100-70
10.	Sorghum/Pearl Millet	-	500	-

B. Crop area, production and productivity under rain-fed and irrigated Agriculture:

The Area, Production and Average yield of Major crops for the period 2021-22 of Jammu and Kashmir are listed in Table 4.54.

Table 4.54 The Area, Production and Average yield of Major crops for the period 2021-22 of Jammu and Kashmir

CROP		Paddy	Wheat	Maize	Oilseeds	Pulses	Total
Districts		**2021-22**					
Jammu	Area	51.33	81.62	27.28	0.81	1.25	162.29
	Prod.	67.86	211.22	43.60	0.59	0.70	256.11
	Avg.Yield	13.22	25.88	15.98	7.28	5.62	15.78
Samba	Area	19.20	28.95	5.22	1.47	0.96	55.79
	Prod.	30.84	61.61	9.66	0.83	0.29	103.24
	Avg.Yield	16.06	21.28	18.52	5.64	3.03	18.50
Kathua	Area	34.17	48.37	16.88	3.61	2.58	105.60
	Prod.	96.24	101.84	48.24	1.57	0.78	248.66
	Avg.Yield	28.17	21.06	28.58	4.35	3.03	23.55
Udhampur	Area	9.85	33.05	32.97	1.45	1.43	78.74
	Prod.	12.45	52.17	67.23	0.95	0.69	133.49
	Avg.Yield	12.64	15.79	20.39	6.56	4.82	16.95
Ramban	Area	3.30	4.79	16.86	0.16	0.00	25.11
	Prod.	8.87	4.24	23.32	0.13	0.00	36.57
	Avg.Yield	26.86	8.85	13.84	8.18	0.00	14.56
Doda	Area	1.36	4.35	25.51	0.79	2.21	34.22
	Prod.	3.33	3.70	38.58	1.52	1.80	48.93
	Avg.Yield	24.48	8.50	15.12	19.17	8.16	14.30
Kishtwar	Area	8.36	2.06	4.85	0.02	0.71	15.99
	Prod.	6.71	1.92	5.23	0.01	0.56	14.42
	Avg.Yield	8.03	9.31	10.78	6.67	7.91	9.02
Rajouri	Area	4.79	48.87	47.43	0.80	0.29	102.19
	Prod.	10.93	87.42	120.13	0.59	0.15	219.22
	Avg.Yield	22.80	17.89	25.33	7.36	5.12	21.45
Poonch	Area	2.90	15.33	22.32	0.03	0.03	40.61
	Prod.	7.58	35.33	72.78	0.02	0.01	115.72
	Avg.Yield	26.10	23.05	32.61	6.67	3.85	28.50
Reasi	Area	1.21	13.90	22.72	0.26	0.19	38.28
	Prod.	1.72	21.63	40.28	0.19	0.08	63.90
	Avg.Yield	14.16	15.56	17.73	7.39	4.23	16.69

C. Livestocks, Birds and Other:

Jammu and Kashmir boast a rich tapestry of animal husbandry, encompassing diverse livestock, birds, and other species that play a pivotal role in the region's agricultural landscape. The area is renowned for its unique breeds, including the prized Kashmiri Pashmina goat and the robust Gujri cattle. Livestock farming forms a linchpin of the local economy, providing substantial income and employment opportunities. The dairy sector, characterized by breeds such as the Kashmiri Red and Sahiwal, contributes significantly to milk and dairy production. Additionally, sheep farming is vital for wool production, with the exquisite Pashmina goat yielding wool of exceptional quality for the renowned Pashmina shawls. Poultry farming is also widespread, meeting the demands for both chicken and eggs. The well-being of these animals is safeguarded through robust veterinary services, with vaccination programs and healthcare initiatives ensuring their health.

According to the 20th Livestock Census, the combined livestock and poultry population of Jammu and Kashmir (J&K) stands at 8.32 million. The distribution of this population reveals that sheep, cattle, goats, and buffaloes contribute 36.84%, 30.41%, and 21.93% respectively to the total. Remarkably, J&K holds the 6th position in terms of sheep population. The region secures the 1st rank for yak population, 2nd for horses and ponies, and 3rd for mules. Additionally, J&K boasts the 6th highest donkey population in India. Despite these significant numbers, the indigenous breeds face persistent threats of dilution and potential extinction (Hamadani et al. 2022). The water requirements for Equine and poultry livestock in the Kashmir Division are shown in Table 4.55 andTable 4.56, respectively. The Water Requirement of Equines in Jammu Division and Water requirement of bovines of Jammu region are shown in Table 4.57 & Table 4.60 ,respectively. Additionally, Table 4.58 & Table 4.59 specifies the water requirements for Livestock in Kashmir, and details the water requirements for Bovines in the division.

Table 4.55 The Water Requirement of Equines in Kashmir Division.

S.No	District	Equines (in No's)	Daily Drinking Water Requirement (in Lac LPD)	Daily Water requirement for other purposes (in Lac LPD)	Total Daily water requirement (in Lac LPD)
1	Anantnag	7723	2.8	2.8	5.6
2	Badgam	2406	0.9	0.9	1.7
3	Bandipora	3003	1.1	1.1	2.2
4	Baramula	2250	0.8	0.8	1.6
5	Ganderbal	2397	0.9	0.9	1.7
6	Kulgam	1060	0.4	0.4	0.8
7	Kupwara	2741	1.0	1.0	2.0
8	Pulwama	1770	0.6	0.6	1.3
9	Shopian	2704	1.0	1.0	1.9

10	Srinagar	105	0.0	0.0	0.1
TOTAL		26,159	9.4	9.4	18.8

Table 4.56 The water requirement of poultry in Kashmir division.

S. No.	District	Total Poultry Population (in No's)	Total Daily water requirement of poultry (in Lac LPD)	Total Yearly water requirement of poultry (in Lac LPD)
1	Anantnag	290679	0.5	146.07
2	Badgam	744411	1.3	325.76
3	Bandipora	247443	0.6	170.98
4	Baramula	804871	1.5	380.65
5	Ganderbal	691897	1.2	260.84
6	Kulgam	132924	0.3	113.63
7	Kupwara	373724	0.9	302.56
8	Pulwama	1135944	1.8	392.47
9	Shopian	86685	0.2	53.69
10	Srinagar	389260	0.7	166.82
TOTAL		4897838	8.9	2313.47

Table 4.57 The Water Requirement of Equines in Jammu Division.

S.No	District	Equines (in lakhs)	Daily Drinking Water Requirement (in Lac LPD)	Total Daily water requirement (in Lac LPD)
1	Doda	0.075	2.69475	96.82
2	Udhampur	0.041	1.47313	52.93
3	Poonch	0.036	1.29348	46.47
4	Rajouri	0.086	3.08998	111.02
5	Jammu	0.034	1.22162	43.89
6	Kathua	0.076	2.73068	98.11
7	Ramban	0.03	1.0779	38.73
8	Kishtwar	0.05	1.7965	64.55
9	Reasi	0.082	2.94626	105.86
10	Samba	0.016	0.57488	20.66
TOTAL		0.526	18.89918	679.04

Table 4.58 The Water Requriment of Livestock in Kashmir Division.

S. No.	District	Total Daily water requirement of bovines (in Lac LPD)	Total Daily water requirement of equines (in Lac LPD)	Total Daily water requirement of poultry (in Lac LPD)	Total Daily water requirement of district (in Lac LPD)	Total Yearly water requirement of bovines (in Lac LPD)	Total Yearly water requirement of equines (in Lac LPD)	Total Yearly water requirement of poultry (in Lac LPD)	Total Yearly water requirement of district (in Lac LPD)
1	Anantnag	211	5.6	0.53	216.75	76888	2029.60	146	79064
2	Badgam	160	1.7	1.31	163.51	58572	632.30	326	59530
3	Bandipora	88	2.2	0.56	90.60	32076	789.19	171	33036
4	Baramula	176	1.6	1.47	179.38	64347	591.30	381	65319
5	Ganderbal	68	1.7	1.15	71.08	24893	629.93	261	25784
6	Kulgam	123	0.8	0.31	124.19	44936	278.57	114	45328
7	Kupwara	204	2.0	0.87	206.62	74379	720.33	303	75402
8	Pulwama	108	1.3	1.83	110.93	39358	465.16	392	40216
9	Shopian	79	1.9	0.17	81.32	28907	710.61	54	29671
10	Srinagar	41	0.1	0.69	42.04	15067	27.59	167	15262
TOTAL		1259	18.8	8.89	1286.42	459424	6874.59	2313	468612

Table 4.59 Water requirement of bovines of Kashmir region.

S. No S.N.	District	Cattle (in No's)	Buffalo (in No's)	Yak (in No's)	Total Bovines (in No's)	Daily Drinking Water Requirement (in Lac LPD)	Daily Water requirement for other purposes (in Lac LPD)	Total Daily water requirement (in Lac LPD)	Total Yearly water requirement (in Lac LPD)
1	Anantnag	188611	2514	378	191503	67	144	211	76888
2	Badgam	145153	730	0	145883	51	109	160	58572
3	Bandipora	76888	794	2208	79890	28	60	88	32076
4	Baramula	157725	2542	0	160267	56	120	176	64347
5	Ganderbal	61627	311	63	62001	22	47	68	24893
6	Kulgam	110416	1504	0	111920	39	84	123	44936
7	Kupwara	182998	2251	3	185252	65	139	204	74379
8	Pulwama	97234	794	0	98028	34	74	108	39358
9	Shopian	69552	2445	0	71997	25	54	79	28907
10	Srinagar	37395	131	1	37527	13	28	41	15067
TOTAL		1127599	14016	2653	1144268	400	858	1259	459424

Table 4.60 Water requirement of bovines of Jammu region.

S. No S.N.	District	Cattle (in lakhs)	Buffalo (in lakhs)	Yak (in lakhs)	Total Bovines (in No's)	Daily Drinking Water Requirement (in Lac LPD)	Total Yearly water requirement (in Lac LPD)
1	Doda	1.657	0.181	0.009	1.847	64.57112	23568.4588
2	Udhampur	2.052	0.799	0.000	2.851	99.67096	36379.9004
3	Poonch	0.537	1.147	0.000	1.684	58.87264	21488.5136
4	Rajouri	1.078	1.486	0.000	2.564	89.63744	32717.6656
5	Jammu	1.870	1.229	0.000	3.099	108.34104	39544.4796
6	Kathua	2.089	0.675	0.000	2.764	96.62944	35269.7456
7	Ramban	1.364	0.192	0.000	1.556	54.39776	19855.1824
8	Kishtwar	0.937	0.082	0.019	1.038	36.28848	13245.2952
9	Reasi	0.987	0.674	0.000	1.661	58.06856	21195.0244
10	Samba	0.703	0.304	0.000	1.007	35.20472	12849.7228
TOTAL		13.274	6.769	0.028	20.071	701.68216	256113.9884

D. Fisheries and others:

Jammu and Kashmir, with its diverse topography encompassing rivers, lakes, and other water bodies, boasts a thriving fisheries and aquaculture sector. Among the key fish species cultivated in the region, trout holds a prominent position, benefitting from the cold-water rivers and lakes that are conducive to its high-quality production. The cultivation of carp and catfish is also widespread, especially in the lowland areas, contributing significantly to overall fish production. Notable water bodies such as Dal Lake, Wular Lake, and the Jhelum River serve as prime locations for aquaculture activities, further emphasizing the economic importance of the sector.

Table 4.61 outlines the water requirement calculations for Trout Hatcheries in Jammu and Kashmir, providing essential data for the efficient management of water resources in these facilities. On the other hand, Table 4.62 details the corresponding calculations for Carp Hatcheries, offering valuable insights into the specific water needs of these facilities in the region. These tables serve as crucial references for fisheries management, aiding in the development of strategies to ensure optimal water usage and sustainability in both Trout and Carp Hatcheries across Jammu and Kashmir.

Table 4.61 Calculation of water requirement for Trout Hatcheries of Jammu and Kashmir.

S. No.	Present egg production (in lacs)	Water requirement As on date (lac lt.)	Expected egg production by 2050 (in lacs)	Water requirement in 2050 (lac lt.)	Source of water	Remarks
1	150	5000	600	20000	Surface water	

Table 4.62 Calculation of water requirement for Carp Hatcheries of Jammu and Kashmir.

S. N.	No. of Hatcheries	Present spawn production in crore	Water requirement as on date (m^3)	No. of carp hatcheries Expected by 2050	Expected spawn production in 2050 (m^3)	Water requirement in 2050 (m^3)	Remarks
1	05	6.3	5481	11	12.3	10701	06 hatcheries are assumed to be established in next 25 years

4.2.2.2. Issues and challenges

- Water scarcity or water availability in drought and summer.
- Poor water use efficiency in livestock production.
- Chronic water shortage in arid and semi-arid areas limiting expansion of livestock rearing.
- Water pollution (animal excreta, urine, feed/fodder refusals, milk shed waste,
- silage effluent etc).
- Water use efficiency (cleaning, milk cooling systems, irrigation).
- Water quality Vs livestock health and production
- Largely unorganized livestock sector.
- Issues related to waste water treatment/recycle/reuse in livestock sector.

4.2.2.3. Governance/management

1 **Statute / Law / Policy/ Regulations if any**

- Regulation for groundwater use / recharge/ sustainable use
- Regulation for canal water distribution
- Energy subsidy for groundwater use
- Renewable energy policy for irrigation / agriculture
- Policies for promoting micro irrigation/ Enhancing water use efficiency
- National / State water policies
- Conjunctive storage in aquifers and rain water harvesting system
- Integrated river basin management (IRBM)
- Policy for de-pollution/ discharge of waste water to different water bodies
- Policies for resolving inter regional water conflicts within and neighboringstates.

2 **Institutions Governing / Managing / Monitoring the natural resources and Institutional structure**

- Command Area Development Authority (CADA)
- Water and Land Management Institute (WALMI)
- State level Nodal Agencies (SLNAs) for watersheds
- AgriculturalTechnology Management Agency (ATMA)
- CII-Triveni Water Institute.
- Department of Animal Husbandry, Jammu and Kashmir
- Department of Fisheries Jammu and Kashmir.

3 Areas of Peoples/ Private/ PPP Participation if any

- Integrated Watershed Management Programme (IWMP)
- Participatory Irrigation Management (PIM)
- Water Users Associations (WUAs)
- Co-operative Groundwater Management

4.2.2.4. Annexure-Farm Sector

Table 4.63 Area, Production and Average Yield of Paddy of Jammu and Kashmir.

CROP		**Paddy**					
Districts		**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
Jammu	Area	64.350	63.882	50.684	58.430	51.330	59.056
	Prod.	251.020	218.800	146.860	168.990	67.857	177.7019
	Av.Yield	39.010	34.251	28.976	28.922	13.220	30.090
Samba	Area	18.910	18.968	18.881	19.153	19.200	18.897
	Prod.	49.770	48.862	41.441	42.277	30.844	49.4899
	Av.Yield	26.328	25.760	21.949	22.073	16.065	26.189
Kathua	Area	33.930	29.962	34.329	34.066	34.167	34.156
	Prod.	128.670	108.557	86.915	101.907	96.235	101.0632
	Av.Yield	37.928	36.232	25.318	29.914	28.166	29.589
Udhampur	Area	8.330	6.685	29.743	7.206	9.850	6.982
	Prod.	21.860	14.495	51.117	14.495	12.451	15.6173
	Av.Yield	26.256	21.683	17.186	20.114	12.640	22.368
Ramban	Area	1.220	0.984	3.301	3.302	3.302	3.299
	Prod.	1.680	2.025	3.351	5.031	8.870	2.9808
	Av.Yield	13.773	20.579	10.151	15.237	26.862	9.035
Doda	Area	1.570	1.382	1.438	2.271	1.361	1.842
	Prod.	4.670	4.469	3.092	4.944	3.331	2.6421
	Av.Yield	29.769	32.337	21.502	21.768	24.476	14.344
Kishtwar	Area	1.170	1.221	1.206	1.188	8.358	8.365
	Prod.	5.162	5.268	3.259	2.180	6.708	19.6135
	Av.Yield	44.119	43.145	27.023	18.348	8.025	23.447

Rajouri	Area	4.400	4.812	4.689	4.813	4.794	4.736
	Prod.	11.510	12.586	8.777	9.690	10.931	8.676
	Av.Yield	26.150	26.155	18.718	20.133	22.802	18.319
Poonch	Area	2.830	2.796	2.935	2.905	2.904	3.000
	Prod.	10.260	8.496	7.695	8.480	7.581	7.6203
	Av.Yield	36.280	30.386	26.218	29.190	26.105	25.401
Reasi	Area	1.120	0.836	5.824	0.964	1.213	1.215
	Prod.	2.770	2.064	13.946	2.724	1.718	2.5121
	Av.Yield	24.692	24.689	23.946	28.258	14.159	20.676
Total	Area	137.830	131.528	153.030	134.298	136.479	141.548
	Prod.	487.372	425.622	366.453	360.716	246.525	387.917
	Av.Yield	35.360	32.360	23.946	26.859	18.063	27.405

Table 4.64 Area, Production and Average Yield of Wheat of Jammu and Kashmir.

CROP		**Wheat**						
Districts		**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
Jammu	Area	79.94	86.84	79.94	50.47	50.47	81.62	Not Available
	Prod.	204.1342	240.47	223.83	127.11	111.39	211.22	
	Av.Yield	25.54	27.69	28.00	25.19	22.07	25.88	
Samba	Area	29.549	29.08	29.17	22.85	24.17	28.95	
	Prod.	55.3574	62.91	61.97	48.51	47.44	61.61	
	Av.Yield	18.73	21.64	21.25	21.23	19.63	21.28	
Kathua	Area	50.195	51.30	50.55	43.13	48.37	48.37	
	Prod.	106.5846	112.03	127.17	104.47	110.23	101.84	
	Av.Yield	21.23	21.84	25.16	24.22	22.79	21.06	
Udhampur	Area	36.906	39.64	35.57	37.51	33.65	33.05	
	Prod.	57.456	67.35	66.09	55.29	61.44	52.17	

	Av.Yield	15.57	16.99	18.58	14.74	18.26	15.79	
Ramban	Area	5.416	4.45	4.82	4.79	4.79	4.79	
	Prod.	4.7318	3.71	6.93	6.41	7.58	4.24	
	Av.Yield	8.74	8.33	14.38	13.37	15.80	8.85	
Doda	Area	3.357	4.75	4.46	4.18	4.19	4.35	
	Prod.	4.186	9.86	7.27	6.92	6.95	3.70	
	Av.Yield	12.47	20.74	16.31	16.55	16.59	8.50	
Kishtwar	Area	2.405	2.41	1.61	2.53	2.06	2.06	
	Prod.	4.6157	4.50	1.89	1.37	1.98	1.92	
	Av.Yield	19.19	18.69	11.72	5.40	9.62	9.31	
Rajouri	Area	45.587	46.85	47.58	45.42	45.40	48.87	
	Prod.	60.1238	82.14	109.29	70.86	85.97	87.42	
	Av.Yield	13.19	17.53	22.97	15.60	18.93	17.89	
Poonch	Area	14.956	15.01	15.54	16.70	14.33	15.33	
	Prod.	21.2966	33.97	38.12	37.19	25.96	35.33	
	Av.Yield	14.24	22.63	24.54	22.27	18.12	23.05	
Reasi	Area	14.232	13.97	13.77	15.06	15.06	13.90	
	Prod.	23.7622	18.75	24.53	28.83	22.20	21.63	
	Av.Yield	16.70	13.42	17.82	19.14	14.74	15.56	
Total	Area	282.539	294.301	282.989	242.655	242.49	281.28	
	Prod.	542.248	635.689	667.095	486.944	481.14	581.08	
	Av.Yield	19.19	21.60	23.57	20.07	19.84	20.66	

Table 4.65 Area, Production and Average Yield of Maize of Jammu and Kashmir.

Districts		2017-18	2018-19	2019-20	2020-21	2021-22	2022-23
Jammu	Area	20.865	14.43	28.555	17.765	27.281	13.097
	Prod.	40.3744	21.921	47.288	32.9853	43.5973	25.5502
	Av.Yield	19.350	15.191	16.560	18.568	15.981	19.508
Samba	Area	6.32	4.447	3.039	5.211	5.217	3.904
	Prod.	9.5876	6.053	4.115	11.1383	9.6617	6.4721
	Av.Yield	15.170	13.611	13.541	21.375	18.520	16.578
Kathua	Area	17.747	14.854	16.526	17.013	16.88	16.893
	Prod.	62.1811	51.783	51.836	46.315	48.2353	40.258
	Av.Yield	35.038	34.861	31.366	27.223	28.575	23.831
Udhampur	Area	36.307	27.29	7.396	31.077	32.965	31.303
	Prod.	82.5316	71.068	17.382	62.3392	67.227	66.9706
	Av.Yield	22.732	26.042	23.502	20.060	20.393	21.394
Ramban	Area	18.36	14.325	16.347	16.856	16.856	16.858
	Prod.	24.2879	21.27	23.575	20.5034	23.3241	18.4
	Av.Yield	13.229	14.848	14.422	12.164	13.837	10.915
Doda	Area	25.365	19.686	25.372	25.194	25.512	24.942
	Prod.	37.5379	29.714	43.413	31.6769	38.5828	41.064
	Av.Yield	14.799	15.094	17.111	12.573	15.123	16.464
Kishtwar	Area	11.691	9.214	11.666	11.702	4.85	4.846
	Prod.	13.4385	6.906	16.699	11.1757	5.2273	6.0159
	Av.Yield	11.495	7.495	14.314	9.550	10.778	12.414

Rajouri	Area	47.978	45.237	47.303	49.231	47.432	47.315
	Prod.	105.561	137.275	112.693	104.2798	120.1347	110.2373
	Av.Yield	22.002	30.346	23.824	21.182	25.328	23.299
Poonch	Area	24.095	23.131	23.485	23.411	22.319	24.942
	Prod.	51.2631	67.577	60.035	51.8646	72.7833	68.4872
	Av.Yield	21.275	29.215	25.563	22.154	32.610	27.459
Reasi	Area	22.93	17.545	17.982	22.597	22.719	22.952
	Prod.	18.5334	22.956	31.477	39.9269	40.2808	40.5277
	Av.Yield	8.083	13.084	17.505	17.669	17.730	17.658
Total	Area	231.66	190.16	197.67	220.06	222.03	207.05
	Prod.	445.297	436.523	408.513	412.205	469.054	423.983
	Av.Yield	19.222	22.956	20.666	18.732	21.126	20.477

Table 4.66 Area, Production and Average Yield of Bajra (Kharief) of Jammu and Kashmir.

S No.	District	2018-19			2019-20			2020-21			2021-22			2022-23		
		Area (Ha)	Production (qtls)	Yield (Qtl/Ha)	Area (Ha)	Production (qtls)	Yield (Qtl/Ha.)	Area (Ha)	Production (qtls)	Yield (Qtl/Ha.)	Area (Ha)	Production (qtls)	Yield (Qtl/Ha.)	Area (Ha)	Production (qtls)	Yield (Qtl/Ha.)
1	Jammu	11.70	69.74	5.96	2.88	17.20	5.96	7.03	41.91	5.96	2.83	16.87	5.96	9.82	48.48	4.94
2	Samba	4.47	26.60	5.95	4.70	27.93	5.95	2.90	17.24	5.95	2.35	13.95	5.95	3.99	33.34	8.36
3	Kathua	1.29	7.08	5.50	0.70	3.86	5.50	1.35	7.40	5.50	1.38	7.59	5.50	1.38	7.60	5.50
4	Udhampur	1.51	9.06	5.99	0.17	1.03	5.99	1.38	8.27	5.99	1.32	7.92	5.99	1.41	8.44	5.99

5	Reasi	0.50	3.06	6.10	0.47	2.86	6.10	0.47	2.87	6.10	0.13	0.82	6.10	0.00	0.00	0.00
6	Rajouri	0.32	2.15	6.73	0.73	4.93	6.73	0.01	0.07	6.73	0.67	4.53	6.73	0.72	4.86	6.73
7	Poonch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	Doda	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	Kishtwar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	Ramban	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	19.79	117.69	5.95	9.66	57.80	5.99	13.13	77.75	5.92	8.69	51.68	5.95	17.32	102.72	5.93

Table 4.67 Area, Production and Average Yield of Bajra (Rabi) of Jammu and Kashmir.

S No.	District	2018-19			2019-20			2020-21			2021-22		
		Area (Ha)	Production (qtls)	Yield (Qtl/Ha.)	Area (Ha)	Production (000qtls)	Yield (Qtl/Ha)	Area (000Ha)	Production (000qtls)	Yield (Qtl/Ha.)	Area (000Ha)	Production (000qtls)	Yield (Qtl/Ha.)
1	Jammu	0.024	0.075	3.125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Samba	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Kathua	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Udham pur	0.00	0.00	0.00	0.115	0.288	2.50	0.00	0.00	0.00	0.00	0.00	0.00
5	Reasi	0.00	0.00	0.00	0.008	0.073	9.13	0.01	0.02	2.50	0.008	0.020	2.50
6	Rajouri	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.004	0.007	1.75
7	Poonch	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	Doda	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	Kishtwar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	Ramban	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

	Total	0.024	0.075	3.125	0.12	0.36	2.93	0.01	0.02	2.50	0.012	0.027	2.25
Grand Total		19.82	117.77	5.94	9.78	58.16	5.95	13.14	77.77	5.92	8.697	51.704	5.95

Table 4.68 Area, Production and Average Yield of Fodder of Jammu and Kashmir.

S No.	District	Kharief														
		2018-19			2019-20			2020-21			2021-22			2022-23		
		Area (Ha)	Production (qtls)	Yield (Qtls/ Ha.)	Area (Ha)	Production (qtls)	Yield (Qtls/ Ha.)	Area (Ha)	Production (qtls)	Yield (Qtls/ Ha.)	Area (Ha)	Production (qtls)	Yield (Qtls/ Ha.)	Area (Ha)	Production (qtls)	Yield (Qtls/Ha.)
1	Jammu	3962	34597	8.732	3941	36827	9.345	3788	31305	8.26	3819	35669	9.34	2987	24215	8.11
2	Samba	941	2287	2.430	1743	4236	2.430	3676	8934	2.43	4039	8142	2.02	1742	4233	2.43
3	Kathua	3081	61338	19.908	3290	67421	20.493	3199	65556	20.49	3243	66458	20.49	3243	66458	20.49
4	Udhampur	49	529	10.796	95	202	2.126	62	132	2.13	48	102	2.13	62	132	2.13
5	Reasi	64	2360	36.875	0	0	0.000	0	0	0.00	67	156	0.00	67	156	2.33
6	Rajouri	188	3951	21.016	204	4287	21.015	39	83	2.13	193	411	2.13	163	390	2.39
7	Poonch	68	149	2.191	68	149	2.191	65	142	2.18	65	142	2.18	79	99	1.25
8	Doda	33	320	9.697	98	950	9.694	81	785	9.69	2	19	9.50	32	45	1.41
9	Kishtwar	0	0	0.000	0	0	0.000	0	0	0.00	0	0	0.00	0	0	0.00
10	Ramban	0	0	0.000	0	0	0.000	0	0	0.00	0	0	0.00	0	0	0.00
	Total	8386	105531	12.584	9439	114072	12.085	10910	106937	9.80	11476	111099	9.68	8375	95728	11.43
Rabi																
1	Jammu	3416	51438	15.06	3416	51438	15.06	3416.00	51438	15.06	3181	48060	15.11	Not Available		
2	Samba	1177	20780	17.66	3064	54095	17.66	2686	47421	17.65	2964	52329	17.65			
3	Kathua	3543	62028	17.51	3745	67416	18.00	3694	62671	16.97	3694	62671	16.97			
4	Udhampur	483	8526	17.65	172	3036	17.65	174	3071	17.65	182	3173	17.43			
5	Reasi	75	5910	78.80	76	6000	78.94	76	6000	78.95	130	6810	52.38			
6	Rajouri	480	21347	44.47	555	27916	50.30	343	17136	49.96	441	24916	56.50			
7	Poonch	2868	43306	15.10	2368	39904	16.85	3127	48989	15.67	3056	48635	15.91			

8	Doda	701	13259	18.91	866	16381	18.92	347	6547	18.87	710	13352	18.81	
9	Kishtwar	150	2849	18.99	129	2450	18.99	138	2621	18.99	138	2621	18.99	
10	**Ramban**	**0**	**0**	**0.00**	**0**	**0**	**0.00**	**0**	**0**	**0.00**	**0**	**0**	**0.00**	
	Total	**12893**	**229443**	**17.80**	**14391**	**268636**	**18.67**	**14001.0 0**	**245894. 0**	**17.56**	**14496**	**262567**	**18.11**	
	Grand Total (K+R)	**21279**	**334974**	**15.74**	**23830**	**382708**	**16.06**	**24911.0 0**	**352831. 0**	**14.16**	**25972.0 0**	**373666. 0**	**14.39**	

Table 4.69 Area, Production and Average Yield of Oilsheeds of Jammu and Kashmir.

S No.	District	Kharief														
		2018-19			**2019-20**			**2020-21**			**2021-22**			**2022-23**		
		Area (Ha)	**Prod. (qtls)**	**Yield (Qtls/ Ha.)**	**Area (Ha)**	**Prod. (qtls)**	**Yield (Qtls/ Ha.)**	**Area (Ha)**	**Prod. (qtls)**	**Yield (Qtls/ Ha.)**	**Area (Ha)**	**Prod. (qtls)**	**Yield (Qtls/H a.)**	**Area (Ha)**	**Prod. (qtls)**	**Yield (Qtls/Ha .)**
1.0	Jammu	487	1998.0	4.10	0	0.00	0.00	550.00	2528.00	4.60	0.00	0.00	0.00	754.00	1720.00	2.28
2.0	Samba	1804	7879.0	4.37	2102	9181.00	4.37	948.00	4141.00	4.37	1076.00	5175.00	4.81	2102.0 0	9183.00	4.37
3.0	Kathua	1621	6520.0	4.02	1303	5335.00	4.09	1094.0 0	4400.00	4.02	1011.00	4067.00	4.02	1034.0 0	4160.00	4.02
4.0	Udhamp ur	394	1087.0	2.76	429	1184.00	2.76	357.00	985.00	2.76	357.00	985.00	2.76	357.00	985.00	2.76
5.0	Reasi	10	50.0	5.00	0	0.00	0.00	0.00	0.00	0.00	34.00	170.00	0.00	42.00	210.00	5.00
6.0	Rajouri	107	538.0	5.03	86	432.00	5.02	0.00	0.00	0.00	57.00	143.00	0.00	77.00	238.00	3.09
7.0	Poonch	0	0.0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8.0	Doda	0	0.0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9.0	Kishtwar	0	0.0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.0	Ramban	0	0.0	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	4423	18072.0	4.09	3920	16132.0	4.12	2949.0 0	12054.0	4.09	2535.00	10540.0	4.16	4366.0	16496.0	3.78
Rabi																

1.0	Jammu	1405	15366	10.94	1405	12297.69	8.75	1405	9054.763	6.445	810	5887	7.268	Not Available
2.0	Samba	394	2365	6.00	710	6065.28	8.54	703	4065.493	5.783	396	3119	7.876	
3.0	Kathua	2708	18491	6.83	2027	8196.59	4.04	2598	8100.529	3.118	2598	11654	4.486	
4.0	Udhampur	2013	4648	2.31	1343	19809	14.75	1360	15358.874	11.293	1092	8551	7.831	
5.0	Reasi	696	4177	6.00	1194	10205.76	8.55	1194	6909.021	5.786	223	1756	7.874	
6.0	Rajouri	679	2387	3.52	1225	10627.09	8.68	655	4553.737	6.952	745	5750	7.718	
7.0	Poonch	159	954	6.00	31	265.2	8.55	30	434.348	14.478	30	236	7.867	
8.0	Doda	949	6130	6.46	879	8185.86	9.31	966	3608.89	3.736	793	15201	19.169	
9.0	Kishtwar	12	72	6.00	23	196.76	8.55	13	75.287	5.791	15	118	7.867	
10.0	Ramban	119	714	6.00	159	1360.2	8.55	119	674.73	5.670	159	1252	7.874	
	Total	9134	55304	6.05	8996	77209.43	8.58	9043	52835.672	5.843	6861	53524	7.801	

Table 4.70 Area, Production and Average Yield of Pulsess of Jammu and Kashmir.

S No.	District	2018-19			2019-20			2020-21			2021-22			2022-23		
		Area (Ha)	**Production(qtls)**	**Yield (Qtl/Ha)**	**Area (000Ha)**	**Production(qtls)**	**Yield (Qtl/Ha.)**	**Area (Ha)**	**Production(qtls)**	**Yield (Qtl/Ha.)**	**Area (Ha)**	**Production (qtls)**	**Yield (Qtl/ Ha.)**	**Area (Ha)**	**Production (qtls)**	**Yield (Qtl/ Ha.)**
1	Jammu	4.003	14.892	3.720	1.189	7.355	6.186	2.575	11.985	4.654	1.139	6.633	5.824	3.160	8.322	2.634
2	Samba	1.706	5.099	2.989	2.000	5.978	2.989	0.951	2.882	3.030	0.953	2.849	2.990	1.977	5.909	2.989
3	Kathua	2.984	8.986	3.011	2.692	8.545	3.174	2.685	8.044	2.996	2.542	7.675	3.019	2.530	7.639	3.019
4	Udhampur	1.366	6.68	4.890	1.573	5.946	3.780	1.425	6.834	4.796	1.429	6.851	4.794	1.427	6.783	4.753
5	Reasi	0.255	1.546	6.063	0.082	0.354	4.317	0.045	0.199	4.422	0.189	0.824	4.360	0.217	0.942	4.341
6	Rajouri	0.593	2.888	4.870	0.416	2.090	5.024	0.028	0.113	4.036	0.289	1.512	5.232	0.428	2.542	5.939
7	Poonch	0.039	0.183	4.692	0.025	0.113	4.520	0.025	0.113	4.520	0.025	0.113	4.520	0.016	0.080	5.000
8	Doda	1.653	12.562	7.600	1.582	13.639	8.621	1.576	15.155	9.616	2.096	17.372	8.288	1.741	14.253	8.187

9	Kishtwar	0.585	5.223	8.928	1.165	9.547	8.195	1.140	9.046	7.935	0.680	5.303	7.799	0.934	6.415	6.868
10	Ramban	0	0	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Total	13.184	58.059	4.404	10.724	53.567	4.995	10.450	54.371	5.203	9.342	49.132	5.259	12.43	52.885	4.255
Rabi																
1	Jammu	0.364	2.432	6.68	0.364	2.432	6.68	0.364	2.432	6.681	0.106	0.349	3.292	Not Available		
2	Samba	0.054	0.252	4.67	0	0	0.00	0.001	0.005	5.000	0.004	0.020	5.000			
3	Kathua	0.039	0.202	5.18	0.186	0.927	4.98	0.034	0.161	4.735	0.034	0.161	4.735			
4	Udhampur	0.005	0.03	6.00	0.002	0.012	6.00	0.002	0.012	6.000	0.002	0.012	6.000			
5	Reasi	0	0	0.00	0	0	0.00	0	0	0.000	0.000	0.000	0.000			
6	Rajouri	0.004	0.036	9.00	0.004	0.036	9.00	0	0	0.000	0.004	0.013	3.250			
7	Poonch	0	0	0.00	0	0	0.00	0.001	0.006	6.000	0.001	0.006	6.000			
8	Doda	0.146	0.877	6.01	0.103	0.572	5.55	0.082	0.493	6.012	0.111	0.668	6.018			
9	Kishtwar	0.028	0.252	9.00	0	0	0.00	0.028	0.252	9.000	0.028	0.252	9.000			
10	Ramban	0	0	0.00	0	0	0.00	0.015	0.073	4.867	0.000	0.000	0.000			
	Total	0.64	4.081	6.38	0.659	3.979	6.04	0.527	3.434	6.516	0.290	1.481	5.107			
Grand Total (K+R))		13.82	62.14	10.78	11.11	58.35	5.252	10.977	57.805	5.266	12.720	54.366	4.274			

4.2.3. Industry & Infrastructure

4.2.3.1. Subject Matter

Jammu and Kashmir, situated in northern India, boasts a varied economic landscape with key industries playing vital roles in its growth. The region is renowned for its diverse handicrafts, such as Pashmina shawls and intricate walnut wood carving, significantly contributing to the local economy (PDMD JK 2023). The tourism sector thrives on the area's picturesque landscapes, historical landmarks, and religious sites. Agriculture, focusing on apple orchards and horticultural products, remains a substantial contributor. The harnessing of hydroelectric power from the region's abundant rivers is a critical element of its industrial development. Transportation infrastructure includes a well-connected network of roads, highways, and airports in major cities like Srinagar and Jammu, with the Jammu–Baramulla railway line enhancing overall connectivity. The power infrastructure, featuring dams and power stations utilizing river energy, addresses the region's energy requirements. Tourist facilities, such as hotels and resorts, cater to the needs of visitors exploring the diverse attractions. However, it's crucial to verify this information from recent sources, considering the evolving political and administrative dynamics in the region.

The survey findings indicate that, out of a total of 1019 factories, 913 were reported as operational in the organized manufacturing sector of Jammu and Kashmir during the 2017-18 fiscal year (PDMD JK 2018). The estimated fixed capital for these factories in Jammu & Kashmir amounted to Rs. 910,261 Lakhs, with an average fixed capital of Rs. 997 Lakhs per operational factory. The input and output from factory production were estimated at Rs. 2,346,869 Lakhs and Rs. 3,077,871 Lakhs, respectively, for Jammu & Kashmir. On average, the estimated input and output per factory in operation were Rs. 2,570.50 Lakhs and Rs. 3,371.16 Lakhs, respectively. Employment figures reveal that organized manufacturing units in Jammu & Kashmir provided jobs to 0.71 Lakh individuals, with an average of 78 persons engaged per operational factory. In registered manufacturing units, the estimated number of workers in Jammu & Kashmir was 0.56 Lakh, with an average of 61 workers per factory in operation. The Gross Value Added (GVA) for factories in J&K amounted to Rs. 731,006 Lakhs, with an average GVA of Rs. 801 Lakhs per operational factory. The Net Value Added (NVA) was estimated at Rs. 651,260 Lakhs for J&K, with an average NVA of Rs. 713 Lakhs per factory in operation. The total wages disbursed to workers in these factories totaled Rs. 65,561 Lakhs, and the average wages per worker in an operational factory were Rs. 1.17 Lakhs.

In the hierarchy of districts within Jammu and Kashmir, District Jammu stands out as the leader with 543 operational factories, securing the top position. District Baramulla, on the other hand, takes the lead in registered manufacturing units with the highest fixed capital of Rs. 337,968 Lakhs.District Jammu demonstrates its prominence in terms of both input and output values, boasting the maximum figures among all districts. The factories in this district recorded an input of Rs. 1,400,998 Lakhs and an output of Rs. 1,788,501 Lakhs.Furthermore, District Jammu significantly contributes to the overall Gross Value Added (GVA) of manufacturing factories in J&K, contributing Rs. 387,504 Lakhs, which accounts for 53.01% of the total GVA.In terms of employment, District Jammu takes the lead with the highest number of persons, totaling 0.39 lakh, and a substantial sum of Rs. 75,907 Lakhs disbursed as emoluments to individuals engaged in manufacturing factories. These statistics underscore District Jammu's pivotal role in the industrial landscape of Jammu and Kashmir.

The establishment of a robust infrastructure for power generation, transmission, and distribution is imperative to ensure the reliable and high-quality supply of power to consumers in Jammu and Kashmir. The region is abundantly endowed with significant hydropower potential, and its full exploitation holds great promise for driving economic growth. The estimated hydropower potential in the Union Territory (UT) of Jammu and Kashmir is 18,392 MW, with 14,867 MW already identified. This includes 11,283 MW in the Chenab basin, 3,084 MW in the Jhelum basin, and 500 MW in the Ravi basin. However, only a fraction of this identified potential has been harnessed, amounting to 3,633.21 MW, which is 24.44% of the identified capacity. This comprises 1,220.96 MW in the State Sector, 2,339 MW in the Central Sector, and 73.25 MW in the Independent Power Producer (IPP) mode (PDMD JK 2023). The realization of the untapped hydro potential has the potential to significantly contribute to the energy needs of the region and drive economic development. The Hydro Power Installed Capacity for Jammu and Kashmir are prested in Figure 4.45.

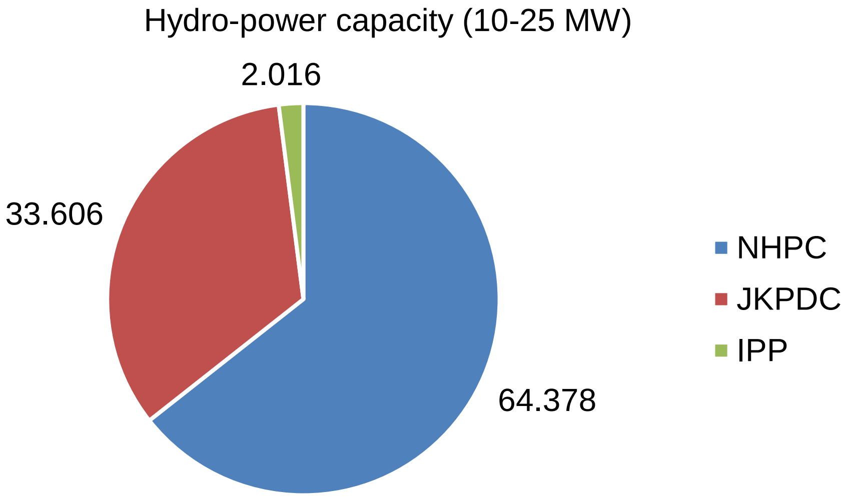


Figure 4.45. The Hydro Power Installed Capacity for Jammu and Kashmir.

4.2.3.2. Issues and Challenges

- Addressing concerns over wastewater disposal and the potential contamination of surface and groundwater resources in Jammu and Kashmir.
- Examining water demand and supply issues specifically within the Thermal Power Plant (TPP) sector in the state.
- Evaluating capital investment challenges, particularly those related to wastewater treatment, recycling, reuse, and water conservation efforts in the region.
- Analyzing issues pertaining to water pricing within Thermal Power Plants in Jammu and Kashmir.
- Assessing the availability, affordability, and efficiency of water-related technologies applicable to the region.
- Tackling issues and challenges unique to water supply and consumption dynamics in Jammu and Kashmir.
- Enhancing monitoring and reporting mechanisms for water-related data in the region, emphasizing the importance of effective data management and reporting systems.

4.2.3.3. Governance / Management:

i. **Statute / Law / Policy/ Regulations if any:**

Jammu and Kashmir Industrial Policy 2021-2030: The new Jammu and Kashmir Industrial Policy 2021 aims-

1. To attract substantial investment across focus sectors.
2. Creation of job for the youth.
3. Promothing development of backward regions.
4. Maximizing growth opportunities by optimum utilization of available resources.
5. Creating backward and forward linkages.
6. Harnessing the talentes and skills of the people and ushering prosperity in every household.
7. To Nurture existing industries.

ii. **Institutions governing / managing / monitoring the resources and Institutional structure**

Deapartment of Industries & Commerce of Jammu and Kashmir: Jammu & Kashmir State has made substantial progress in industrial development during the last four decades with the efforts made by the State Government and Government of India by sanctioning various Incentive Schemes/Packages. The state Government, has adopted Industrial Policies from time to time (i.e 1995, 1998 & 2004) the latest being Industrial Policy, 2016.

4.2.3.4. Road map of activities / tasks proposed for

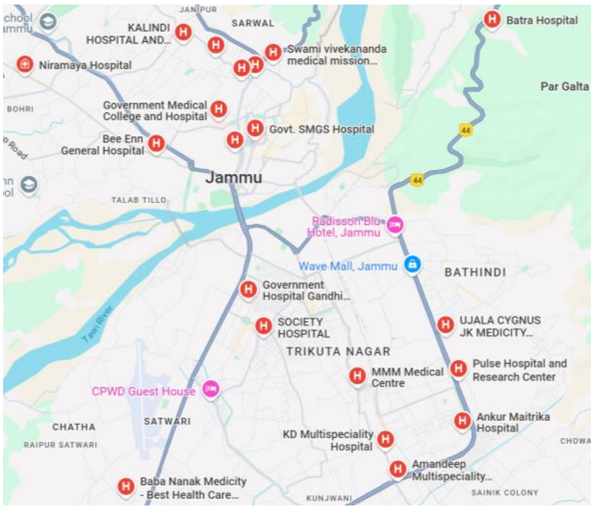
- A comprehensive assessment of Jammu and Kashmir's abundant mineral resources is essential, followed by strategic planning for scientifically sustainable mining practices.
- Emphasize the need for in-state value addition of minerals, promoting local economic growth and industry development.
- Encourage the establishment of tourist infrastructure to boost historical, religious, and adventure tourism in Jammu and Kashmir, leveraging the region's potential for adventure tourism.
- Recognize the state's diverse herbal and medicinal plant varieties, advocating for the establishment of a research and development center. Planned cultivation and extraction methods should be implemented to promote the growth of Herbal & Medicinal Plants.
- Highlight the importance of developing a robust supply chain infrastructure to support the growth of these sectors in Jammu and Kashmir.
- Advocate for the establishment of Skill Development Institutes in the region to enhance the capabilities of the local workforce.
- Propose the creation of a National or State-level testing lab within Jammu and Kashmir, emphasizing the significance of a dedicated facility for research and quality assurance.

4.2.4. Establishments Institutions

4.2.4.1. Subject Matter:

Jammu and Kashmir house a diverse array of institutions that significantly contribute to the multifaceted development of the region. Notable among these are esteemed educational establishments such as the University of Jammu, the University of Kashmir, Indian Institute of Technology Jammu, Indian Institute of Management Jammu and the National Institute of Technology, Srinagar, fostering academic excellence. The administrative and governance framework is upheld by institutions like the Jammu and Kashmir Administrative Service (JKAS) and the Jammu and Kashmir Police, ensuring efficient governance and maintaining law and order. Healthcare services are provided by institutions like the Sher-i-Kashmir Institute of Medical Sciences (SKIMS) and Government Medical Colleges in Jammu and Srinagar. Culturally enriching entities, including the Jammu and Kashmir Academy of Art, Culture, and Languages, strive to preserve and promote the rich cultural heritage of the region. The financial sector is bolstered by the Jammu and Kashmir Bank, while tourism development is overseen by the Jammu and Kashmir Tourism Development Corporation (JKTDC). Research and development find a home in institutions like Sher-e-Kashmir University of Agricultural Sciences and Technology (SKUAST). Collectively, these institutions play a pivotal role in shaping the socio-economic landscape, educational fabric, and cultural identity of Jammu and Kashmir. The Hospitals under Directorate of Health Services, Jammu & Kashmir are presented in Figure 4.46.

Jammu Region



Kashmir Region

Figure 4.46. Hospitals under Directorate of Health Services, Jammu & Kashmir. Source: https://www.google.com/maps/search/Hospitals

The Main source of water in all the health institutions under Directorate of Health Services Jammu is tapped water supply. The annual consumption of water in the health institutions of Jammu Division for the Year 2022-23 was 13,79,00,000 litres. A few hospitals (NQAS certified) are having water harvesting system. All the District hospitals have functional ETP. Out of the 36 CHCs only 5 are having ETP. The installation ETP and water harvesting system at all health institutions up to the level of CHC is under process and it is expected that by the end of 2025.

All the health institutions are having proper drains for disposal of waste water. Majority of the Health institutions are located in the rural area. Every village is having functional Village Health and Sanitation Committee (VHSNC) which hold regular meetings with the Panchayati raj institutions for proper sanitation and IEC activities regarding importance of the proper sanitation, proper disposal of refuse so that they do not contaminate the water sources e.g. wells, ponds, springs etc. which otherwise will cause water borne diseases in the community.

Directorate of Health Services Jammu aims to provide Preventive, Promotive & Curative Services in all the Health Institutions within the ambit of Jammu division. In Jammu division the Health Department is headed by the Director Health Services Jammu. The division comprises of ten districts. Each district is headed by a Chief Medical Officer. The Chief Medical officers work under the direct Administrative Control of Director Health Services Jammu. Each district is further divided into various Health Blocks headed by the Block Medical Officers who work under the immediate Administrative Control of Chief Medical Officers. The Block Medical Officers are the supervising and monitoring heads of their respective Health Blocks.

The Directorate of Health Services Jammu has a total of 1904 health institutions (6 District Hospitals, 36 CHCs, and 13 other Hospitals, 438 PHCs, 1369 Health Sub Centres and others 41). All the Institutions of Jammu Division are having tapped water supply. The total Bed Strength of these institutions is 3809.

4.2.4.2. Details of Water Availability, Supply, Demand, Withdrawal & Consumption for the Hospitals

Table 4.71 Water Availablity, supply, Demand, withdrawal and Consumption of the hospitals.

Hospital (district-wise)	**Total No. of beds in Dist.**	**Previous Year / Average Annual Demand (Lit.)**	**Previous Year/ Average Annual Supply & Consumptive Use (Lit.)**		**Demand for the present Water Year (Lit.)**
			Supply	**Consum-ptive Use**	
Doda	405	14782500	15000000	13000000	14000000
Jammu	944	34456000	34500000	33000000	34500000
Kathua	260	9490000	9500000	9200000	9500000

Kishtwar	181	6606500	6000000	5500000	6000000
Poonch	483	17629500	17500000	15000000	17600000
Rajouri	356	12994000	13000000	12000000	13000000
Ramban	253	9234500	9300000	9100000	9300000
Reasi	338	12337000	12000000	11500000	12000000
Samba	262	9563000	10000000	9500000	10000000
Udhampur	327	11935500	12000000	10500000	12000000
GRAND TOTAL	3809	139028500	138800000	128300000	137900000

4.2.4.3. Issues and Challenges

The Illustrative issues and challenges may include:

- Erratic water supply in the remote areas (HWC) due to power issues.
- The waste water is disposed by drains and there are no waste water treatment facilities at PHCs and Sub Centres.

4.2.4.4. Performance Indicators:

Table 4.72 Performance indicator

Categ-ory	Indicator	Benchmark (as applicable)	Doda	Jammu	Kathua	Kishtwar	Poonch	Rajouri	Ramban	Reasi	Samba	Udhampur
Water Use Effici-ency	Specific Water Consumption in Water per in-patient bed days consumption (refer Annexure Table-7(a),(b) & (c))		0	0	0		0	0	0	0	0	0
	Specific water consumption in Water per OPD person consumption		100	100	100	100	100	100	100	100	100	100
	Have specific water consumption norms/benchmarks established	Yes/No	No	No	No	No	No	No	No	No	No	No
	% of hospitals with specific water consumption within the	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

	norms/bench marks/standards											
Waste Water	% reduction in wastewater generation as compared to previous year											
Water Quality	% of Hospitals with online water quality monitoring systems installed.	100%	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
	% of Hospitals having compliance with the wastewater quality discharge norms.	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	% of Hospitals discharging wastewater into open area/ earthen nallah /open drain/ municipal sewer?	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	% of Hospitals notified for violating effluent discharge norms for discharge in	0	0	0	0	0	0	0	0	0	0	0

	natural resources (surface/ground)?											
Econo-mics	Whether economic incentives are in place to encourage water efficiency & conservation?	Yes/No	No	No	No	No	No	No	No	No	No	No
	Whether economic disincentive mechanisms like penalties etc. are in place to discourage water wastage & inefficient use?	Yes/No	No	No		No	No	No	No	No	No	No
	Whether water use charges & tariff are revised regularly and are reflective of rational pricing mechanisms?	Yes/No	No	No	No	No	No	No	No	No	No	No

4.2.4.5. Annexure –Establishments Institution

Table 4.73 Total Number of Hospitals in Jammu and Kashmir.

Type – Based on Ownership	
Central Government Hospitals	
- CGHS Hospitals	0
- CGHS Dispensary	0
- Medical Colleges	0
Total	(A)
State Government Hospitals	
- District Hospitals	1
- Community Health centers	9
- Primary Health centers	70
- Medical colleges	0
Total	(B)
Private Hospitals	
- Private Hospitals	1
- Clinics	122
Total	(C)
Total (A+B+C)	**203**

Table 4.74 Growth Trend of Hospitals over a period and Water Demand and Supply position.

Hospitals – Based on ownership	**Years**					
	1990	**1995**	**2000**	**2005**	**2010**	**2017**
No. of Hospitals						
Central Government Hospitals				0	0	0
State Government Hospitals				168	168	208
Private Hospitals				0	0	1
Total				168	168	209
Water Demand and Supply						
Total Water Demand (MCM)						

Total Water Supply (MCM)	GW	Yes					Yes
	SW						
	Municipal Supply	Yes					yes
	Total						

Table 4.75 Previous Year/ Average Annual Demand, Supply (Source wise) and Consumption for Whole State

Source of Water	**Demand of all Units in the State**	**Supply/ Withdrawal for all Units**	**Consumptive Use of all Units**	**Gap/Remarks**
Rain Water (Directly Harvested)	NA	0	NA	NA
Springs, Nallahs		0		
Major Projects		0		
Medium Projects		0		
Minor Projects		135		
Ponds, Tanks		0		
Wetlands		0		
Desalinated Water/ Sea water		0		
Inter-Basin Transfer		0		
Ground Water (Dynamic)		0		
Treated Waste Water		0		
TOTAL (MCM)		135		

Table 4.76 Growth Trend of Hospitals over a period and Water Demand and Supply position

Hospitals – Based on ownership	**Years**					
	1990	**1995**	**2000**	**2005**	**2010**	**2017**
No. of Hospitals						
Central Government Hospitals	0	0	0	0	0	0
State Government Hospitals	40	60	60	117	117	117
Private Hospitals	0	0	0	4	0	6
Total	40	60	60	121	117	123

Table 4.77 State Water Budgeting for Budgam

Hospital (district-wise)	Previous Year / Average Annual Demand (MCM)	Previous Year/ Average Annual Supply & Consumptive Use (MCM)		Demand for the present Water Year (MCM)
		Supply	Consumptive Use	
Budgam	249160 ltr per bed per day	300000 ltrs per bed per day	249160	No
GRAND TOTAL	90943400 ltr in annual	109500000 ltr in annual	90943400 ltr in annual	

Table 4.78 Waste water of Jammu and Kashmir Hospitals. Districtwise data not available.

	Bench Mark (as applicable)
Total Waste Water Generated from Hospitals (m^3/annum)	90943400 ltr in annual
% Total quantum of wastewater discharged after recycling	nil

Table 4.79 Comparative trend of Total Freshwater Withdrawal Vs Actual Water Consumption by Hospitals in the district Ganderbal.

Hospitals in state (district-wise)	Previous Year / Average Annual Demand (MCM)	Previous Year/ Average Annual Supply & Consumptive Use (MCM)		Demand for the present Water Year (MCM)
		Supply	Consumptive Use	
Ganderbal	901034888 ltr in annual	9038564121 ltr in annual	901034888 ltr in annual	-

Table 4.80 Total Freshwater Withdrawal and Actual Water Consumption by Universities in the Jammu & Kashmir.

Universitis (district-wise)	**Previous Year/ Average Annual Demand (MCM)**	**Previous Year/ Average Annual Supply & Consumptive Use (MCM)**		**Demand for the present Water Year (MCM)**
		Supply	**Consumptive Use**	
Jammu- Skuast	2.04	1.25	1.25	2.14
Jammu- Ju	2.14	1.27	1.27	2.25
Jammu-Degree Colleges	0.441	0.315	0.315	0.567
Reasi-Smvdu	0.219	0.180	0.180	0.350
Reasi Degree Colleges	0.037	0.027	0.027	0.048
Udhampur Degree Colleges	0.126	0.090	0.090	0.09
Samba Degree Colleges	0.063	0.039	0.039	0.081
Kathua Degree Colleges	0.132	0.094	0.094	0.17
Doda Degree Colleges	0.050	0.028	0.028	0.064
Kishtwar Degree Colleges	0.021	0.012	0.012	0.027
Ramban Degree Colleges	0.020	0.014	0.014	0.025
Rajouri Degree Colleges	0.107	0.076	0.076	0.167
Rajouri Bgsbu	Data Not Provided	Data Not Provided	Data Not Provided	Data Not Provided
Poonch Degree Colleges	0.063	0.045	0.045	0.081
Grand Total	5.37	3.44	3.44	6.06

4.2.5. Drinking water and Domestic use

4.2.5.1. Subject Matter:

In Jammu and Kashmir, the provision of safe drinking water and the management of domestic water usage present significant challenges. The region grapples with a notable decline in water discharges from sources, primarily attributed to factors such as deforestation. Efficient management of water distribution systems remains a persistent issue, impacting the reliability of water supply to households. The hilly and remote terrain prevalent in many areas of the state poses accessibility challenges, complicating the task of managing spring sources and affecting overall water availability.

The economy of Jammu and Kashmir is predominantly dependent on agriculture, with nearly 70% of the population directly or indirectly engaged in agricultural and allied occupations (PDMD JK 2023). The focus has been on constructing and maintaining irrigation canals/khuls to provide better irrigation facilities for agriculture. However, the hilly and mountainous terrain of the Union Territory poses significant challenges exacerbated by climate change. The disruption of weather patterns and the occurrence of extreme weather events are changing water cycle patterns, increasing the threat of floods. To mitigate flood risks, various flood protection measures are currently being executed, and additional measures are in the pipeline. In the 2021-22 period, 348 projects were completed under the Public Health Engineering (PHE) sector, resulting in the provision of 62,500 household connections and benefiting 3.47 lakh individuals. Additionally, approximately 2.17 lakh water quality tests were conducted. Under the Irrigation and Flood Control (I&FC) sector, 109 projects were completed, creating an irrigation potential of 0.18 lakh hectares and protecting 27,000 hectares of land from flood threats (PDMD JK 2023).

In the ongoing 2022-23 period, 124 projects have been completed under the PHE sector, benefiting 30,000 individuals, and approximately 1.91 lakh water quality tests have been conducted. Under the I&FC sector, 25 projects have been completed, resulting in the creation of 0.11 lakh hectares of irrigation potential and protecting 50 hectares of land from flood threats (PDMD JK 2023).

The ambitious goal of the Jal Jeevan Mission (JJM) in India is to provide piped water supply to all rural households, offering Functional Household Tap Connections (FHTC) capable of delivering a minimum service level of 55 LPCD in accordance with BIS 10500 standards on a long-term and sustainable basis. In Jammu and Kashmir (J&K), the objective is to achieve 100% piped water connections for every rural household by the fiscal year 2023-24.

The JJM emphasizes community involvement in planning, implementing, monitoring, and operating and maintaining the water supply systems. Source sustainability measures, such as rainwater harvesting, groundwater recharge, and greywater treatment and reuse, are integrated in a convergence mode. The mission adopts a community-centric approach and incorporates extensive Information, Education, and Communication (IEC) as a pivotal component. Based on Village Action Plans and District Action Plans formulated by Pani Samitis and District Jal Jeevan Missions, J&K has planned 3,125 schemes (1,120 new/augmentation and 2,005 retrofitting) at an estimated cost of Rs 14,226.00 crore. These schemes aim to cover the remaining 12.92 lakh rural households and upgrade the service level for 5.75 lakh rural households already connected at the initiation of the Mission.

As of now, 10.66 lakh households out of 18.67 lakh have been covered under the Mission. The remaining 8.01 lakh households are set to be covered during the fiscal years 2022-23 and 2023-24. J&K has achieved a 57.32% coverage of households with tap water connections within premises, slightly below the national coverage of 58.68%.

The UT has successfully provided 100% household tap connections in two districts (Srinagar & Ganderbal), 11 Blocks, 451 Panchayats, and 1,118 Villages. As part of the 100-day campaign launched by the Hon'ble Prime Minister, all rural schools (23,160), Anganwadi Centers (24,163), and health institutions (3,324) have been equipped with tap water connections. Additionally, 1,666 Gram Panchyat buildings (52.8%) out of 3,156 have received tap water connections, with the remaining to be covered during the fiscal years 2022-23 and 2023-24.

Srinagar District achieved the 2nd rank in Jal Jeevan Sarvekhshan among 128 districts in the Front Runners category. Following the implementation of the 74th amendment, operation and maintenance (O&M) responsibilities for 140 water supply schemes and associated infrastructure in Jammu and Srinagar City, along with permanent officers/officials, funds, etc., have been transferred to Urban Local Bodies (ULBs).

4.2.5.2. Availability, Utilizable, Supply, Demand, Consumption

Table 4.81 Average Domestic Water consumption of Jammu and Kashmir

S. No.	Use	Consumption in Ltr per person per day
1	Drinking	5
2	Cooking	5
3	Bathing (including ablution)	55
4	Washing Cloths	20
5	Washing of Utensils	10
6	Cleaning of Houses	10
7	Flushing of Latrines	30
	Total	135

4.2.5.3. Issues and Challenges

- Reduction in water discharges from sources due to deforestation and other factors.
- Challenges in the efficient management of water distribution systems.
- Difficulties in accessing or managing spring sources in hilly or remote areas.
- Continuous monitoring challenges, including parameters like discharge.
- Impact on the health of water sources due to changes in the biophysical landscape.
- Influence of factors such as deforestation, rainfall patterns, temperature rise, seismic activity, and landslides on source discharges.
- Pollution from domestic and sewage sources, potentially exacerbated by the lack of sewage disposal systems or mining activities.
- Mapping the diverse and hilly terrain of the state for source area conservation is a significant challenge.
- Managing the impact of rapid industrialization on pollution and the permeability of spring recharge zones.

4.2.5.4. Annexure –Drinking water and Domestic use

Table 4.82 Basic Habitation Information for Jammu and Kashmir.

S.No.	District	Blocks	Panchayats	Villages	Habitations	HouseHolds	Population
1	Doda	17	237	464	1346	111216	516775
2	Jammu	20	285	725	1106	184735	958270
3	Kathua	19	237	510	1056	133599	674649
4	Kishtwar	13	136	184	615	55520	304593
5	Poonch	11	228	177	618	106715	650912
6	Rajauri	19	312	476	1400	133201	726863
7	Ramban	11	143	168	522	57453	348677
8	Reasi	12	153	257	720	77477	409011
9	Samba	9	99	222	598	60666	291207
10	Udhampur	17	236	355	976	99928	553340
	Total	148	2066	3538	8957	1020510	5434297

Table 4.83 Details of Water Requirement/ Availability in Urban Areas of Jammu Province (Under the jurisdiction of Urban Local Bodies of Jammu and Kashmir.

S.No.	Name of Division	Name of Town	Population (as per 2011 census)	Growth factor taken into consideration (%)	Present population (2023)	Floating Population	Rate at which floating population calculated (%)	Total Population	Requirement of water	Demand from hospitals @ 340/450 LPCD (GPD)	Demand from Hotels @ 180 LPCD (GPD)	Demand from hostels @ 135 LPCD (GPD)	Demand from nursing homes @ 135 LPCD (GPD)	Demand from boarding schools/ boarding colleges @	Demand from restaurants @ 70 LPCD (GPD)	Demand from airports @ 70 LPCD (GPD)	Demand from railway stations/ bus stations @ 70	Demand from day schools/ day colleges @ 45 LPCD	Demand from offices (public/ private) @ 45 LPCD	Demand from factories/ industries @ 45 LPCD (GPD)	Demand from cinemas, concert halls & theatres @ 15	Demand for fire fighting (GPD)	Total Requirement of	Loss %	Losses (GPD)	Total Water	Total Water	Total Water
								A	B														C			D	E	F
1	PHE Div. Ci	Jammu	4E+05	1.960	463582	2E+05	40	649015	19298904	303869	396475	39648	13381	29735	77093	-	154185	892070	99118	4330396	19824	689251	26343949	30	7903185	34247134	34.247	32.930

	ty I																											
2	PHE Div. City II	Jammu	3E+05	1.960	320880	2E+05	30	481320	14312379	27313	118942	55873	7434	-	2E+05	77092	462555	550110	198238	13004405	26432	483238	29478196	30	8843459	38321655	38.322	30.720
3	PHE Division Kathua	Kathua	59866	2.347	76727	11509	15	88236	2623758	39648	4758	3568	892	-	2313	-	15419	59471	10606	-	496	206894	2967823	15	445173	3412996	3.413	1.700
4		Nagri	7681	2.347	9844	1477	15	11321	336638	2621	-	-	-	-	617	-	10793	44604	1189	-	-	2494	398955	15	59843	458799	0.459	0.160
5		Lakhanpur	3461	2.347	4436	665	15	5101	151682	1123	1189	-	-	-	617	-	16960	29736	1982	-	496	1124	204908	15	30736	235645	0.236	0.280
6		Bilawar	5011	2.347	6422	963	15	7385	219598	9912	793	-	-	-	2313	-	15419	77092	10407	-	-	1627	337161	15	50574	387735	0.388	0.184

7		Hiranagar	8294	2.347	10629	1594	15	12223	363459	3744	-	1487	-	-	1850	-	13876	80176	2478	-	-	2692	469763	15	70464	540227	0.540	0.200
8		Basholi	5433	3.000	7746	1162	15	8908	264885	2621	3965	1487	-	10407	925	-	40088	52037	10407	-	-	1962	388785	18	58318	447102	0.447	0.140
9	PHE Division Reasi	Reasi	7796	2.93	10716	1753	15	12469	370774	11233	1388	2230	892	-	6938	-	46256	54515	8920	-	2478	2746	508371	17	86423	594794	0.595	1.400
10		Katra	9008	2.93	12382	3096	40	15478	460234	2247	2E+06	-	-	-	2E+05	-		2183		50	215	3409	3063052	17	520719	3583770	3.584	2.000
11	PHE Division Doda	Bhaderwah	11084	2.800	15439	4632	30	20071	596825	9912	26762	23789	-	5947	6938	-	23128	44604	4758	743	-	4421	747827	20	149565	897392	0.897	0.670
12		Doda	21605	2.800	30093	9028	30	39121	1163290	29735	5550	6690	2676	-	11564	-	69383	118943	7930	-	-	8617	1424378	20	284876	1709253	1.709	1.200

13	PHE Division Rajouri	Rajouri	21820	2.9	47185	7077	15	54262	1613518	49560	2775	17841	2081	5947	9251	-	107930	145705	10903	-	2312	162555	2130378	17	362164	2492542	2.493	0.730
14		Thanamandi	3359	2.9	9654	1448	15	11102	330126	7115	595	13381	-	-	4626	-	38546	69383	8920	-	-	2445	475137	17	80773	555910	0.556	0.138
15	PHE Rural Division Jammu	Bishnah	10719	1.080	11500	2083	15	13583	403900	8238	-	-	7434	-	8480	-	28524	17841	1487	109	-	2992	479005	15	71851	550855	0.551	0.384
16		Arnia	8948	1.090	9761	1465	15	11226	333813	749	-	-	-	-	7709	-	14648	14868	2478	99	2395	2473	379231	15	56885	436116	0.436	0.240
17		Sidhra	12140	1.370	16631	2495	15	19126	568725	49559	19824	19923	-	-	23128	-	-	10407	1982	2477	-	4213	700237	15	105036	805273	0.805	0.300
18		R.S. Pura	15197	1.180	17950	2693	15	20643	613834	3744	1982	4460	5947	-	4626	-	6707	5947	2974	991	-	4547	655759	15	98364	754122	0.754	0.480
19		Ghou	3944	1.250	4900	735	15	5635	167561	374	-	-	-	-	1542	-	16035	8920	694	-	-	1241	196367	15	29455	225822	0.226	0.416

		Manhasan																										
20	PHE Division Nowshera	Nowshera	10408	5.54	18022	2703	15	20725	616272	9912	2379	2676	5947	-	15419	-	-	3084	54515	5947	9912	4565	730628	20	146126	876754	0.877	0.380
21		Sundernabani	6930	5.54	12000	1800	15	13800	410352	9912	5947	2081	2974	-	15419	-	3084	74339	3965	-	-	3040	531113	20	106223	637336	0.637	0.270
22		Kalakote	-	-	11500	1725	15	13225	393254	3744	1982	2974	1486	-	3084	-	15419	49559	3469	-	-	2913	477884	20	95577	573461	0.573	0.155
23	PHE Division	Kishtwar	14865	2.68	20412	39480	15	59892	1780930	14978	13877	2475	-	-	4163	-	25132	149174	4064	-	-	53964	2048757	15	307313	2356070	2.356	1.900
24		That	4938	2.68	6780	3051	15	9831	292331	1123	3568	-	-	-	694	-	-	35871	3965	-	-	2165	339718	15	50958	390676	0.391	0.130

	Kishtwar	hri																										
25	PHE Division Udhampur	Chenani	3870	2.830	5409	811	15	6220	184956	14868	5500	2379	-	-	16189	-	362233	446044	4956	-	-	1370	311055	15	46658	357713	0.358	0.400
26		Udhampur	84015	2.830	117368	17605	15	134973	4013514	34692	20617	53524	10348	-	9559	-	163745	166520	10754	-	-	255903	4739176	15	710876	5450053	5.450	3.400
27		Ramnagar	6292	2.830	8790	1317	15	10107	300539	3744	5947	1487	2676	-	3084	-	38546	60165	5095	-	-	2226	423509	15	635526	487035	0.487	0.201
28	PHE Division Po	Surankote	14246	2.797	19836	5950	30	25786	766764	9912	7930	2974	4460	17841	7771	-	15419	34692	13381	-	-	5680	879824	10	87982	967806	0.968	0.495
29		Poonch	26854	2.800	38428	11528	30	49956	1485476	19824	1982	8920	5947	11894	2775	-	20137	35683	20815	-	-	161564	1775017	10	177502	1952518	1.953	0.905

	onch																											
30	PHE	Batote	4315	2.86	6041	1812	30	7853	233514	3744	4758	-	-	12192	2313	-	3084	34692	2974	-	-	1730	299001	10	29900	328901	0.329	0.218
31	Division	Ramban	3585	2.86	5026	1508	30	6534	194293	7489	2379	-	-	-	9251	-	9251	27902	2775	-	-	1439	254779	10	25478	280257	0.280	0.220
32	Ramban	Banihal	3900	2.86	5624	843	15	6467	192301	3744	2775	-	743	-	16420	-	100220	26930	3965	5947	-	1424	354469	10	35447	389916	0.390	0.120
33	PHE Di	Akhnoor	20756	2.84	26654	3998	15	30652	911458	14978	1982	-	7434	-	3855	-	92511	64427	2230	446	-	6752	1106073	17	188032	1294105	1.294	0.618
34	vision	Khour	6931	2.84	8901	1335	15	10236	304374	2247	-	-	-	-	-	-	-	11894	1487	-	-	2255	322257	17	54784	377041	0.377	0.300
35	Akhnoor	Jourian	3934	2.84	5052	757	15	5809	172735	1498	-	-	-	-	1542	-	23128	15363	446	-	-	1280	215991	17	36718	252710	0.253	0.168
36	PHE Di	Samba	16571	2.57	22466	3370	15	25836	768251	109030	7731	5947	-	-	2852	-	-	26762	17742	21806	-	5691	965812	17	164188	1130000	1.130	0.352

37	vision Samba	Bari Brahmana	10650	2.57	21200	3180	15	24380	724956	1498	5947	-	-	-	925	-	617	23789	872	-	-	5370	763974	17	129876	893850	0.894	0.450
38		Vijaypur	8044	2.57	10906	1636	15	12542	372945	2247	-	-	-	-	-	-	-	22104	2478	-	-	2763	402536	17	68431	470968	0.471	0.400
39		Ramgarh	5612	2.57	7604	1140	15	8744	260009	5841	-	-	-	-	-	-	-	33700	2478	-	-	1926	303954	17	51672	355626	0.356	0.210

Table 4.84 Details of water requirement/Availability in urban areas of Kashmir Province (under the Urban Local Bodies).

S.No.	Name of Division	Name of Town	Population (as per 2011 census)	Growth factor taken into consideration (%)	Present population (2023)	Floating Population	Rate at which floating population calculated (%)	Total Population A	Requirement of water B	Demand from hospitals @ 340/450 LPCD (GPD)	Demand from Hotels @ 180 LPCD (GPD)	Demand from hostels @ 135 LPCD (GPD)	Demand from nursing homes @ 135 LPCD (GPD)	Demand from boarding schools/ boarding colleges @ 135 LPCD	Demand from restaurants @ 70 LPCD (GPD)	Demand from airports @ 70 LPCD (GPD)	Demand from railway stations/ bus stations @ 70 LPCD (GPD)	Demand from day schools/ day colleges @ 45 LPCD (GPD)	Demand from offices (public/ private) @ 45 LPCD (GPD)	Demand from factories/ industries @ 45 LPCD (GPD)	Demand from cinemas, concert halls & theatres @ 15 LPCD	Demand for fire fighting (GPD)	Total Requirement of water (GPD) C	Loss %	Losses (GPD)	Total Water Requirement (in GPD) D	Total Water Requirement (in MGD) E	Total Water Availability (in MGD) F
1	Kupwara	Kupwara	217771	31.76	45296.6	8000	17.661	53297	2E+06	89207	3964.8	3568	1487	5947	33921	0	46256	42126	29736	9911.894	2643	30000	1883577	15	282537	2166114	2.166	0.64
2	Kupwara	Handwara	13600	21.78	22829.2	1826	8%	22829	3E+06	30600	2700	405	202	0	4410	0	3500	292500	15750	2700	2250	120	772863	15	25535	798398	0.798	0.7

												00	50									00						
3	Kupwara	Langate	6585	20.08	9821.8	1200	8%	9822	1E+06	23800	1440	270000	0	0	420	0	0	135000	11250	0	900	8000	337831	15	11162	348993	0.349	0.32
4	Special PHE Division Kulgam	Kulgam	23584	actual data as per ULB preliminary.census	42295	0	0	42295	1E+06	44053	1982.4	29736	0	0	18502	0	7709.3	29736	19824	1982.379	0	143248	1554443	20	310888.6	1865331.558	1.86533156	0.7
5	Kulgam	Yaripora	5557	actual data as per ULB preliminary.census	6891	0	0	6891	204909	17621.15	0	0	0	0	123334.802	0	1541.85	19823.7886	3964.75771	0	0	57820.96	318015.89	20	63603.1781	381619.0686	0.381619069	0.18
6	Kulgam	Frisal	5132	actual data as per ULB preliminary.census	6360	0	0	6360	189119	17621.15	0	0	0	0	123334.802	0	1541.85	19823.7886	3964.75771	0	0	555548.55	299953.83	20	59990.7667	359944.6002	0.3599446	0.1

7	Tangmarg	Gulmarg/ Tanqmarg	1965	55.32	3034	15169	Actual Assessment	18203	2E+06	27200	280800	0	#####	0	0	27000	34650	0	0	0	0	0	699120	15	104868	803988	0.803	0.5
8	Tangmarg	Kunzer	1890	-0.58	2922	4800	1500 +20 Percent of Gulmarg	7722	1E+06	8500	38880	0	0	0	80000	0	0	45000	9000	0	0	0	271966	15	40795	312761	0.3	0.2
9	Jal Shakti PHE Division Chadoora	Chadoora Town	6482	2.44%	8930	1340	15 %	10270	305385	2200	2000	Nil	Nil	Nil	500	Nil	1000	3000	2000	Nil	Nil	48300	364385	15	54657	419042	0.42	0.26
10	Awantipora	Awantipora	12647	2.7%per annum	17275.4	2589	0.15	19864	590681	10000	2400	10000	1000	0	1500	0	0	3000	2000	0	0	47577	668158	0	133632	801790	0.802	0.75
11	Awantipora	Khrew	9851	27.26	13043	1956.5	0.15	14999	2E+06	5000	0	0	0	0	200	0	500	25000	500	0	0	3257	2101200	15	315180	2416380	2.41638	0.15

																						34						
12	Awantipora	Pampore	21680	27.26	28704.8	4305.7	0.15	33011	4E+06	1000000	0	44600	4460	4460	5000	0	3200	45000	2500	100	0	484000	5149805	15	772470.8	5922275.75	5.92227575	1.59
13	Awantipora	Tral	17844	34.71	22126.8	3319	15	25446	3E+06	72050	150000	0	0	0	70000	0	0	202500	12150	0	0	216000	4157883	15	623682.5	4781565	4.78	2.21
14	Shopian	Shopian	16360	2.58	22878	0	0	22878	3E+06	90000	36000	13500	27000	0	22400	0	0	243000	54000	4725	0	10000	3589155	20	717831	4306986	4.3	1.2
15	Water Works Division & Master Plan Division	Srinagar	1206419	27.35	1536343	307269	20	1843612	2E+08	49777513.2													6.6E+07	15	9867789	75653049	75.6530487	72.925

16	Water Works Division	Badami Bagh	12124	27.35	15440	3088	20	18528	3E+06	500256													661131	15	99169.69	760301	0.760300969	0.5
17	Uri	Uri	9366	54.67	233326.8			23327	3E+06	35000	29000	10000	-	-	3000	-	-	175185	7560	-	-	4500	0.749		14927	898927	0.898	0.125
18	Sopore	Hajin	13239	24.68	164177.6	2000	12.182	16418	2E+06	22500	360	0	1000	270	14000	0	2800	9000	5850	0	0	4500	501478	20%	100295.6	601774	0.601773568	0.6
19	Sopore	Sumbal	15041	29.16	199446.1	4986.5	25%	24933	3E+06	45000	360	0	1000	270	35000	0	7000	90000	67500	0	0	30000	802211	20%	160442.1	962653	0.962652712	1.75
20	Sopore	Sopore	92365	2.41	114533	8000	35%	114533	3E+06	44052	3964	8929	14867	0	10792	0	3083	49559	9911	1982	495	500	148134	40%	1420000	5680000	5.68	3.8
21	Qazigund	Devsar	9765	100	8106.4	81.064	1%	8187	243460	3744.5	2202.6	0	1101	0	1762	0	0	3304	3304	0	0	0	258878	15%	38832	297710	0.298	0.298
22	Qazigund	Dooru Verinag	22968	24.95	304277.4	304.27	1%	30732	913827	2202.6	2202.6	1101	1101	0	2203	0	0	4405.3	3304	881.1	0	2202.6	933431	15%	140015	1073445	1.073	0.733

23	Qazigund	Qazigund	5299	64.17	8217.4	82.174	1%	8300	246794	4405.3	2643.2	11101	11101	0	1762	0	0	3304	2973.6	660.8	0	220.3	264965	15%	39745	304710	0.305	0.165
24	Pulwama	Pulwama	17333	22.84	21493.4	3224	15	24717	734989	55390	17043	12782	12782	19174	9942	0	6627.9	4260.8	6391.2	10652.02	710.1	22050	912795	15	136919	1049714	1.05	0.8
25	Baramulla	Baramulla	58053	19.45	111208	22242	20%	133450	2E+07	100000	9000	15000	6000		12000		7000	13500	7500	2700	1500	8000	1.8E+07	15	2729684	20927580	20.92	2.05
26	Baramulla	Pattan	14603	41.88	18108.2	5432	30%	23540	3E+06	55000	1000	2500	2500	nil	2550	nil	5000	25000	12300	3000	nil	10000	731217	15	109683	621535	0.731	0.28
27	Baramulla	Watergam	7015	100	9542.2	1200	L/E	9542	1E+06	2907	2907	-	-	7267	1507	-	-	13600	1453	-	-	-	1353543	15%	203031.5	1556575	1.55 MGD	0.3
28	Budgam	Badgam	15338	23.28	15165.8			15166	2E+06	29736	19824	2973	0	99121	15418	0	105964	39647	29736	0	0	63436	2453238	15	367986	2821224	2.82	1.25
29	Budgam	Beerwah	8192	23.16	10153.6			10154	1E+06	12184	11894	0	0	0	7709	0	0	23788	15000	0	0	86801	1528112	15	229217	175329	1.76	0.5

30	Budgam	Khansahib	2630	22.51	3356.4			3356	453114	9911	4956	0	0	0	4626	0	0	19823	9912	0	0	51826	554168	15	83125	637293	0.64	0.35
31	Budgam	Magam	5470	21.17	6781.8			6782	915543	12214	8000	0	0	0	4000	0	0	18000	3000	0	0	35943	996700	15	149505	1146205	1.146	0.5
32	Bandipora	Bandipora	37081	30.44	47758.2	7164	15%	54922	2E+06	89868	19824	13381	23789	13381	2.00E+05	0	46256	67401	74339	5451.542	0	81657	2302408	20%	460482	2762890	2.763	2.15
33	Tangdar	Karnah	58690	3.46	65000	1000		66000	2E+06	13000	0	0	0	0	5000	0	0	25000	3000	0	0	5000	2013555	15	302033.3	2315588	2.31	2.55
34	Ganderbal	Ganderbal	28233	36.5	43409	868	2%	44277	1E+06	15000	2000	5000	0	0	15000	0	0	50000	20000	0	0	0	1423607	15	213541	1637148	1.64	1.75
35	Anantnag	Achabal	6321	7.7	10276	3082	30	13358	397209	9911	2320	800	600	0	1420	0	890	10496	1320	1250	0	2380	428596	20	85719.25	514316	0.514	0.41
36	Anantnag	Aishmuquam	6519	100	20380	4076	20%	24456	3E+06	45000	10000	0	0	0	28000	0	0	50000	15000	0	0	25000	382661	10	38266	420927	0.421	

37	Anantnag	Anantnag	109433	10.54	136029	40809	30	176837	5E+06	59513	2450	9500	10500	1900	46800	0	14500	246182	54700	36500	0	543800	5795299	20	1159060	6954359	6.95	5.5
38	Anantnag	Kokernag	6553	25.79	15289.2	1070.2	7%	16359	2E+06	51000	14400	8100	0	0	28000	0	0	63000	7650	0	0	22891	264710	10	26471	291181	0.291	0.3
39	Anantnag	Mattan	9246	29.3	14256	2851.2	20	14256	423912	9911	1890	1380	739	0	2790	0	745	56280	4380	4530	0	3290	509847	20	101969	611816	0.612	0
40	Anantnag	Pahalgam	9264	34.52	37869.6	37870	100%	75739	1E+07	120000	#####	0	0	0	1.00E+05	0	0	50000	50000	0	0	75000	1308347	10	130835	1439182	1.439	
41	Anantnag	Seer Hamdan	19000	100	23560	3534	15%	27094	4E+06	120000	10000	0	0	0	15000	0	0	50000	10000	0	0	25000	428160	10	42816	470976	0.471	
42	Anantnag	Bijbehara	22789	13.14	35368.6	10610	30	45979	1E+06	15860	95154	11894	13381		30937		30837	70444	9911	5947	1321	7500	1660391	25	415098	2075489	2.075	0.75

Table 4.85 Storage Capacity of Jammu and Kashmir.

Name of the Division	Existing Storage Capacity (in lakh gallons)		Sub Total of Existing Storage Capacity (in lakh gallons)	Proposed Storage Capacity under JJM (in lakh gallons)		Sub Total of Proposed Storage Capacity under JJM (in lakh gallons)	Total Stoarge after JJM (in lakh gallons)	Total Stoarge after JJM (in m3)
	OHT	GSRs		OHT	GSRs			
Akhnoor	28.9	81.75	110.65	13.4	50.52	63.92	174.57	79254.78
Doda	0	40.56	40.56	0	54.59	54.59	95.15	43198.1
Gandoh	0	6.15	6.15	0	12.85	12.85	19	8626
City 2nd	70.7	30.7	101.4	0.4	0.5	0.9	102.3	46444.2
Samba	17	22.5	39.5	26	18.35	44.35	83.85	38067.9
City 1st	77	163.65	240.65	0	0	0	240.65	109255.1
Rural	65.7	34.9	100.6	56.75	39.8	96.55	197.15	89506.1
Nowshera	0	20.7	20.7	1.8	56.3	58.1	78.8	35775.2
Kishtwar	0	6.36	6.36	0	60.84	60.84	67.2	30508.8
Kathua	19.4	41.4	60.8	60.5	45.5	106	166.8	75727.2
Udhampur	12.8	71.2	84	3.9	64.28	68.18	152.18	69089.72
Reasi	0	55.5	55.5	0	40.4	40.4	95.9	43538.6
Dharmari	0	12.7	12.7	0	40.38	40.38	53.08	24098.32
Rajouri	0.5	47.95	48.45	0.6	93.15	93.75	142.2	64558.8
Poonch	0	50.54	50.54	0	82.87	82.87	133.41	60568.14
Ramban	0	40.99	40.99	0	54.18	54.18	95.17	43207.18
Total	292	727.55	1019.55	163.35	714.51	877.86	1897.41	861424.14

Table 4.86 Status of Pipe Water Supply in School of Jammu and Kashmir.

S.No.	District	Nos. of Schools									
		Total entry done	Availability of drinking water through tap connection	Running water in toilets/ urinals	Availability of hand washing facility	Separate toilets for girls and boys	Rain Water Harvesting structure installed	Availability of dry toilets/ urinals	Grey water managment	With Geo-tagging	Approved by State
1	Doda	1305	1305	1220	1222	793	3	354	31	1	1305
2	Jammu	1546	1546	1313	1527	889	1	95	1	436	1546
3	Kathua	1392	1392	1285	1392	1355	0	94	1	0	1392
4	Kishtwar	881	881	789	878	196	3	12	0	0	881
5	Poonch	1656	1656	965	837	276	0	0	0	2	1656
6	Rajauri	1828	1828	1749	1667	1715	8	1015	103	1055	1828
7	Ramban	964	964	944	955	236	1	4	0	0	964
8	Reasi	1495	1495	347	1483	1108	4	260	23	542	1495
9	Samba	696	696	696	696	695	0	363	1	221	696
10	Udhampur	1656	1656	1113	1404	418	0	94	0	1	1656
Total		13419	13419	10421	12061	7681	20	2291	160	2258	13419

Table 4.87 Status of Pipe Water Supply in Balwadi/ Anganwadi of Jammu and Kashmir.

S.No.	District	Total Nos. Balwadi/ Anganwadi (as provided by State / WCD)	Nos. of Balwadi/ Anganwadi									
			Total entry done	Availability of drinking water through tap connection	Running water in toilets/ urinals	Availability of hand washing facility	Access to toilets for girls and boys	Rain Water Harvesting structure installed	Availability of dry toilets/ urinals	Grey water management	With Geo-tagging	Approved by State
1	Doda	1212	1320	1320	1058	1079	395	0	48	7	1	1320
2	Jammu	1867	1850	1850	1667	1800	311	1	366	0	61	1850
3	Kathua	1511	1515	1515	1236	1493	379	0	0	0	0	1515
4	Kishtwar	765	776	776	683	775	7	0	0	0	0	776
5	Poonch	1344	1344	1344	859	719	163	0	3	1	0	1344
6	Rajauri	1551	1636	1636	1512	1550	1481	7	406	229	1086	1636
7	Ramban	736	736	736	721	734	3	0	0	0	0	736
8	Reasi	934	1264	1264	318	1212	590	0	127	101	0	1264
9	Samba	731	742	742	680	736	678	0	383	3	245	742
10	Udhampur	1304	1301	1301	808	498	403	0	0	0	0	1301
Total		11955	12484	12484	9542	10596	4410	8	1333	341	1393	12484

Table 4.88 Status of Pipe Water Supply in Ashram Shala & Other Public Institutions of Jammu and Kashmir.

S.No.	District	Nos. of Ashram Shala & Other Public Institutions															
		Total entry done		Nos. of GP Building/ Panchayat ghar		Nos. of Health Centre		Nos. of Community Centre		Nos. of AshramShala		Nos. of Community Toilet		Nos. of Other Govt. Office		Approved by State	
		Total	Availability of Tap Connection	Total	Availability of Tap Connection	Total	Availability of Tap Connection	Total	Availability of Tap Connection	Total	Availability of Tap Connection	Total	Availability of Tap Connection	Total	Availability of Tap Connection	Total	Availability of Tap Connection
1	Doda	264	239	55	30	209	209	0	0	0	0	0	0	0	0	264	239
2	Jammu	473	362	290	179	167	167	0	0	0	0	0	0	16	16	473	362
3	Kathua	466	425	218	177	248	248	0	0	0	0	0	0	0	0	466	425
4	Kishtwar	240	114	126	0	114	114	0	0	0	0	0	0	0	0	240	114
5	Poonch	350	212	164	26	185	185	1	1	0	0	0	0	0	0	350	212
6	Rajauri	395	395	127	127	266	266	2	2	0	0	0	0	0	0	350	350
7	Ramban	145	145	27	27	118	118	0	0	0	0	0	0	0	0	145	145
8	Reasi	313	276	162	125	141	141	10	10	0	0	0	0	0	0	313	276
9	Samba	172	164	53	46	108	108	11	10	0	0	0	0	0	0	172	164
10	Udhampur	419	329	234	144	185	185	0	0	0	0	0	0	0	0	419	329
	Total	3237	2661	1456	881	1741	1741	24	23	0	0	0	0	16	16	3192	2616

Table 4.89 District wise PWS and FHTC Coverage of Jammu and Kashmir.

S. No.	District Name	Total no. of Villages	Villages without PWS			Villages with PWS				
			No. of Village	No. of households (without Household tap connections)	No. of households (with private connections)	No. of Village	Total No. of households	No. of Households with Household tap Connection	Number of villages having 100% FHTC	Number of villages having < 100% FHTC
1	Doda	464	0	0	0	464	111216	77439	85	379
2	Jammu	725	0	0	0	725	184735	100557	106	619
3	Kathua	510	0	0	0	510	133599	82742	38	472
4	Kishtwar	184	0	0	0	184	55520	33427	34	150
5	Poonch	177	0	0	0	177	106715	80387	24	153
6	Rajauri	476	0	0	0	476	133201	79657	46	430
7	Ramban	168	0	0	0	168	57453	33402	7	161
8	Reasi	257	0	0	0	257	77477	68061	115	142
9	Samba	222	0	0	0	222	60666	49191	124	98
10	Udhampur	355	0	0	0	355	99928	56928	12	343
Total		3538	0	0	0	3538	1020510	661791	591	2947

Table 4.90 Village wise percentage FHTC coverage of Jammu and Kashmir.

S.No.	District	Nos. of Villages	Nos. of Villages with (100% FHTC)	Nos. of Villages with >= 90 to < 100 % FHTC	Nos. of Villages with >= 80 to < 90 % FHTC	Nos. of Villages with >= 70 to < 80 % FHTC	Nos. of Villages with >= 50 to < 70 % FHTC	Nos. of Villages with > 0 to < 50 % FHTC	Nos. of Villages with 0 FHTC
1	Doda	464	85	109	49	43	71	104	3
2	Jammu	725	106	84	50	49	100	242	94
3	Kathua	510	38	84	54	50	73	211	0
4	Kishtwar	184	34	25	20	11	23	63	8
5	Poonch	177	24	35	34	26	23	29	6
6	Rajauri	476	46	32	45	72	115	151	15
7	Ramban	168	7	6	13	20	71	50	1
8	Reasi	257	115	48	25	15	19	34	1
9	Samba	222	124	17	13	12	18	37	1
10	Udhampur	355	12	32	41	40	75	151	4
Total		3538	591	472	344	338	588	1072	133

4.3. Water Quality

4.3.1. Subject Matter

In Jammu and Kashmir, the quality of water used for drinking and other purposes is a crucial concern, necessitating continuous monitoring. Various Central and State government agencies are actively involved in the water sector to ensure the safety and quality of water resources. For the monitoring of river water quality in Jammu and Kashmir, the Central Water Commission may play a role, employing mechanisms to assess and manage the quality of water in the rivers.

The chemical quality of ground water in the Union Territory (UT) of Jammu & Kashmir has been evaluated on the basis of 642 number of water samples (214 for basic, 214 for Uranium and 214 for Arsenic) collected from shallow aquifers during pre-monsoon season in month of May-June, 2020 (CGWB 2022). All the collected samples were analysed by adopting standard methods of analysis from APHA.

The chemical quality of the exploratory wells drilled during the year 2021-22 was analysed to assess the deeper aquifer water quality. Total 19 samples were received in the chemical lab. The samples were analysed for basic parameters and uranium. All the samples were found within the permissible limit prescribed by the BIS.

4.3.2. Issues and Challenges

- Unpredictable monsoons and reduced groundwater recharge contribute to water scarcity.
- Industrial, agricultural, and urban activities contribute to water pollution.
- Over-extraction of groundwater and depletion of water beds threaten water availability.
- Geological factors and soil composition contribute natural contaminants to water.
- Limited sampling sites, especially in urban areas, hinder comprehensive water quality monitoring.
- Changing climate patterns affect water quality.

4.3.3. Governance / Management:

i. **Institutions governing / managing / monitoring the resources and Institutional structure:**

- **Government of Jammu and Kashmir Pollution Control committee:** JK-PCB, Jammu, and Kashmir's pollution control committee was established in 1986 under the provision of the Water (Prevention and Control of Pollution) Act, 1974, and Air (Prevention and Control of Pollution) Act, 1981. While it was entrusted with the responsibility of implementation of Environment (Protection) later on September 22, 1988.

JK-PCB is an authority responsible to uniformly implement the environmental laws throughout the country to prevent and control the environmental issues for the health and safety of the human beings, flora and fauna, including to control or prevent environmental degradation.

4.3.4. Annexure- Water Quality

Table 4.91 Water Quality of Tributary Streams Chunt Kol, Gawkadal, Jhelum, Banganga, Basanter, Chenab, Devak, Lidder, Sindh, Tawi & Ujh In Jammu & Kashmir – 2013

Stn Code	Location	Temperature (°C)		D.O (Mg/L)		Ph		Conductivity (Umhos/Cm		Bod (Mg/L)		Nitrate + Nitrite (Mg/L)		Fecal Coliform (Mpn/100 Ml)		Total Coliform (Mpn/ 100ml)	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1307	Chunt Kol * (Maulana Azad Bridge), J&K	4	6	3.1	3.8	7.2	7.4	462	469	-	-	0.72	1.03	-	-	-	-
1306	Gawkadal, Srg *(Sherghari, Srg), J&K	2	4	7.7	7.8	7.5	7.6	232	500	-	-	1.59	2.08	-	-	-	-
1304	Jhelam at Anantnag D/S, J&K	2	7	7.6	7.9	7.5	7.9	299	425	-	-	0.38	0.45	-	-	-	-
3274	Jhelum at Awantipora	1	4	8.4	9	7.8	7.9	244	379	-	-	0.72	1.05	-	-	-	-
3275	Jhelum at Pampore	1	6	7.9	8	7.8	7.9	249	381	-	-	0.51	1.56	-	-	-	-
2755	Banganga (Bathing Ghat), Katra, J&K	10	24	6.2	8.4	7.4	8.2	290	540	2	9	0.03	1.48	-	-	-	-
2756	Banganga (In Front Of Pony Shed Near Reasi Bridge) Katra, J&K	11	26	5.5	9	7.7	8.1	108	658	2.6	19	0.26	1.59	-	-	-	-
2752	Basanter at Samba (Below NH-1a Bridge), Basantar Us (R.H.S), J&K	16	27	7.6	9.3	7.8	8.5	272	300	1.2	3	0.064	0.09	-	-	-	-

2753	Basanter at Samba (at Chak Manga Gujjar Basantar) D/S(R.H.S.), J&K	16	27	6.4	7.8	6.8	7.8	260	330	2.4	6	0.51	1.23	-	-	-	-
2748	Chenab at L.H.S. (Below Bridge Chenab), J&K	9	18	7.4	10.5	7.2	7.8	120	260	0	1	0.011	0.03	-	-	-	-
2749	Chenab at Blind Curve Shamshan Ghat (1.5 Km U/S From Spot), J&K	9	18	7.5	9.5	7.1	7.8	122	251	0	1.2	0.06	1.09	-	-	-	-
2750	Chenab at Chadra Gaon View Point (4 Km U/S From Spot), J&K	9	18	7.5	9.5	7	7.8	124	254	0	0	0.02	0.06	-	-	-	-
2751	Chenab at Jal Patan Mandir After Meeting With Main Drain Of Akhnoor City (1.5 Kmd/S From Spot, J&K	9	18	6.8	8.6	7.2	8.2	126	265	1.8	5	0.041	0.06	-	-	-	-
2754	Devak Udhampur (Near Shiv Mandird/S) L.H.S., J&K	16	31	2.6	6.5	6.6	7.5	410	594	22	37	0.212	1.23	-	-	-	-
2757	Devak at Utterbehni, J&K	14	25	5.4	6.7	6.9	7.9	252	422	3.6	5.3	0.002	1.22	-	-	-	-

2742	Tawi at Shetali Lifting Point Nagrota (5km U/S Tawi Bridge), J&K	12	26	7.6	9.8	7.3	8.5	135	264	1.3	1.3	0.026	0.05	-	-	-	-
2743	Tawi at Bagh-E-Bahu Lifting Point (1 Km U/S Tawi Bridge, J&K	12	26	7.8	9.7	7.5	8.4	142	256	1.8	2.1	0.044	0.06	-	-	-	-
2744	Tawi at Below Tawi Bridge, J&K	14	26	5.5	8.5	7.7	8.7	120	292	2.5	8	0.055	1.06	-	-	-	-
2746	Tawi at Belicharana (4km D/S Tawi Bridge), J&K	14	14	8.4	8.4	8	8	266	266	2.2	2.2	0.04	0.06	-	-	-	-
2747	Tawi at Surajpur Chatha (10 Km D/S Tawi Bridge) Below Bridge Near Chatha Msw Dumping Site, J&K	14	14	8.4	8.4	7.9	7.9	280	280	2.1	2.1	0.03	0.07	-	-	-	-
2758	Ujh at Dam Site (L.H.S.), Kathua, J&K	13	26	8.2	10	7.5	7.5	230	273	0	0	0.01	0.03	-	-	-	-

Table 4.92 Water Quality Of Lakes & Ponds In Jammu & Kashmir- 2013

Stn Code	Monitoring Location	Temperature (°C)		Dissolved O_2 (Mg/L)		Ph		Conductivity (Umhos/Cm)		Bod (Mg/L)		Nitrate + Nitrite (Mg/L)		Fecal Coliform (Mpn/100 Ml)		Total Coliform (Mpn/ 100ml)	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1309	Dal Lake at Srinagar, J&K	1	5	7.8	8.2	7.8	7.8	322	381			0.46	1.22	-	-	-	-
2738	Mid Point (Mansar Lake), J&K	14	27	7.6	9.4	7.1	8.2	138	284	3.3	11.5	0.62	1.24				
2739	Point Of Discharge Of Waste Water From Different Establishments Near Nag Temple, J&K	14	27	6.6	7.2	7.1	7.4	140	238	3.8	9	0.35	1.66				
2740	Mid Point (Surinsar Lake), J&K	15	26	6.6	7.6	8.2	8.4	134	182	20	28	0.28	1.03				
2741	Point Of Discharge Of Waste Water From Different Establishments, J&K	15	26	6.1	7.6	8.2	9.1	132	190	22	32	0.42	2.99				
3251	Dal Lake at Dalgate	1	6	5.3	7.3	7.6	7.6	201	219			0.21	2.33				
3253	Dal Lake Near Nishat Lam	1	1	7.4	7.4	7.3	7.3	511	511			0.89	1.88				
3256	Dal Lake at Entry Point Of Talibal Nallah	2	2	8	8	7.6	7.6	628	628			0.68	1.02				
3257	Dal Lake at Habak	1	1	6.2	6.2	7.4	7.4	686	686			1.44	2.33				
3258	Dal Lake at Hazratbal	2	2	6.1	6.1	7.3	7.3	803	803			1.92	3				
3259	Dal Lake at Dhobighat	1	1			7.8	7.8	642	642			2.56	3				
3261	Dal Lake at Nishat, Water Intake Point Of Nishat Water Treatment Plant	1	1	7.3	7.3	7.8	7.8	443	443			0.88	1				

3262	Dal Lake at Nigeen, Water Intake Pt Of Pokhribal Water Treatment Plant	1	6	5.6	6.8	7.5	7.9	265	272			0.40	1				
2759	Dugwell at Gaghwal (Kathua Distt), J&K	14	27			6.4	6.8	460	487			0.42	1.03				
2760	Maladhar Talab(Pond)Hatli (Kathua), J&K	13	28			6.2	6.8	312	320			0.65	1				
2761	Tube Well Kathua Sicop Industrial Area Kathua, J&K	12	28			6.2	6.2	92	92			0.91	1				
2762	R.S. Pura Tehsil, Jammu, J&K	11	26			8.1	8.5	1800	2000			2.4	2.66				

Table 4.93 Water Quality Of Tributary Streams Chunt Kol, Gawkadal, Jhelum, Banganga, Basanter, Chenab, Devak, Lidder, Sindh, Tawi & Ujh In Jammu & Kashmir - 2014

Stn Code	Monitoring Location	Temperature (°C)		Dissolved O2 (Mg/L)		Ph		Conductivity (Umhos/Cm)		Bod (Mg/L)		Nitrate + Nitrite (Mg/L)		Fecal Coliform (Mpn/100 Ml)		Total Coliform (Mpn/ 100ml)	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1307	Chunt Kol * (Maulana Azad Bridge), J&K	4	20	4.5	9.4	7	8.1	166	250	3	5.8	0.8	1.2				
1306	Gawkadal, Srg *(Sherghari, Srg),J&K	3	18	6	8.5	7.1	7.9	75	216	1.5	3	0.5	1.2				
1304	Jhelam at Anantnag D/S, J&K	2.5	19	6	7.9	0.8	8	210	445	1	3.5	0	2.34				
3274	Jhelum at Awantipora	2.3	19	6	8.4	7.1	8	140	381	1.2	2.4	0	3.2				
3275	Jhelum at Pampore	1	19	6.1	8.6	7.4	8.4	134	381	1	3.5	0	1.3				
3278	Lidder Nallah at Laripora	2	14.8	7.8	8.9	7.3	8.3	78	151	1	1.3	0.2	1.7				
3279	Lidder Nallah at Club Park	2	14	7.5	9.9	7.4	8.2	76	139	1	1.8	0.4	0.9				
3280	Lidder Nallah at Bus Adda	2	14	8.4	9.6	7.7	8.3	81	141	1	3.1	0.1	1				

3281	Lidder Nallah at Yaneer, D/S Of Phalgum	2	13.5	8	9.2	7.7	8.2	57	104	1	1.5	0.6	2.3				
3283	Sindh at Sonamarg U/S	8	13	8.7	9.1	8.0	8.2	120	175			0.5	0.8				
3284	Sindh at Sonamarg D/S	8.2	13	8.8	9.2	7.9	8.2	130	335			0.6	1.2				
3285	Sindh at Wail Bridge	4	14.2	7	9.2	7.2	8.1	110	158	1	1.2	0.3	1				

Table 4.94 Water Quality Of Lakes & Ponds In Jammu & Kashmir – 2014

Stn Code	**Monitoring Location**	**Temperature (°C)**		**Dissolved O2 (Mg/L)**		**Ph**		**Conductivity (Umhos/Cm)**		**Bod (Mg/L)**		**Nitrate + Nitrite (Mg/L)**		**Fecal Coliform (Mpn/100 Ml)**		**Total Coliform (Mpn/ 100ml)**	
		Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
1309	Dal Lake at Srinagar, J&K	6	22	5	9.3	7	8.1	106	326	1.9	2.6	0.3	3.4				
3262	Dal Lake at Nigeen, Water Intake Pt Of Pokhribal Water Treatment Plant	6.5	25.3	4.8	9.8	7.6	8.6	158	442	2.7	5.6	0.5	2.3				

Table 4.95 Water Quality Of Lake In Jammu & Kashmir-2015.

Stn Code	**Monitoring Location**	**Temperature (°C)**		**Dissolved O2 (Mg/L)**		**Ph**		**Conductivity (Umhos/Cm)**		**Bod (Mg/L)**		**Nitrate + Nitrite (Mg/L)**		**Fecal Coliform (Mpn/100 Ml)**		**Total Coliform (Mpn/ 100ml)**	
		Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
1309	Dal Lake at Srinagar, J&K	5.5	26	5	8.3	7	8.9	112	235	1	2	0	0				
2738	Mid Point (Mansar Lake), J&K	13	24	9	9.2	7	8.2	140	275	4	8	0	0.5				

2739	Point Of Discharge Of Waste Water From Different Establishments Near Nag Temple, J&K	15	26	6	8.3	7	7.4	152	277	6	11	0	0.8				
2740	Mid Point (Surinsar Lake), J&K	15	25	7	7.6	8	8.4	152	179	12	20	0	1.5				
2741	Point Of Discharge Of Waste Water From Different Establishments, J&K	15	25	6	7.4	8	9	156	186	15	24	0	1.4				
3251	Dal Lake at Dalgate	6	27	5	8	7	9	110	239	1	2	0	0				
3252	Dal Lake at Chairchinari	6	17	6	8.1	7	8.2	132	210	0	1.8	0	0				
3253	Dal Lake Near Nishat Lam	7	25	4	8	8	9	110	443	1	4.2	0	0				
3254	Dal Lake at Abikarpondra	6	19	6	7	7	8.4	141	230	1	2	0	0				
3256	Dal Lake at Entry Point Of Talibal Nallah	8.5	25	6	8.6	7	9.5	85	494	1	2	0	0				
3257	Dal Lake at Habak	8	25	4	12	7	8.5	140	534	1	4.2	0	0				
3258	Dal Lake at Hazratbal	4.2	25	6	9.4	7	9	204	596	1	5.5	0	0				
3259	Dal Lake at Dhobighat	7.5	26	5	8.6	7	8.4	107	559	2	4.6	0	0				
3260	Dal Lake at Sonalank	7	19	6	7.2	7	8.3	141	230	1	2	0	0				
3261	Dal Lake at Nishat, Water Intake Point Of Nishat Water Treatment Plant	6.5	25	4	8.4	7	9.4	125	338	1	4.1	0	0				
3262	Dal Lake at Nigeen, Water Intake Pt Of Pondkhribal Water Treatment Plant	6	28	6	9.2	7	8.9	164	477	1	3.5	0	0				

Table 4.96 Water Quality Of Ground Water In Jammu & Kashmir – 2015.

Stn Code	Monitoring Location	Temperature (°C)		Ph		Conductivity (Umhos/Cm		Bod (Mg/L)		Nitrate + Nitrite (Mg/L)		Fecal Coliform (Mpn/100 Ml)		Total Coliform (Mpn/ 100ml)	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
2759	Dugwell at Gaghwal (Kathua Distt), J&K	20	20	7	6.8	455	455			0.4	0.4				
2760	Maladhar Talab(Po)Hatli (Kathua), J&K	20	20	7	6.7	310	310			0.6	0.6				
2761	Tube Well Kathua Sicop Industrial Area Kathua, J&K	22	22	6	6.1	90	90			0.8	0.8				
2762	R.S. Pura Tehsil, Jammu,J&K	24	24	8	8.2	1600	1600	55	55	2.3	2.3				

Table 4.97 Water Quality Of Tributary, Streams - Banganga, Basanter, Chenab, Devak, Lidder Nallah, Sindh, Tawi & Ujh In Jammu & Kashmir – 2015.

Stn Code	Monitoring Location	Temperature (°C)		Dissolved O_2 (Mg/L)		Ph		Conductivity (Umhos/Cm)		Bod (Mg/L)		Nitrate + Nitrite (Mg/L)		Fecal Coliform (Mpn/100 Ml)		Total Coliform (Mpn/ 100ml)	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1307	Chunt Kol (Maulana Azad Bridge), J&K	2	19.8	4	6.5	7	8.5	174	259	4.1	6						
1306	Gawkadal, Srg (Sherghari, Srg), J&K	2	19	6.5	8.3	7.1	8.2	90	234	1	3						
1304	Jhelam at Anantnag D/S, J&K	7.5	19	5.1	8.8	7.4	8.1	165	356	1.2	3						

1410	Jhelam at Dalagate (Inlet), Srinagar, J&K	3.4	19.2	5.7	8.1	7.4	8.2	120	320	1	3						
1411	Jhelam at Chattabal Weir (Outlet), J&K	5	20	6.3	7.1	7.2	8.3	123	231	1	2.3						
3272	River Jhelum at Verinag	3	18	5.8	6.8	7.5	7.8	100	160	0.5	1.2						
3273	River Jhelum at Sangam, Confluence Point Of Vishav Nalla	6	19.2	5.8	8.5	7.1	8.2	140	320	1	2.4						
3276	River Jhelum Atspore, Confluence Point Of Wular Lake	1	16.5	6	7.4	7	8.2	241	495	1	3.4						
3277	River Jhelum Atbaramulla D/S	2	17	6	7.6	7.2	8.2	156	465	1.7	3						
3274	River Jhelum at Awantipora	3.7	19.2	5.8	8.1	7.3	8.1	160	290	1.1	2.7						
3275	River Jhelum at Pampore	3	19.3	6	8.1	7.2	7.9	120	280	1.4	2.6						
2755	Banganga (Bathing Ghat), Katra, J&K	9	24	5.8	7.7	7.2	8.5	310	540	2.4	6	0	0.6				
2756	Banganga (In Front Of Pony Shed Near Reasi Bridge) Katra,J&K	9	24	5.8	8.2	7.5	8.5	300	540	2.2	6	0.2	0.3				
2752	Samba (Below Nh-1a Bridge), Basantar Us (R.H.S), J&K	14	24	7.7	8.6	7.8	8	4	270	2.5	3	0.1	0.3				
2753	Samba (at Chak Manga Gujjar Basantar) D/S(R.H.S.), J&K	14	24	6.3	8.2	7.2	8.1	240	336	2.1	6	0.1	0.5				

2748	Chenab at L.H.S. (Below Bridge Chenab), J&K	8	16	8.7	9.7	7.2	8.6	120	237	0	1	0	0.1				
2749	Bli Curve Shamshan Ghat (1.5 Km U/S From Spot), J&K	8	16	8.3	9.6	7.1	8.5	120	214	0	1	0	0				
2750	Chadra Gaon View Point (4 Km U/S From Spot), J&K	8	16	8.8	9.6	7.1	8.4	122	245	0	1	0	0.1				
2751	Jal Patan Mair After Meeting With Main Drain Of Akhnoor City (1.5 Kmd/S From Spot, J&K	9	16	6.6	8.2	7.3	7.4	126	237	1.5	6	0.1	0.4				
2754	River Devak Udhampur (Near Shiv Maird/S) L.H.S., J&K	12	27	3.7	7.1	7.2	7.5	473	600	8	28	0.2	2.6				
2757	River Devak at Utterbehni, J&K	15	25	3.3	8.1	7.2	7.8	255	310	1	3.5	0	0				
3278	Lidder Nallah at Laripora	1	14.4	7.7	9.6	7.3	8.1	91	174	0.6	1.4	0	0				
3279	Lidder Nallah at Club Park	1	14.5	7.7	9.8	7.3	7.9	48	178	0.3	2	0	0				
3280	Lidder Nallah at Bus Adda	1	14.6	6.8	9.8	7.1	8	79	174	0.5	2.2	0	0				
3281	Lidder Nallah at Yaneer, D/S Of Phalgum	2	15	7.8	10	7.2	8	40	120	0.5	1.2	0	0				

3282	Lidder Nallah Nera Bumzoo, Anantnag	2	17	7	8.8	7.3	8.5	97	162	0.8	2	0	0				
3283	River Sindh at Sonamarg U/S	5.8	13.5	7.7	8.9	7.2	8.1	140	280	1	1.4	0	0				
3284	River Sindh at Sonamarg D/S	6.6	13.2	7.2	9.3	7.2	8.2	138	285	0.5	1.2	0	0				
3285	River Sindh at Wail Bridge	1	14.7	6.7	9.2	7.1	8.1	78	234	0.5	1.7	0	0				
3286	River Sindh at Duderhama	1	15	6.8	8.5	7	8.3	76	275	1	2	0	0				
3287	River Sindh at Rangil, Srinagar	2	14	6.7	9.1	7.2	8.1	87	271	0.6	1.9	0	0				
2742	Shetali Lifting Point Nagrota (5km U/S Tawi Bridge), J&K	11	24	7.7	9.2	7.3	7.8	132	256	1	1.5	0	0.1				
2743	Bagh-E-Bahu Lifting Point (1 Km U/S Tawi Bridge), J&K	10	24	7.5	8.8	7.6	7.8	144	253	1	1.5	0	0.1				
2744	Below Tawi Bridge, J&K	13	24	7	7.4	7.6	8	116	275	3.2	5.6	0	0.6				
2746	Belicharana (4km D/S Tawi Bridge), J&K	20	24	8.2	8.2	8	8	246	260	1.7	2.1	0	0				
2745	Baghwati Nagar (2km D/S Tawi Bridge), J&K	14	24	6.5	6.6	7.7	8	230	260	3.9	7	0	0.7				
2747	Surajpur Chatha (10 Km D/S Tawi Bridge) Below Bridge Near Chatha Msw Dumping Site, J&K	20	24	8.2	8.2	7.8	7.8	274	276	1.6	1.8	0	0				

2758	River Ujh at Dam Site(L.H.S.),Kathua, J&K	13	25	8.4	9.3	7.2	8.1	230	266	0	1	0	0.6				

Table 4.98 Water Quality of ground water in Jammu and Kashmir – 2016

Stn Code	Station Name	Temperature (°C)		Ph		Conductivity (Umhos/Cm		Bod (Mg/L)		Nitrate + Nitrite (Mg/L)		Fecal Coliform (Mpn/100 Ml)		Total Coliform (Mpn/ 100ml)	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
2759	Dug Well at Gaghwal (Kathua Distt.)	16	16	7	7	450	450			0.4	0.4				
2760	Maladhar Talab (Pond)Hatli (Kathua)	16	16	6.7	6.7	306	306			0.6	0.6				
2761	Tube Well Kathua Sicop Industrial Area Kathua	17	17	7.2	7.2	88	88			0.8	0.8				
2762	Gharana Wetland, R.S.Pura	19	19	8.1	8.1	1542	1542	50	50	2.2	2.2				
3288	Ground Water at Iqbal Park	16	16	7.4	7.4	680	680	1.5	1.5	0	0				
3290	Ground Water at Zanakot (I)	15	15	7.4	7.4	1032	1032	1.3	1.3	0	0				
3291	Ground Water at Zanakot (Ii)	15.4	15.4	7.4	7.4	1001	1001	1.2	1.2	0	0				
3292	Ground Water at Sadakadal	16	16	7.5	7.5	505	505	1	1	0	0				

Table 4.99 Water quality of Lakes in Jammu and Kashmir – 2016

Stn Code	Monitoring Location	Temperature (°C)		Dissolved O2 (Mg/L)		Ph		Conductivity (Umhos/Cm)		Bod (Mg/L)		Nitrate + Nitrite (Mg/L)		Fecal Coliform (Mpn/100 Ml)		Total Coliform (Mpn/ 100ml)	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
2738	Midpoint Mansar Lake	13	24	7.3	8.7	7.5	8.1	142	250	2.9	7	0.1	0.7				
2739	Mansar Lake, Point of Discharge of Wastewater From Different, Establishment	13	24	6.5	7.4	7.2	8.1	145	275	5.3	10	0.1	0.7				
2740	Mansar Lake, Near Shamshan Ghat/ Residential Area	14	22	6.3	7.6	7.3	8.1	132	161	10	18	0.2	1.4				
2741	Surinsar Lake, Point Of Discharge Of Waste Water	14	25	6	7.2	7.9	8.2	136	184	14	21	0.4	1.4				
1309	Dal Lake at Srinagar	5.7	23.5	6	9.1	7.6	9	121	238	2	4	0	0				
3251	Dal Lake at Dalgate	5.9	23	4.2	9.3	7.2	8.8	146	284	2	5	0	0				
3252	Dal Lake at Chairchinari	5.5	25.9	6.2	9	7.6	8.5	125	250	1	0	0	0				
3253	Dal Lake Near Nishat Lam	5.7	23.3	4	9.4	7.5	8.5	131	395	4	0	0	0				
3254	Dal Lake at Abikarpora	5.6	25.5	5	8.8	7	7.8	130	246	1	0	0	0				
3256	Dal Lake at Entry Point Of Talibal Nallah	7.4	26.6	5.3	9.5	7.7	8.1	106	461	2	0	0	0				
3257	Dal Lake at Habak	6.1	23.1	4	9.1	7.4	7.9	197	695	4	0	0	0				
3258	Dal Lake at Hazratbal	6.7	27.7	4.8	9.7	7.6	8	232	508	4	0	0	0				
3259	Dal Lake at Dhobighat	5.9	24.6	6.5	9.6	7.4	8	28	458	3.8	0	0	0				
3260	Dal Lake at Sonalank	5.8	25	6.3	8.8	7	7.9	120	280	1.5	0	0	0				

3261	Dal Lake at Nishat, Water Ntake Point Of Nishat Water Treatment Plant	5.1	24.1	6	9.6	7.7	8.5	123	290	2.5	0	0	0				
3262	Dal Lake at Nigeen, Water Ntake Pt of Pokhribal Water Treatment Plant	6.5	25.2	5.7	9.2	7.1	8.9	186	394	2	4	0	0				
3263	Wular Lake at Ningli Nallah	5	15.2	7	8.8	7	7.8	140	165	1.2	3	0	0				
3264	Wular Lake at Watlab	6	16	7.3	8.9	7.2	7.9	132	169	2	3.1	0	0				
3265	Wular Lake Atkanibath	5	16.2	7.1	8.8	7.5	8	115	150	2.5	3.2	0	0				
3266	Wular Lake at Entry Pt Of Erin Nallah	6	16.5	6.2	7.6	7	7.9	112	180	1.4	3.8	0	0				

Table 4.100 Water Quality of Tributary, Stream In Jammu Kashmir – 2016

Stn Code	**Monitoring Location**	**Temperature (°C)**		**Dissolved O_2 (Mg/L)**		**Ph**		**Conductivity (Umhos/Cm)**		**Bod (Mg/L)**		**Nitrate + Nitrite (Mg/L)**		**Fecal Coliform (Mpn/100 Ml)**		**Total Coliform (Mpn/ 100ml)**	
		Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
1306	Gawkadal, Srg (Sherghari,Srg)	6	24	5.4	8.5	7.1	8	124	580	2.5	9	0	0				
1304	Jhelam D/S Anantnag	8	14	6.4	8.4	7.4	8.3	187	606	2	2.6	0	0				
1410	Jhelam at Dalagate (Inlet), Srinagar	7	23	4.6	8.3	7.4	8.1	138	578	2	4	0	0				
1411	Jhelam at Chattabal Weir (Outlet)	7	25	5.2	8.5	7.4	8.1	124	550	2	4.7	0	0				
3272	Jhelum at Verinag	7	14	7	9	7.1	8	191	310	0.4	0.8	0	0				
3273	Jhelum at Sangam, Confluence Point Of Vishav Nallah	8.1	15	5.4	9.2	6.5	8.1	134	493	1	2.7	0	0				

3274	Jhelum at Awantipora	8.2	14	6.9	9.5	7	8	151	547	1.6	2.7	0	0						
3275	Jhelum at Pampore	8.1	15	5.6	8.5	7.4	7.9	144	559	1	2.9	0	0						
3276	Jhelum Atspore, Confluence Point Of Wular Lake	6	16	6.8	8.9	7	7.9	136	520	2	3	0	0						
3277	Jhelum D/S Atbaramulla	6	16	7	8.8	7	7.9	139	525	2.5	3.2	0	0						
3278	Lidder Nallah at Laripora	5.4	8.8	8.7	10.1	7.2	8	109	374	0.6	1	0	0						
3279	Lidder Nallah at Club Park	5.5	8.9	7	9.4	7.6	8.1	116	374	0.6	1	0	0						
3280	Lidder Nallah at Bus Adda	5.4	8.6	7.8	10.1	7.4	7.9	133	367	1	1.4	0	0						
3281	Lidder Nallah at Yaneer, D/S Of Phalgum	5.3	11	5.7	10	7.1	8.1	68	383	0.6	1	0	0						
3282	Lidder Nallah Nera Bumzoo, Anantnag	6	12	7.8	10.8	7.2	7.9	90	342	0.6	1	0	0						
3283	Sindh U/S Sonamarg	4.5	9	8	8.9	7.5	8.5	152	283	0.5	0.6	0	0						
3284	Sindh D/S Sonamarg	4.5	8	8.1	8.7	7.5	8.3	141	290	0.6	0.7	0	0						
3285	Sindh at Wail Bridge	4.7	9	8	10.9	7.4	8.5	113	373	0.5	1.2	0	0						
3286	Sindh at Duderhama	4.9	10	8.5	9.7	7.6	8.1	135	438	1	2	0	0						
3287	Sindh at Rangil, Srinagar	4.1	10	8.2	10.3	7.4	8.3	128	435	0.5	2	0	0						
2755	Banganga (Bathing Ghat), Katra	8.9	25	5.6	7.6	7.8	8.2	316	530	2.1	4	0	5						
2756	Banganga (In Front Of Pony Shed Near Reasi Bridge) Katra	8.8	26	5.6	8.1	7.8	8.1	304	523	2.1	6	0.1	7.8						
2752	Samba (Below Nh-1a Bridge) Basantar Us (R.H.S.)	13	29	7.2	8.1	7.8	8.2	240	290	2.4	5	0.1	0.3						
2753	Samba (at Chak Manga Gujjar) Basantar D/S (R.H.S)	15	29	6.5	8.1	7.2	8.3	232	260	2	6	0	0.5						
2748	Chenab, L.H.S. (Below Bridge Chenab)	9	16	6.6	9.2	7.6	8.1	112	190	0	0	0	1						

2749	Chenab, Blind Curve, Shamshan Ghat	9	16	7	9.4	7.5	8.2	114	194	0	2.8	0	0.9				
2750	Chenab, Chadra Gaon View Point	9	16	7.2	9.4	7.5	8	115	185	0	0	0	0.3				
2751	Chenab, Jai Patan Mandir After Meeting With Main Drain Of Akhnoor City	9	17	8	8.2	7.3	7.8	120	185	1.3	5	0.1	0.7				
2754	Devak Udhampur (Near Shiv Mandir), L.H.S.	11	27	4.2	6.8	7.2	7.9	460	542	8.2	22	0.2	4.1				
2757	Devak at Utterbehni.	12	28	3.1	8	7.8	8.1	250	320	3.2	3.4	0	5.7				
2743	Tawi,U/S Tawi Brudge, Bagh – E-Bahu Lifting Point	16	24	6.3	8.5	7.6	8	142	251	1	2.2	0	0.1				
2744	Tawi, Below Tawi Bridge	15	24	7.1	7.3	7.5	7.8	114	277	3.1	3.1	0	0.1				
2746	Tawi,D/S Tawibridge , Belicharana	16	24	7.8	8.1	8	8	255	256	2	6.8	0	0.2				
2742	U/S Tawi Bridge Sheetli Lifting, Point, , Nagrota	16	24	6.5	8.6	7.3	7.8	130	254	1.2	1.2	0	0.1				
2758	Ujh at Dam Site	12	28	7.8	9.1	7.1	8.1	226	260	0	0	0	0.6				

Table 4.101 Water Quality of Lakes In Jammu & Kashmir – 2017.

Stn Code	Monitoring Location	Temperature (°C)		Dissolved O_2 (Mg/L)		Ph		Conductivity (Umhos/Cm)		Bod (Mg/L)		Nitrate + Nitrite (Mg/L)		Fecal Coliform (Mpn/100 Ml)		Total Coliform (Mpn/ 100ml)	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1309	Dal Lake at Srinagar, J&K	3.6	27.0	5.2	10.0	7.2	8.5	112	231	1.0	2.1						
2738	Mid Point (Mansar Lake), J&K	10.0	26.0	6.9	8.6	7.3	8.0	154	264	2.3	6.0	0.01	0.54				
2739	Point of Discharge Of Waste Water From Different Establishments Near Nag Temple, J&K	10.0	26.0	6.1	8.0	7.6	8.1	156	270	2.4	8.0	0.11	0.79				
2740	Mid Point (Surinsar Lake), J&K	9.0	27.0	6.4	9.5	7.4	8.2	156	258	9.0	13.0	0.02	1.00				
2741	Point of Discharge Of Waste Water From Different Establishments, J&K	9.0	27.0	6.2	9.1	7.7	8.3	145	262	6.0	21.0	0.02	1.20				
3251	Dal Lake at Dalgate	3.2	27.8	2.0	8.4	7.1	8.1	110	368	1.1	4.8						
3252	Dal Lake at Chairchinari	3.5	27.0	5.7	10.2	7.4	8.4	114	250	1.0	2.5						
3253	Dal Lake Near Nishat Lam	2.5	29.0	2.2	10.0	7.2	8.7	119	496	3.8	6.3						
3254	Dal Lake at Abikarpora	3.5	28.0	6.5	10.9	7.3	8.7	120	236	1.0	2.8						
3256	Dal Lake at Entry Point Of Talibal Nallah	7.5	28.0	5.0	11.0	7.2	8.2	119	407	1.3	5.3						

3257	Dal Lake at Habak	5.2	28.0	4.8	10.8	7.2	7.9	239	440	3.5	10.4						
3258	Dal Lake at Hazratbal	6.0	28.0	5.0	13.2	7.2	8.6	188	464	3.0	6.6						
3259	Dal Lake at Dhobighat	5.4	28.0	4.5	11.7	7.2	8.7	168	352	2.0	6.5						
3260	Dal Lake at Sonalank	3.3	28.0	6.2	10.5	7.4	8.3	130	342	1.0	3.0						
3261	Dal Lake at Nishat, Water Intake Point Of Nishat Water Treatment Plant	4.4	28.0	5.1	11.0	7.3	8.6	103	235	1.0	3.5						
3262	Dal Lake at Nigeen, Water Intake Pt Of Pokhribal Water Treatment Plant	4.8	29.0	5.6	11.2	7.3	8.9	117	303	1.4	3.3						
3263	Wular Lake at Ningli Nallah	6.5	23.3	3.6	9.5	7.6	8.0	110	282	1.3	2.6						
3264	Wular Lake at Watlab	6.0	24.6	2.0	10.4	7.5	7.8	120	300	2.0	4.1						
3265	Wular Lake Atkanibath	6.0	23.0	3.0	9.6	7.4	8.0	115	230	1.6	6.1						
3266	Wular Lake at Entry Pt Of Erin Nallah	5.8	27.6	4.3	8.6	7.4	8.0	120	240	1.8	4.7						

Table 4.102 Water Quality of Tributary Streams Chunt Kol, Gawkadal, Jhelum, Lidder Nallah & Sindh In Jammu & Kashmir – 2017.

Stn Code	Monitoring Location	Temperature (°C)		Dissolved O_2 (Mg/L)		Ph		Conductivity (Umhos/Cm)		Bod (Mg/L)		Nitrate + Nitrite (Mg/L)		Fecal Coliform (Mpn/100 Ml)		Total Coliform (Mpn/ 100ml)	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1307	Chunt Kol (Maulana Azad Bridge)	6.4	24	1.1	8.5	7	7.9	163	428	2.3	14.5						
1306	Gawkadal, Srg (Sherghari, Srg)	6.5	23.1	5.6	9.4	7.2	8.1	132	313	1.5	6						
1304	Jhelam at Anantnag D/S	5.2	22.5	6.1	9.2	7.3	8.2	165	352	1.3	3.5						
3274	Jhelum River at Awantipora	3.9	22.8	6	8.9	7.2	8.3	124	281	1.2	3.3						
3275	Jhelum River at Pampore	3.5	22.5	5	9.1	7.1	8.5	110	284	1.4	3.2						
1410	Jhelam at Dalagate (Inlet), Srinagar	7.1	23	4.8	8.3	7	8.7	124	305	1.5	4.5						
1411	Jhelam at Chattabal Weir (Outlet	5.3	22.1	4.3	8.9	7.1	7.8	124	298	1.5	5.5						
2755	Banganga (Bathing Ghat), Katra,	13	28	5.1	7.6	7.9	8.3	290	590	2	14						
2756	Banganga (In Front Of Pony Shed Near Reasi Bridge) Katra	13	28	4.8	8.4	7.6	8.3	305	766	2.1	5	0.2	7.8				
2752	Basanter Us (R.H.S) Samba (Below Nh1a Bridge),	15	26	6.6	8.9	8	8.6	268	420	2	2.9	0.2	0.1				
2753	Basanter) D/S(R.H.S.) Samba (at Chak Manga Gujjar	15	26	6.4	8.3	7.8	8.1	238	530	1.9	4	0.2	0.4				
2748	Chenab at L.H.S. (Below Bridge Chenab)	11	16	7.2	8.2	7.4	8	116	180	0.8	2.8	0.2	0.7				

2749	Chenab at Blind Curve Shamshan Ghat (1.5 Km U/S From Spot)	11	16	8	9.5	7.4	8.1	116	184	0.8	2.7	0.2	0.6				
2750	Chenab River at Chadra Gaon View Point (4 Km U/S From Spot)	11	16	8.1	9.8	7.4	8	118	182	0.8	1	0.2	0.6				
2751	Chenab at Jal Patan Mandir After Meeting with Main Drain Of Akhnoor City (1.5 Kmd/S From Spot)	11	17	8	9.5	7.3	8	122	180	1.2	3.1	0.2	0.6				
2754	Devak Riverudhampur (Near Shiv Mandird/S) L.H.S.	13	26	4.5	8	7.6	8.4	350	510	8	10	0.1	4				
2757	Devak River at Utterbehn	11	26	7.2	8	7.8	8.1	304	476	1	3.3	0.1	5.7				
2742	Tawi at Shetali Lifting Point Nagrota (5km U/S Tawi Bridge)	17	26	7	6.9	7.7	8.2	188	216	1.1	1.2	0.1	0.1				
2743	Tawi at Baghebahu Lifting Point (1 Km U/S Tawi Bridge)	17	26	7.3	8.6	8	8.2	176	248	0.9	1.3	0.2	0.3				
2744	Tawi Below Tawi Bridge	14	26	6.2	8.2	8	8.5	260	290	2.1	8.3	0.2	7.3				
2745	Tawi Baghwati Nagar (2km D/S Tawi Bridge	26	26	6.7	7.6	8.2	8.2	268	268	5.3	5.3	0.6	0.6				
2746	Tawi at Belicharana (4km D/S Tawi Bridge)	14	26	7.3	6.7	7.6	8.5	154	280	1.3	6.7	0.2	0.2				
2747	Tawi at Surajpur Chatha (10 Km D/S Tawi Bridge) Below Bridge Near Chatha Msw Dumping Site, J&K	14	26	7	8.3	7.4	8.4	160	260	1.4	4.9	0.2	0.1				

2758	Ujh River at Dam Site(L.H.S.), Kathua	12	26	8	9.1	7.9	8.5	158	320	0.7	1						
3272	Jhelum River at Verinag	8	15	6.4	7.5	7.3	7.8	100	299	0.4	1						
3273	Jhelum River at Sangam, Confluence Point Of Vishav Nallah	5.2	23.2	5.7	8.8	7.3	8.1	114	260	1.2	3						
3276	Jhelum River Atspore, Confluence Point Of Wular Lake	5.6	22	6	9.7	7.2	8.2	130	256	1.4	3						
3277	Jhelum River Atbaramulla D/S	5.6	23	6.2	8.9	7.5	8.2	145	270	1.8	3.3						
3278	Lidder Nallah at Laripora	2.9	15	7	8.2	7.4	8.6	80	191	0.4	1.2						
3279	Lidder Nallah at Club Park	3.8	15.2	6.8	11.2	7.3	8.5	84	192	0.4	1.2						
3280	Lidder Nallah at Bus Adda	3.4	16.5	6.9	10.7	7.4	8.3	90	243	0.9	2.1						
3281	Lidder Nallah at Yaneer, D/S Of Phalgum	2.5	18.5	7.3	10	7.4	8.1	60	156	0.4	1.1						
3282	Lidder Nallah Nera Bumzoo, Anantnag	6.9	18.2	7.5	11.2	7	8.3	81	205	0.5	1.1						
3283	Sindh River at Sonamarg U/S	3.5	10.5	7.3	11.3	7.5	8.1	112	362	0.4	1.1						
3284	Sindh River at Sonamarg D/S	3.4	11.2	7.6	10.5	7.6	8.3	117	357	0.4	1						
3285	Sindh River t Wail Bridge	2.7	14.8	7.6	10.4	7.3	8.4	98	291	0.5	1						
3286	Sindh River at Duderhama	5.9	17.7	5.9	10.4	7.3	8.1	102	313	1.2	3.7						
3287	Sindh River at Rangil, Srinagar	2.7	14.3	6.5	9.8	7.2	8	131	305	0.4	1.5						

Table 4.103 Water Quality of ground water in Jammu and Kashmir-2017.

Stn Code	Station Name	Temperature (°C)		Ph		Conductivity (Umhos/Cm		Bod (Mg/L)		Nitrate + Nitrite (Mg/L)		Fecal Coliform (Mpn/100 Ml)		Total Coliform (Mpn/ 100ml)	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
2759	Dugwell at Gaghwal (Kathua Distt)	16.0	26.0	7.0	7.2	440	460			0.30	0.31				
2760	Maladhar Talab(Pond)Hatli (Kathua)	22.0	26.0	7.6	8.6	266	380	1.4	14.0	0.02	0.71				
2761	Tube Well Kathua Sicop Industrial Area Kathua	16.0	24.0	7.2	7.5	140	200			0.01	0.82				
2762	R.S. Pura Tehsil, Jammu	20.0	22.0	8.6	8.6	1140	1920	15.0	32.0	0.20	0.43				
3288	Ground Water at Iqbal Park	16.0	16.0	7.1	7.1	569	569	3.0	3.0	0.00	0.00				
3290	Ground Water at Zanakot (I)	15.0	15.0	7.2	7.2	668	668	3.5	3.5	0.00	0.00				
3291	Ground Water at Zanakot (Ii)	15.0	15.0	7.2	7.2	679	679	4.6	4.6	0.00	0.00				
3292	Ground Water at Sadakadal	18.0	18.0	7.3	7.3	917	917	5.0	5.0	0.00	0.00				

Table 4.104 Water Quality of Tributary Streams Ravi, Chunt Khol, in Jammu and Kashmir-2018.

Stn Code	Location	Temperature (°C)		D.O (Mg/L)		Ph		Conductivity (Umhos/Cm		Bod (Mg/L)		Nitrate + Nitrite (Mg/L)		Fecal Coliform (Mpn/100 Ml)		Total Coliform (Mpn/ 100ml)	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1307	Chunt Kol (Maulana Azad Bridge), J&K	9.0	28.0	1.4	6.0	7.3	8.0	273	575	5.0	11.3						

Table 4.105 Water Quality Of Tributary Streams Gawkadal, Jhelum, Lidder Nallah & Sindh In Jammu & Kashmir – 2018

Stn Code	Location	Temperature (°C)		D.O (Mg/L)		Ph		Conductivity (Umhos/Cm		Bod (Mg/L)		Nitrate + Nitrite (Mg/L)		Fecal Coliform (Mpn/100 Ml)		Total Coliform (Mpn/ 100ml)	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1306	Gawkadal, Srg (Sherghari, Srg), J&K	7.0	29.0	4.0	8.2	7.5	8.0	190	359	1.9	4.2						
1304	Jhelum at Anantnag D/S, J&K	9.0	24.0	4.6	9.7	7.5	7.9	219	391	2.0	5.2						
1410	Jhelum at Dalagate (Inlet), Srinagar, J&K	8.0	26.0	4.8	9.3	7.5	8.0	187	332	2.4	3.9						
1411	Jhelum at Chattabal Weir (Outlet), J&K	7.0	25.0	4.7	9.0	7.4	7.9	197	355	1.3	3.8						
3272	River Jhelum at Verinag	10.0	20.0	7.2	9.0	7.4	8.2	193	305	0.4	1.0						
3273	River Jhelum at Sangam, Confluence Point Of Vishav	9.0	24.0	5.1	9.8	7.4	7.7	163	317	2.1	25.4						
3276	Jhelum River Atspore, Confluence Point of Wular Lake	6.0	25.0	4.5	9.0	7.5	8.1	130	343	1.3	2.8						
3277	Jhelum River Atbaramulla D/S	7.0	25.0	4.5	8.8	7.4	8.0	153	340	1.5	3.5						
3274	Jhelum River at Awantipora	9.0	24.0	5.8	9.3	7.2	7.8	161	318	1.6	3.0						
3275	Jhelum River at Pampore	8.0	24.0	4.5	9.5	7.3	7.8	162	341	1.7	2.5						

2755	Banganga (Bathing Ghat), Katra, J&K	14.0	24.0	5.2	7.9	7.8	8.5	390	835	1.8	2.6	0.19	5.82				
2756	Banganga (In Front Of Pony Shed Near Reasi Bridge)	14.0	25.0	4.8	8.0	8.1	8.4	380	692	2.0	5.7	0.26	6.91				
2752	Samba (Below Nh-1a Bridge), Basantar Us (R.H.S)	15.0	27.0	6.2	8.8	8.4	8.8	408	480	1.8	2.2	0.01	2.37				
2753	Samba (at Chak Manga Gujjar Basantar) D/S(R.H.S.),	15.0	27.0	5.0	8.0	7.4	8.4	384	4704	2.4	4.6	0.01	0.14				
2748	L.H.S. (Below Bridge Chenab), J&K	7.0	16.0	8.0	9.0	7.6	7.9	130	219	0.0	1.9	0.01	0.54				
2749	Blind Curve Shamshan Ghat (1.5 Km U/S From Spot),	7.0	16.0	8.0	9.3	7.6	8.0	132	217	0.0	1.8	0.02	0.55				
2750	Chadra Gaon View Point (4 Km U/S From Spot), J&K	7.0	16.0	7.4	9.4	7.5	7.9	130	224	0.0	1.8	0.02	0.67				
2751	Jal Patan Mandir After Meeting With Main Drain	7.0	16.0	6.9	8.3	7.5	8.1	140	224	1.0	2.4	0.03	6.45				
2754	River Devak Udhampur (Near Shiv Mandird/S) L.H.S.	15.0	24.0	5.6	8.3	7.4	8.3	420	630	6.0	10.4	0.04	4.19				
2757	River Devak at Utterbehni, J&K	15.0	24.0	5.6	8.0	7.4	8.1	380	470	1.4	2.2	0.30	4.30				
3278	Lidder Nallah at Laripora	3.0	16.0	7.2	11.0	7.3	8.2	47	243	0.4	0.8						
3279	Lidder Nallah at Club Park	5.0	16.0	7.4	10.8	7.4	8.2	125	230	0.5	1.0						

3280	Lidder Nallah at Bus Adda	4.0	15.0	7.4	11.1	7.3	8.1	132	237	0.7	1.3						
3281	Lidder Nallah at Yaneer, D/S Of Phalgum	3.0	16.0	7.5	10.5	7.4	8.5	76	171	0.5	1.2						
3282	Lidder Nallah Nera Bumzoo, Anantnag	3.0	17.0	7.5	11.0	7.5	8.6	97	227	0.9	1.2						
3283	Sindh River at Sonamarg U/S	4.0	12.0	7.8	10.5	7.4	8.1	245	399	0.4	0.9						
3284	Sindh River at Sonamarg D/S	3.0	12.0	7.8	9.2	7.4	8.1	228	405	0.5	0.9						
3285	Sindh River at Wail Bridge	3.0	16.0	7.2	9.7	7.3	8.2	159	302	0.7	1.3						
3286	Sindh Rive at Duderhama	6.0	26.0	7.3	9.8	7.3	8.1	165	345	1.0	2.0						
3287	Sindh River at Rangil, Srinagar	3.0	17.0	6.5	10.2	7.4	8.4	161	339	0.5	1.6						
2742	Shetali Lifting Point Nagrota (5km U/S Tawi Bridge)	13.0	22.0	6.5	8.2	7.6	8.4	190	380	1.0	1.1	0.01	1.02				
2743	Bagh-E-Bahu Lifting Point (1 Km U/S Tawi Bridge)	14.0	22.0	7.2	9.2	8.0	8.4	220	420	1.0	3.2	0.03	0.08				
2744	Below Tawi Bridge, J&K	14.0	22.0	6.3	7.2	8.3	8.6	280	437	1.7	6.0	0.02	5.53				
2746	Belicharana (4km D/S Tawi Bridge), J&K	15.0	23.0	7.0	7.9	8.0	8.3	260	467	1.2	8.2	0.03	0.45				
2745	Baghwati Nagar (2km D/S Tawi Bridge), J&K	15.0	15.0	8.1	8.1	8.3	8.3	490	490	1.0	1.0	0.04	0.04				
2742	Shetali Lifting Point Nagrota (5km U/S Tawi Bridge)	13.0	22.0	6.5	8.2	7.6	8.4	190	380	1.0	1.1	0.01	1.02				
2743	Bagh-E-Bahu Lifting Point (1 Km U/S Tawi Bridge)	14.0	22.0	7.2	9.2	8.0	8.4	220	420	1.0	3.2	0.03	0.08				

2744	Below Tawi Bridge, J&K	14.0	22.0	6.3	7.2	8.3	8.6	280	437	1.7	6.0	0.02	5.53				
2745	Baghwati Nagar (2km D/S Tawi Bridge), J&K	15.0	15.0	8.1	8.1	8.3	8.3	490	490	1.0	1.0	0.04	0.04				
2746	Belicharana (4km D/S Tawi Bridge), J&K	15.0	23.0	7.0	7.9	8.0	8.3	260	467	1.2	8.2	0.03	0.45				
2747	Surajpur Chatha (10 Km D/S Tawi Bridge) Below Bridge	14.0	23.0	6.8	8.0	7.9	8.3	250	448	1.0	2.6	0.04	0.41				
2758	River Ujh at Dam Site(L.H.S.), Kathua, J&K	10.0	24.0	7.6	8.7	7.6	8.4	187	345	0.8	1.4	0.30	1.03				

Table 4.106 Water Quality of Lakes In Jammu & Kashmir-2018.

Stn Code	Monitoring Location	Temperature (°C)		Dissolved O_2 (Mg/L)		Ph		Conductivity (Umhos/Cm)		Bod (Mg/L)		Nitrate + Nitrite (Mg/L)		Fecal Coliform (Mpn/100 Ml)		Total Coliform (Mpn/ 100ml)	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1309	Dal Lake at Srinagar, J&K	8.4	27.3	3.4	8.3	7.5	8.4	173	266	1.5	4.2						
2738	Mid Point (Mansar Lake), J&K	12.0	28.0	7.5	8.2	7.6	8.1	204	260	1.0	2.5	0.2	0.4				
2739	Point Of Discharge Of Waste Water From Different E	12.0	26.0	4.9	7.9	7.5	8.8	228	285	1.3	4.8	0.2	1.3				
2740	Mid Point (Surinsar Lake), J&K	13.0	28.0	4.5	8.8	7.8	8.2	210	320	3.6	7.0	0.8	2.6				
2741	Point Of Discharge Of Waste Water From Different E	13.0	28.0	4.1	8.5	7.8	8.2	204	340	3.4	8.0	0.7	3.8				

3251	Dal Lake at Dalgate	5.8	27.0	2.0	6.0	7.4	7.9	155	354	1.7	5.0							
3252	Dal Lake at Chairchinari	4.3	28.0	6.1	10.1	7.6	8.3	232	280	2.0	2.6							
3253	Dal Lake Near Nishat Lam	9.0	29.0	4.0	8.8	7.7	9.1	170	319	1.9	8.0							
3254	Dal Lake at Abikarpora	4.2	26.9	2.0	10.5	7.3	8.3	227	301	1.0	2.8							
3256	Dal Lake at Entry Point Of Talibal Nallah	5.0	28.2	5.0	9.2	7.4	8.6	149	351	1.5	3.6							
3257	Dal Lake at Habak	6.4	30.0	4.0	11.3	7.4	8.3	236	472	4.5	9.9							
3258	Dal Lake at Hazratbal	6.3	28.0	3.0	10.0	7.5	8.1	236	430	2.5	9.0							
3259	Dal Lake at Dhobighat	4.6	29.1	4.0	11.0	7.4	8.2	236	363	2.4	5.4							
3260	Dal Lake at Sonalank	4.4	28.9	5.0	11.5	7.5	8.0	203	342	1.4	2.8							
3261	Dal Lake at Nishat, Water Intake Point Of Nishat W	4.6	28.1	3.9	8.5	7.7	8.7	156	372	1.9	4.7							
3262	Dal Lake at Nigeen, Water Intake Pt Of Pokhribal W	4.8	28.1	5.4	8.9	7.6	8.1	228	336	2.0	3.7							
3263	Wular Lake at Ningli Nallah	6.5	24.0	6.5	11.8	7.5	8.0	116	240	0.8	5.1							
3264	Wular Lake at Watlab	7.0	28.1	6.0	8.3	7.5	7.8	134	284	0.7	5.9							
3265	Wular Lake Atkanibath	6.5	25.0	4.9	8.1	7.2	7.8	155	250	1.3	6.3							
3266	Wular Lake at Entry Pt Of Erin Nallah	6.0	20.6	4.6	8.8	7.3	7.9	180	296	3.0	7.5							
4040	Ashaibagh Bridge	6.0	28.0	2.6	6.6	7.5	7.9	257	316	2.0	2.8							

4041	Nayadyar	10.5	27.6	0.6	1.0	7.2	7.9	317	858	14.0	21.0						
4042	Jogilanker	3.9	28.0	0.5	2.2	7.1	7.8	317	851	12.0	20.0						
4043	at Sindh Inflow	8.0	25.4	4.8	7.0	7.3	7.9	311	520	2.0	3.0						
4044	Central Site	8.0	26.3	3.5	5.0	7.3	7.9	375	458	2.0	4.0						
4045	at Sangam	8.0	26.6	2.4	4.8	7.2	7.9	372	471	3.0	6.4						
4046	Near Skims	8.2	25.3	2.5	3.6	7.2	7.8	358	480	3.0	6.0						
4047	Jenab Sahab Soura	8.2	25.0	2.0	3.5	7.3	7.8	358	460	3.0	6.5						

Table 4.107 Water Quality of ground water in Jammu and Kashmir-2018.

Stn Code	Station Name	Temperature (°C)		Ph		Conductivity (Umhos/Cm		Bod (Mg/L)		Nitrate + Nitrite (Mg/L)		Fecal Coliform (Mpn/100 Ml)		Total Coliform (Mpn/ 100ml)	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
2759	Dugwell at Gaghwal (Kathua Distt)	16	16	7.3	7.8	440	480			0.0	0.2				
2760	Maladhar Talab (Pond) Hatli (Kathua)	17	21	7.3	9.0	280	315	2.4	2.7	0.0	0.0				
2761	Tube Well Kathua Sicop Industrial Area Kathua	15	16	7.2	7.2	220	385	36.0	36.0	0.0	0.0				
2762	R.S. Pura Tehsil, Jammu	16	21	7.8	8.4	1210	1506	20.0	20.0	0.3	0.6				
3288	Ground Water at Iqbal Park	19	19	7.6	7.6	902	902	6.1	6.1						
3290	Ground Water at Zanakot (I)	18	18	7.6	7.6	966	966	1.6	1.6						
3291	Ground Water at Zanakot (Ii)	17	17	7.6	7.6	969	969	1.4	1.4						

3292	Ground Water at Sadakadal	13	13	7.7	7.7	1000	1000	2.7	2.7						

Table 4.108 Water Quality of Tributary, Stream lakes in Jammu and Kashmir-2019.

Stn Code	Monitoring Location	Temperature (°C)		Dissolved O_2 (Mg/L)		Ph		Conductivity (Umhos/Cm)		Bod (Mg/L)		Nitrate + Nitrite (Mg/L)		Fecal Coliform (Mpn/100 Ml)		Total Coliform (Mpn/ 100ml)	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1309	Dal Lake at Srinagar	3.5	24.0	4.6	8.6	7.3	7.7	139	14301	1.60	3.30						
2738	(Mansar Lake at Mid Point (Mansar Lake)	15.0	24.0	7.1	8.8	7.6	8.0	144	262	0.30	2.10	0.01	0.47				
2739	Mansar Lake Point Of Discharge Of Waste Water From Different	8.1	27.0	4.2	7.2	7.7	8.1	144	266	0.40	4.20	0.01	0.05				
2740	Establishments Near Nag (Mansar Lake at Mid Point (Surinsar Lake), J&K	18.0	27.0	5.1	6.8	8.2	8.4	140	170	4.50	23.00	0.01	0.05				
2741	Surinsar Lake Point Of Discharge Of Waste Water	16.0	27.0	4.8	6.6	8.1	8.6	140	272	4.10	6.30	0.01	0.11				
3251	From Different Establishments Dal Lake at Dalgate	3.9	25.0	2.2	7.9	7.2	7.8	138	308	2.00	3.40						
3252	Dal Lake at Chairchinari	3.3	29.0	4.4	9.2	7.1	8.2	145	305	1.50	2.50						

3253	Dal Lake Near Nishat Lam	3.6	27.8	3.0	8.0	7.2	8.8	189	328	2.90	7.50						
3254	Dal Lake at Abikarpora	3.2	28.0	3.3	8.9	7.2	8.7	145	292	1.60	4.00						
3256	Dal Lake at Entry Point Of Talibal Nallah	2.0	22.2	5.5	8.4	7.3	8.0	156	386	1.40	4.10						
3257	Dal Lake at Habak	5.0	27.0	3.3	10.1	7.2	7.8	210	438	3.50	7.20						
3258	Dal Lake at Hazratbal	5.4	27.0	4.7	9.5	7.4	8.8	220	486	2.00	6.80						
3259	Dal Lake at Dhobighat	4.7	26.0	6.1	8.5	7.5	8.5	207	455	2.00	5.60						
3260	Dal Lake at Sonalank	1.0	28.0	5.3	9.0	7.5	8.4	214	378	1.60	3.10						
3261	Dal Lake at Nishat, Water Intake Point Of Nishat Water	5.0	24.0	4.3	8.0	7.4	8.1	173	360	2.00	3.20						
3262	Treatment Plant Dal Lake at Nigeen, Water Intake Pt Of Pokhribal Water	1.5	25.0	5.0	9.0	7.3	8.4	189	375	1.50	2.70						
3263	Treatment Plant Wular Lake at Ningli Nallah	8.7	32.1	4.5	9.5	7.2	7.8	110	297	0.90	2.50						
3264	Wular Lake at Watlab	9.1	24.8	5.0	8.8	7.2	7.7	112	258	1.40	2.25						
3265	Wular Lake Atkanibath	8.8	29.5	4.5	9.1	7.2	8.1	172	230	1.80	6.30						
3266	Wular Lake at Entry Pt Of Erin Nallah	7.6	23.8	5.8	8.6	7.3	7.9	115	332	1.20	2.60						
4040	Ashaibagh Bridge	2.0	25.0	3.0	8.3	7.3	8.4	181	331	1.60	3.50						
4041	Nayadyar	5.6	21.0	0.6	2.2	7.1	7.7	235	554	4.10	20.00						
4042	Jogilanker	6.1	22.0	0.5	2.1	7.1	7.7	238	567	4.50	21.00						
4043	Anchar at Sindh Inflow	3.5	16.2	6.3	9.0	7.5	8.7	137	485	1.50	2.70						
4044	Central Site	3.4	20.0	3.0	5.8	7.2	8.5	250	425	1.40	3.90						
4045	at Sangam	4.5	20.1	0.6	3.0	7.1	8.2	296	445	2.75	6.30						

4046	Near Lkims	4.2	20.3	1.7	3.0	7.1	8.4	303	430	2.40	5.20						
4047	Jenab Sahab Soura	4.0	22.0	1.3	3.8	6.8	8.3	201	394	3.00	6.60						
4048	Saderkote	6.1	33.0	4.4	8.7	7.1	7.8	96	312	2.10	3.75						
4049	Zalwan	8.5	22.0	3.8	9.0	7.1	7.9	163	332	1.80	3.00						
4050	Lankrish Pora	8.8	27.0	4.0	8.4	7.3	7.8	127	260	1.25	3.50						

Table 4.109 Water Quality of Ground Water Under NWMP In Jammu & Kashmir – 2019

Stn Code	Station Name	Temperature (°C)		Ph		Conductivity (Umhos/Cm		Bod (Mg/L)		Nitrate + Nitrite (Mg/L)		Fecal Coliform (Mpn/100 Ml)		Total Coliform (Mpn/ 100ml)	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
2759	Dugwell at Gaghwal (Kathua Distt)	23.0	23.0			7.8	7.8	685	685			0.04	0.04		
2760	Maladhar Talab (Pond)Hatli (Kathua)	22.0	22.0	7.9	7.9	7.2	7.2	150	150	2.0	2.0	0.10	0.10		
2762	R.S. Pura Tehsil, Jammu	20.0	22.0	5.4	7.0	8.6	8.8	790	1000	2.8	7.5	0.23	0.38		
4064	Borewell Near Industrial Area Gangyal	13.0	23.0			7.3	7.5	500	587			0.00	0.01		
4065	Borewell Near Industrial Area Bari-Brahmna	23.0	23.0			6.8	6.8	494	494			0.01	0.01		
4066	Borewell Near Industrial Area Samba	23.0	23.0			7.5	7.5	582	582			0.00	0.00		
4067	Borewell Near Industrial Area Udhampur	21.0	21.0			6.9	6.9	320	320			0.00	0.00		
4068	Baba Talab (Ancient Pond) at Mishriwala (Wetland)	22.0	22.0	7.6	7.6	7.9	7.9	98	98	1.5	1.5	0.00	0.00		

4069	Ancient Bowlies In Udhampur at Gangera Bowli	24.0	24.0			7.2	7.2	680	680			0.01	0.01		
4070	Ancient Bowlies In Udhampur at Rehmati Mohalla Bowli	24.0	24.0			7.4	7.4	520	520			0.04	0.04		
4072	Borewell In Smailpur Near Christian Hospital	13.0	23.0			6.8	7.4	708	1122			0.00	0.05		
4073	Borewell Near Main Chowk, Smailpur	14.0	23.0			6.8	7.5	527	993			0.00	0.01		
4074	Manwar Tawi Below Salaini Bridge-Rajouri	22.0	22.0	8.1	8.1	8.3	8.3	163	163	0.0	0.0	0.00	0.00		

Table 4.110 Water Quality Of Ground Water Under Nwmp In Jammu & Kashmir 2020.

Stn Code	Name of Monitoring Location	Temperature (°C)		Ph		Conductivity		BOD		Nitrate		Total	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
2759	Dugwell at Gaghwal (Kathua Distt]	22	22	7.4	7.4	630	630	-	-	BDL	BDL	365	365
2760	Maladhar Talab(Pond) Hatu (Kathua)	22	22	7.6	7.6	322	322	4.3	4.3	BDL	BDL	187	187
2761	Tube Well Kathua Sicop Industrial Area Kathua	20	20	7.3	7.3	415	415	-	-	-	-	241	241
2762	R.S. Pura Tehsil, Jammu	20	20	9	9	880	880	2.5	2.5	BDL	BDL	510	510
3288	Ground Water at Iobal Park	14.2	14.2	7.3	7.3	84	84	7.1	7.1	-	-	416.3	416.3
3290	Ground Water at Zanakot(I)	9.1	9.1	7.4	7.4	861	861	1.4	1.4	-	-	447	447
3291	Ground Water at Zanakot (Ii)	9.8	9.8	7.4	7.4	870	870	2	2	-	-	450	450
3292	Ground Water at Sadakadal	11.1	11.1	7.4	7.4	984	984	2.3	2.3	-	-	513	513
4064	Borewell Near Industrial Area Gangyal	20	20	7.8	7.8	350	350	-	-	BDL	RDL	203	203

4065	Borewell Near Industrial Area Bari Brahmna	20	20	7.9	7.9	376	376	-	-	BDL	BDL	218	218
4066	Borewell Near Industrial Area Samba	23	23	7.4	7.4	560	560	-	-	BDL	BDL	325	325
4067	Borewell Near Industrial Area Udhampur	22	22	7.9	7.9	504	504	-	-	BDL	BDL	292	292
4068	Baba Talab (Ancient Pond) Mishriwala (Wetland)	22	22	7.5	7.5	334	334	1.5	1.5	BDL	RDL	267	267
4069	Ancient Bowlies In Udhampur at Gangera Bowli	22	22	7.9	7.9	696	696	-	-	BDL	BDL	403	403
4070	Ancient Bowlies In Udhampur at Rehmati Mohalla Bowli	22	22	7.9	7.9	458	458	-	-	BDL	BDL	266	266
4072	Borewell Smailpur Near Christian Hospital	20	20	7.9	7.9	372	372	-	-	BDL	BDL	216	216
4073	Borewell Near Main Chowk Smailpur	20	20	7.9	7.9	412	412	-	-	BDL	BDL	239	239

Table 4.111 Water Quality Data Of Lakes Jammu & Kashmir -2020.

Stn Code	**Name Monitoring Location**	**Temperature °C**		**Dissolved Oxygen**		**Ph**		**Conductivity**		**Bod (Mg/L)**		**Nitrate-N**		**Faecal Coli**		**Total Coli**	
		Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
1309	Dal Lake Srinagar	12	27	4.9	9.1	7.2	8.3	130	226	1.3	2.7	-	-	-	-	-	-
2738	Mansar Lake Mid Point (Mansar Lake)	15	24	7.6	7.8	7.2	7.7	105	220	0.3	0.4	0.01	0.02	-	-	-	-
2739	Mansar Lake Point Of Discharge Of Waste Water From Different Establishments Near Nag Temple	15	24	6.2	7.6	7.3	7.9	110	234	0.4	0.6	0.02	0.03	-	-	-	-

2740	Mansar Lake Mid Point (Surinsar Lake) Isk	8	24	5.4	6.8	8.1	8.2	120	212	3.2	4.8	0.03	0.04	-	-	-	-
2741	Surinsar Lake Point Of Discharge Of Waste Water From Different Establishments	15	23	5.2	6.6	8.2	8.2	180	224	4.0	5.6	0.04	0.05	-	-	-	-
3251	Dallake Dalgate	11	26	6.2	8.8	7.3	7.7	135	250	2.4	3.1	-	-	-	-	-	-
3252	Dallake at Chairchinari	18	29	5.5	8.7	7.4	8.2	128	234	2.0	3.3	-	-	-	-	-	-
3253	Dal Lake Near Nishat Lam	18	27	4.5	9.6	7.3	8.6	154	284	3.0	5.6	-	-	-	-	-	-
3254	Dai Lake at Abikarpora	19	29	3.7	8.5	7.1	8.4	126	239	2.2	3.2		-		-		-
3256	Dal Lake Entry Point Talibal Nallah	14	29	3.7	9.9	7.1	8.4	106	377	1.0	3.3	-	-	-	-	-	-
3257	Dallake Habak	19	28	4.6	8.9	7.3	8.0	214	359	3.2	5.3	-	-	-	-	-	-
3258	Dal Lake at Hazratbai	21	28	4.8	8.6	7.4	8.1	146	305	1.6	4.8	-	-	-	-	-	-
3259	Dal Lake at Dhobighat	19	29	5.0	8.4	7.2	8.5	133	281	2.0	4.6	-	-	-	-	-	-
3260	Dal Lake at Sonalank	18	28	6.5	7.4	7.6	8.8	130	210	2.0	2.5	-	-	-	-	-	-
3261	Dal Lake Nishat Water Intake Point Of Nishat Water Treatment Plant	20	28	3.9	7.8	7.9	8.6	148	258	2.6	4.2	-	-	-	-	-	-
3262	Dal Lake Nigeen Water Intake Of Pokhribal Water Treatment Plant	20	28	5.2	8.7	7.5	8.5	132	241	1.0	2.8	-	-	-	-	-	-
3263	Wular Lake Ningli Nallah	12	25	3.9	6.3	7.3	7.4	106	281	0.1	1.5	-	-	-	-	-	-
3264	Wular Lake at Watlab	17	25	3.6	8.7	7.1	7.4	108	269	0.1	3.1	-	-	-	-	-	-
3265	Wular Lake Atkanibath	20	24	4.1	8.4	7.2	7.3	250	278	2.0	4.1		-		-		-
3266	Wular Lake at Entry Pt Of Erin Nallah	15	21	3.3	5.4	7.2	7.3	108	180	0.1	2.2	-	-	-	-	-	-
4040	Dal at Ashaibagh Bridge	19	30	5.6	8.7	7.6	8.2	143	227	1.0	2.6	-	-	-	-	-	-

4041	Dal at Nayadyar	14	29	0.9	3.4	7.0	7.7	316	686	3.2	16.9	-	-	-	-	-	-
4042	Dal at Jogilanker	14	29	0.5	3.2	7.1	7.5	350	708	3.6	17.4	-	-	-	-	-	-
4043	Anchar at Sindh Inflow	13	27	2.7	8.0	7.3	7.8	125	528	1.4	3.6	-	-	-	-	-	-
4044	Anchar at Central Site	16	30	2.7	7.2	7.1	7.6	228	417	1.6	4.5	-	-	-	-	-	-
4045	Anchar at Sangam	17	29	0.7	4.5	7.1	7.3	185	520	2.4	4.9	-	-	-	-	-	-
4046	Anchar Near Lkims	19	29	0.7	2.6	7.1	8.3	205	505	3.4	6.4	-	-	-	-	-	-
4047	Anchar at Jenab Sahab Soura	17	27	1.0	2.2	7.0	7.2	194	493	4.0	6.2	-	-	-	-	-	-
4048	Wular at Saderkote	19	24	1.8	7.3	7.0	7.2	103	499	2.4	10.4	-	-	-	-	-	-
4049	Wular at Zalwan	18	19	2.8	7.2	7.0	7.6	90	241	1.6	5.8	-	-	-	-	-	-
4050	Wular at Lankrish Pora	16	16	3.5	3.5	7.1	7.1	260	260	5.8	5.8	-	-	-	-	-	-

Table 4.112 Water Quality of Tributary, Stream In Jammu Kashmir - 2020

Stn Code	Monitoring Location	Temperature (°C)		Dissolved O_2 (Mg/L)		Ph		Conductivity (Umhos/Cm)		Bod (Mg/L)		Nitrate (Mg/L)		Fecal Coliform (Mpn/100 Ml)		Total Coliform (Mpn/ 100ml)		Fecal Streptococci (Mpn/100mL)	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
4059	Ranjit Sagar Dam, at Panagar (Basohil)	21	21	7.6	7.6	7.6	7.6	198	198	BDL	BDL	BDL	BDL	-	-	-	-	-	-
4082	Baju Nallah at Khokhyal Near Barage, Confluence Point Of Sahar-Khad And Kathua City Nallahs	22	22	6.2	6.2	8.1	8.1	339	339	1.8	1.8	-	-	BDL	BDL	BDL	BDL	-	-
4061	River Ravi at Lakhanpur, 1 Km	22	22	7.5	7.5	7.8	7.8	264	264	BDL	BDL	BDL	BDL	-	-	-	-	-	-

	D/S From Madhopur Bridge																		
2755	Banganga (Bathing Ghat), Katra	11	23	6.1	7.5	8.2	8.7	280	380	1.1	4.2	BDL	0.78	-	-	-	-	-	-
2756	Banganga (In Front Of Pony Shed Near Reasi Bridge	11	24	6.1	7.7	8.4	8.6	300	342	1.4	5.6	BDL	0.79	-	-	-	-	-	-
2752	Basanter U/S (R.H.S) Samba (Below Nh-1a Bridge),	15	22	6.4	7.4	8.4	8.5	210	340	1	1.6	BDL	0.72	-	-	-	-	-	-
2748	Chenab at L.H.S. (Below Bridge Chenab	13	16	8.2	9	7.8	8.1	126	180	BDL	BDL	BDL	BDL	-	-	-	-	-	-
2749	Chenab at Blind Curve Shamshan Ghat (1.5 Km U/S Frchenab River at Chadra Gaon View Point (4 Km U/S Fr	13	16	8	9.1	7.7	8.1	128	180	BDL	BDL	BDL	BDL	-	-	-	-	-	-
2750	Chenab River at Chadra Gaon View Point (4 Km U/S F	13	16	8	9.1	7.6	8.1	128	183	BDL	BDL	BDL	BDL	-	-	-	-	-	-
2751	Chenab at Jal Patan Mandir After Meeting With Main Drain Of Akhnoor City (1.5 Kmd/S From Spot)	13	16	8.3	8.3	8.1	8.2	104	184	BDL	BDL	BDL	BDL	-	-	-	-	-	-

2754	Devak River Udhampur (Near Shiv Mandir D/S) L.H.S	16	24	5	6.7	7.3	7.9	430	540	3	7.2	0.3	1.9	-	-	-	-	-	-
2757	Devak River at Utterbehni	16	20	8.1	8.2	8.6	8.8	386	400	BDL	BDL	BDL	BDL	-	-	-	-	-	-
2742	Tawi at Shetali Lifting Point Nagrota (5km U/S Tawi	14	23	7.7	9.1	7.4	8.2	100	286	BDL	BDL	BDL	BDL	-	-	-	-	-	-
2743	Tawi at Bagh-E-Bahu Lifting Point (1 Km U/S Tawi Bridge	14	23	7.3	9	7.2	8.3	110	373	BDL	BDL	BDL	BDL	-	-	-	-	-	-
1412	Tawi at Jammu U/S, (Tawi Bridge)	14.2	25	5.2	6.8	7.8	8.6	440	650	2	2.5	BDL	0.47	-	-	-	-	-	-
2744	Tawi Below Tawi Bridge	14	24	6.5	8.2	7.2	8.7	114	380	1.5	2.8	BDL	BDL	-	-	-	-	-	-
2745	Tawi Baghwati Nagar (2km D/S Tawi Bridge	14	24	5.2	8	7.7	8.9	120	705	3	8.5	BDL	0.3	-	-	-	-	-	-
2746	Tawi at Belicharana (4km D/S Tawi Bridge)	14	24	7.2	8.5	7.5	8.7	116	353	BDL	1	BDL	BDL	-	-	-	-	-	-
2747	Tawi at Surajpur Chatha (10 Km D/S Tawi Bridge) Belo	14	24	7.5	8.6	7.5	8.6	118	350	BDL	BDL	BDL	1	-	-	-	-	-	-

1307	River Chunt Kol (Maulana Azad Bridge)	16.9	27	1.5	5.5	7.1	7.5	131	320	2.5	6.8	-	-	-	-	-	-	-	-
1306	River Gawkadal, Srg (Sherghari, Srg)	15.5	21.5	4.1	6.7	7.0	8.1	123	333	2.0	3.7	-	-	-	-	-	-	-	-
1304	River Jhelum at Anantnag D/S	12	22	5.5	8.5	7.2	7.7	156	425	1.3	4.3	-	-	-	-	-	-	-	-
1410	River Jhelum at Dalagate (Inlet), Srinagar	14.8	22	4.7	9.8	7.1	8.8	126	321	1.5	3.3	-	-	-	-	-	-	-	-
1411	River Jhelum at Chattabal Weir (Outlet	14.1	28.1	4.2	6.5	7.1	7.8	125	335	1.7	3.1	-	-	-	-	-	-	-	-
3272	River Jhelum at Verinag	12	18	6.3	8.0	7.1	7.6	270	355	BDL	BDL	-	-	-	-	-	-	-	-
3273	River Jhelum at Sangam, Confluence Point Of Vishav Nallah	11	23	5	7	7.2	7.7	113	318	1.5	2.0	-	-	-	-	-	-	-	-
3274	River Jhelum at Awantipora	11	22.5	4.9	6	7.5	7.6	192	277	1.6	2.1	-	-	-	-	-	-	-	-
3275	River Jhelum at Pampore	10	25.5	4.6	7.7	7.3	7.6	106	312	1.7	2.6	-	-	-	-	-	-	-	-
3276	River Jhelum at Sopore, Confluence Point Of Wular Lake	11.8	25.8	4.3	8.5	7.2	7.6	165	300	1.5	3.0	-	-	-	-	-	-	-	-
3277	River Jhelum at Baramulla D/S	12	25.5	5	6.6	7.2	7.7	175	370	1.8	3.2	-	-	-	-	-	-	-	-

4053	River Jhelum at Bijehara	11	22	4.9	6.5	7.5	7.6	163	363	1.3	2.0	-	-	-	-	-	-	-	-
4054	River Jhelum at Panthachowk	1	22	5.2	7	7.3	7.7	106	310	1.8	3.2	-	-	-	-	-	-	-	-
3278	River Lidder at Laripora	10.1	14.4	7.1	8.7	7.6	7.9	87	141	BDL	BDL	-	-	-	-	-	-	-	-
3279	River Lidder at Club Park	9.8	14.5	6.8	8.5	7.4	7.9	92	142	BDL	BDL	-	-	-	-	-	-	-	-
3280	River Lidder at Bus Adda	10.3	14.8	7.0	8.2	7.2	7.9	80	166	BDL	1.1	-	-	-	-	-	-	-	-
3281	River Lidder at Yaneer, D/S Of Phalgum	13.0	17.3	7.1	8.9	7.2	8.3	71	122	BDL	BDL	-	-	-	-	-	-	-	-
3282	River Lidder Nera Bumzoo, Anantnag	14	18.7	6.4	8.8	7.3	8.0	88	192	BDL	1.2	-	-	-	-	-	-	-	-
4051	River Lidder at Nunwan	13.2	15.8	7.3	8.8	7.5	7.9	74	110	BDL	1.0	-	-	-	-	-	-	-	-
4052	River Lidder Near Lavender Park	10.3	14.6	7.3	8.5	7.5	7.9	91	142	BDL	BDL	-	-	-	-	-	-	-	-
3283	River Sindh at Sonamarg U/S	6.8	14.2	6.6	8.4	7.2	8.0	136	347	BDL	1.1	-	-	-	-	-	-	-	-
3284	River Sindh at Sonamarg D/S	6	14.1	6.9	8.5	7.8	8	140	346	BDL	BDL	-	-	-	-	-	-	-	-
3285	River Sindh at Wail Bridge	11.6	18.4	6.8	8.8	7.7	7.9	147	255	BDL	1.2	-	-	-	-	-	-	-	-
3286	River Sindh at Duderhama	12.5	19.1	6.7	8	7.4	7.7	209	345	1	1.5	-	-	-	-	-	-	-	-

3287	River Sindh at Rangil, Srinagar	10.2	19.9	5.7	8.7	7.4	7.7	117	283	BDL	1.1	-	-	-	-	-	-	-	-
2758	River Ujh at Dam Site(L.H.S.), Kathua	20	20	7.8	7.8	7.8	7.8	238	238	BDL	BDL	-	-	-	-	-	-	-	-

Table 4.113 Water Quality Data of Lakes, Under Nwmp-2022.

Stn Code	Monitoring Location	Temperature (°C)		Dissolved O_2 (Mg/L)		Ph		Conductivity (Umhos/Cm)		Bod (Mg/L)		Nitrate N + Nitrite N (Mg/L)		Fecal Coliform (Mpn/100 Ml)		Total Coliform (Mpn/ 100ml)		Fecal Streptococci (Mpn/100mL)	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
2738	(Mansar Lake Mid Point (Mansar Lake)	14	22	7.5	8.1	7.1	7.6	144	163	1.0	1.0	-	-	-	-	-	-	-	-
2740	(Mansar Lake Mid Point (Surinsar Lake) Isk	16	24	6.4	6.8	8.1	8.2	138	176	3.0	3.5	-	-	-	-	-	-	-	-
3257	Dal Lake Habak	24	24	6.7	6.7	8.0	8.0	376	376	1.1	1.1	-	-	-	-	-	-	-	-
3261	Dal Lake at Nishat Water Intake Point Nishat Water Treatment Plant	21	21	7.2	7.2	8.5	8.5	196	196	1.0	1.0	-	-	-	-	-	-	-	-
3255	Dal Lake at Sadapora	20	20	5.6	5.6	8.0	8.0	380	380	1.6	1.6	-	-	-	-	-	-	-	-
2739	Mansar Lake Point Of Discharge Of Waste Water From Different Establishments	14	22	7.4	8.0	7.4	7.7	152	172	1.0	1.0	-	-	-	-	-	-	-	-

2741	Surinsar Lake Point Of Discharge Of Waste Water From Different Establishments	16	24	6.0	6.7	8.2	8.3	142	180	3.1	16.8	-	-	-	-	-	-	-	-

5.Water Sustainable & Efficient technologies and best practices

Adaptation technologies for sustainability in agriculture and water resources are typically categeorized as: 1. Hardware- encompassing hard technologies like equipment/infrastructure and climate resilient crops; 2. Software referring to the genera knowledge skills, management systems, etc.; 3. Orgware, which includes the institutional mechanisms, coordination, regulatory frameworks and policies. These categories cover broader sub-categories including nature-based solutions, eco-system-based adaptation, etc (UNFCC 2022).

Improving food productivity requires subsequent improvement in irrigation and water management, while optimising the timing of water supply to reduce stresses at critical crop growth periods to increase yield (Chowdhury et al. 2016). Understandably, with reliable water supply investments for higher productivity gain more confidence.

5.1. Structural interventions

5.1.1. Tank Cum Well System

For rainwater harvesting and utilization, a tank-cum-well system with a defined drainage line in a watershed is highly recommendable for flat plateau areas with lower slopes similar to 2-5 %. This approach is particularly suitable when the runoff flows either as overland and or channel flow. The well is constructed downstrat at a distance of about 100-300 m from the tank and water is tapped by seepage from the tank. A typicaly schematic diagram based on Srivastava et al. (2009) is shown in Figure 5.1.

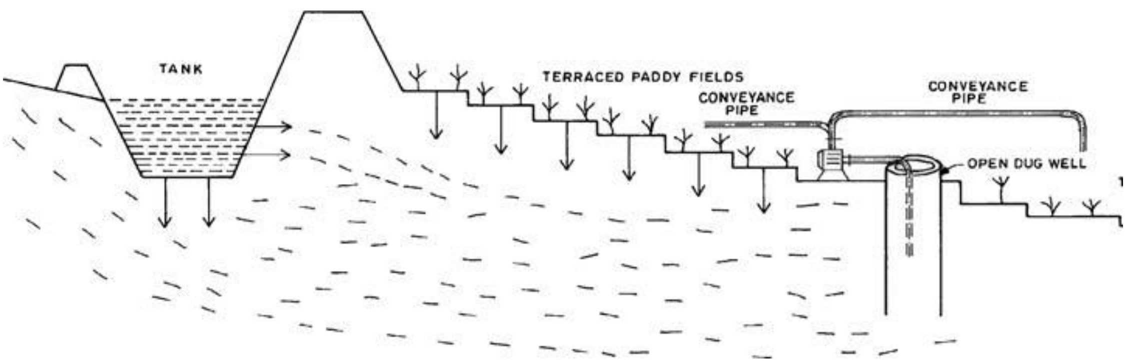


Figure 5.1. Schematic diagram of rain water harvesting based tank and well system. Source: Srivastava et al. (2009)

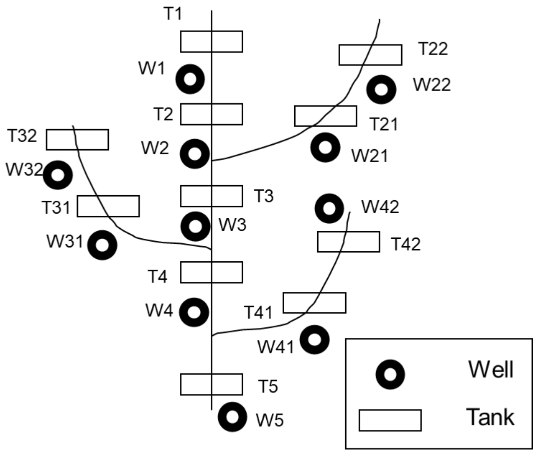


Figure 5.2. Schematic sketch of multi-tank multi-well system in a watershed. Source: http://www.iiwm.res.in/technology.php

In general, for a catchment area of 500 Ha, set of 15 tanks and wells can irrigate 60 Ha area. The cost of implementation of the technology is Rs. 100,000/ Ha of gross irrigated area (2015 price) (Chowdhury et al. 2016). The construction unit cost is approximately Rs. 100,000 per Ha of gross irrigated area and the technology potentially generates Rs. 30,000/- extra gross income per year with additional employment generation of 115-man days per Ha with an increase in the cropping intensity to up to 166%.

5.1.2. Rainwater Conservation Through Increased Dyke Height

In the UT of Jammu and Kashmir, rainfed agriculture is predominant, particularly in the Jammu Division. Although the region receives high rainfall, the rainfed agriculture is subjected to the anomalies of the monsoon season often due to dry spells at critical crop growth stages leading to unstable yields, which formulates the major constraints for investment in rainfed agriculture. Subsequently, proper management of rainwater is critical to meet the evapotranspiration demand of crops.

Rice being one of the staple crops in the region particularly requires higher water demand for irrigation and proper bunding of rice fields significantly facilitates rainwater conservation. Rice plots with bund height of 6 cm can store about 57% of the rainwater (Chowdhury et al. 2016) following an exponential relationship between excess rainfall or runoff identified as as percent of rainfall and bund height. Consequently, the irrigation requirement decreases significantly with an increase in bund height. The loss of sediment and nutrient in runoff water is also exponentially related to bund height.

Small dugout ponds of about 2.5 m depth in about 8% of the total rice field, and 1:1 side slope is beneficial at downstream for water conservation. Such ponds find significant utility in short-duration aquaculture during monsoon season. The conserved pond water is also used for supplemental irrigation of rice paddies. This approach is particularly applicable in rice growing areas vulnerable to moisture stress during critical growth stage of the crop. Such methods for conservation have known to show an increase of upto 200% in the cropping intensity with a construction cost per unit about Rs. 67,000 per hectare.

Figure 5.3. Increased dyke height for in-situ rainwater conservation. Source: http://www.iiwm.res.in/technology.php

5.1.3. Use of Rubber Dams for Rainwater Harvesting

A rubber dam is typically used for rainwater harvesting during the monsoon season by inserting a rubber tube as a check structure. The rubber tube is flexible and can be easily inflated or deflated to regulate streamflow. The design comprises a concrete foundation, a rubberized fabric dam body, mechanisms for anchoring the dam body and inlet/outlet piping systems which enable inflation and deflation mechansms. Inflation through water supply acts as a barrier to render water storage and deflation facilitates flood mitigation. The outlet pipe facilitates the water release from the stored water towards downstream (Chowdhury et al. 2016).

Figure 5.4. Rubber dam near thane. Source Jena et al. (N.D.)

Figure 5.5. Rubber dams installed in the farmers' field. Source Chowdhury et al. (2016).

Rubber dams have the potential to enhance the water storage capacity by about 52,000 to 80,000m^3 for irrigating about 30-40 ha of paddy in kharif and 6 ha of pulses, oilseeds and vegetable crops in the Rabi season (Chowdhury et al. 2016). Chowdhury et al. (2016) further noted the increased productivity of rice by 62% in Kharif season and 47% in vegetatble in Rabi season. Additionally, rubber dam installations also led to increase in irrigation command area and cropping intensity with further potential for ground water recharge.

Figure 5.6. Manual soil block press for making mud blocks and tank with mud block and low-density polyethylene film. Source Chowdhury et al. (2016)

5.1.4. Rainwater Harvesting Through Check Dam and Its Multiple Use

Check dams are small barriers designed to restrict the water flow on shallow rivers and streams to facilitate water harvesting. During monsoon, these dams retain excess water flow and the are significantly beneficial for the recharge of groundwater reserves. The water stored through the check dam can be utilized for livestock, deomestic and irrigation need, particularly during post-monsoon dry seasons (Chowdhury et al. 2016). at relatively much smaller construction costs, these enhance the local water productivitiy which can improve the capacity for both consumptive and non-consumptive uses.

Earthen check dam with stone patching : a case study in Bahasuni watershed, Dhenkanal

Fish reared inside check dam and banana grown with harvested water of check dam

Figure 5.7. Earthen check dam case study of Bahasuni watershed, Dhenkanal. Source Chowdhury et al. (2016)

5.1.5. Integrated System of Rice Intensification (SRI)

Water controls over rainfed rice fields are critical especially during the rainy season. Both waterlogging and long dry spells may reduce the rice yield and thus, application of water conservation mathors for irrigation are challenging.

The system of rice intensification (SRI) is a rice cultivation management practice used for improving the rice yield, where waterlogging is avoided through storage of excess water in a refuge in the field for short duration aquaculture (Chowdhury et al. 2016). The process ensures proper water management in field and supplementary irrigation during dry spells and adds value through integrated aquaculture and horticulture. A layout design for the SRI is shown in Figure 5.8.

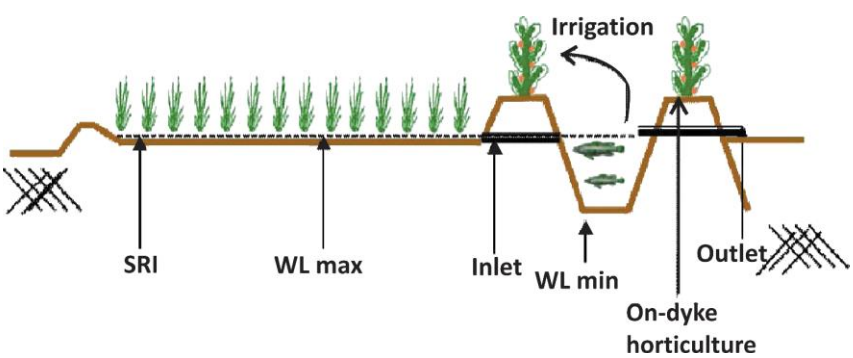


Figure 5.8. Lay-out Design of Integrated System of Rice Inrensification

5.1.6. Raised and Sunken Bed for Higher Productivity in Canal Command

When a significant proportion of the land area is under rainfed lowlands, the regional agricultural system can be improved through construction of raised and sunken beds. These beds potentially improve the farm income by reducing the risk of low land agriculture agriculture suitable land modification.

The development process involves construction of alternate 5-10 m wide and about 1-meter-high sunken and raised beds at a few 10s of meters apart by putting the dugout soil over adjacent strips. A schematic diagram of alternate raised and sunken bed system is shown in Figure 5.9. The unsaturated soil layer comprising the top 20-30 cm of the raised beds allows cultivation of vegetables, while the sunken beds allow cultivations of crops like taro or rice, and or fisheries (Singh et al. 2005). The cost of intervention is much cheaper and no permanent structures are involved making this approach highly simple and significant.

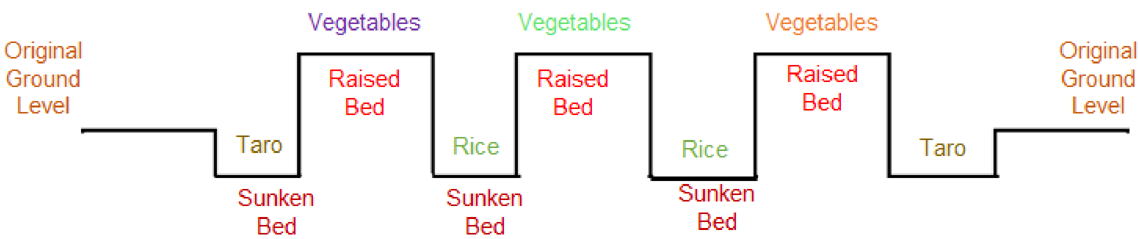


Figure 5.9. Schematic diagram of alternate raised and sunken bed system. Source: http://www.iiwm.res.in/pdf/Bulletin_28.pdf

5.1.7. Roof Rain Water Harvesting for Domestic and Drinking Purposes

Water scarcity is a major issue for rapidly urbanizing cities and villages, as observed particularly in the Indian Himalayan regions often due to poor water management and increase in the water consumption. Roof Rainwater Harvesting (RRWH) is one of the most economical and environment friendly approaches for water conservation, especially for domestic purposes, particularly in heavy rain intensity zones with uniform rainfall patterns. The RRWH systems are particularly promising for public and administrative institutions considering they have significant building roof areas and sufficient financial resources.

A RRWH system comprises various elements as shown in Figure 5.10 (Anchan and Shiva Prasad 2021). The storm water is supplied to storage tanks through pipes or drains after water collection in the roof area (catchment area). The typical process involved flushing out the first rain water to restrain propogation of contaminants to the storage tank. Effective pre-treatment of water using conventional gravity filters can be ensured for domestic purposes. Timely checks of the water quality and quantity to ensure water usability and contraints against water overflow are necessary (Anchan and Shiva Prasad 2021).

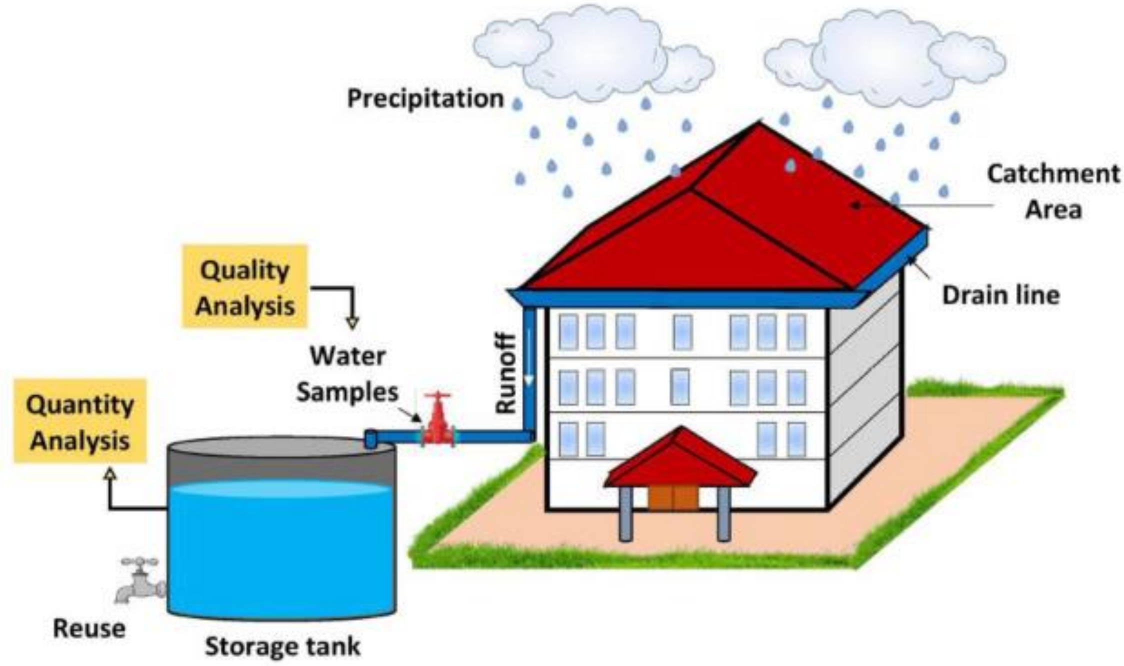


Figure 5.10. A schematic representation of RRWH system with indicated checks of water quality and quantity.

5.2. Water and Energy Efficient Integrated Farming System for Rainfed Farmers

Integrated Farming System is a viable option for small and marginal farmers particularly in rainfed ecological systems for enhancing food production, income and employment. The demand for such a system is further increasing due to issues in water supply, energy availability, associated costs and declining soil productivity. Particularly, with the climate change resulting in anomalous rainfall patterns, water and energy efficient farming system is critical for rainfed agriculture. Salient benefits of integrated farming systems include, efficient nutrient management, higher energy outputs and net agricultural returns, increased water productivity, beneficial residual soil fertility, and employment generation.

According to Chowdhury et al. (2016), "Water and energy efficient farming system could be achieved through optimum cropping system (rice-horse gram and rice sunflower), less use of agro-chemicals (green manuring and vermi-compost), mulching, ring method of irrigation (cucurbits), paired row bed planting (okra), multiple use of water (pisciculture, horticulture, apiculture, poultry and mushroom cultivation), growing of widely spaced crop with large ground coverage (bottle gourd and water melon)and redgram cultivation on field bunds.Residue recycling of poultry and duckery for pisciculture, paddy straw for mushroom cultivation, and bio- waste for vermi-compost production saved energy on fish feed and fertilizer.The farming system model (3408.44 m^2) was based on water harvesting pond (30 m x 30 m x 2.8 m depth), dyke around pond (556 m^2), field crop unit (1879 m^2) and field bund (73.44 m^2)."

5.2.1. Drainage Water Management in Medium and Lowlands

The UT of Jammu and Kashmir faces varied degrees of waterlogged condition in its agricultural premises, often leading to reduction in land productivity due to adverse edaphic environment from excess water. A properly designed drainage system accelerates the surface flow to an outlet without siltation and soil erosion, thereby reducting the depth and duration of ponding (Chowdhury et al. 2016). Additionally, the drainage system also creates potential for fish production and post-monsoon irrigation for low duty crops through development of auxiliary water bodies supplied by the drainage system.

5.2.2. Pond Based Farming System for Deep Waterlogged Areas

As a solution to the waterlogged ecosystem during monsoon and to stabilize and enhance the income, pond based farming technology was recommended by Chowdhury et al. (2016). The method was typically recommended for seasonal deep waterlogged scenario of >1m during monsoon. The design of a typical micro-water harvesting system is shown in Figure 5.11.

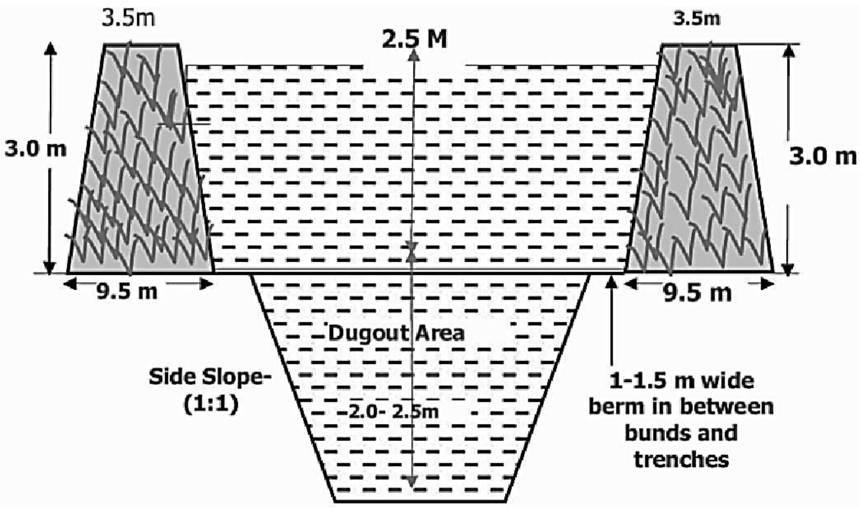


Figure 5.11. A view of a pond in deep waterlogged area

Waterlogged tolerant rice crops can be cultivated in the command areas during the rainy season and post harvesting in the dry season, second crops can be grown on the same land with auxiliary irrigations from rain-harvested water in the pond. This approach is highly beneficial considering relatively lower costs compared to structural interventions and the technology ensures higher returns due to intensive croppring from fisheries with harvested water and on-dyke horticulture. The harvested pond water can also be used for post flood timely transplanting of rice leading to a viable solution for developing a productive and profitable system for non-productive waterlogged areas (Chowdhury et al. 2016).

5.2.3. Land Use Planning of Watershed Using Remote Sensing and GIS

In the last few decades, remote sensing technology has found a variety of applications in natural resource management and environmental monitoring, particularly with the developments in the space technology providing stereo viewing capabilities to estimate land depth. The bio-physical capabilities of existing natural resource comprising soil properties, fertility, slope and aspect derived from digital elevation models have been crticial in hydrological studies. Tools based on Geographical Information System (GIS) have significantly augmented with remotely sensed data for various applications in Land use planning, agriculture and watershed management (Suresh 2022).

5.2.4. Water Quality Index for Assessment of Water Quality for Irrigation

The increasing food demands have had an adverse effect on the practices used in farming such as excessive use of chemicals and fertilizers. In cases, increasing use of poor-quality water in agriculture is observed, which adversely affects natural resources like soil, crop, and groundwater posing a threat to the agriculture system. An irrigation water quality index (IWQI) is typically used to asses the suitability of the water/wastewater for irrigation. IWQI integrates multiple indices to express the water quality for irrigated agriculture as a single indicating value. IWQI produces more reliable estimates for assessing irrigation water quality, while distringuishing the water quality based on effects on irrigated soil and plant toxicity (Tegegne et al. 2023).

5.2.5. Other interventions for water conservation and management

Several other interventions have been summarized by Chowdhury et al. (2016), under water sustainable technologies that have proven to be very efficient, which include the following.

Residual Soil Moisture Utilization

- Medium and lowlands with heavy texture and slightly acidic nature and shallow water table have known to exhibit better moisture retention capabilities. Subsequently, such lands are suitable for a second crop growth with residual soil moisture with conservation tillage. However, ground water contribution for second crop growth may be critical in rainfed regions.

- Relay cropping of soaked seeds of pulses or oil seeds can be spread in a drained field inside standing rice crop about 2 weeks prior harvest for Rabi season utilization of residual soil moisture.
- A CAM (crassullacean acid metabolism) plant such as pineapple can be fitted into the rainfed system after harvest of kharif rice to cultivate on residual soil moisture.

Improved Planting Technique for Saving of Irrigation Water in Post-Rainy Season Crops

- Cultivating crops like groundnut and potatos in post-rainy season in paired rows on raised beds can save water compared to flat-bed method of planting for groundnut and potato.

Integrated Water Chestnut Cultivation and Aquaculture Technology

- Fishes and aquatic crops formulate a thriving waterlogged ecology and their integration is economically beneficial. For example, integration of waterchestnut clutivation with aquaculture in water logged areas was observed to increase net water productivity.
- Similarly, taro is another crop which can be integrated with aqualture.

5.3. Best practices for supply side management

5.3.1. Domestic water

- Outreach activities and campaigns to spread education and public awareness on issues and future water scarcity dangers, and the larger benefits of domestic water conservation through billboards, television, radio, etc. Short-term programs in educational institutes at various levels.
- Detailed statistical information on water consumption in community household water bill.
- Promoting efficient practices in water-conservation structures for rainwater harvesting at individual and community level.
- Water metering and on demand pricing for water management, and water efficient urban planning.
- Demonstration campaigns for roof rain water harvesting and subisdizing associated components.

- Creation of alternative water sources to meet water demand in dry summer seasons.
- Regularly auditin water usage, consumption, management and billing.

5.3.2. Farm sector

- Irrigation practices involving efficient structural inventions, as discussed earlier.
- Comprehensive design, planning and investigation using hydro-meteorological data for preparedness and effective appropriate response against water shortages.
- Implementation of agricultural practices favoring water consumption and ensuring efficient use of water resources in irrigation.

5.3.3. Industrial sector

- Developing a smart metering system with data logging for the Industrial areas to ensure checks on water leakage. The data logging should enable systematic investigation of water consumption and planning for water conservation.
- Reuse of water used for cleaning floors, machinery and wastewater.
- Usage or air blowers for cleaning of machinery. Using the dry methods as much as possible through compressed air, brushing of surfaces rather than hosing with water.
- Using automated sensors for water faucets to restrict unnecessary water dispense.
- Replacing water-cooled systems with chemical coolants or air-coolants.

5.4. Irrigation Techniques:

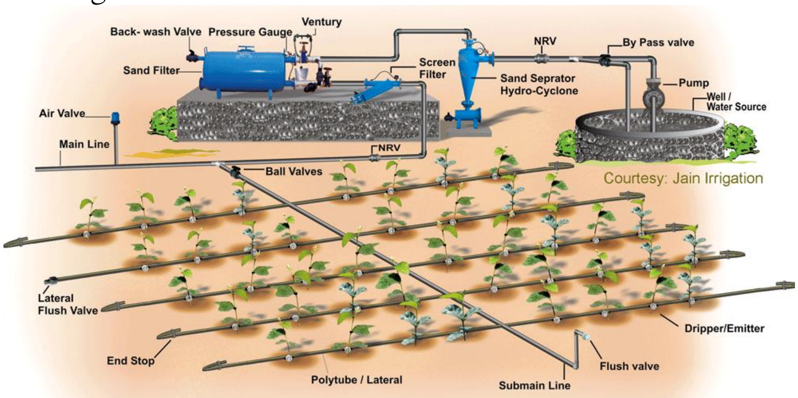
5.4.1. Drip Irrigation

Drip irrigation[1] (Figure 5.12) involves a network of valves, pipes, tubing, and emitters that deliver water directly to the base of the plant. This system operates at low pressure, releasing water slowly and directly to the root zone. The slow release minimizes evaporation and runoff, making it highly efficient. The salient features of drip irrigation are as follows.

1. **High Water Use Efficiency**: Water is delivered directly where it is needed, reducing waste.

[1] https://www.agrifarming.in/drip-irrigation-system-complete-guide

2. **Reduced Weed Growth:** By targeting specific plants, the surrounding area remains dry, inhibiting weed growth.
3. **Minimized Soil Erosion:** Slow release of water prevents soil displacement.
4. **Suitability:** Ideal for various terrains and crop types, particularly valuable in arid regions.



Source: https://www.agrivi.com/blog/drip-irrigation-as-the-most-efficient-irrigation-system-type/

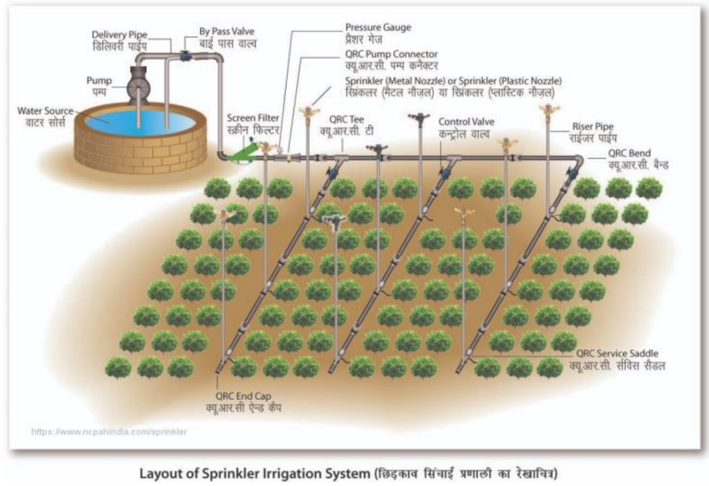
Figure 5.12 Drip irrigation Techniques.

5.4.2. Sprinkler Irrigation

Sprinkler irrigation[1] (Figure 5.13) systems mimic natural rainfall by spraying water over crops using a network of pipes and high-pressure sprinklers. These systems can be stationary or moveable and are suitable for a wide range of crops and soil types. The salient features of sprinkler irrigation are as follows.

1. **Even Water Distribution:** Ensures uniform coverage across the field.
2. **Large Area Coverage:** Suitable for large-scale fields.
3. **Versatility:** Can be adjusted for different water pressures and spray patterns.
4. **Evaporation Loss:** Water sprayed into the air can evaporate, especially in hot climates.
5. **Wind Drift:** Wind can affect the distribution pattern, causing uneven watering.

[1] https://agritech.tnau.ac.in/agricultural_engineering/spring_irrigation.pdf



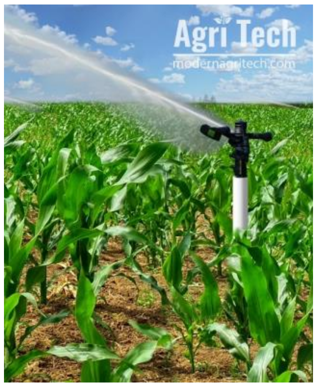


Figure 5.13 Sprinkle irrigation Techniques.

5.4.3. Subsurface Irrigation

Subsurface irrigation[1] systems involve burying pipes beneath the soil surface, delivering water directly to the root zone. This method is highly efficient as it significantly reduces water loss through evaporation. The salient features of subsurface irrigation are as follows.

1. **Reduced Evaporation:** Water is applied below the surface, minimizing exposure to the air.
2. **Improved Water Efficiency:** Direct root zone application enhances plant uptake.
3. **Less Interference:** Farming activities are not hindered by surface irrigation equipment.

Source: https://grekkon.com/subsurface-drip-irrigation/

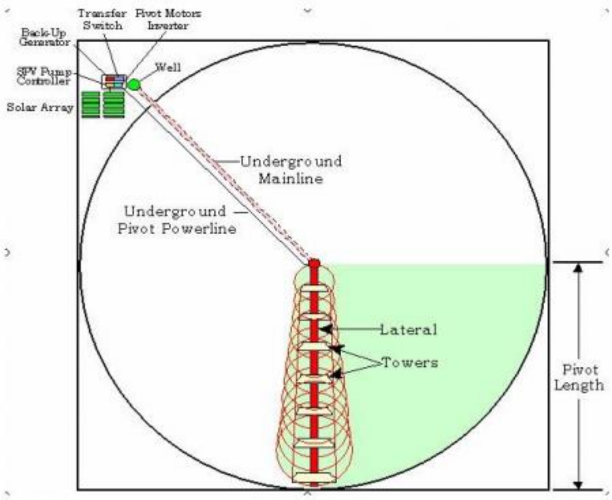
Figure 5.14 Subsurface irrigation Techniques.

[1] https://www.rivulis.com/crop/sdi/

5.4.4. Center Pivot Irrigation

Center pivot irrigation[1] systems (Figure 5.15) feature a long, pivoting arm that rotates around a central pivot point, watering crops in a circular pattern. These systems are often used for large, flat fields. The salient features of Center Pivot irrigation are as follows.

1. **Efficiency:** Highly efficient for large-scale farming.
2. **Uniform Application:** Ensures even water distribution across the field.
3. **Automation:** Can be automated for precise water control.



Source: https://aksoysolarenergy.com/agricultural-irrigation/center-pivot-irrigation-system/

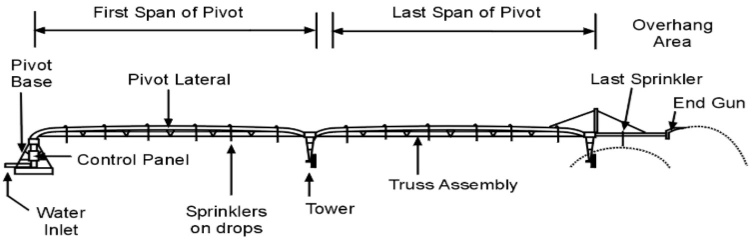
Figure 5.15. Center Pivot Irrigation Techniques.

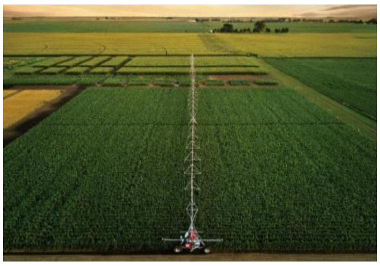
5.4.5. Lateral Move Irrigation

Lateral move irrigation[2] systems (Figure 5.16) operate similarly to center pivots but move laterally across the field rather than rotating around a central point. This method is ideal for rectangular fields. The salient features of lateral move irrigation are as follows.

1. **Uniform Water Distribution:** Consistent watering along the system's path.
2. **Field Shape:** Suitable for rectangular and large fields.

[1] https://www.agrivi.com/blog/center-pivot-system-an-efficient-and-economical-solution-for-irrigation/
[2] https://extensionaus.com.au/irrigatingag/centre-pivot-or-lateral-move/





Source: https://irrigazette.com/index.php/en/news/managing-center-pivots-and-lateral-move-irrigation-systems

Figure 5.16 Lateral Move Irrigation Techniques.

5.4.6. Smart Irrigation Systems

Smart irrigation[1] systems (Figure 5.17) use sensors, controllers, and IoT technology to monitor soil moisture, weather conditions, and crop water needs. These systems automate irrigation based on real-time data.

1. **Water Efficiency:** Precise control over water application reduces waste.
2. **Labor Savings:** Reduces the need for manual intervention.
3. **Data Integration:** Can be integrated with other farm management systems for comprehensive monitoring.

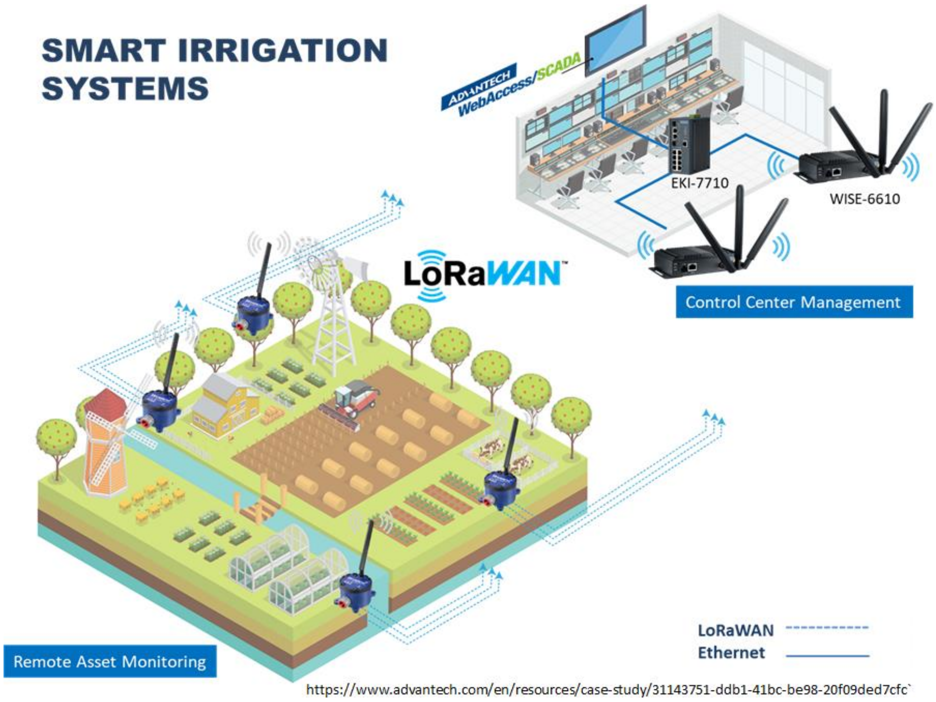


Figure 5.17 Smart irrigation Techniques.

[1] https://theagrotechdaily.com/smart-irrigation-systems/

5.4.7. Flood Irrigation

Modernized flood irrigation[1] (Figure 5.18) involves controlled flooding of fields, often with the aid of laser leveling to ensure even water distribution. While more traditional, improvements have made it more efficient. The salient features of Flood irrigation are as follows.

1. **Low Initial Cost:** Relatively inexpensive to set up.
2. **Crop Suitability:** Effective for certain crops like rice that thrive in flooded conditions.

Source: https://www.twl-irrigation.com/what-is-flood-irrigation/

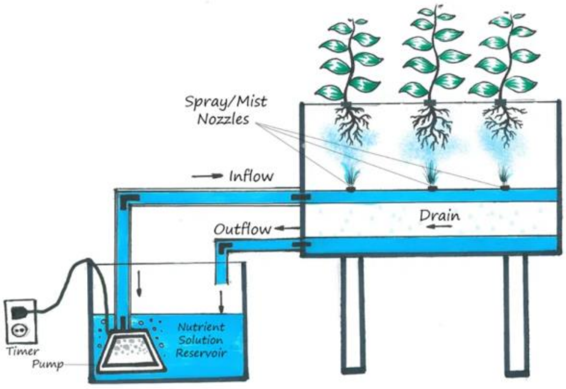
Figure 5.18 Flood irrigation Techniques.

5.4.8. Aeroponics

Aeroponics[2] (Figure 5.19) involves growing plants with their roots suspended in the air and misted with a nutrient-rich water solution. This method is typically used in controlled environment agriculture. The salient features of Aeroponics are as follows.

1. **High Efficiency:** Maximizes water and nutrient use efficiency.
2. **Rapid Growth:** Promotes faster plant growth due to optimal nutrient delivery.
3. **Space Efficiency:** Ideal for vertical farming and urban agriculture.
4. **System Complexity:** Requires precise control over misting and nutrient delivery.

[1] https://www.twl-irrigation.com/what-is-flood-irrigation/
[2] https://www.plantedwell.com/aeroponics/



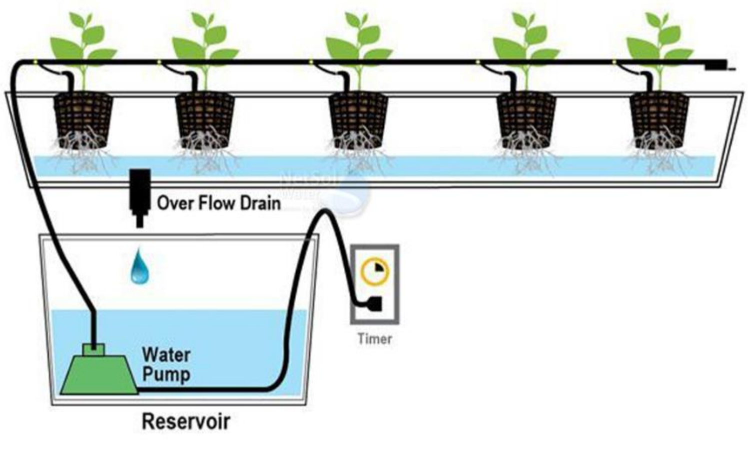
Source: https://modernfarmer.com/2018/07/how-does-aeroponics-work/

Figure 5.19 Aeroponics Techniques.

5.4.9. Hydroponics

Hydroponics[1] (Figure 5.20) is a soil-less cultivation method where plants grow in a nutrient-rich water solution. This technique is popular for controlled environment agriculture, including greenhouses and urban farms. The salient features of hydroponics are as follows.

1. **Water Efficiency:** Uses significantly less water than soil-based cultivation.
2. **Nutrient Control:** Allows precise management of nutrients delivered to plants.
3. **High Yield:** Enables high-density planting and rapid growth.



Source: https://verticalfarmingshow.com/assets/images/resources/about-seven-img-1.jpg

Figure 5.20 Hydroponics Techniques.

[1] https://www.britannica.com/topic/hydroponics

6. Water Resources: Governance and Management

6.1. State Level

6.1.1. Jammu and Kashmir State Water Policy and Plan 2017

The State Water Policy and Plan has the following objectives[1]:

(a) To cope up the demand of water for diverse purposes such as domestic, agriculture, power, industry etc.

(b) To address ecological system and environmental concerns

(c) To plan and manage irrigation and multipurpose projects involving varied socio-economic aspects such as environmental sustainability

(d) To develop and improve ground water and prevent its over exploitation

(e) To encourage re-cycling and reuse of water;

(f) To prioritize water allocation broadly in the following order but subject to modification if so, warranted by area/situation specific considerations:

   a. drinking water including washing and bathing;
   b. Irrigation;
   c. generation of electricity;
   d. ecology; and
   e. Agro Industries and Non-Agricultural Industries.

(g) To prevent and treat effluents, solid/gaseous wastes which are discharged into the natural streams, water bodies and have the potential of contaminating the ground water through seepage, leaching to acceptable standards before these are released from the industries, institutions, residential and commercial areas;

(h) To prepare basin master plan to assess the water needs for various uses and also to assess the potential resources so as to prioritize the water resource development;

(i) To promote water conservation consciousness through education, awareness building, regulation, incentives and disincentives.

[1] https://rgp.jk.gov.in/pdf/SRO/SRO-2017/456.pdf

6.1.2. Jammu and Kashmir Water Resources (Regulation and Management) ACT 2010.

The UT of Jammu and Kashmir has enacted the Regulation and Management/Water Resources Act, 2010[1]. The J&K water resources act aims to consolidate the redulations relating the use of water, measurement, construction, control and management works with respect to water storage, improvement of water flow, protection and improvement in the physical integrity of water courses, lakes and springs, and safety and surveillance of dams etc.

The act details in the first chapter the definitions; in the second chapter covering the state water policy and plan; in the third chapter, the driking water supply, covering driking water, water for domestic purposes, water for other than domestic purposes, Application for supply of water, process of connection, validity of permissions, process of stopping of water supply, authority to lay or carry pipes, charges for supply of water, separation of premises for water supply, connection with main line, indemnity, rules on prohibition on construction over water works, rules on prohibition of certain acts affecting the water works, rules on prohibitions of certain other acts, rule on obligation of owner to prevent misuse of water, authorities of officers to enter premises, rules on cutting of water supply, and rules on appeals.

The fourth chapter on irrigation and flood control includes, rules on construction and maintenance of Irrigation works, rules on water channels and field channels, rules and course of action on drainage and prevention of water logging, regulation of irrigation supplies, safety of irrigation works, flood basin and embankments. Chapters 5, 6, and 7 of the act discusses the award of compensation for damages, and usage of water by installation of a unit, and ground water development and management, respectively. Chapter 8 and 9 discuss metering and water usage charges (tariff), respectively. Chapter 10 discusses the details of the State Water Resources Regulatory Authority. Chapter 11 to 13 discuss investigations and law enforcement, and offence and penalities, and special courts, respectively. The remaining chapters 14 and 15 discuss the grants, funds, accounts, audit and reporting mechanisms, and miscellaneous regulations, respecitvely.

The Jammu and Kashmir water resource (Regulation & Management) act of 2010 under the general clause:

"Every water source in the State is, and shall remain, the property of the government and any proprietary ownership, or any riparian or usage right, on such water resources vested in any individual, group of individuals or any other bodey, corporation, company, society or community shall, from the date of commencement of the act, be have been terminated and vested with the government."

[1] https://jkswrra.nic.in/Acts%20&%20Rules/JKSWRRA%20Act,%202010.pdf

"No person shall use any water from any source (surface or ground), or collect or extract any material from such water sources except in accordance with the provisions of the Act."

6.1.3. State Irrigation Plan 2016

The State Irrigation Plan amounting to Rs 1468546.06 lakhs is devised by assimilating all the District Irrigation Plans from the 22 districts of Jammu and Kashmir in 2016. The SIP aims to provide feasible irrigation facilities to each and every block of the state with Rs. 623425.1285 lakhs and Rs 845120.9326 lakhs for Jammu and Kashmir divisions, respectively. The SIP is sub-divided into four primary components as follows.

1. **Accelerated Irrigation Benefit Program (AIBP),** which focuses on the rapid completion of ongoing major and medium irrigation projects in the UT of Jammu and Kashmir.
2. **Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)[1], 'Har Khet Ko Pani',**

(a) Creation of new water sources through Minor Irrigation (both surface and ground water)

(b) Repair, restoration and renovation of water bodies; strengthening carrying capacity of traditional water sources, construction rain water harvesting structures (Jal Sanchay);

(c) Command area development, strengthening and creation of distribution network from source to the farm;

(d) Ground water development in the areas where it is abundant, so that sink is created to store runoff/ flood water during peak rainy season.

(e) Improvement in water management and distribution system for water bodies to take advantage of the available source which is not tapped to its fullest capacity (deriving benefits from low hanging fruits). at least 10% of the command area to be covered under micro/precision irrigation.

(f) Diversion of water from source of different location where it is plenty to nearby water scarce areas, lift irrigation from water bodies/rivers at lower elevation to supplement requirements beyond IWMP and MGNREGSirrespective of irrigation command.

(g) Creating and rejuvenating traditional water storage systems like Jal Mandir (Gujarat); Khatri, Kuhl (H.P.); Zabo (Nagaland); Eri, Ooranis (T.N.); Dongs (Assam); Katas, Bandhas (Odisha and M.P.) etc. at feasible locations.

[1] https://pmksy.gov.in/pdflinks/Guidelines_English.pdf/

3. Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)[2], 'Per Drop More Crop',

(a) Programme management, preparation of State/District Irrigation Plan, approval of annual action plan, Monitoring etc.

(b) Promoting efficient water conveyance and precision water application devices like drips, sprinklers, pivots, rain-guns in the farm (Jal Sinchan);

(c) Topping up of input cost particularly under civil construction beyond permissible limit (40%), under MGNREGS for activities like lining inlet, outlet, silt traps, distribution system etc.

(d) Construction of micro irrigation structures to supplement source creation activities including tube wells and dug wells (in areas where ground water is available and not under semi critical /critical /over exploited category of development) which are not supported under AIBP, PMKSY (Har Khet ko Pani), PMKSY (Watershed) and MGNREGS as per block/district irrigation plan.

(e) Secondary storage structures at tail end of canal system to store water when available in abundance (rainy season) or from perennial sources like streams for use during dry periods through effective on-farm water management;

(f) Water lifting devices like diesel/ electric/ solar pumpsets including water carriage pipes, underground piping system.

(g) Extension activities for promotion of scientific moisture conservation and agronomic measures including cropping alignment to maximise use of available water including rainfall and minimise irrigation requirement (Jal sarankchan);

(h) Capacity building, training and awareness campaign including low-cost publications, use of pico projectors and low-cost films for encouraging potential use water source through technological, agronomic and management practices including community irrigation.

(i) The extension workers will be empowered to disseminate relevant technologies under PMKSY only after requisite training is provided to them especially in the area of promotion of scientific moisture conservation and agronomic measures, improved/ innovative distribution system like pipe and box outlet system, etc. Appropriate Domain Experts will act as Master Trainers.

(j) Information Communication Technology (ICT) interventions through NeGP-A to be made use in the field of water use efficiency, precision irrigation technologies, on farm water management, crop alignment etc. and also to do intensive monitoring of the Scheme.

4. **Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), 'Watershed Development',**

(a) Effective management of runoff water and improved soil & moisture conservation activities such as ridge area treatment, drainage line treatment, rain water harvesting, in-situ moisture conservation and other allied activities on watershed basis.

(b) Converging with MGNREGS for creation of water source to full potential in identified backward rainfed blocks including renovation of traditional water bodies.

6.2. National Level

6.2.1. National Water Policy (2012)

The National Water Policy of 2012[1] aims to evaluate the current water management situation in India and to establish a comprehensive framework for a unified national action plan. This policy includes several recommendations focused on the conservation, development, and improved management of the country's water resources. Implementation of the policy requires ongoing coordinated efforts from both Central and State Government Ministries and Departments. The policy document has been enacted by all State Governments, Union Territories, and relevant Central Government Ministries for appropriate action. The key features of the National Water Policy, 2012 include:

1. **Legal Framework:** Emphasizes the necessity of a national water framework law and comprehensive legislation to ensure the optimal development of inter-State rivers and river valleys.
2. **Water as an Economic Good:** After fulfilling essential needs such as safe drinking water, sanitation, food security, and livelihoods for those dependent on agriculture, water should be considered an economic good. This approach encourages conservation and efficient use.
3. **Ecological Considerations:** Advocates for determining the ecological requirements of rivers, recognizing the natural variability in river flows, including low and high flows, small floods, and large floods. A portion of river flows should be reserved to meet these ecological needs, ensuring that water releases correspond closely to the natural flow patterns.
4. **Climate Change Adaptation:** Stresses the need for adaptation strategies in the design and management of water resource infrastructure, taking into account the impacts of climate change and revising the criteria for their larger

[1] https://nwm.gov.in/sites/default/files/national%20water%20policy%202012_0.pdf

acceptability.

5. **Water Use Efficiency:** Recommends developing a system to establish benchmarks for water use across different purposes, including water footprints and water auditing, to promote efficient use. Project financing should be utilized to incentivize efficient and economic water use.
6. **Water Regulatory Authority:** Proposes the establishment of a Water Regulatory Authority and recommends incentives for the recycling and reuse of water.
7. **Empowering Water Users Associations:** Suggests that Water Users Associations be granted statutory powers to collect and retain a portion of water charges, manage the allocated water volume, and maintain the distribution system within their jurisdiction.
8. **Addressing Urban-Rural Disparities:** Calls for the removal of significant disparities in water supply standards between urban and rural areas.
9. **Community Participation:** Encourages community participation in managing water resource projects and services. State Governments and local governing bodies may involve the private sector as a service provider under a public-private partnership model, ensuring adherence to agreed service delivery terms, including penalties for non-compliance.
10. **Capacity Building and Technology Upgradation:** Recommends adequate grants for States to update technology, design practices, and management approaches, including the preparation of annual water balances, hydrologic balances for water systems, and performance evaluations.

6.2.2. Indus Water Treaty 1960

In 1960, the government of India and Pakistan settled an agreement between India and Paskistan for the water-sharing of the Indus waters. The treaty was brokered by the World Bank between the countries for negotiation for nine years after which it was signed[1]. The Indus Water Treaty enables India to use the water from western rivers for domestic, non-consumptive requirements such as storage, irrigation and hydropower generation. The treaty gives India only 20% of the water from the Indus River system and the rest 80% to Pakistan, even though majority of the discharge is generated on the Indian side.

The Indus Water Treaty 1960 are following provisions[2]:

[1] https://www.mea.gov.in/bilateral-documents.htm?dtl/6439/Indus

[2] https://mowr.nic.in/core/WebsiteUpload/2023/INDUS%20WATERS%20TREATY%201960.pdf

a. The Indus River system includes three rivers in the east—Ravi, Beas, and Sutlej—along with their smaller rivers that flow into them. Similarly, it comprises three rivers in the west—Indus, Jhelum, and Chenab—along with their tributaries. This division helps in categorizing and understanding the various rivers and their networks within the broader Indus system.

b. According to the treaty, India is allotted the waters from the Eastern Rivers. However, India is required to ensure that the waters from the Western Rivers continue to flow, except for specific purposes. These purposes include domestic use, non-consumptive use, agricultural use as defined, and the generation of hydro-electric power as outlined in the treaty. This provision ensures that India utilizes the allocated waters from the Eastern Rivers while still respecting the flow of water in the Western Rivers for designated uses.

c. India has been granted permission under the treaty to build water storage facilities on the Western Rivers for various purposes, up to a maximum of 3.6 million acre-feet (MAF). However, as of now, India has not developed any such storage facilities. This means that while India has the right to construct storage infrastructure on the Western Rivers according to the treaty.

d. India has been granted permission to use an additional 701,000 acres of land for agricultural purposes, beyond the area already being cultivated as of April 1, 1960. However, out of this additional land, only 270,000 acres can be developed for agriculture until storage facilities are constructed. This means that the total area available for cultivation, including the existing land as of April 1, 1960, would be 912,477 acres. Additionally, once storage facilities are built, 0.5 million acre-feet of water must be released annually for irrigation from these storage facilities.

6.2.3. Integrated Watershed Management Programme (IWMP)

The Department of Rural Development historically implemented watershed development through various programmes like the Integrated Wastelands Development Programme, Drought Prone Areas Programme, and Desert Development Programme. In 2008, based on the recommendations of a Technical Committee chaired by Prof. C.H. Hanumantha Rao, the Government of India launched the Integrated Watershed Management Programme (IWMP). This new programme aimed to consolidate efforts for more effective watershed management.

The primary objective of the IWMP[1] is to restore the ecological balance by harnessing, conserving, and developing degraded natural resources, including soil, vegetative cover, and water. The programme focuses on several key outcomes:

[1] https://iwmp.ap.gov.in/

1. **Prevention of Soil Run-off:** By implementing soil conservation measures, the IWMP aims to reduce soil erosion, thereby maintaining soil health and fertility.
2. **Regeneration of Natural Vegetation:** The programme promotes afforestation and reforestation activities, which help in the regeneration of natural vegetation, improving biodiversity and providing habitat for wildlife.
3. **Rainwater Harvesting:** The IWMP emphasizes the importance of rainwater harvesting techniques to capture and utilize rainwater efficiently. This helps in reducing water scarcity and ensures the availability of water for various uses.
4. **Recharging of Groundwater Table:** By enhancing groundwater recharge through various structures like check dams, percolation tanks, and recharge pits, the programme aims to replenish groundwater resources, which are critical for sustaining agricultural and domestic water needs.

The IWMP adopts a participatory approach, engaging local communities, government bodies, and NGOs in planning and executing watershed development activities. Key components of this strategy include direct community involvement in decision-making to tailor interventions to local needs, capacity-building initiatives to enhance skills in sustainable land and water management, and integrated planning to ensure a holistic approach to natural resource management. This collaborative and comprehensive strategy aims to effectively restore and conserve vital natural resources.

6.2.4. Drought Prone Area Development Programme (DADP)

The Drought Prone Area Programme (DPAP)[1] in Jammu and Kashmir is a critical initiative aimed at addressing the persistent drought conditions that adversely affect the region's socio-economic stability. Launched by the Government of India in 1973-74, DPAP focuses on mitigating the impacts of drought through a comprehensive approach that includes water conservation, soil conservation, and sustainable agricultural practices. The programme's key interventions involve the construction of water harvesting structures such as check dams and percolation tanks to enhance water availability, as well as the promotion of soil conservation techniques like contour bunding and afforestation to prevent soil erosion and maintain soil fertility. Additionally, DPAP encourages the adoption of drought-resistant crop varieties and sustainable farming methods to improve agricultural productivity and resilience. The implementation of DPAP in Jammu and Kashmir is characterized by a participatory approach, engaging local communities, government agencies, and non-governmental organizations in the planning and execution of drought mitigation measures. By integrating watershed management practices and providing training and

[1] https://osou.ac.in/eresources/Drought-Prone-Areas-Programme.pdf

resources to local stakeholders, DPAP aims to build capacity and ensure the long-term sustainability of its initiatives. Ultimately, the programme seeks to enhance the quality of life for rural populations by improving water and soil management, boosting agricultural output, and creating diverse livelihood opportunities, thereby fostering resilience against the adverse effects of drought.

The common guidelines for Watershed Development ensure a consistent strategy for implementing all area development programmes. Key features of this strategy include:

1. **Watershed Basis Implementation:** All area development programmes are to be implemented exclusively on a watershed basis.
2. **Defined Project Area:** Programme activities are confined to identified watersheds of about 500 hectares, executed on a project basis over four to five years.
3. **Alignment with Village Boundaries:** Watershed projects should, as far as possible, coincide with village boundaries.
4. **Community Participation:** Direct participation of local communities is required in the planning, development, and maintenance of watershed areas during and after the project period.
5. **Role of Panchayati Raj Institutions:** These institutions have the authority to monitor and review the programme at district, block, and village levels, and they can serve as Project Implementation Agencies if they choose to.
6. **Involvement of Voluntary Agencies:** Voluntary agencies are given an effective role in the programme's implementation, particularly in motivating people, organizing communities, and providing training.

6.2.5. Panchayati Raj Act of 1989

The Jammu and Kashmir Panchayati Raj Act[1] of 1989 establishes a three-tier system of local self-governance, comprising Halqa Panchayats at the village level, Block Development Councils at the intermediate level, and District Planning and Development Boards at the district level. The Act aims to decentralize administrative and financial powers, enhance grassroots participation in governance, and improve public service delivery in rural areas. By mandating regular elections and granting financial autonomy to Panchayati Raj Institutions (PRIs), the Act ensures democratic representation and accountability. It delineates the specific powers and functions of each tier, covering areas such as agriculture, health, education, public works, and social welfare.

[1] https://panchayat.gov.in/document/jammu-and-kashmir-panchayati-raj-act-1989/

Additionally, the Act emphasizes capacity building for PRI members, equipping them with the necessary skills to manage local governance effectively. Overall, the Act fosters inclusive and sustainable development by aligning development initiatives with the specific needs of local communities, thereby strengthening local self-governance and promoting democratic principles in Jammu and Kashmir.

6.2.6. Command Area Development (CAD)[1]

6.2.6.1. CAD Jammu Division

Since 1974, the Command Area Development (CAD) Jammu has been sustainably addressing the gap between the irrigation potential created and the actual utilization for efficient water management. The aim is to enhance crop production and productivity, thereby improving the socio-economic status of the state. The CAD Jammu's primary mandate is to ensure that the irrigation potential developed by the Irrigation Department is effectively utilized. This involves ensuring that water reaches farms and cropped areas through the construction of field channels and the implementation of interventions like drip and sprinkler irrigation. To address the issue of inadequate irrigation, supply to tail-end farmers, the Incentivization Scheme for Bridging Irrigation Gap (ISBIG) scheme mandates that at least 30% of the allocated funds be used for micro-irrigation activities, including drip and sprinkler systems.

Currently, the CAD Jammu focuses on several key initiatives: the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), which aims to strengthen and create irrigation distribution networks from source to farm; the completion of projects under the Rashtriya Krishi Vikas Yojana (RKVY); the promotion of Participatory Irrigation Management among water users; conducting adaptive trials to transfer technology for higher income and better crop yield per unit of water; and on-farm development in canal command areas to enhance water use efficiency and overall agricultural productivity.

6.2.6.2. CAD Kashmir Division

The CAD for Kashmir Division was neucleated in the year 1980-81 after initiation in the year 1974 by the Government of India with the aim to bridge the gaps between the Irrigation potential created and that utilized through micro level infrastructure development and efficient farm water management, to enhance agricultural production and productivity and thus improve socio –economic conditions of the farmers. The CAD programme, thus, focusses on efficient utilization of created irrigation potential by improving the water distribution by construction of field channels, field drains, flumes, etc; avoiding or minimizing

[1] https://cadjmu.nic.in/intro.html

inadequate and over irrigation; optimal usage of surface water; improving efficiency of irrigation infrastructure; and inculcating the habit of Warabandi system.

6.2.7. Rashtriya Krishi Vikas Yojana (RKVY)[1]

The Rashtriya Krishi Vikas Yojana (RKVY) - Remunerative Approaches for Agriculture and Allied Sector Rejuvenation (RAFTAAR) is a scheme aimed at transforming farming into a profitable economic activity by enhancing farmers' efforts, reducing risks, and promoting agri-business entrepreneurship. The key features of the scheme are as follows.

1. **Incentivizing States for Increased Public Investment:** RKVY-RAFTAAR encourages states to significantly boost their public investment in agriculture and allied sectors. This is critical for ensuring sustained growth and development in these areas, which are vital for the economy and for ensuring food security.
2. **Flexibility and Autonomy for States:** The scheme grants state considerable flexibility and autonomy in planning and executing agricultural and allied sector schemes. This enables states to tailor their strategies to local conditions and priorities, making interventions more effective and context-specific.
3. **Preparation of Agriculture Plans Based on Local Conditions:** RKVY-RAFTAAR mandates the development of agricultural plans at the district and state levels. These plans are to be based on agro-climatic conditions, technological availability, and natural resources. This ensures that interventions are scientifically grounded and practically feasible.
4. **Reflection of Local Needs and Priorities:** The scheme emphasizes the importance of incorporating local needs, crops, and priorities into state agricultural plans. This localized approach ensures that the unique challenges and opportunities of each area are addressed, leading to more relevant and effective agricultural development.
5. **Reducing Yield Gaps in Key Crops:** One of the primary goals of RKVY-RAFTAAR is to reduce the yield gaps in important crops. This is achieved through focused interventions that address the specific factors limiting productivity, thereby enhancing overall crop yields.
6. **Maximizing Returns for Farmers:** The scheme aims to maximize returns for farmers by improving the efficiency and productivity of agricultural and allied activities. This involves adopting best practices, advanced technologies, and innovative approaches to farming and resource management.
7. **Holistic Addressing of Agricultural Components:** RKVY-RAFTAAR takes

[1] https://rkvy.nic.in/Default.aspx#

a comprehensive approach to improving the production and productivity of various components of agriculture and allied sectors. By addressing these components in a holistic manner, the scheme aims to bring about quantifiable improvements that benefit farmers and the agricultural ecosystem as a whole.

6.2.8. Atal Mission for Rejuvenation and Urban Transformation[1] (AMRUT)

The Hon'ble Prime Minister, in his address to the nation on August 15, 2019, highlighted the critical water issues faced by India. He noted that nearly half of the households lacked access to water, forcing women to travel long distances to fetch it. To address these challenges, he emphasized the need for water conservation, irrigation, rainwater harvesting, rejuvenation of water bodies, desalination, and wastewater treatment, leading to the launch of the Jal Jeevan Mission.

To enhance living conditions for citizens, the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) was initiated on June 25, 2015, targeting 500 cities. AMRUT aimed to provide 1.39 crore household tap connections and increase sewer/septage connections from 31% to 62%. The mission achieved significant milestones, including 1.12 crore tap connections, 87 lakh sewer connections, and the creation of 1,800 MLD of sewage treatment capacity, of which 907 MLD is reused.

AMRUT has substantially improved the quality of life, particularly for women, by reducing the time and effort spent on water collection. To further Sustainable Development Goal 6.4, which seeks to enhance water-use efficiency and address water scarcity by 2030, AMRUT 2.0 was launched. This mission extends its focus to provide universal water supply and 100% sewerage/septage management in all statutory towns.

The mission will empower States/UTs and cities to plan and implement projects with flexibility through Central assistance allocated based on project progress. Women and youth will provide feedback on mission progress, and women Self-Help Groups (SHGs) will be involved in water demand management, quality testing, and infrastructure operations. Training programs for women will be conducted by PHEDs or water and sewerage boards under state urban development departments.

AMRUT 2.0's reform agenda focuses on the financial sustainability and water security of Urban Local Bodies (ULBs), aiming to meet 20% of water demand through recycled water, reduce non-revenue water to less than 20%, and rejuvenate water bodies. Other reforms include property tax, user charges, enhancing ULB creditworthiness, and urban planning. Smart elements will be incorporated into every project, including a sub-scheme on well rejuvenation.

The capacity building programs are conducted for stakeholders, including

[1] https://mohua.gov.in/upload/uploadfiles/files/AMRUT-Operational-Guidelines.pdf

contractors, plumbers, plant operators, students, women, and citizens. Technical institutions will assess mission outcomes, and students will engage in project surveys through the gig economy model. The Technology Sub-Mission will identify and promote global technologies in the water sector, encouraging entrepreneurship and startups in low-cost indigenous equipment and processes. AMRUT 2.0 will be paperless, with robust technology-based monitoring and evaluation.

ULBs will submit detailed City Water Balance Plans (CWBPs) and City Water Action Plans (CWAPs) online, prioritizing projects that enhance sustainability and efficiency in water supply, sewerage, septage management, reuse of treated water, and rejuvenation of water bodies. The Centre will fully fund Administrative & Other Expenses (A&OE) to cover the cost of preparing CWBPs, PMUs, DPRs, PIUs, PDMCs, Aquifer Management Plans, IRMAs, and capacity building.

The mission's reform agenda includes reducing non-revenue water, recycling treated used water, rejuvenating water bodies, enhancing urban finance and planning, incentivizing successful reforms. The technology sub-mission will promote startup ideas and private entrepreneurship, commissioning pilot projects after expert screening. It will also support innovative lighthouse projects. Information, Education, and Communication (IEC) will be a key strategy for spreading awareness on water conservation and enhancing water use efficiency.

Pey Jal Survekshan will assess compliance with water supply, sewerage, septage management, water reuse, and water body conservation benchmarks, instilling competition among cities and acting as a monitoring tool and mission accelerator. Community participation will focus on involving women SHGs in water infrastructure management and quality assessment through the National Urban Livelihood Mission (NULM).

The outcome-based funding will be a defining feature, with cities submitting roadmaps for achieving mission outcomes. Evidence-based evaluation of outcomes will be conducted using an online monitoring platform and citizen feedback. Public-Private Partnership (PPP) projects will be mandatory in cities with over one million residents, with at least 10% of city-level funds allocated to PPP projects.

For Jammu and Kashmir, AMRUT 2.0 aims to address unique regional water challenges by focusing on enhancing water supply infrastructure to ensure universal coverage, implementing effective sewage and septage management systems, rejuvenating water bodies to improve ecological balance and water quality, promoting community participation, particularly involving women SHGs in water management, leveraging technology for efficient monitoring and evaluation of projects, and encouraging local startups and innovations in water conservation and management. These initiatives will contribute to achieving water security and improving the quality of life for residents in Jammu and Kashmir, aligning with the broader goals of AMRUT 2.0 and the vision of a water-secure India.

6.2.9. Catch the Rain[1]

In 2019, the Ministry of Jal Shakti launched the Jal Shakti Abhiyan (JSA) across 1,592 blocks in 256 water-stressed districts out of a total of 2,836 blocks nationwide. The initiative was paused in 2020 due to the Covid pandemic, during which the "Catch The Rain" campaign was introduced with the tagline "Catch the rain, where it falls, when it falls" to encourage the creation of Rain Water Harvesting Structures (RWHS). In 2021, the "Jal Shakti Abhiyan: Catch the Rain" (JSA: CTR) was launched by the Hon'ble Prime Minister, incorporating the CTR campaign to cover all districts, both rural and urban, across the country. Since then, JSA: CTR has become an annual event. For 2023, JSA: CTR focused on "Source Sustainability for Drinking Water," running from March 4, 2023, to November 30, 2023, with special emphasis on 150 districts identified by the Jal Jeevan Mission (JJM).

Looking ahead to 2024, Jal Shakti Abhiyan: Catch the Rain will be held from March 9, 2024, to November 30, 2024, with the theme "Nari Shakti se Jal Shakti," emphasizing the vital role of women in water conservation. The campaign will continue to focus on five key interventions: (i) water conservation and rainwater harvesting; (ii) enumerating, geo-tagging, and inventorying all water bodies, and developing scientific conservation plans; (iii) establishing Jal Shakti Kendras in all districts; (iv) intensive afforestation; and (v) generating awareness. In Jammu and Kashmir, these initiatives are being adapted to address the region's specific water challenges and leverage community involvement for effective implementation.

[1] https://nwm.gov.in/catchtherain

7. Water Financing and Economics

The government of the UT of Jammu and Kashmir is committed towards providing every household with clean drinking water and adamantly recognizes the necessity for providing water facilities for improving the quality of life. Subsequently, spirited efforts to provide a functional tap connection to every household are being in action through various schemes also aimed at maintainence/upgradation/augmentation of water supply schemes.

The economy of Jammu and Kashmir is predominately dependent on agriculture dependent and nearly 70% of population is directly or indirectly engaged in agricultural and allied occupations. As a consequence, the focus has been on developing irrigation facilities like canals/khuls for agriculture, where primary activities involve construction and maintainence of these facilities. Due to climate change and consequent anomalous weather patterns, and significant changes in the water cycle patterns, flood threats have increased. The government authorities have putin significant efforts consideration for mitigation efforts and safeguarding of flood protection measures. The expenditures for financial year 2022-23 for various schemes and sectors are illustrated in Table 7.1. Table 7.2, shows the various achievements and targets. In Table 7.3, the finances and expenditures for major irrigation and flood control sectors areillustrated.

Table 7.1. Outlay and expenditure during FY 2022-23 in Cr. Source: (PDMD JK 2023)

SN	Scheme	Outlay	Funds Released	Expenditure (31.01.2023)	% Expenditure
1	Capex Budget	313.75	211.42	105.28	49.79
2	Centrally Sponsored Schemes	8124.01	677.01	524.42	77.46
3	N ABARD	363.67	99.87	11.35	11.36
4	PMDP	455	114.29	0	0
	Total	9256.43	1102.59	641.05	58.14
					Data source: Jal Shakti Department, J&K

Table 7.2. Physical achievements during FY 2022-23 ending 31 January 2023.

SN	Particulars	Unit	Targets (2022-23)	Targets Achieved (on 31.01.23)
A	PHE Sector, Jammu / Kashmir			
1	Schemes/ works to be com leted	nos.	999	145
2	Population to be benefitted	nos.	4097521	30894
3	House Hold Connections to be	nos.	774238	5263
B	RTIC/I&FC sector, Jammu/Kashmir			
1	Schemes/ works to be com leted	nos.	193	50
2	Potential to be created	Ha	21979	12437
3	Area to be protected	Ha	108654	70

Table 7.3. Water Financing: Summary Table - Financial Allocation and Expenditure (01/04/2022 - 31/03/2023)

SN.	Name of Scheme	Scheme (Central/ State)	Project Authority	Cat. of Financing	Funding Scheme	State		Total Allocation	Total Expenditure
						Allocation	Expenditure		
1	Major Medium Irrigation (MMI)	State	Jal Shakti (I&FC) Dept. Jammu	UT of J&K	CAPEX	1318.64	992.11	1318.64	992.11
2	Minor Irrigation (MI)	State	Jal Shakti (I&FC) Dept. Jammu	UT of J&K	CAPEX	7664.66	2797.5	7664.66	2797.5
3	Flood Control (FC)	State	Jal Shakti (I&FC) Dept. Jammu	UT of J&K	CAPEX	4420	3200.69	4420	3200.69

7.1. Public Health Engineering (PHE) sector

According to the Economic Survey of Jammu and Kashmir, 2023 (PDMD JK 2023), 348 works were completed under the PHE sector of Jammu and Kashmir to provide 62500 household connection which benefitted an overall population of 3.47 lakhs, during 2021-22. In the same period, about 2.17 lakh water quality tests were also conducted. Further, 124 works were completed under the PHE sector in 2022-23 benefitting 30000 people, with more water quality tests of about 1.94 lakhs in number.

7.2. Jal Jeevan Mission

UT of J&K planned 3125 schemes with 1120 New/Augmentation & 2005-Retro fitting schemes at an estimated cost of Rs 14226.00 crore to cover the balance 12.92 lakh rural households under the village and district action plans of the Pani Samitis and district Jal Jeevan Missions. Further, upgrading of the service level of 5.75 lakh rural households were connected with tap water connections at the start of the Mission. About 10.66 lakh households out of 18.67 lakh are covered under the Mission in 2022-23, and the remaining 8.01 lakh households are expected to be covered during 2023-24 (PDMD JK 2023).

The UT of J&K achieved 57.32% coverage of households with tap water connections within premises as compared to the National coverage of 58.68 and has provided 100% households tap connections in the Srinagar & Ganderbal districts, 11 Blocks, 451 Panchayats and 1118 Villages. All the rural Schools (23160), Anganwadi Centers (24163) and Health Institutions (3324) were provided tap water connections as part of the 100 days campaign launched by Hon'ble Prime Minister. Besides, 1666 Gram Panchyat buildings (52.8%) out of 3156 have also been provided with tap water connections and remaining are in process and shall be covered during 2023-24.

7.3. Irrigation

In 2021-22, under Irrigation & Flood Control (I&FC) sector, 109 works were completed creating 0.18 lakh Ha of irrigation potential. Further, under I&FC, 27000 Ha of land was protected from flood threats during this period. In 2022-23, under Irrigation & Flood Control (I&FC) sector, 25 works were completed creating additional 0.11 lakh Ha of irrigation potential. Further, under I&FC, additional 50 Ha of land was protected from flood threats during this period. A total of 294 water supply, irrigation and flood control projects have been sanctioned since 2016-17 at an estimated cost of Rs. 958.77 crore under various RIDF tranches from XXII-XXVII, NABARD, which include 06 number of projects sanctioned during 2021-

22. 21 projects have been completed upto March, 2022 and 112 projects are targeted to be completed during 2022-23.

Within the irrigation sector, several schemes are being implemented for enhancing, stabilizing and creating irrigation potential, aiming to improve the production of agricultural and horticulture crops. Thus, leading to an increase in the farmer's income while contributing significantly to the growth of the economy of the UT of J&K.

A total of 396 Surface Minor Irrigation Schemes have been sanctioned under PMKSY (HKKP) in the UT of J&K at an estimated cost of Rs. 1184.41 crore out of which 198 schemes stands completed ending 03/2022 thereby creating irrigation potential of 84732 Ha. A total of 74 Ongoing Minor Irrigation Schemes under AIBP-PMKSY are likely to be completed during 2022-23 that will create 13956 Ha of irrigation potential. While two projects of UT of J&K have been completed under Pradhan Mantri Krishi Sinchayee Yojana–Accelerated Irrigation Benefit Programme (PMKSY-AIBP). Further, at an estimated cost of Rs. 215.87 crore, 19 schemes were sanctioned under Flood Management and Border Areas Programme in the UT of J&K. Out of these, three schemes stand completed in 03/2022. The other 16 schemes were likely to be completed during 2022-23.

7.4. Flood Management

The Kashmir valley experienced devastating floods in September 2014, that focussed the attention towards prioritizing flood control in the UT of Jammu and Kashmir. Subsequently, Priority Works- Comprehensive Flood Management Plan of River Jhelum was approved for funding under Prime Minister's Development Package (PMDP)-2015, which was divided in two phases of Rs. 399.29 Cr. and Rs. 1684.60 Cr. The first phase of the Project is nearing completion with a fund utilization of Rs323.61 crores out of Rs. 399.29 Cr. in 03/2022. The second phase of the project has been initiated.

7.5. Major Initiatives

After signing a fresh agreement between the Governments of Jammu and Kashmir, and Punjab on 08.09.2018, the Shahpur Kandi Dam Project was restarted. The project cost is estimated at about Rs. 2715.70 Cr, being executed by the government of Punjab, and was targeted to be completed by August 2023. The dam project is ensured to provide irrigation to 53927 Ha of land and 20% of the total electricity generated per annum on low cost to the Jammu & Kashmir (PDMD JK 2023).

Further, work on Tawi Barrage is expected to be completed in 2023-24 at an estimated cost of Rs 64.80 crore. Other planned works as per PDMD JK (2023) include the following.

- Modernization of Ranbir canal and its distribution system Jammu,
- Construction of protection works on critical spots downstream of Akhnoor Steel Bridge at Hamirpur on banks of river Chenab,
- Training of river Tawi from Manwal to exit of Indo-Pakistan border at spots,
- Improvement/up-gradation of Lar Irrigation Canal, Ganderbal, Revamping/modernization of Marval Lift Irrigation Scheme, Pampore (Pulwama),
- Flood Protection works on Ningli Nallaha, Baramulla, in active consideration.
- Introduction of online services and water quality monitoring system.

8. Current governance of Water Resources Best practices and Issues

The best practices for water conservation, particularly in the farming sector were discussed in 5. Water Sustainable & Efficient technologies and best practices, (pg 453). Further, recommendations are individually discussed in sub-topics of 4.Water Resources-
(Source, Demand and Quality). The general water management issues and recommendations observed in the UT of Jammu and Kashmir as described by the representatives of different UT level departments during the inception workshop and based on the modelling experience are summarized as follows.

- The meteorological data sourced from regional meteorological centre, and government-affiliated platforms offers a comprehensive range of weather, climate, and meteorological information. However, the rain gauging stations are mostly of the manual nature. The accessibility to rain gauging data needs simplification. The readily available IMD gridded rainfall products are only available at very coarse resolution and medium resolution products should be developed through data assimilation methods. The data dissemination web portal could be significantly improved to match national and international data portal standards.
- The ground water monitoring needs to be prioritized particularly in the Jhelum basin. CGWB has a significant number of ground water wells in the Jammu and Kashmir region. However, the well depth data is only available from the annual reports, and a ground water level database has not been developed for the UT of Jammu and Kashmir. Further information on ground water storage and baseline storage (decadal pre-season and post-season mean) should be included in the annual reports. A mechanism for data access should be developed at UT level for public utilization of the ground water depth and quality data. For the same a webGIS is recommended.
- As per the Department of Horticulture informed that 25% of the land is irrigated from about 2000 borewells, and 75% land is rainfed. Due to the excessive drainage from water bodies, the water level is observed to be low at several places. Possible solutions for ground water recharge could be looked into for better water management. Further, water efficient technologies may also be implemented as discussed in Section 5. Other recommendations were provided for a suitable policy development focussing on conduct amongst the various departments and water harvesting. Another issue observed was corresponding to water logging and stagnation due to improperly planned infrastructure development. Integrated aquaculture and cropping systems may be looked into for water conservation as discussed in section 5.

- Facilitation of regular audits for water management and further installation of small-scale equipment such as water flow meters, etc are lacking as informed by the department of animal husbandry and the authories should centralize at UT level collection of water related data for animal husbandary remotely through the use of data-loggers with the small-scale equipment. Since water requirements are largely varying corresponding to the regional factors such as temperature, animal breeds, nature and size of animal ponds, etc., monitoring of other parameters including animal pond water quality, temperatures and animal health may also be looked into.
- A common issue in cross department water data requirements is the lack of measures taken for timely data collected, automated data collection and often coordination between various departments. A web-based querying system or an e-governance system could be looked into by the UT government to overcome the coordination issues. IoT techniques can be looked into for smart collection and maintainence of data.
- Drainage issues and municipal water quality issues was often observed with irregular and improper waste disposal in Jammu, often in government residential colonies, and at medical and educational institutions. As discussed earlier, regular auditing and implementation of an efficient waste water management system will be highly beneficial in overcoming these issues. Further recommendations can be given to promote reuse water from waste water treatment plants in horticulture uses.
- Although the concept of rain harvesting is regionally known, however, the implementation seems to be significantly lacking. Thus, recommendations should be given to promote, implement, and facilitate incentives for rain harvesting technology. Additionally, it is also recommended to plan for harvesting water from small stream reservoirs, for example, by developing check dams rather than being dependent on ground water wells and municipal supply only, especially in large public communities and institutions.
- Focusing on the concentration of secondary data is needed. Identifying gaps in available data is required. Scrutinizing the quality and reliability of existing data is essential. Establishing a structured framework for data processing and analysis is recommended. Developing a government-level policy for data convergence through a single-window approach should be recommended. Ensuring the availability and efficient sharing of data is recommended.

9. Water Resources Planning and Development- Strategic Plan

9.1. Water availability

9.1.1. Computational Approach

The Indian Land Data Assimilation System (ILDAS) couples a land surface and hydrodynamic model to generate a high-resolution reanalysis dataset over the Indian domain. Effective water resources management relies on consistent and long-term estimates of the total water balance, typically derived from computational models driven by accurate meteorological forcing and observational inputs. Land surface models (LSMs) are employed to mathematically represent various land surface processes critical for transferring energy fluxes and moisture between the land surface and the atmosphere. The primary function of an LSM is to simulate the dynamics of water storage on the surface and subsurface (Magotra et al. 2024). ILDAS was developed by Magotra et al. (2024) under an ISRO sponsored project and shall be transferred to SAC Ahmedabad. The ILDAS components and their specifications are outlined in Table 9.1.

Table 9.1. ILDAS Components & their Specification. Source: Magotra et al. (2024)

S. No.	ILDAS Components	Specification
1	Land Surface Model	Noah-MP 3.6
2	Spatial Resolution	0.1°
3	Time Period	2000-2022
4	Atmospheric forcing Variables	Modern-Era Retrospective Analysis (Merra-2), Climate Hazards Group InfraRed Precipitation (Chirps), ERA-Interim reanalysis (Era-5), Indian Meteorological Department (IMD) precipitation
5	Observed and satellite products	GRUN runoff, observed soil moisture (COSMOS), ESA-CCI (Satellite soil Moisture), MODIS evapotranspiration, GRACE total water storage anomalies, Observed streamflow

ILDAS has been demonstrated by Magotra et al. (2024) to exhibit strong agreement with observed data for several glaciered basins in the Indian Himalayas. Specifically, it has shown good accuracy in reflecting the spatial and temporal variations of key hydrological parameters. Given the sparse distribution and challenging accessibility of ground-based data in these regions, ILDAS raster products offer a practical solution for overcoming these data limitations. The availability of these raster products simplifies the process of obtaining critical information and enhances the reliability of hydrological analyses in the Himalayan context. The calibrated ILDAS products were subsequently used in the computations of the water budget for UT of Jammu and Kashmir. When compared with the ground observations, a significant agreement was observed between the variables. As an example, Figure 9.1 compares the ground water table depth and discharge data from ground observations with corresponding ILDAS products.

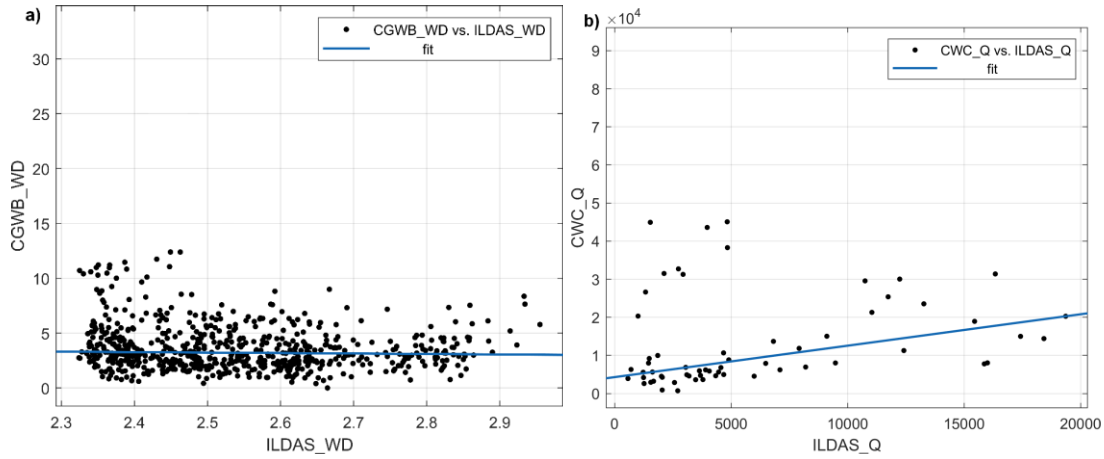


Figure 9.1. Scatterplots comparing ground data with ILDAS observations. a) shows the comparison of ground water table depth (m) from wells by CGWB (CGWB_WD) and the corresponding values from ILDAS ground water table depth (m) data (ILDAS_WD). b) shows the comparison CWC station discharge (CWC_Q) data (m^3s^{-1}) and the corresponding values from ILDAS runoff (m^3s^{-1}) product (ILDAS_Q).

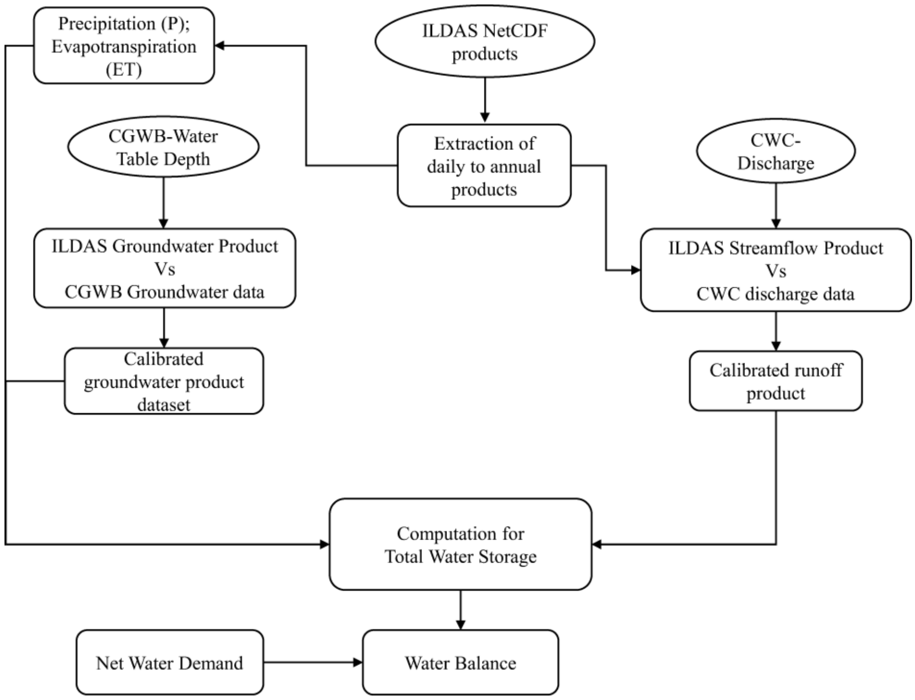


Figure 9.2. Workflow for the computation of Total Water Storage.

For the computations of the total water storage (TWS), we utilized the ILDAS inputs and modelled outputs. The workflow for the approach is shown in Figure 9.2. A multi-phase calibration of the ILDAS products is conducted corresponding to ground data. The calibration is conducted using Linear regression with the least absolute residuals (LAR) method. The first calibration is conducted the water table depth products and then between the calibrated water table depth and ILDAS ground water storage. A total of 93 CGWB station data from 2014-2022 was used for the calibration. In both cases a high agreement was observed between the first order polynomial fitted and original inputs determined with the coefficient of determination similar to 0.99 with an RMSE below 3. The second calibration was conducted for the runoff determined from the ILDAS streamflow products. The CWC discharge data at Sidhra (Jammu division), Asham (Kashmir division), and Munsibagh (Kashmir division) from 2000 to 2022 was used for the calibration of the streamflow. A high agreement was observed between the the first order polynomial fitted and original inputs determined with the coefficient of determination of 0.94 and an RMSE of 30.71. The calibrated products were used to determine the total water storage (TWS) used for the water balance computations.

The general water balance equation (Subramanya 2009) used for computation of TWS is expressed as follows.

$$\Delta S = P - ET - R - G \qquad 1)$$

where, P represents the precipitation, ET is the evapotranspiration, R is the surface runoff, G is net groundwater contribution and ΔS is the Total Water Storage (TWS) comprising surface water storage (ΔS_s), soil moisture storage (ΔS_{sm}) and ground water storage (ΔS_g).

$$\Delta S = \Delta S_s + \Delta S_{sm} + \Delta S_g \qquad 2)$$

The water budget equation is defined as follows.

$$W_b = TWS - D \qquad 3)$$

where, D is the total water demand comprising various water demand in various sectors, and W_b is the water balance.

9.1.2. Hydrological parameters over the recent decade

The historical records of TWS are significant in understanding the overall patterns of water availability, and especially, during certain scenarios for future projections. The annual TWS defined in BCM of the UT of Jammu and Kashmir is shown in Figure 9.3. The plot shows significant fluctuations in TWS in Jammu and Kashmir from 2000 to 2022, with peaks and drops over the years. The highest value, 109.35 BCM, occurred in 2004, while the lowest, 65.48 BCM, was recorded in 2008. After 2008, TWS recovered but remained inconsistent, with ups and downs throughout the following years. The overall TWS trend is marginally declining compared to precipitation and could be attributed to increased runoff and gaps in water conservation measures.

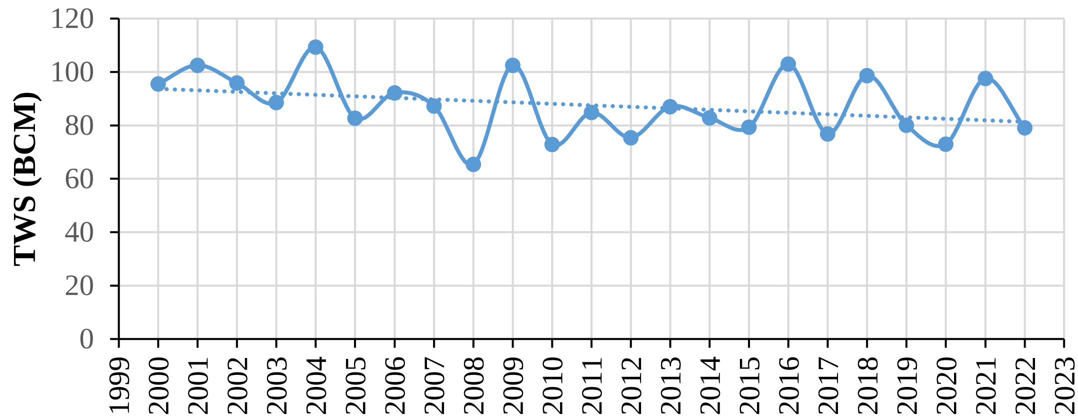


Figure 9.3. TWS in UT of Jammu and Kashmir.

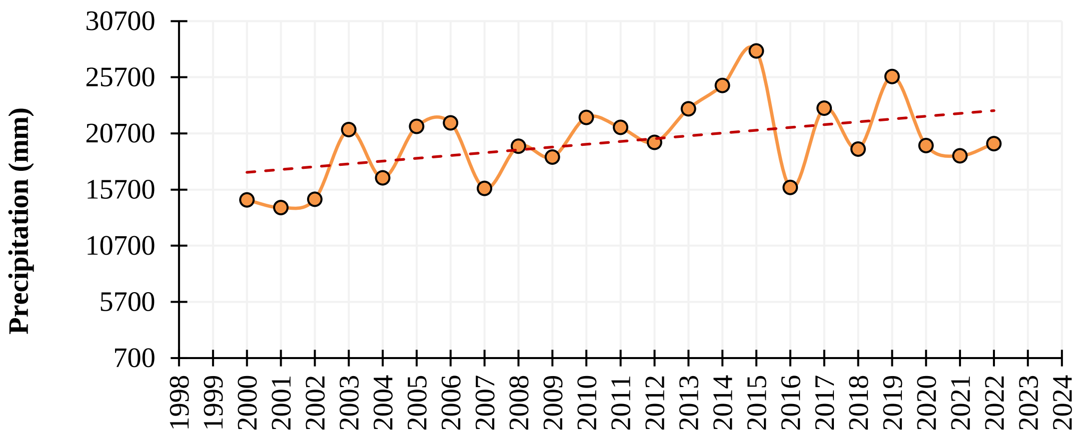


Figure 9.4 Precipitation (mm) in UT of Jammu and Kashmir.

The primary contributor in the TWS is precipitation. It is well known that precipitation plays a fundamental role in the hydrological cycle, influencing both the quantity and distribution of water resources. Analyzing historical patterns of precipitation is essential for comprehending the water availability. Figure 9.4 illustrates the annual precipitation (in mm) time-series for the Union Territory of Jammu and Kashmir. The curve reveals considerable variability, highlighted by pronounced fluctuations throughout the last two decades. A period of consistent increase in precipitation is observed between 2012 to 2015, after which alternate undulations are observed till 2020. Since 2020 to 2022 only a marginal change has been observed in the precipitation. Despite these variations, the overall trend suggests a gradual increase in precipitation over the observed period.

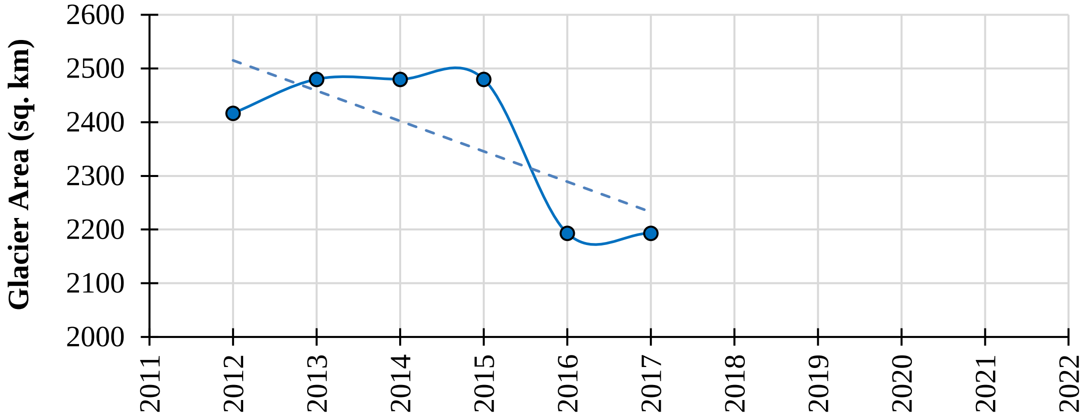


Figure 9.5 Decresing glacier area (as per RGI versions) in UT of Jammu and Kashmir.

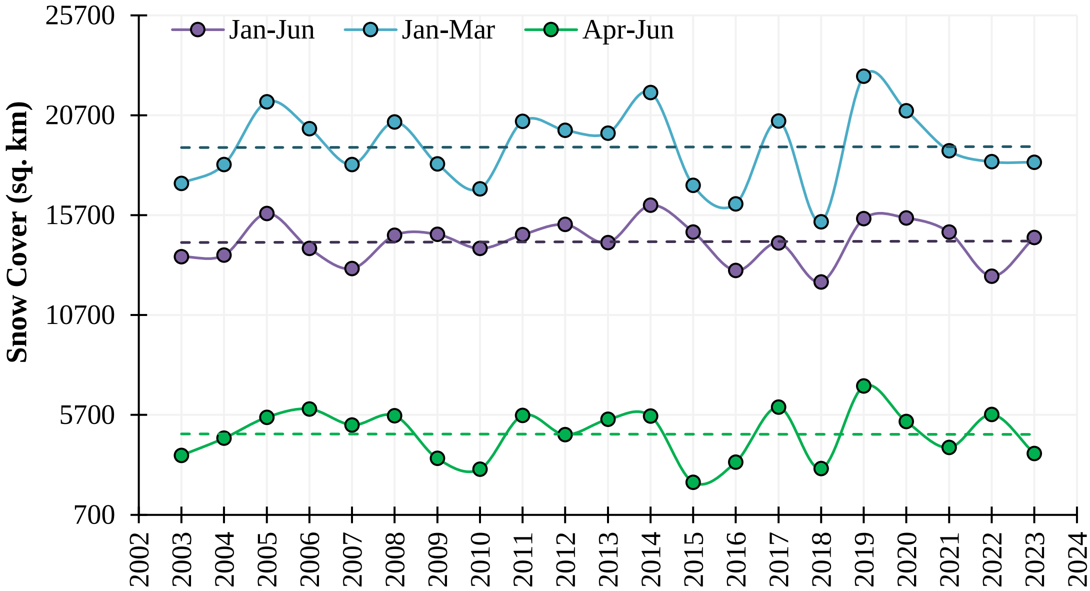


Figure 9.6 Snow cover changes in in UT of Jammu and Kashmir.

The UT of Jammu and Kashmir exhibits a significant cover of seasonal snow and glaciers which contribute to the regional water resource. Investigating the glacier cover area provides invaluable insights into long-term water storage and release mechanisms from glaciers in mountainous regions. Glacier cover fluctuations directly impact downstream water availability in summer and autumn seasons, influencing hydrological cycles and regional water resource management. Understanding the temporal dynamics of glaciers is crucial for assessing long-term water availability. Figure 9.5 illustrates the annual changes in glacier area (in square kilometers) derived from the historical GLIMS: Global Land Ice Measurements from Space[1] data (Randolf Glacier Inventory) for the region of Jammu and Kashmir, showing a critical

[1] https://www.glims.org/RGI/

decline between 2015 and 2016. Notably, the glacier cover is observed to be nearly similar excluding the 2015-16 period, where approximately 287 sq. km glacier area loss is observed. The overall trend of the curve indicates a significant decrease in glacier area over this period.

Like glaciers, seasonal snow also plays a pivotal role in the hydrological cycle, acting as a natural reservoir that stores water during the winter season and gradually releases it during the melt season. It is worth mentioning that the combination of releases from snow and glaciers in regions such as the UT of Jammu and Kashmir ensure water availability in the high-altitude regions throughout the year excluding the winters. Subsequently, understanding the temporal variations in snow cover is crucial for assessing water availability patterns, particularly in the melt season. Figure 9.6 illustrates the annual mean snow cover area (in square kilometers) for the Union Territory of Jammu and Kashmir, where a comparison is given for the winter season (Jan-March), melt season (Apr-Jun) and winter to summer season (Jan-June). The average of the mean snow cover area for Jan-March, Apr-Jun, and Jan-June is about 19000 sq. km, 14300 sq. km, 4700 sq. km. The patterns are highly unpredictable with strong undulations, but nearly contant decadal mean.

9.1.3. Population Senarios

Demographic data is identified as one of the major inputs in governance not only in the water sector but in various other sectors also. Understanding population dynamics is crucial for devising effective regional water resource management strategies. As populations expand and critically urbanize, water demand rises, which can affect the sustainability of available resources. The previous latest census in the country were conducted in 2011 and 2001. We projected the population by considering the districtwise growth rate illustrated in Figure 9.7, extracted from 2011 census[1] and floating population[2] (30%) for 2022. For further future population patterns, the same approach is followed cumulatively.

[1] https://www.census2011.co.in/census/state/districtlist/jammu+and+kashmir.html
[2] https://web.archive.org/web/20120202103650/http://www.dudh.gov.bt/gelephu/part4/4.3.htm

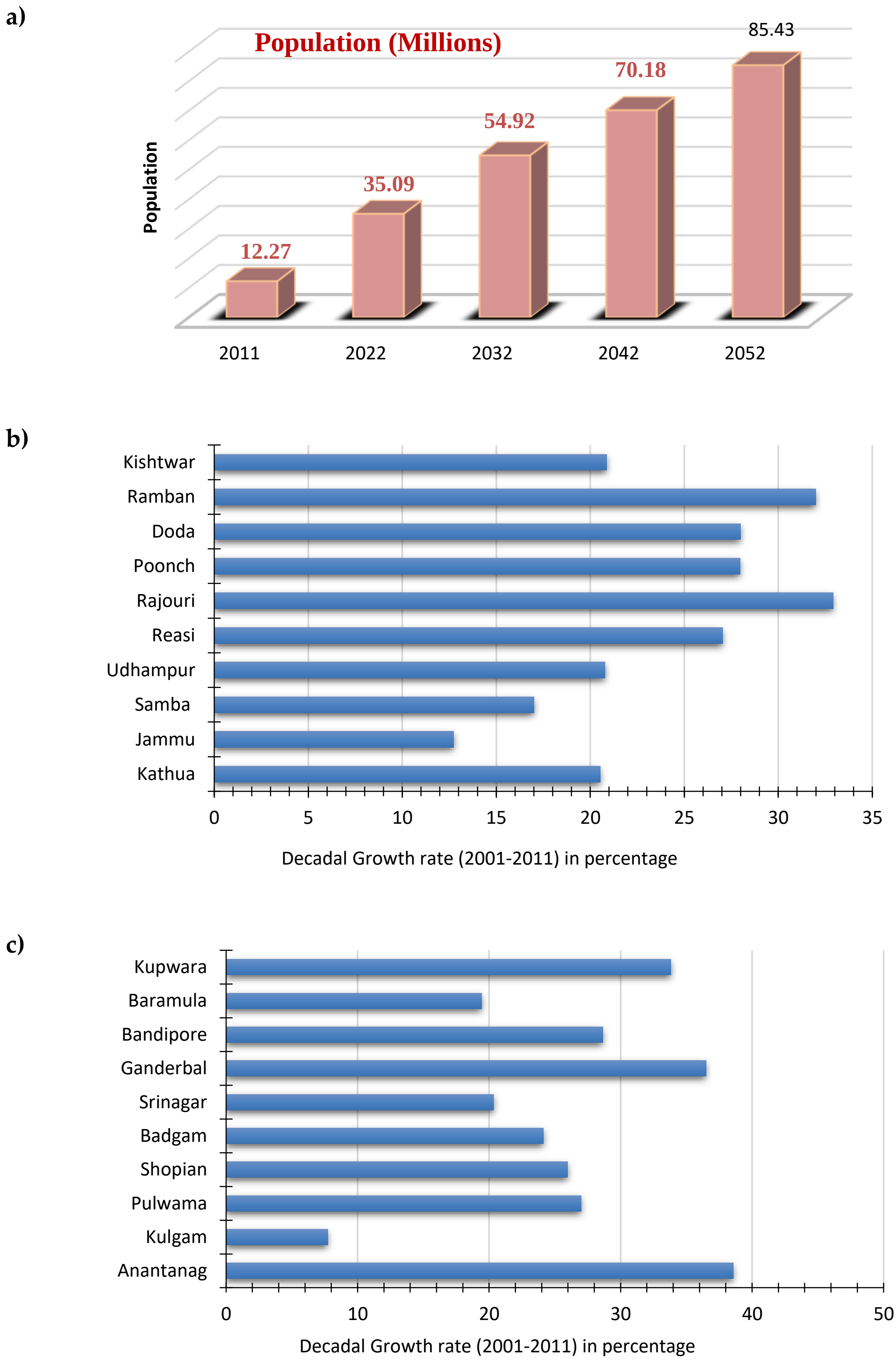


Figure 9.7 (a) Population scenarios for the UT of Jammu and Kashmir. (b) Decadal growth rate (2001-2011), in percentage of Jammu region. (c) Decadal growth rate (2001-2011), in percentage of Kashmir region.

Table 9.2. Total Water Storage (TWS) and its Mean departures, Standard departures from 20-year mean TWS data for the UT of Jammu and Kashmir.

Year	TWS (BCM)	Mean Departure	Standard Departure
2018	98.71	11.19	0.021
2019	80.07	-7.45	0.001
2020	73.06	-14.46	-0.011
2021	97.58	-10.06	0.005
2022	79.10	- 8.43	-0.007

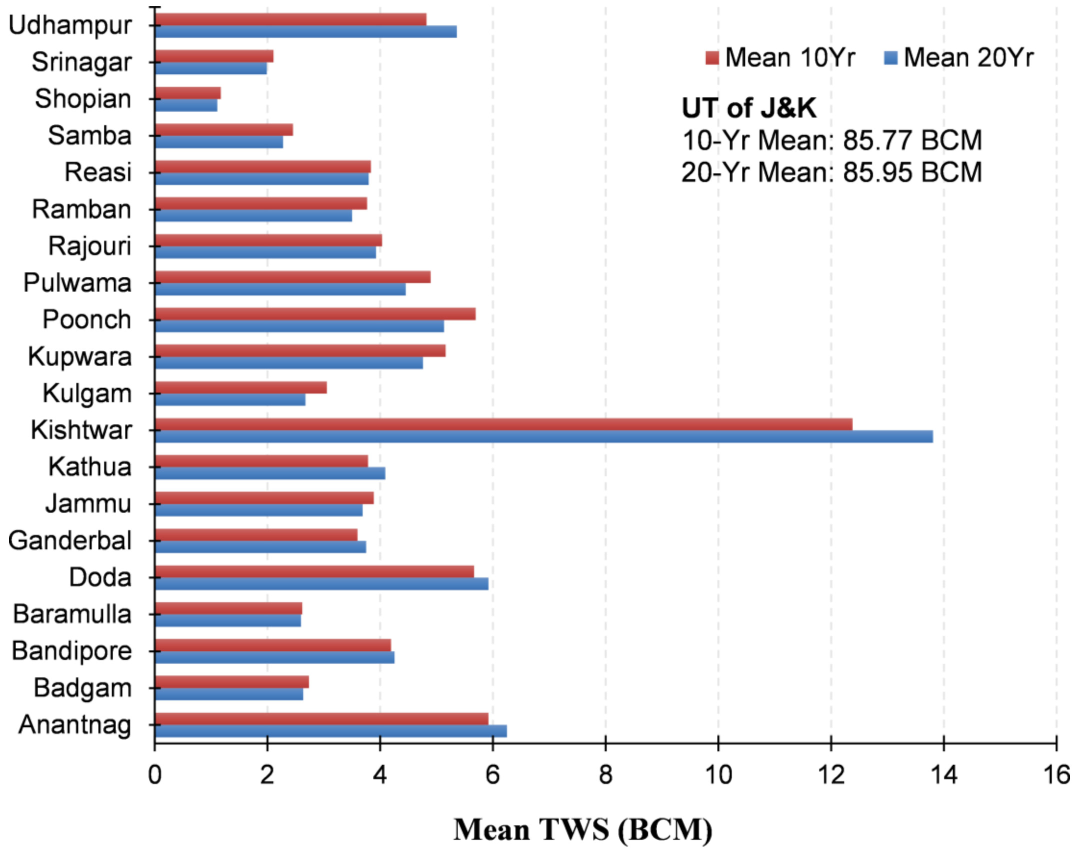


Figure 9.8 The districtwise decadal mean TWS of Jammu and Kashmir.

Table 9.3. Districts-wise Total Water Storage (BCM) of Jammu & Kashmir for the last five years.

District	2018	2019	2020	2021	2022
Anantnag	5.65	6.82	5.31	6.20	5.63
Badgam	4.97	1.44	2.62	3.47	3.77
Bandipore	4.45	5.03	2.87	3.90	3.10
Baramulla	4.32	1.25	1.75	2.17	2.56
Doda	8.02	3.95	4.43	9.23	6.33
Ganderbal	3.35	5.84	2.22	3.73	1.97
Jammu	5.14	3.81	3.39	2.62	4.02

Kathua	3.39	3.91	4.33	3.49	4.35
Kishtwar	9.79	9.01	12.67	13.89	9.60
Kulgam	4.68	4.64	2.53	1.42	1.93
Kupwara	7.14	3.84	4.30	5.65	5.70
Poonch	1.73	5.37	5.29	7.95	6.18
Pulwama	1.73	4.47	4.55	6.74	5.34
Rajouri	3.94	3.13	4.00	6.73	2.69
Ramban	5.95	4.48	1.89	3.87	2.16
Reasi	6.08	6.40	2.73	3.31	3.92
Samba	4.14	1.66	1.91	2.36	2.60
Shopian	2.64	0.48	0.66	1.01	1.30
Srinagar	4.59	1.09	1.59	1.69	2.32
Udhampur	7.00	3.45	4.01	8.14	3.61

Table 9.4. Districts-wise standardized departures from 20 year mean Total Water Storage of Jammu & Kashmir for the last five years.

District	**2018**	**2019**	**2020**	**2021**	**2022**
Anantnag	-0.04	0.06	-0.07	0.01	-0.04
Badgam	2.06	-1.24	-0.13	0.66	0.95
Bandipore	0.33	0.89	-1.18	-0.19	-0.96
Baramulla	1.36	-1.31	-0.88	-0.51	-0.18
Doda	0.90	-1.18	-0.94	1.53	0.04
Ganderbal	-0.11	1.63	-0.90	0.15	-1.07
Jammu	1.27	0.15	-0.20	-0.85	0.33
Kathua	-0.79	-0.32	0.05	-0.70	0.07
Kishtwar	-1.04	-1.26	-0.22	0.12	-1.09
Kulgam	8.80	8.65	-0.11	-4.72	-2.63
Kupwara	1.56	-0.69	-0.37	0.55	0.58
Poonch	-5.18	-0.13	-0.24	3.45	1.00
Pulwama	-1.38	-0.13	-0.10	0.90	0.27
Rajouri	-0.79	-2.32	-0.69	4.50	-3.16
Ramban	2.38	0.95	-1.59	0.35	-1.33
Reasi	1.50	1.72	-0.81	-0.41	0.02
Samba	1.52	-0.66	-0.44	-0.04	0.16
Shopian	2.93	-1.19	-0.85	-0.18	0.38
Srinagar	4.73	-1.66	-0.75	-0.57	0.58
Udhampur	0.64	-1.15	-0.87	1.22	-1.07

The Total Water Storage (TWS) data for the districts of Jammu and Kashmir in 2022 reveals a varied distribution. The tabulated data for the same is shown in Table 9.2 representing the districtwise TWS for 2018 to 2022, with departures computed from the mean of last 2 decades and standardized with standard deviation (standard departures). The districtwise representation of TWS and departures are illustrated in Table 9.3 and Table 9.4. Figure 9.8 shows the 10-year and 20-year mean TWS in MCM in districtwise and for the UT of Jammu and Kashmir.

A labelled representation of the TWS in the UT of Jammu and Kashmir is shown in Figure 9.9 which indicates signicant variability across five distinct bands. The districts of Samba, Ramban, Rajouri, Kulgam, Shopian, Baramulla, Srinagar, and Ganderbal fall within the very low band, with Total Water Storage (TWS) ranging from 1.3 BCM to 3 BCM. The low band, with TWS between 3 BCM and 4.6 BCM, includes the districts of Jammu, Udhampur, Kathua, Reasi, Budgam, and Bandipore. The moderate-low band, ranging from 4.6 BCM to 6.3 BCM, covers the districts of Anantnag, Pulwama, Kupwara, and Poonch. The moderate-high band, with TWS varying from 6.3 BCM to 7.9 BCM, includes only the district of Doda. Finally, the high band, with the most substantial TWS ranging from 7.9 BCM to 9.6 BCM, includes only the district of Kishtwar.

Similarly, district-wise Total Water Storage (TWS) differences for Jammu and Kashmir between 2021 and 2022 are presented in Figure 9.10. A significant decrease of over 3.3 BCM has been observed in the districts of Rajouri, Udhampur, and Kishtwar, while a significant increase is noted in Doda and other districts. Additionally, district-wise standardized departures in TWS from the mean TWS of the past two decades for Jammu and Kashmir are depicted in Figure 9.11. The districts showing significant departures include Srinagar, Budgam, and Jammu, which are observed to be in critical stages in all these representations. Excluding the districts of Baramullah, shopian, Ramban, Doda and Kupawara, the other districts generally show standard departures below 0.013 indicating significant depreciation in the available water resources in the other districts.

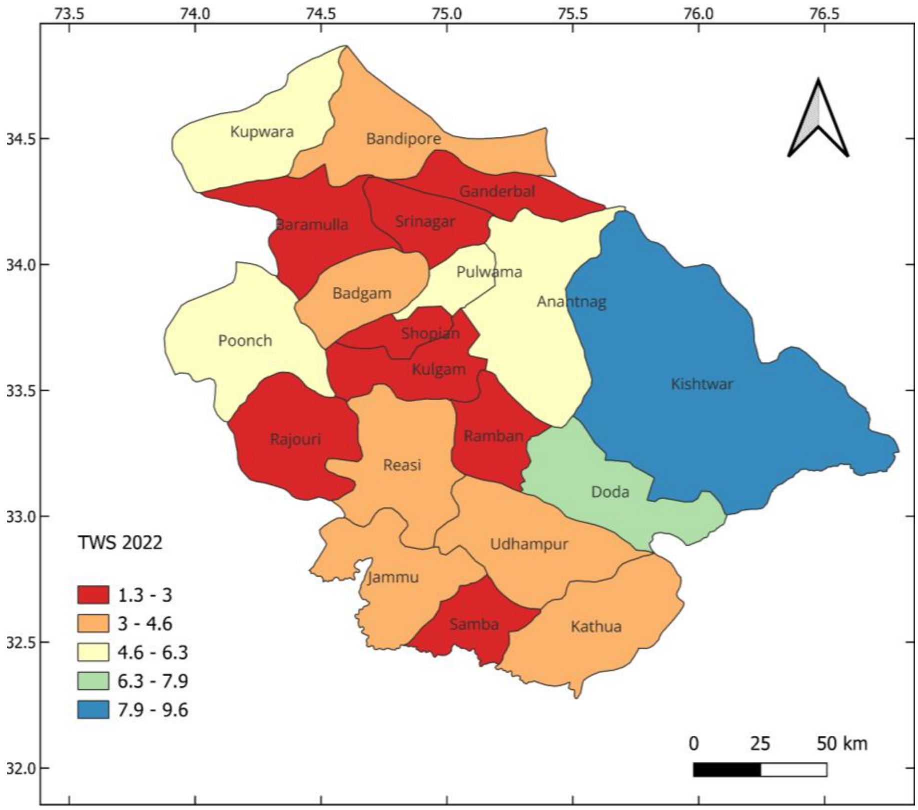


Figure 9.9. Districtwise Total Water Storage (BCM) of Jammu and Kashmir for Year 2022.

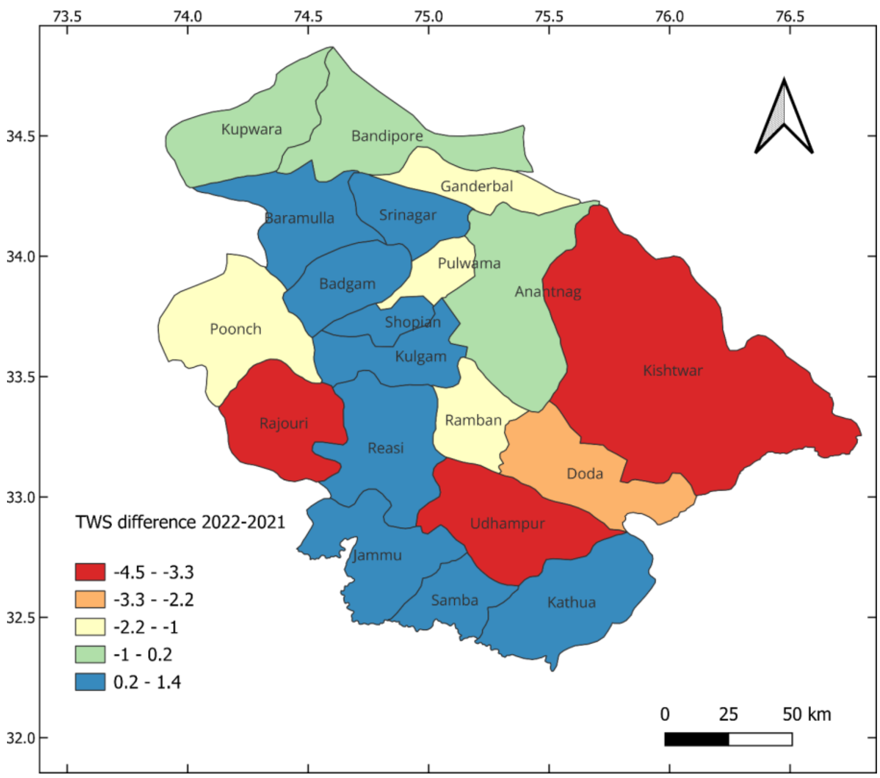


Figure 9.10. Districts-wise Total Water Storage difference of Jammu and Kashmir for Year 2022-2021.

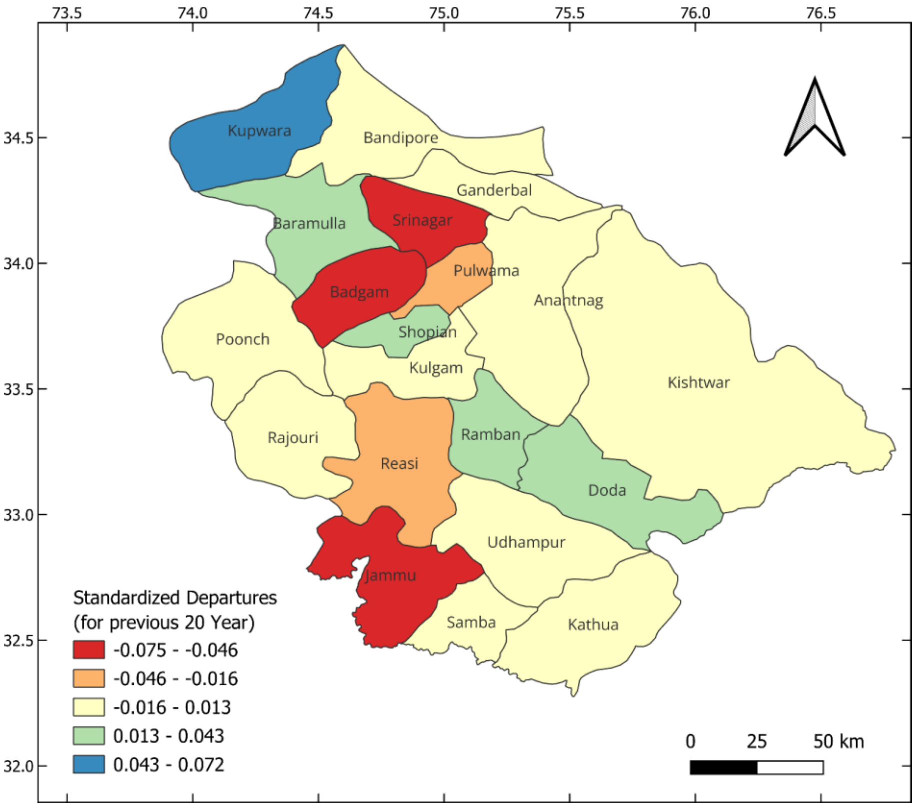


Figure 9.11. Districts-wise Total Water Storage Standardized Departures of Jammu and Kashmir for Previous 20 Year.

9.2. Demand, Supply (Withdrawals) & Consumptive Use of Water

Demand estimation of comprising water use and requisite volume is a crucial component in water resource management, especially in regions experiencing diverse water usage patterns. For the year 2022, we estimated the population-dependent water demand by leveraging the 2011 census data, as illustrated in Figure 9.7. The district-wise population was updated using the decadal growth rate from 2001-2011, adjusted for an additional 30% floating population to capture temporary residents and seasonal migrations. Forestry and wildlife, significant water-consuming sectors, were assumed to require 50% of the agriculture water demand, reflecting their role in maintaining ecological balance. The fisheries sector's water demand was tied to the number of hatcheries, as documented on the official fisheries website (jkfisheries.in). Industrial water demand was calculated based on the specific requirements of different types of industries, with medium-scale industries assumed to require 0.0025 million Cubic Meters (MCM) per unit, as per sources from jkindustriescommerce.nic.in[1] and the Digest of Statistics 2022-23 for Jammu and Kashmir[2]. To keep some margins on the demand the small-medium scale industries such as handicrafts etc, were all considered with the same demand. The demand estimates, summarized in Table 9.5, provide an understanding of the region's water needs. It is worth noting these demands are scaled per considering medium scale industries and based on the number of industries in the district as per available information.

Projections for future water demand are essential for sustainable resource management, particularly in regions undergoing rapid population growth and industrialization. For the years 2032, 2042, and 2052, water demand is projected by considering anticipated population growth, sector-specific needs, and evolving demands. The decadal projections of water demand were framed based on cumulative projection of the demand from 2022 through various assumed scale factors based on general expectations applied to the various demand sectors.

For the year 2032, the population is projected based on the 2022 census data, district-wise population decadal growth rate, and an additional 30% floating population. The forestry and wildlife water demand is assumed to increase by 2% compared to the demand in 2022. The farm water demand is projected to rise by 5%, while the industry and infrastructure water demand is anticipated to increase by 10%. The water demand for establishments and institutions is assumed to increase by 1.5% (although the demand share of this sector is significantly less, implying near negligible influence on the water balance). These projections are detailed in Table 9.6.

For the year 2042, the population is estimated based on the 2032 projected census, district-wise population decadal growth rate, and an additional 30% floating population. The forestry and wildlife water demand are projected to increase by 4% compared to the demand in 2022. The farm water demand is expected to rise by 10%, industry and infrastructure water demand by 20%, and water demand for establishments and institutions by 2%. These figures are presented in Table 9.7.

For the year 2052, the population is projected based on the 2042 projected census, district-wise population decadal growth rate, and an additional 30% floating population. The forestry and wildlife water demand is anticipated to increase by 6% compared to the demand in 2022. The farm water demand is projected to increase by 15%, the industry and infrastructure water demand by 30%, and the water demand for establishments and institutions by 2.5%. These projections are illustrated in Table 9.8 for 2052.

[1] jkindustriescommerce.nic.in

[2] https://ecostatjk.nic.in/pdf/publications/digeststat/Digest%20of%20Staistics%202022-23.pdf

Table 9.5. Districtwise and total demand of water in BCM for 2022.

S.No.	Districts	Drinking & Domestic Water Demand (2022), in BCM[1]	Forestry & Wildlife Water Demand (2022), in BCM[2]	Farm Water Demand (2022), in BCM[3]	Industry & Infrastructure Water Demand (2022), in BCM[4]	Establishments & Institutions Water Demand (2022), in BCM	Total Water Demand (2022), in BCM
1	Anantnag	0.17	0.08	0.51	1.09	0.0022	1.863
2	Badgam	0.11	0.05	0.56	1.95	0.0004	2.669
3	Bandipore	0.06	0.03	0.27	0.46	0.0005	0.820
4	Baramulla	0.14	0.07	0.46	1.43	0.0015	2.090
5	Doda	0.06	0.03	0.14	0.49	0.0002	0.729
6	Ganderbal	0.05	0.02	0.15	1.36	0.0001	1.584
7	Jammu	0.20	0.10	1.39	0.65	0.0071	2.333
8	Kathua	0.08	0.04	0.91	0.49	0.0003	1.525
9	Kishtwar	0.03	0.02	0.18	0.30	0.0001	0.527
10	Kulgam	0.05	0.03	0.16	0.50	0.0002	0.740
11	Kupwara	0.13	0.07	0.39	0.57	0.0003	1.157
12	Poonch	0.07	0.03	0.20	0.26	0.0002	0.566
13	Pulwama	0.08	0.04	0.23	0.70	0.0005	1.051
14	Rajouri	0.10	0.05	0.47	0.39	0.0003	1.005

[1] As per census population in 2011 + Districts-wise Population Decadal growth rate (2001-2011) + 30% Floating Population = Population in 2022. (https://www.census2011.co.in/census/state/districtlist/jammu+and+kashmir.html;https://web.archive.org/web/20120202103650/http://www.dudh.gov.bt/gelephu/part4/4.3.htm)

[2] Assuming that forestry and wildlife water demand constitutes 50% of the agriculture water demand.

[3] Corresponding to No. of Hatcheries (jkfisheries.in ; https://ecostatjk.nic.in/pdf/publications/digeststat/Digest%20of%20Staistics%202022-23.pdf)

[4] The industrial water demand estimation in the basin relies on the specific needs of various types of industries. Assume for all districts for medium-scale industries, the recommended rate is 0.0025 MCM (Million Cubic Meters) per unit. (jkindustriescommerce.nic.in;https://ecostatjk.nic.in/pdf/publications/digeststat/Digest%20of%20Staistics%202022-23.pdf)

15	Ramban	0.04	0.02	0.14	0.17	0.0001	0.372
16	Reasi	0.05	0.02	0.16	0.12	0.0035	0.351
17	Samba	0.04	0.02	0.50	0.22	0.0002	0.780
18	Shopian	0.04	0.02	0.01	0.32	0.0002	0.385
19	Srinagar	0.17	0.08	0.08	0.80	0.0321	1.159
20	Udhampur	0.08	0.04	0.45	0.19	0.0003	0.748
21	UT-JK	1.73	0.86	7.37	12.44	0.050	22.452

Table 9.6 Districtwise and total demand of water in BCM for 2032.

S.No.	Districts	Drinking & Domestic Water Demand (2032), in BCM[1]	Forestry & Wildlife Water Demand (2032), in BCM[2]	Farm Water Demand (2032), in BCM[3]	Industry & Infrastructure Water Demand (2032), in BCM[4]	Establishments & Institutions Water Demand (2032), in BCM[5]	Total Water Demand (2032), in BCM
1	Anantnag	0.265	0.086	0.54	1.20	0.002	2.09
2	Badgam	0.166	0.054	0.59	2.14	0.000	2.95
3	Bandipore	0.090	0.029	0.28	0.51	0.000	0.91
4	Baramulla	0.214	0.070	0.48	1.57	0.001	2.33
5	Doda	0.093	0.030	0.15	0.54	0.000	0.82
6	Ganderbal	0.072	0.023	0.16	1.50	0.000	1.75
7	Jammu	0.306	0.100	1.46	0.71	0.007	2.58
8	Kathua	0.132	0.043	0.96	0.54	0.000	1.67
9	Kishtwar	0.049	0.016	0.19	0.33	0.000	0.58

[1] As per census population in 2022 + Districts-wise Population Decadal growth rate + 30% Floating Population = Population in 2032
[2] Assuming that forestry and wildlife water demand increasing 2 percentages (%) of demand of 2022.
[3] Assuming the farm water demand increasing 5 percentages (%) of demand of 2022.
[4] Assuming the Industry & Infrastructure water demand increasing 10 percentages (%) of demand of 2022.
[5] Assuming the Establishments and Institutions water demand increasing 1.5 percentages (%) of demand of 2022.

10	Kulgam	0.081	0.026	0.17	0.55	0.000	0.83
11	Kupwara	0.207	0.067	0.41	0.62	0.000	1.31
12	Poonch	0.108	0.035	0.21	0.29	0.000	0.64
13	Pulwama	0.126	0.041	0.25	0.77	0.001	1.18
14	Rajouri	0.151	0.049	0.49	0.43	0.000	1.12
15	Ramban	0.066	0.022	0.15	0.18	0.000	0.42
16	Reasi	0.071	0.023	0.17	0.13	0.004	0.40
17	Samba	0.066	0.022	0.52	0.24	0.000	0.85
18	Shopian	0.059	0.019	0.01	0.35	0.000	0.44
19	Srinagar	0.264	0.086	0.08	0.87	0.033	1.34
20	Udhampur	0.119	0.039	0.47	0.21	0.000	0.83
21	UT-JK	2.706	0.882	7.74	13.68	0.051	25.06

Table 9.7 Districtwise and total demand of water in BCM for 2042.

S.No.	Districts	Drinking & Domestic Water Demand (2042), in BCM[1]	Forestry & Wildlife Water Demand (2042), in BCM[2]	Farm Water Demand (2042), in BCM[3]	Industry & Infrastructure Water Demand (2042), in BCM[4]	Establishments & Institutions Water Demand (2042), in BCM[5]	Total Water Demand (2042), in BCM
1	Anantnag	0.339	0.088	0.565	1.311	0.0023	2.305
2	Badgam	0.212	0.055	0.621	2.334	0.0004	3.223
3	Bandipore	0.114	0.030	0.298	0.555	0.0005	0.998
4	Baramulla	0.273	0.071	0.501	1.714	0.0015	2.561

[1] As per census population in 2032 + Districts-wise Population Decadal growth rate + 30% Floating Population = Population in 2042
[2] Assuming that forestry and wildlife water demand increasing 4 percentages (%) of demand of 2022.
[3] Assuming the farm water demand increasing 10 percentages (%) of demand of 2022.
[4] Assuming the Industry & Infrastructure water demand increasing 20 percentages (%) of demand of 2022.
[5] Assuming the Establishments and Institutions water demand increasing 2 percentages (%) of demand of 2022.

5	Doda	0.119	0.031	0.159	0.594	0.0002	0.903
6	Ganderbal	0.092	0.024	0.168	1.635	0.0002	1.919
7	Jammu	0.391	0.102	1.525	0.777	0.0072	2.801
8	Kathua	0.168	0.044	1.002	0.584	0.0003	1.799
9	Kishtwar	0.063	0.016	0.200	0.357	0.0001	0.637
10	Kulgam	0.104	0.027	0.178	0.599	0.0002	0.909
11	Kupwara	0.264	0.069	0.431	0.680	0.0003	1.444
12	Poonch	0.138	0.036	0.218	0.317	0.0002	0.709
13	Pulwama	0.161	0.042	0.257	0.835	0.0005	1.296
14	Rajouri	0.194	0.050	0.512	0.474	0.0003	1.230
15	Ramban	0.085	0.022	0.156	0.199	0.0001	0.463
16	Reasi	0.091	0.024	0.181	0.138	0.0035	0.436
17	Samba	0.085	0.022	0.546	0.264	0.0002	0.917
18	Shopian	0.076	0.020	0.010	0.382	0.0002	0.489
19	Srinagar	0.337	0.088	0.086	0.954	0.0327	1.498
20	Udhampur	0.152	0.040	0.491	0.224	0.0003	0.907
21	**UT-JK**	3.458	0.899	8.105	14.928	0.0512	27.442

Table 9.8 Districtwise and total demand of water in BCM for 2052.

S.No.	Districts	Drinking & Domestic Water Demand (2052), in BCM[1]	Forestry & Wildlife Water Demand (2052), in BCM[2]	Farm Water Demand (2052), in BCM[3]	Industry & Infrastructure Water Demand (2052), in BCM[4]	Establishments & Institutions Water Demand (2052), in BCM[5]	Total Water Demand (2052), in BCM
1	Anantnag	0.412	0.090	0.591	1.420	0.0023	2.516
2	Badgam	0.258	0.056	0.650	2.529	0.0004	3.493
3	Bandipore	0.139	0.030	0.312	0.602	0.0005	1.083
4	Baramulla	0.332	0.072	0.524	1.857	0.0015	2.787
5	Doda	0.145	0.032	0.166	0.643	0.0002	0.986
6	Ganderbal	0.112	0.024	0.176	1.771	0.0002	2.083
7	Jammu	0.476	0.104	1.594	0.841	0.0072	3.022
8	Kathua	0.205	0.045	1.048	0.633	0.0003	1.931
9	Kishtwar	0.077	0.017	0.209	0.387	0.0001	0.690
10	Kulgam	0.126	0.027	0.186	0.649	0.0002	0.990
11	Kupwara	0.321	0.070	0.450	0.737	0.0003	1.579
12	Poonch	0.168	0.037	0.227	0.343	0.0002	0.776
13	Pulwama	0.196	0.043	0.269	0.905	0.0005	1.413
14	Rajouri	0.236	0.051	0.535	0.513	0.0003	1.335
15	Ramban	0.103	0.022	0.163	0.216	0.0001	0.505
16	Reasi	0.110	0.024	0.189	0.150	0.0036	0.476
17	Samba	0.103	0.022	0.571	0.286	0.0002	0.982

[1] As per census population in 2042 + Districts-wise Population Decadal growth rate + 30% Floating Population = Population in 2052
[2] Assuming that forestry and wildlife water demand increasing 6 percentages (%) of demand of 2022.
[3] Assuming the farm water demand increasing increasing 15 percentages (%) of demand of 2022.
[4] Assuming the Industry & Infrastructure water demand increasing 30 percentages (%) of demand of 2022.
[5] Assuming the Establishments and Institutions water demand increasing 2.5 percentages (%) of demand of 2022.

18	Shopian	0.093	0.020	0.011	0.414	0.0002	0.538
19	Srinagar	0.411	0.089	0.090	1.034	0.0329	1.657
20	Udhampur	0.185	0.040	0.514	0.243	0.0003	0.982
21	**UT-JK**	4.210	0.916	8.474	16.172	0.0515	29.824

9.3. Limitations and Scope

The Indian Land Data Assimilation System (ILDAS) plays a crucial role in water budget computation by integrating various observational datasets with land surface models. However, despite its utility, ILDAS encounters certain data limitations that affect its scope in accurately computing water availability. ILDAS assimilates various hydro-meteorological products from different sources, including satellite-based products and other reanalysis products. Although these are highly advantageous in computations of regional water budget, the calibration and validation of ILDAS is necessary for the region. ILDAS products have been calibrated and validation over the various states in India. However, calibration and validation require long-term ground data which is not always available at a higher spatial density. Moreover, the network of ground stations should match IMD (India Meteorological Department) and BIS (Bureau of Indian Standards) standards. Further, network optimisation has been conducted in the western countries which may be looked upon by the central and regional authorities subsequently extending the precision and capabilities of ILDAS for future work in the country.

In a similar way to the availability of long-term ground station data, a thorough and wider recordkeeping of demand-side data from stakeholders comprising such as agriculture, industry, domestic use, etc. is essential in the computations of the regional water budget. The water demand information is available discreetly and to derive any trends on the water demand for a particular sector long-term periodical recordkeeping is necessary. This is essential particularly for sectors which formulate the bulk of the water demand, such as agriculture, especially considering India is one of the largest exporters and producers of primary crops. Moreover, several limitations affect the accuracy of this data in reflecting true water demand. The lack of comprehensive and up-to-date water usage data, especially in developing regions are often associated with inadequate monitoring infrastructure, and often the data is scaled from generic parameters or based on assumptions, as also considered in the scenarios designed in this investigation for future projections of water budget. Further, data collection and reporting practices vary widely from one stakeholder to another, resulting in differences in data quality and reliability. In many cases, water use data is based on estimates or self-reported figures, which can introduce biases or errors as compared to when based on sophisticated instrumentation. The recordkeeping is also often manual and only tabulated on demand and there is a lack of any centralized data monitoring and upkeeping facility at regional level. The availability of the long-term time series information not only enables observation of demand trends but also allows to compute factors such as growth/decline rates and further enhances potential capabilities of future projections which is necessary to derive the future projections of water budget using sophisticated approaches, as compared to statistical approaches followed in this investigation. Further interventions for recordkeeping and upkeeping of water demand and usage information are necessary and formulate a critical component of the interim report.

10. UT Water Budget

10.1.Present Scenario

The water budget of the UT of Jammu and Kashmir was estimated based on the water demand described by various stakeholders and the TWS estimates as described in Chapter-09, as the numerical difference between the TWS and the demand. The detailed districtwise and UT water balance for 2022 are illustrated in Table 10.1. For 2022, the district with the maximum Total Water Demand is Badgam, with a demand of 2.669 BCM, while the district with the minimum Total Water Demand is Kishtwar, with a demand of 0.527 BCM. Regarding the Water Balance for 2022, the district with the highest balance is Kishtwar, with 9.07 BCM, while the district with the lowest balance is Baramulla, with 0.47 BCM.

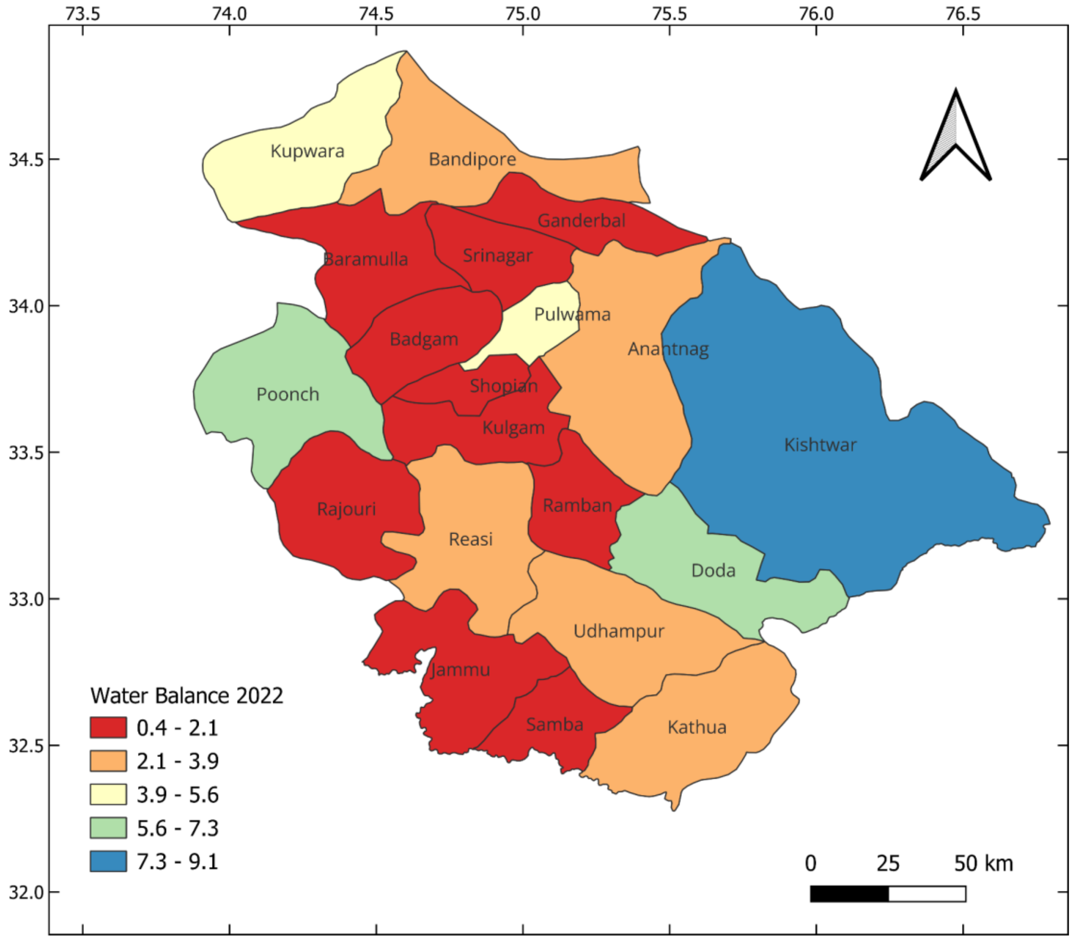


Figure 10.1 Districtwise and UT water balance for 2022.

Figure 10.1 illustrates the water balance for 2022 in the Union Territory of Jammu and Kashmir, highlighting significant variability across five distinct bands indicating the water resource. The very low band, ranging from 0.4 BCM to 2.1 BCM, includes the districts of Samba, Jammu, Ramban, Rajouri, Kulgam, Shopiyan, Badgam, Baramulla, Srinagar and

Ganderbal. The low band, with values between 2.1 BCM and 3.9 BCM, encompasses the districts of Kathua, Udhampur, Reasi, and Anantnag. The moderate low band, ranging from 3.9 BCM to 5.6 MCM, covers the districts of Pulwama, and Kupwara.The moderate high band, varying from 5.6 BCM to 7.3 BCM, includes the districts of Poonch, and Doda. Finally, the high band, with the most substantial range from 7.3 BCM to 9.1 BCM, comprises the districts of Kishtwar. Overall, a significant need for water conservation is perceived in the Kashmir region and the western districts of the UT of Jammu and Kashmir. The districts of Kishtwar, Doda and Poonch are largely water surplus districts and strategies to divert the surplus water to the water deficient districts should be formulated.

Table 10.1. Districtwise and UT water balance for 2022.

S.No.	Districts	Total Water Storage (2022), in BCM	Total Water Demand (2022), in BCM	Water Balance (2022), in BCM
1	Anantnag	5.631	1.863	3.77
2	Badgam	3.774	2.669	1.10
3	Bandipore	3.104	0.820	2.28
4	Baramulla	2.557	2.090	0.47
5	Doda	6.332	0.729	5.60
6	Ganderbal	1.970	1.584	0.39
7	Jammu	4.019	2.333	1.69
8	Kathua	4.354	1.525	2.83
9	Kishtwar	9.595	0.527	9.07
10	Kulgam	1.926	0.740	1.19
11	Kupwara	5.704	1.157	4.55
12	Poonch	6.181	0.566	5.62
13	Pulwama	5.342	1.051	4.29
14	Rajouri	2.692	1.005	1.69
15	Ramban	2.160	0.372	1.79
16	Reasi	3.924	0.351	3.57
17	Samba	2.597	0.780	1.82
18	Shopian	1.302	0.385	0.92
19	Srinagar	2.319	1.159	1.16
20	Udhampur	3.612	0.748	2.86
21	**UT-JK**	79.096	22.452	56.64

10.2.Projected Scenarios for 2032, 2042 & 2052 from 2022 TWS

The projected water balance scenarios (in BCM) were computed based on the projected water demand and the 2022 TWS for each of the districts and the UT of Jammu and Kashmir. as discussed in Chapter-09, section 9.2. The projected water balance for each of the districts of the UT of Jammu and Kashmir and for the UT itself for the years 2032, 2042, and 2052 are tabulated in Table 10.2 and illustrated in Figure 10.2. The district of Kishtwar exhibits the highest water balance across all years, with values of 9.011 BCM in 2032, 8.958 BCM in 2042, and a slight decrease to 8.905 BCM in 2052. On the other hand, Ganderbal has one of the lowest projected water balances, starting at decreasing to 0.215 BCM in 2032, decreasing to 0.051 BCM by 2042 and decreasing to 0.113 BCM by 2052. In terms of overall trends, the Pulwama district shows a noticeable decline from 4.163 BCM in 2032 to 3.923 BCM in 2052, while Doda maintains relatively stable figures, with a minor reduction from 5.512 BCM in 2032 to 5.346 BCM by 2052.

The minimum projected water balance occurs in Baramulla in 2052, at decreasing 0.230 BCM, and the maximum is in Kishtwar for the same year, at 8.905 BCM. The overall decline across the Union Territory emphasizes the need for sustainable water management strategies to cope with these future changes. On average, the water balance across the Union Territory declines from 54.036 BCM in 2032 to 49.272 BCM by 2052, indicating a gradual decline. Districts like Srinagar, Ganderbal and Baramulla are projected to face more significant reductions, while Kishtwar seems to have the most resilient water balance over time.

Table 10.2. Water balance scenarios for the years 2032, 2042, and 2052 based on the 2022 TWS and projected demand.

S.No.	Districts	**Water Balance in BCM**		
		Projected Year		
		2032	**2042**	**2052**
1	Anantnag	3.536	3.326	3.115
2	Badgam	0.821	0.551	0.281
3	Bandipore	2.191	2.106	2.021
4	Baramulla	0.223	-0.004	-0.230
5	Doda	5.512	5.429	5.346
6	Ganderbal	0.215	0.051	-0.113
7	Jammu	1.439	1.218	0.997
8	Kathua	2.687	2.555	2.423
9	Kishtwar	9.011	8.958	8.905
10	Kulgam	1.099	1.017	0.936
11	Kupwara	4.395	4.260	4.125
12	Poonch	5.539	5.472	5.405
13	Pulwama	4.163	4.046	3.929
14	Rajouri	1.568	1.462	1.357
15	Ramban	1.740	1.697	1.655
16	Reasi	3.528	3.488	3.448
17	Samba	1.746	1.680	1.615
18	Shopian	0.863	0.813	0.764
19	Srinagar	0.979	0.821	0.662
20	Udhampur	2.780	2.705	2.630
21	UT-JK	**54.036**	**51.654**	**49.272**

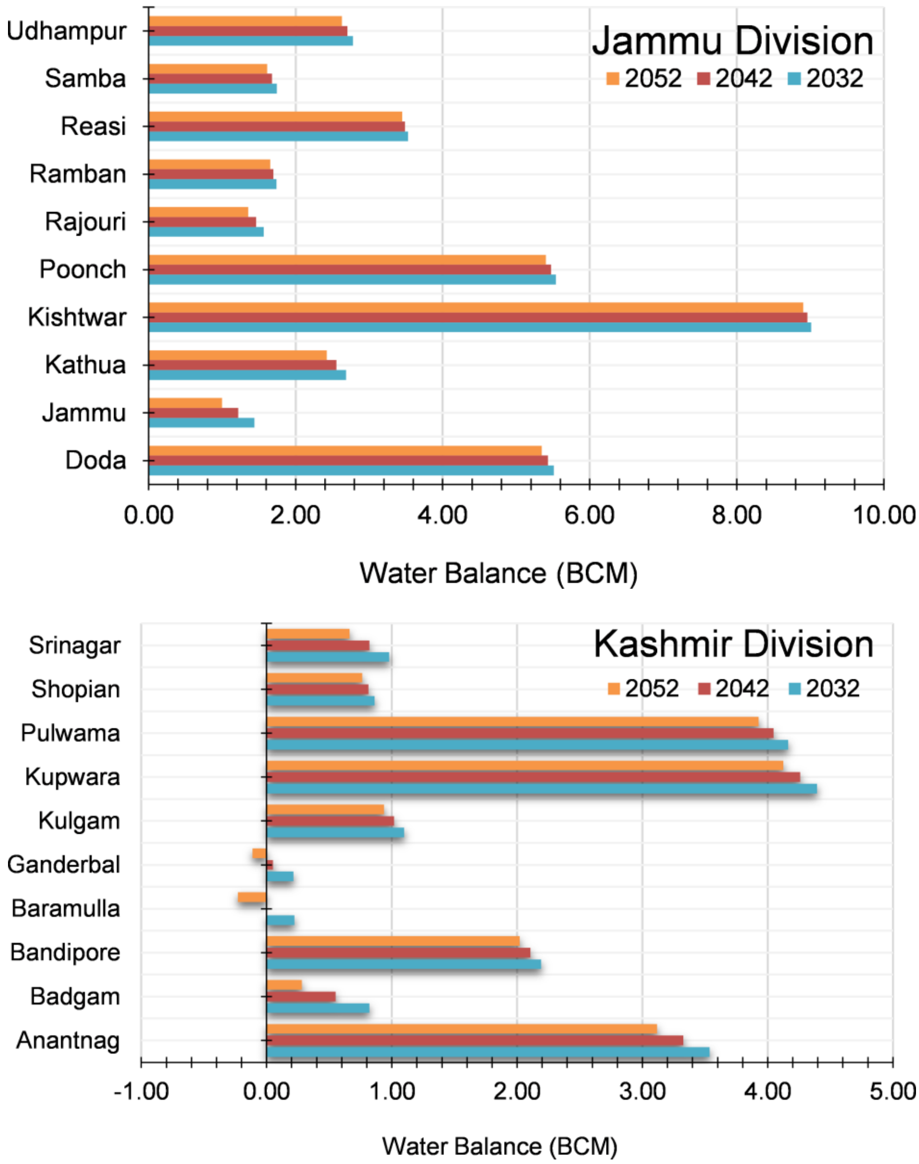


Figure 10.2. Projected water balance computed from 2022 TWS data and projected water demand for the Jammu division and Kashmir division.

10.3. Conslusion

Water plays a pivotal role in sustaining life and fostering socio-economic development, particularly in regions like Jammu and Kashmir, where it supports key sectors such as agriculture, hydropower, tourism, and domestic consumption *etc*. However, the unique geographical and climatic conditions of the region present significant challenges in managing water resources sustainably. The hydrological cycle in Jammu and Kashmir, while following global principles, is deeply influenced by local factors such as climate, topography, and human activities, all of which impact water availability and ecosystem health. Addressing these challenges requires a nuanced approach, as outlined in the State Specific Action Plan (SSAP) for the water sector of Jammu and Kashmir. This report emphasizes a comprehensive critical analysis of water availability, demand, and use, as well as the review of existing policies and programs. It further highlights the need for sustainable development, the creation of water budgets, and performance indicators aligned with Sustainable Development Goals. Effective governance, the integration of diverse stakeholders, and ongoing monitoring are essential for the successful implementation of these initiatives, securing water resources for future generations while safeguarding the environment and livelihoods in the region.

To develop an understanding on the water resource availability in the UT of Jammu and Kashmir and to ascertain the projected water balance in the future decades, the Indian Land Data Assimilation System (ILDAS), which utilizes a coupled land surface and hydrodynamic modeling approach to generate high-resolution reanalysis data for the Indian region was used. ILDAS hydrological raster products were calibrated through a multi-phase process, utilizing ground data for key hydrological parameters, including water table depth and surface products such as the streamflow. The calibration employs a polynomial regression using least absolute residuals (LAR) method to ensure btter relative agreement between the ground data and the ILDAS products. The coefficients of determination above ~0.9 for water table depth and for streamflow were observed at 95% confidence interval from the regression. The water balance is computed using the general equation comprising net storage equivalent to the difference of inflow and outflow of water. The water budget quantifies the balance between water availability and demand across various sectors, providing a robust foundation for water management strategies.

The water availability for the year 2022 across various districts of Jammu and Kashmir (UT-JK) was derived based on the calibrated ILDAS products and projections were approximated using the 20-year mean at decadal intervals till 2052. The population projections for each district are projected from the 2002-11 census data, adjusted by the district-wise decadal growth rate, and an additional 30% floating population. For the other sectors, a scenario was designed, where Forestry and wildlife water demand was anticipated to increase by 6% compared to 2022, farm water demand by 15% compared to 2022, industry and infrastructure demand by 30% compared to 2022, and establishments and institutions by 2.5% compared to 2022.

The water demand for the year 2022 across various districts was assimilated from the information provided by the various stakeholders and considering assumptions where information was completely unavailable. The following observations were noted.

- The 2022 water availability as per the TWS estimates is noted amongst the districts as follows.
    - Kishtwar has the highest water availability at 9.595 BCM, followed by Doda at 6.332 BCM.
    - Kishtwar, Doda, Poonch, Kupwara, Pulwama and Anantnag districts exhibit a TWS of above 5 BCM.

- Shopian and Ganderbal are the only two districts exhibiting a TWS of below 2 BCM. Shopian records the least availability at 1.302 BCM, closely followed by Kulgam and Ganderbal with 1.926 BCM and 1.970 BCM, respectively. A primary reason for this disparity is due the larger area differences and the precipitation characteristics of these regions.
- The TWS for the UT of Jammu and Kashmir was observed to be 79.096 BCM, the total water demand was estimated at 22.452 BCM, and the surplus availability was identified as 56.64 BCM. The order of the water availability approximates with the general observations from the CWC report on "Reassessment of water availability in India using space inputs 2019," considering the population and additional water resources derived from snow-glacier melt.

- The assimilated water demand for 2022 from the various stakeholders exhibits the following characteristics.
  - Amongst the various districts of the UT of Jammu and Kashmir, Badgam exhibited the highest demand at 2.669 BCM, followed by Jammu with 2.333 BCM, and Baramulla with 2.090 BCM.
  - Other districts such as Anantnag, Ganderbal, Kathua and Srinagar also saw significant water demand, with 1.863 BCM, 1.584 BCM, 1.525 BCM and 1.159 BCM, respectively, especially considering the extent of these districts.
  - On the lower end of the spectrum, districts like Ramban, Reasi, and Shopian reported much lower water demands, at 0.372 BCM, 0.351 BCM, and 0.385 BCM, respectively, due to limited agricultural activities and less industrial development compared to other regions *etc*.
- The projected water demand for the year 2052 across various districts is expected to exhibit significant variations.
  - Badgam is expected to have the highest water demand at 3.493 BCM, followed by Jammu with 3.022 BCM, and Anantnag with 2.516 BCM.
  - Baramulla and Kathua and Srinagar are also projected to see substantial demands, with 2.787 BCM, 1.931 BCM, and 1.657 BCM respectively.
  - In contrast, Udhampur, Ramban and Reasi are expected to exhibit lower demands at 0.982 BCM, 0.505 BCM and 0.476 BCM.
  - Overall, in the 2052 scenario, the UT of Jammu and Kashmir shows a total water demand of 29.824 BCM with a decline of 7.372 BCM from the year 2022.

- The projected water balance for the year 2052 across various districts indicates a wider range of magnitudes, by considering the 2022 water availability for projections of water balance depicts the following.
    - In 2052, in various districts of Jammu and Kashmir (UT-JK), Kishtwar district shows the highest average surplus with a water balance at 8.905 BCM, followed by Poonch with 5.405 BCM, and Kupwara with 4.125 BCM.
    - Kisthwar, Poonch and Doda are the only districts to retain above 5 BCM water balance post 2050.
    - Anantnag, Bandipore, Pulwama, Reasi, and Udhampur are projected to have moderate water balances of 3.115 BCM, 2.021 BCM, 3.929 BCM, 3.448 BCM and 2.630 BCM, respectively.
    - Districts like Jammu, Srinagar, Shopian, and Kulgam show relatively lower projections, with water balances of 0.997 BCM, 0.662 BCM, 0.764 BCM and 0.936 BCM.
    - Some districts like Ganderbal and Baramulla show significant water deficit indicated by a negative water balance.

Considering the present scenario corresponding to the year 2022 and the projected water balance in year 2052, overall, the UT of Jammu and Kashmir shows a significant water surplus beyond 49.272 BCM. After two centuries, the water balance for the UT of Jammu and Kashmir is expected to undergo a water deficient state requiring comprehensive planning for water management. Like Ganderbal and Baramullah, in 2052, other districts like Badgam and Srinagar are expected to undergo a water deficient state by 2092. It is worth noting that the presented scenario, doesn't include the critical impact of climate change as observed in the recent decade. The water availability corresponding to the climate change scenarios developed through the CMIP6 datasets[1] are to be extended under the interim report for detailed observations on the water balance scenarios for the future targeting the year 2050.

[1] https://cds.climate.copernicus.eu/cdsapp#!/dataset/projections-cmip6?tab=overview

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“There will be a tomorrow,
if
There is water”

Shri Narendra Modi
Hon. Prime Minister of India

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