



SUPREME AUDIT INSTITUTION OF INDIA
लोकहितार्थं सत्यनिष्ठा
Dedicated to Truth in Public Interest

**Report of the
Comptroller and Auditor General of India
on
Conservation and Management of Lakes in
Jammu and Kashmir
for the period ended March 2022**

**Government of Union Territory of Jammu and Kashmir
Report No. 4 of 2025
(Performance Audit - Civil)**

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PREFACE

This Report of the Comptroller and Auditor General (CAG) of India on Conservation and Management of Lakes for the period ended March 2022 has been prepared for submission to the Lieutenant Governor of Jammu and Kashmir under Section 72 of Jammu and Kashmir Reorganisation Act 2019 for laying in the Legislative Assembly.

This Report contains six chapters.

Chapter I includes introduction, organisational setup, audit objectives, audit criteria and audit scope, sample and methodology.

Chapter II gives an overview of statutory and regulatory arrangements for Conservation and Management of Lakes, changes in areas of Lakes and land use changes in Lakes.

Chapter III gives an overview of National and State/ UT programmes and Lake generic management activities for Conservation and Management of Lakes.

Chapter IV, V and VI contain the details of the implementation of Conservation and Management programmes/ plans undertaken and highlight the inadequacies in Conservation and Management in respect of Dal Lake, Wular Lake, Hokersar Lake, Mansar Lake, Surinsar Lake and Manasbal Lake.

The cases mentioned in the Report are among those which came to notice in the course of test audit covering the period from 2017-18 to 2021-22. Observations highlighted in the Performance Audit of Dal Lake included in the CAG's Audit Report 2006 and 2011 were also reviewed. Instances relating to the period subsequent to March 2022 have also been included, wherever necessary.

The audit has been conducted in conformity with the Auditing Standards issued by the Comptroller and Auditor General of India.

Executive Summary

Executive Summary

Jammu and Kashmir is gifted with 697 natural Lakes¹ having great ecological and socio-economic significance. Keeping in view the significance of Lakes, threats faced by them and importance of Conservation and Management of Lakes for ecological sustainability, a Performance Audit (PA) of Conservation and Management of Lakes in J&K was taken up to assess whether the Government of Jammu and Kashmir (GoJ&K) had formulated policies and programmes for Conservation and Management of Lakes and whether these programmes and policies were effective in preserving/ conserving them. The PA covered the period from 2017-18 to 2021-22. The policy matters of Conservation and Management of Lakes prior to 2017 were also reviewed for holistic coverage of the issue. Instances relating to the period subsequent to March 2022 have also been included, wherever necessary. The audit sample included 63 Lakes (test-checked), of which six Lakes viz., Dal Lake, Wular Lake, Hokersar Lake, Manasbal Lake, Surinsar and Mansar Lakes were selected for detailed examination.

At the National Level, the Ministry of Environment, Forest and Climate Change (MoEF&CC) is the nodal agency committed to conservation and wise use of wetlands (including Lakes) within its territory. The administrative control of Lakes in J&K is vested with five Departments viz. Forest, Revenue, Agriculture, Housing and Urban Development and Tourism. The Forest Department in J&K was mandated (October 1989) to handle Conservation and Management of all 697 Lakes. Out of 697 Lakes, six Lakes viz. Wular, Dal, Anchar, Gilsar, Khushal Sar and Manasbal Lakes were transferred (1997-2012) to three Development Authorities. Audit observed that these Departments/ Authorities had fragmented mandate and responsibilities for fully complying with the entrusted mandate e.g. GoJ&K assigned (October 1989) EE&RSD to conduct a detailed survey of Lakes, study their physical, chemical and biological dynamics and on the basis of the data so collected, prepare detailed plans for development and monitoring of each Lake. However, the detailed survey was not carried out by the Department being deficient in technical manpower. There was no Centralised Development and Regulatory Authority and no specific legal statute/ Act for Conservation and Management of Lakes had been put in place. Due to the absence of a Lake specific Centralised Development and Regulatory Authority and specific legal statute/Act, there were diffused functions across various institutions, inadequacies in institutional arrangements for discharge of environmental functions related to Lakes, lack of cross-sectoral institutional convergence, monitoring and evaluation.

There were significant changes in land use and classification use of areas of Lakes. Analysis of remote sensing data for the period 2014-2020 related to 63 test-checked Lakes revealed that there was decrease of area of open water, and increase of area in other land uses like built-up, pasture, vacant land, fallow land, agriculture, horticulture, plantation etc. The Department stated that the data provided by Ecology Environment & Remote Sensing Department (EE&RSD) regarding land use/ classification use

¹ As per Atlas of J&K Department of Ecology, Environment and Remote Sensing (EE&RSD)

changes need to be validated by ground truthing. It was further stated that detailed remote sensing for all Lakes of J&K was not possible due to budget constraints, however it could be carried out for some major Lakes. The reply should be seen in the light of the fact that the Directory of Lakes and water bodies of J&K was prepared using high resolution data supported by limited field checks/ground truthing. The geo-coordinates of the 63 audit sampled Lakes provided by the EE&RSD were plotted by audit on Google Earth Pro on various timelines. It was found that seven Lakes² were not visible or had almost dried up. There were land use changes in Khushal Sar Lake and degradation/ shrinkage of Anchar Lake. Although Development Authorities were established for development of areas of five out of six detailed-checked Lakes, there were no clear directions and specific mandate with any of these authorities for Conservation and Management of Lakes.

GoJ&K had Conservation and Management programmes for only six Lakes viz. Dal, Wular, Hokersar, Manasbal, Surinsar and Mansar, which were examined in detail by audit. In respect of the remaining 691 Lakes, Forest Department neither identified the eligible Lakes nor formulated any plans to seek assistance under various programmes launched by the MoEF&CC. Approximately one *per cent* (₹ 560.65 crore) of CAPEX budget of Jammu and Kashmir during 2017-22 was allocated to six detailed-checked Lakes. In case of the 63 sampled Lakes, changes in the catchment area of Lakes had not been evaluated from time to time. Further, there was lack of assessment of water carrying capacity and water budget of Lakes. Flushing on scientific grounds, restoration of water quality of Lakes to their original trophic levels, evaluation and preservation of biodiversity, assessment of expected life of Lakes, identification and treatment of source points and non-source points of pollution, de-weeding and dredging as per laid down norms as well as public awareness among masses had either not been carried out or were inadequately implemented in respect of the 63 sampled Lakes.

Detailed audit examination of the six Lakes also disclosed several shortcomings regarding the implementation of their Conservation and Management programmes. There were land use changes in Dal Lake due to non-acquisition of land from Dal dwellers, malfunctioning of Sewage Treatment Plants (STPs), improper de-weeding mechanism and inadequate monitoring and surveillance mechanism. Consequently, the open water area in Dal Lake could not be restored. There were inadequacies in the implementation of Lake conservation programme under National Lake Conservation Programme (NLCP), Prime Minister's Reconstruction Plan (PMRP) and other programme activities. Audit also noticed deficiencies in installation and upgradation of STPs, treatment of solid waste, extracted weed and sludge as well as providing sewage disposal facilities to households and sewer networking of "mohallas". Inadequacies were also noticed in relocation and alignment of houseboats, shifting of hotels,

² (i) Rakh-i-Arth, (ii) Sether Gund Numbal, (iii) Marhama, (iv) Devpursar, (v) Mahtan, (vi) Chandargar Numbal and (vii) Galwal Talao.

augmentation of water budget of the Lake, restoration and development works, catchment management works and relocation/ rehabilitation of Dal Lake dwellers.

Due to non-constitution of monitoring bodies, the Conservation and Management programme of Wular Lake had suffered as policy matters of Wular Conservation and Management Authority (WUCMA) could not be decided. Non-formulation of detailed plan resulted in deprivation of financial assistance from GoI for rejuvenation and restoration of Wular Lake. Insufficient afforestation in degraded forests resulted in increase of siltation in the Lake and consequent hastening ageing of the Lake.

The planned activities for survey and demarcation, catchment conservation, enhancement of water holding capacity and water quality improvement were inadequately carried out. Training programmes, awareness generation and research activities for ensuring capacity building, public awareness and monitoring of impact of Lake conservation activities were not carried out.

Similarly, in case of Hokersar Lake no comprehensive plan was formulated for Conservation and Management of the Lake. Wildlife Protection Department had formulated only annual plans which did not address the root causes of degradation of Lake such as change in hydrological regimes, pollution or loss of biodiversity in the Lake. Due to lack of survey and demarcation, Lake area measuring 2,528.10 *kanals* of Hokersar Lake had been encroached upon.

Wildlife Warden-Kathua (WLW-Kathua) and Surinsar-Mansar Development Authority (SMDA) did not have a specific legal framework and clear demarcation of responsibility for Conservation and Management of the Surinsar and Mansar Lakes. In the absence of any comprehensive plan for Conservation and Management of Lakes, WLW-Kathua and SMDA were carrying out Lake-related activities in a ad-hoc manner. State level monitoring committee had not monitored Conservation and Management of the twin Lakes. WLW-Kathua and SMDA had not carried out demarcation of boundary of Surinsar and Mansar Lakes due to which the two Lakes had remained open to encroachments. No STPs were in place for treatment of sewage generated by inhabitants living in the vicinity of Lakes resulting in discharge of untreated waste and sewage into the Lakes. Introduction of exotic species into the Lake had resulted in dwindling of number of native fishes.

Similarly, no comprehensive plan was in place for Conservation and Management of Manasbal Lake. Wular Manasbal Development Authority (WMDA) did not have a specific legal framework and clear-cut responsibility for Conservation and Management of the Lake. Lake management plans were formulated, financed and implemented through annual plans, in which only marginal Lake related activities such as sanitation of the area, de-weeding and dredging of Lake were included. Non-demarcation of Manasbal Lake beyond seven kilometers of length exposed the Lake to encroachments. The sources of sewage entering the Lake, which were responsible for pollution in the Lake were not identified. Due to non-finalisation of Master Plan of the area, unrestricted development and construction work was going on around the Lake and there were cases of encroachment and unauthorised constructions.

Recommendations:

Lake Conservation and Management is a scientific process involving various activities, which require proper planning, adequate funding and technical expertise. As stated above, the Conservation and Management of Lakes suffered mainly due to anthropogenic activities which had remained unchecked, as no specific Centralised Development and Regulatory Authority was in place for specifically focusing on integrated and comprehensive management of Lakes.

The Government may explore the possibility of establishing a central and specialised Authority and equipped with the necessary resources to ensure focused, coordinated and accountable Conservation and Management of Lakes.

Manpower with technical and domain expertise including environmental and hydrological engineers, wetland ecologists, limnologists, remote sensing and Geographic Information System specialists, ornithologists and microbiologists should be provided.

Concerted efforts should be made to formulate a comprehensive Conservation and Management plan for Lakes after taking into consideration all the relevant natural and anthropogenic factors affecting the health of Lakes.

The provisions of Wetlands (Conservation and Management) Rules should be enforced to delineate, demarcate and notify the boundaries of Lakes and to prohibit activities in the vicinity of Lakes. Generic Lake management activities viz. survey, categorisation, sewage treatment, flushing etc. need to be planned and carried out in a time-bound manner. Changes in the Lakes due to anthropogenic pressures need to be addressed by taking appropriate measures. Water sources of all Lakes need to be identified and protected from various sources of pollution. Appropriate measures should be taken for ensuring proper and scientific treatment of the sewage entering the Lakes.

The GoJ&K should place emphasis on Conservation and Management of Lakes by earmarking increased percentage of its budget for Conservation and Management of Lakes. Clearing of encroachment in Lake areas and launching of public awareness programmes should be prioritised.

Robust Lake management policy should be in place to ensure effective functioning and upgradation of Sewage Treatment Plants and proper treatment of sewage and solid waste.

LC&MA should prioritise and expedite various tasks such as providing sewage disposal facilities to households, establishing sewer networking of mohallas, relocating and aligning of houseboats, shifting of hotels, augmenting water budget of the Lake, implementing restoration and development works, catchment management works and relocating or rehabilitating Dal-dwellers.

Encroachments in the Lake and impact of inflow of nutrients into the Lake need to be monitored regularly and mitigation measures may be taken expeditiously.

Point sources/ non-point sources of pollution entering the lakes need to be identified and treated. Survey and demarcation of the Lake needs to be undertaken so that the Lake area is not susceptible to encroachment and concerted efforts should be made to clear encroachment of Lake area. Construction works going around the Lake need to be restricted.

Chapter-I

Introduction

Chapter-I

Introduction

1.1 Introduction

A Lake is a water body which generally holds certain volume of water in all seasons. Often described as ‘Eye of the Earth’, Lakes are the most beautiful and expressive features of the landscape and are an intrinsic part of our ecosystem. Jammu & Kashmir (J&K), having a diverse geographic and climatic composition, is replete with Lakes of considerably varying physicochemical and biological characteristics.

Being among the most productive ecosystems, Lakes directly or indirectly support millions of people by providing them goods and services including drinking water, fish, fodder, fuel, recreation, tourism etc. Lakes also support various life forms by providing habitat to aquatic flora and fauna. Lakes also contribute to purification of water by filtration of sediments and nutrients from surface water and help in ground water recharging, flood mitigation, stabilisation of local climate, recycling of nutrients etc. Lakes are a genetic reservoir for various species of plants and animals.

Lakes are one of the most rapidly degrading ecosystems. Dense human population, urbanisation, encroachments, anthropogenic pressures in the catchment area of Lakes and conversion of Lakes into other land uses¹ and discharge of untreated sewage into Lakes have resulted in their overexploitation. This further results in degradation of quality of Lake water and reduction in water quantity. Apart from these, deforestation, salinisation, and climate change also directly or indirectly affect the Lakes.

1.2 Performance Audit of Conservation and Management of Lakes in J&K

Jammu and Kashmir is gifted with 697 natural Lakes² having great ecological and socio-economic significance in the two divisions comprising 20 districts³. These Lakes include 185 Lakes which are more than five hectares in area such as the Wular Lake, the largest fresh water Lake in India and other famous Lakes⁴.

Keeping in view, the significance of Lakes and threats faced by them and importance of Conservation and Management of Lakes for ecological sustainability, a Performance Audit (PA) of Conservation and Management of Lakes in Jammu and Kashmir was taken up to assess whether Government of J&K (GoJ&K) had policies and programmes

¹ Agriculture, horticulture, built-up etc.

² As per Atlas of J&K Department of Ecology, Environment and Remote Sensing

³ Jammu Division: Doda, Jammu, Kathua, Kishtwar, Poonch, Rajouri, Ramban, Reasi, Samba, Udhampur; Kashmir Division: Anantnag, Bandipore, Baramulla, Budgam, Ganderbal, Kulgam, Kupwara, Pulwama, Shopian, Srinagar.

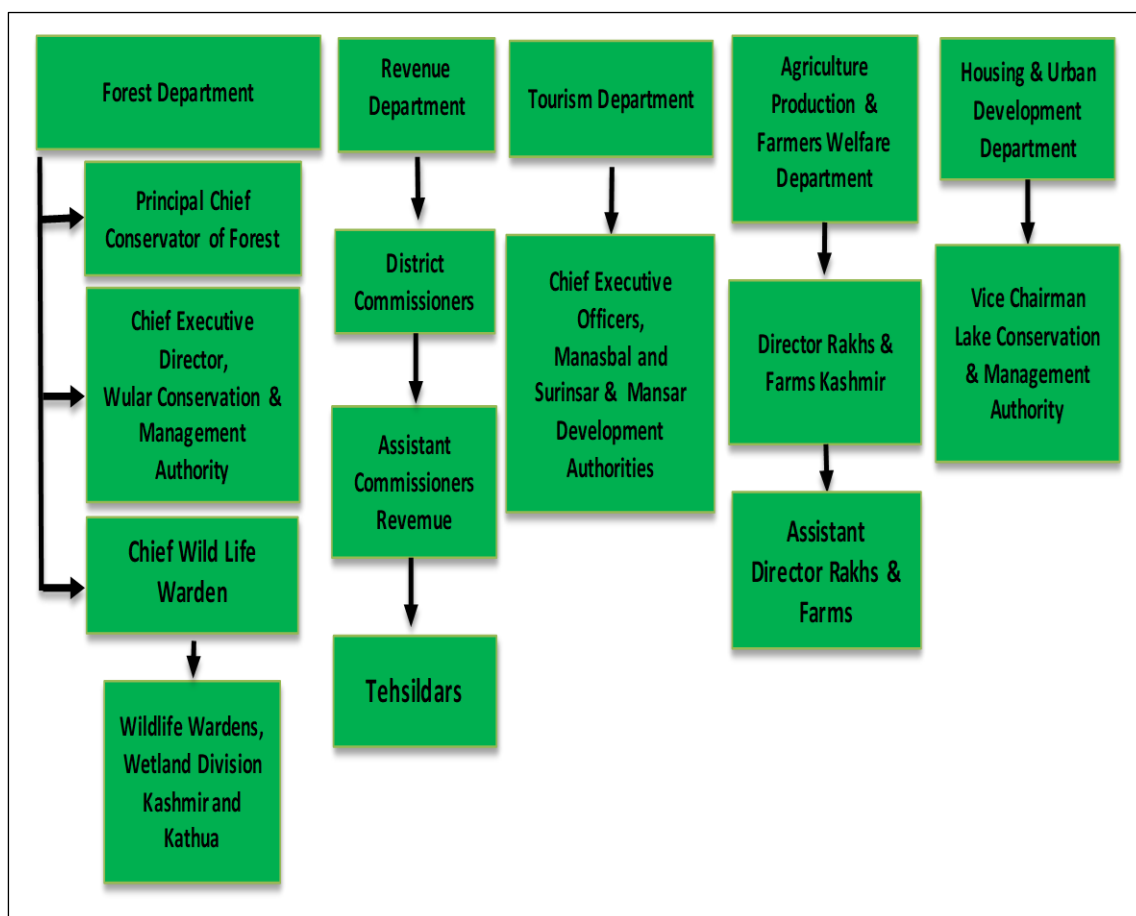
⁴ Dal, Hokersar, Manasbal, Surinsar and Mansar

for Conservation and Management of Lakes and whether these programmes and policies were effective in preserving/ conserving them.

1.3 Organisational Setup

The administrative control of Lakes in J&K is vested with five Departments viz. Forest, Revenue, Agriculture, Housing & Urban Development and Tourism as detailed in the flow **Chart 1.1**.

Chart 1.1: Organisational Setup of five Departments responsible for administrative control of Lakes



Out of the 697 Lakes in J&K, 410 Lakes are located outside forests and 287 Lakes are inside forests. The Forest Department was mandated (October 1989) to handle Conservation and Management of all 697 Lakes in J&K. However, the administrative control of 402 Lakes was vested with concerned District Commissioners. Six Lakes⁵ were transferred (1997 to 2012) by the GoJ&K to three Development Authorities. Details of Departments/ Authorities wise jurisdiction of Lakes are given in **Table: 1.1**.

⁵ (i) Wular, (ii) Dal, (iii) Anchar, (iv) Gilsar, (v) Khushar Sar and (vi) Manasbal Lakes.

Table 1.1: Department/ Authority-wise administrative control of Lakes

Sl. No.	Name of the Administrative Department	Controlling Authority	Jurisdiction	Number of Lakes
1.	Forest Department	Principal Conservator of Forest (PCCF)	Lakes within territorial jurisdiction/ boundaries of forests	255
		Wular Conservation and Management Authority (WUCMA)	Wular Lake	1
		Chief Wildlife Warden, Wildlife Protection Department (WPD)	Lakes within territorial jurisdiction of protected areas/ wildlife area	39
2.	Revenue Department	District Administrations	Lakes within the jurisdiction of the District Administration	397
3.	Agriculture Production Department	<i>Rakhs</i> and Farms Department	Part of Lakes of District Administration falling within jurisdiction of <i>Rakhs</i> and Farms	
4.	Housing and Urban Development Department	J&K, Lakes Conservation and Management Authority (LC&MA)	Dal, Anchar, Gilsar and Khushal Sar	4
5.	Tourism Department	Wular Manasbal Development Authority (WMDA) and Surinsar & Mansar Development Authority (SMDA)	Manasbal and Surinsar and Mansar Lakes	1 ⁶
Total				697

(Source: data compiled by audit from the records of various Departments)

1.4 Audit Objectives

The Performance Audit of Conservation and Management of Lakes was conducted to assess whether:

- Legal frameworks and institutional arrangements for management of Lakes were in place;
- Programmes and plans, generics of Lake management activities and fund management for Lakes were in place; and
- Implementation of Conservation and Management programmes of Lakes was efficient and effective.

⁶ Two Lakes (Surinsar & Mansar) are falling under jurisdiction of WPD and have been counted at serial number "1" in sub-row 3rd (under Number of Lakes). As such these two Lakes have not been counted at serial number "5" of column four (under Number of Lakes).

1.5 Audit Criteria

The Performance Audit was assessed against the following criteria:

- Policies of GoJ&K relating to Conservation and Management of Lakes;
- Forest (Conservation) Act 1980, Wild Life (Protection) Act 1972, Water (Prevention and Control of Pollution) Act 1974, Environment (Protection) Act 1986, Biological Diversity Act 2002, National Environment Policy, 2006, National Wetland Conservation Programme, Guidelines for Conservation and Management of Wetlands in India 2009, Wetlands (Conservation and Management) Rules, 2010 and 2017 and J&K Water Resources (Regulation and Management) Act 2010;
- Detailed Project Reports of Dal Lake, Comprehensive Management Action Plan (CMAP) of Wular Lake and Annual Plans of Hokersar, Manasbal, Surinsar and Mansar Lakes;
- J&K Financial Rules, General Financial Rules 2017 and instructions issued by GoJ&K.

1.6 Audit Scope, Sample and Methodology

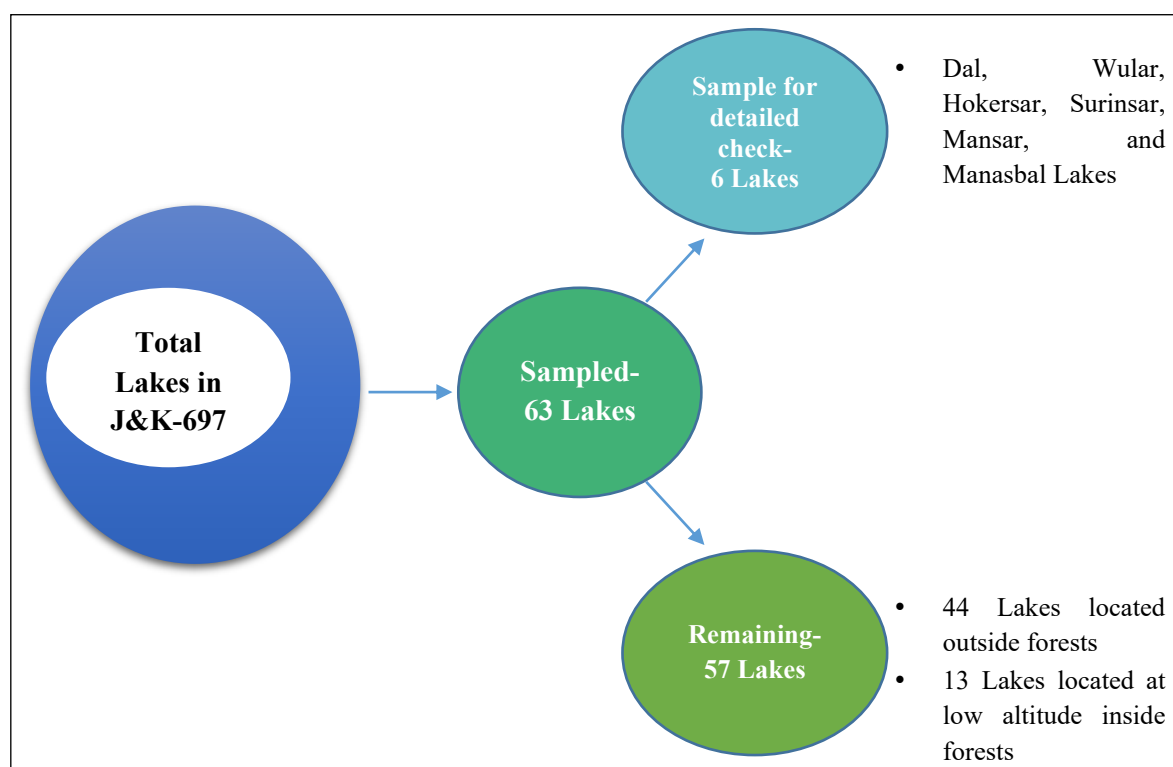
The Performance Audit (PA) covered the period from 2017-18 to 2021-22. However, policy matters of Conservation and Management of Lakes prior to 2017-22 and observations highlighted in the PA of Dal Lake included in the CAG's Audit Reports 2006 and 2011 were also reviewed. The spatio-temporal changes in Lakes and deterioration of their water quality are continuous processes that occur over a larger time span. To illustrate these changes, audit included images of the Lakes taken both from prior to and during the audit period. These images were obtained from GoJ&K and downloaded from Google Earth Pro software.

An entry conference was held on 23 May 2019 with the Commissioner/ Secretary, Housing and Urban Development Department and Secretary, Forest, Ecology and Environment Department wherein the audit objectives and scope of audit were discussed.

An exit conference was held on 19 September 2022 with the Commissioner/Secretary, Forest, Ecology and Environment Department, Principal Chief Conservator of Forest/ Member Secretary, Biodiversity Board, Chairman Pollution Control Board, Chief Wildlife Warden, Chief Executive Director, Wular Conservation and Management Authority, Regional Wildlife Warden, Kashmir and Special Secretary (Technical). During the exit conference, audit observations were largely accepted and it was stated that compliance of these observations was in progress.

The audit sample comprised 63 Lakes (test-checked Lakes) which constituted an area⁷ of 25,303 hectares (87 *per cent*) of total area of 28,990 hectares of the 697 Lakes in Jammu and Kashmir. These 63 Lakes include six Lakes⁸ which were selected for detailed examination. The remaining sample of 57 Lakes was based on 44 Lakes located outside forests and 13 Lakes located at low altitude inside forests. The Lakes outside forests being urban or semi-urban Lakes are more exposed to pollution and degradation due to urbanisation. Besides, low altitude Lakes inside forests were selected as these are also vulnerable to surrounding population as compared to the high altitude Lakes. The sample selected for audit examination is shown in **Chart 1.2**:

Chart 1.2: Sample selection of Lakes



The audit methodology comprised scrutiny of records in the offices of Director-Ecology, Environment and Remote Sensing Department, Principal Chief Conservator of Forests, Chief Wildlife Warden, J&K Pollution Control Board, J&K Biodiversity Board, Divisional Forest Officers, Water Resource Regulatory Authority, Director Rakhs & Farms, District Administrations (Tehsildars/ Naib Tehsildars), Wildlife Wardens and Development Authorities⁹ of six Lakes viz. Dal, Manasbal, Wular, Hokersar, Surinsar and Mansar.

⁷ Area in 1967

⁸ Dal, Wular, Hokersar, Mansar, Surinsar and Manasbal.

⁹ Wildlife Wardens (Kathua and Wetland Division-Kashmir) Chief Executive Officer-WUCMA, Vice-Chairman-LC&MA, Chief Executive Officers (Manasbal, Surinsar & Mansar Development Authorities)

A questionnaire¹⁰ based survey on 63 test-checked Lakes was also undertaken by audit. Further, audit utilised the satellite images of the Lakes provided by Ecology, Environment and Remote Sensing Department (EE&RSD) of GoJ&K to analyse the spatio-temporal changes in Lakes. For validating these changes, audit downloaded images of Lakes from Google Earth Pro Software to supplement the analysis and to illustrate the spatio-temporal changes in Lakes effectively. Further, joint physical verification of Lakes along with Departmental officials was also carried out to corroborate the audit findings.

The PA on the Conservation and Management of Lakes has been structured into six chapters.

Chapter I includes introduction, organisational setup, audit objectives, audit criteria, audit scope, sample and methodology.

Chapter II gives an overview of statutory and regulatory arrangements laid down for Conservation and Management of Lakes, changes in area of Lakes and land use changes in Lakes.

Chapter III gives an overview of National and State/ UT programmes and Lake generic management activities for Conservation and Management of Lakes.

Chapter IV, V and VI contain the details of the implementation of Conservation and Management programmes/ plans undertaken and highlight the inadequacies in Conservation and Management in respect of Dal Lake, Wular Lake, Hokersar Lake, Mansar Lake, Surinsar Lake and Manasbal Lake.

1.7 Acknowledgement

Indian Audit and Accounts Department acknowledges the cooperation and assistance provided by the concerned Departments/ Authorities / Bodies of GoJ&K in production of records and furnishing of information during the conduct of this audit. The replies received from various Departments/ Authorities/ Bodies from time-to-time as well as their responses during the Exit Conference have been suitably incorporated in the relevant paragraphs of this Report.

¹⁰ It was designed by Audit on the basis of Lake management books viz. Lake Management Guidance January 2014, Practical Guide to Lake Management 2004, The Water (Prevention and Control of Pollution) Act 1974, Biological Diversity Act 2002, J&K Water Resources (Regulation and Management) Act 2010, Guidelines for National Lake Conservation Plan May 2008, Guidelines for National Wetland Conservation Programme June 2009, An Indian Perspective - Conservation and Management of Lakes July 2010, Wetland (Conservation & Management) Rules November 2010 & 2017, Guidelines for implementing Wetland (Conservation & Management) Rules 2017 and National Plan for conservation of aquatic ecosystems April 2019

Chapter-II
Statutory and regulatory arrangements for
Conservation and Management of Lakes,
changes in areas of Lakes and land use
changes in Lakes

Chapter-II

Statutory and regulatory arrangements for Conservation and Management of Lakes, changes in areas of Lakes and land use changes in Lakes

2.1 Introduction

Article 48A of the Constitution of India envisages protection and improvement of the environment and safeguarding of forests and wildlife. As per the Article, the State shall endeavor to protect and improve the environment and to safeguard the forests and wildlife of the country. Article 21 also guarantees right to decent environment including pollution-free water and air.

At the national level, Ministry of Environment, Forest and Climate Change (MoEF&CC) is the nodal agency committed to conservation and wise use of wetlands (including Lakes) within its territory. At the GoJ&K level, Forest Department is entrusted with the responsibility for Conservation and Management of 697 Lakes.

Despite the mandate of Departments/ Authorities for conservation of Lakes, there were changes in the area of Lakes of J&K as detailed below:

2.2 Spatio-temporal changes in the area of Lakes in Kashmir and Jammu Divisions of J&K

Spatio-temporal changes in Lakes indicate changes in area of Lakes over a period of time. Audit analysis of the data (Atlas of Lakes & Wetlands of J&K¹) obtained from J&K, Ecology, Environment and Remote Sensing Department (EE&RSD) revealed that the total area of Lakes in J&K decreased by 2,851.26 hectares compared to the base year 1967, with 2014 as reference year for Kashmir Division and 2020 for Jammu Division. The Division/ Department-wise details of Lakes are summarised in **Table 2.1** and detailed in *Appendix-2.1*.

¹ Atlas is an inventory of Lakes that contains information on spatial extent, geo-coordinates, location and present status of each Lake/ wetland in J&K. The Atlases of Lakes & Wetlands were prepared by Ecology, Environment and Remote Sensing Department of GoJ&K in 2014 and 2020 for Kashmir and Jammu provinces respectively.

Table 2.1: Changes in the area of Lakes in Jammu and Kashmir Divisions of J&K

(Area in hectares)

Province	Number of Lakes in 1967	Disappeared Lakes		Decrease in area of Lakes				Increase in area of Lakes				No change in area of Lakes	
		No. of Lakes	Total Area ²	No. of Lakes	Area in 1967	Area in 2014/ 2020	Total	No. of Lakes	Area in 1967	Area in 2014 / 2020	Total	No. of Lakes	Area in 2014/ 2020
Jammu	367	259	297.05	59	190.05	121.29	68.76	46	196.04	260.79	64.75	3	1.62
Kashmir	330	56	1,240.02	144	8,376.50	7,131.07	1,245.43	104	4,154.43	4,627.9	473.47	26	14,534.14
Total	697	315	1,537.07	203	8,566.55	7,252.36	1,314.19	150	4,350.47	4,888.69	538.22	29	14,535.76

(Source: data of EE&RSD)

There was disappearance of 315 Lakes having an area of 1,537.07 hectares and decrease in area of 1,314.19 hectares in respect of 203 Lakes. Thus, there was total decrease/ disappearance of area of 2,851.26 hectares³ in 518 Lakes⁴. As a result, there was a loss in flora and fauna and other goods and services provided by these Lakes as referred in **Paragraph 1.1**. While the area of 150 Lakes increased by 538.22 hectares, there were no changes in areas of 29 Lakes. The reasons for increase in area of Lakes were not analysed/monitored by the concerned Departments.

2.2.1 Department/ Controlling Authority-wise change in area of Lakes

Department/ Controlling Authority-wise change in area of Lakes are summarised in **Table 2.2** and detailed in *Appendix-2.2*.

Table 2.2: Department/ Controlling Authority-wise change in area of Lakes

(Area in hectares)

Department	Controlling Authority	Total Lakes	Decreased		Disappeared		Decrease in Lake area (equal to or more than 50 per cent)	Increase		Static		Decrease (-) / Increase (+) of Area { 10-(5+7) }
			Lake	Area	Lake	Area		Lake	Area	Lake	Area	
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	<i>11</i>	<i>12</i>	<i>13</i>
Forest Department	PCCF	255 ⁵	98	223.20	80	217.85	32	69	143.92	9	49.88	-297.13
	WUCMA	1	-	-	-	-	-	-	-	1	13,325.35	
	WPD	39	20	156.78	-	-	-	18	51.80	1	754.21	-104.98
Revenue Department	District Administration	397	83	877.05	235	1,319.22	31	61	204.44	17	146.32	-1,991.83
Agriculture Department	Rakhs and Farms Department											

² Water area of 1,537.07 hectares of 315 Lakes in 1967 had completely disappeared by 2014 in Kashmir Division and by 2020 in Jammu Division.

³ 1,537.07 hectares plus 1,314.19 hectares.

⁴ 315 disappeared Lakes plus 203 decreased Lakes.

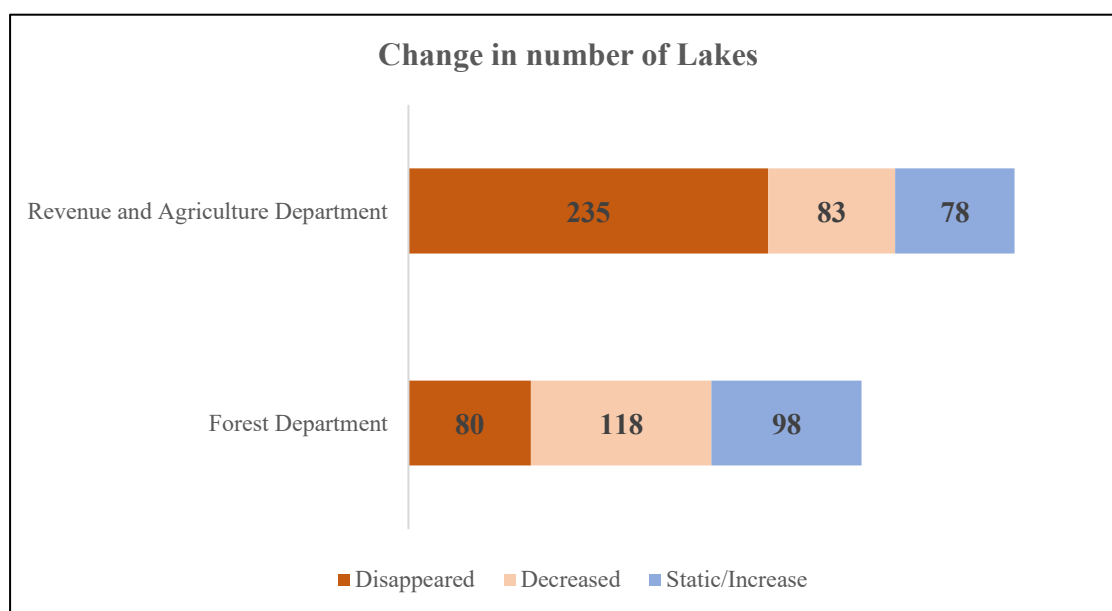
⁵ Excludes Wular Lake

Department	Controlling Authority	Total Lakes	Decreased		Disappeared		Decrease in Lake area (equal to or more than 50 per cent)	Increase		Static		Decrease (-) / Increase (+) of Area { 10-(5+7) }
			Lake	Area	Lake	Area		Lake	Area	Lake	Area	
1	2	3	4	5	6	7	8	9	10	11	12	13
Housing and Urban Development Department	Lakes Conservation & Management Authority	4	2	57.16	-	-	-	2	138.06	-	-	80.90
Tourism Department	Manasbal Development Authority	1	-	-	-	-	-	-	-	1	260.00	-
Total		697	203	1,314.19	315	1,537.07	63	150	538.22	29	14,535.76	-2,313.04

(Source: data compiled by audit from records of Departments)

Out of the total 697 Lakes, 692 Lakes were under the control of Forest, Revenue and Agriculture Departments. The number of Lakes which disappeared, decreased, remained static or increased under these Departments is depicted in **Chart 2.1**:

Chart 2.1: Number of Lakes which disappeared, decreased, remained static or increased under Forest, Revenue and Agriculture Departments



Audit analysis of the data obtained from EE&RSD revealed the following:

- 315 Lakes (45 per cent of 697 Lakes) constituting a water area of 1,537.07 hectares had disappeared. These Lakes included 80 Lakes (25 per cent) falling under the jurisdiction of Forest Department and 235 Lakes (75 per cent) falling under the jurisdiction of Revenue Department and Agriculture Department.

- The water area of 203 Lakes⁶ (29 per cent of 697 Lakes) had decreased by 1,314.19 hectares⁷. These Lakes included 63 Lakes wherein the decrease in water area was more than or equal to 50 per cent. Thus, there is a potential greater risk of extinction of these 63 Lakes. 203 Lakes included 98 Lakes (48 per cent), 83 Lakes (41 per cent), 20 Lakes (10 per cent) and two Lakes falling respectively under the jurisdiction of PCCF, District Administration, WPD and LC&MA.
- The water area of 150 Lakes (22 per cent of 697 Lakes) had increased by 538.22 hectares. These included 69 Lakes, 61 Lakes, 18 Lakes and two Lakes falling respectively under the jurisdiction of PCCF, District Administration, WPD and LC&MA.
- The water area of 14,535.76 hectares in 29 Lakes (four per cent of 697 Lakes) had remained static. These included 17 Lakes, nine Lakes, one each Lake respectively falling under the jurisdiction of District Administration, PCCF, WUCMA, WPD and WMDA.

Thus, disappearance/ decrease in the area of 518 Lakes (74 per cent) had resulted in degradation of ecosystem, loss of water, food and biodiversity, alteration in the interlinked carbon/ nutrient and water cycles as well as climate insecurity. Besides, shrinkage of Lake area was also one of the causes for massive floods in J&K in September 2014, as Lakes are natural flood balancing reservoirs/ defense for the flood regulating system. Research conducted by scholars from various institutions at State/ UT and National level had also attributed causes of floods to change in land use of Lakes.

Further, causes of increase in water area of 538.22 hectares in 150 Lakes were not monitored/analysed by the concerned Departments.

In absence of monitoring of reasons for increase in water area by the concerned Departments, Audit could also not ascertain whether increase in the surface area of 150 Lakes had actually led to increase in water volume of Lakes or not.

2.2.2 Spatio-temporal changes in area of audit sampled Lakes

Departments/ Authorities-wise analysis of the data of EE&RSD in respect of 63 test-checked Lakes revealed that there had been spatio-temporal changes between 1967 and 2020. The changes are summarised in **Table 2.3**, **Chart 2.2** and detailed in **Appendix-2.3**.

⁶ 518 Lakes (Disappeared & decreased Lakes) minus 315 Lakes (Disappeared Lakes)

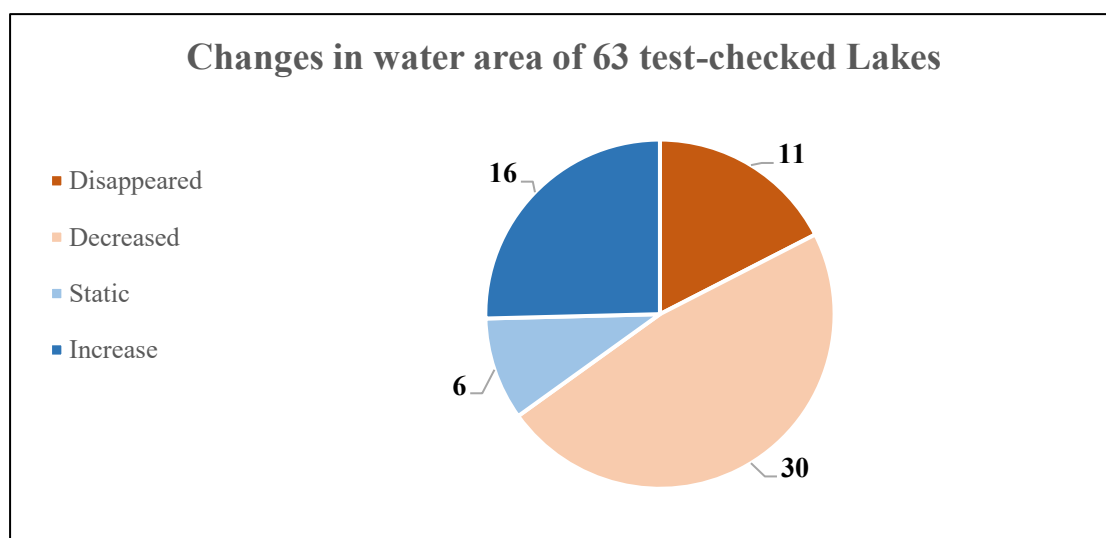
⁷ Total area = 2,851.27 hectares (area of 518 Lakes which have disappeared & decreased) minus 1,537.07 hectares (area of 315 Lakes which have disappeared)

Table 2.3: Spatial and Temporal changes in the 63 test-checked Lakes between 1967 and 2020

(Area in hectares)												
Department / Authority	Total Lakes	Disappeared Lake		Decrease in area of Lakes		Lake where decrease area \geq 50%	Total area of decreased & disappeared Lakes	Increase in area		Static		Net Impact (10-8)
		No. of Lakes	Area	No. of Lakes	Area			No. of Lakes	Area	No. of Lakes	Area	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
PCCF	9	1	90.96	4	30.16	1	121.12	3	10.37	1	7.46	-110.75
WUCMA	1	-	-	-	-	-	-	-	-	1	13,325.35	-
WPD	11	-	-	4	132.76	-	132.76	6	23.88	1	754.21	-108.88
District Administration	38	10	933.22	20	689.52	3	1,622.74	6	141.52	2	52.72	-1,481.22
LC&MA	3	-	-	2	57.16	-	57.16	1	135.80	-	-	78.64
WMDA	1	-	-	-	-	-	-	-	-	1	260.00	-
Total	63	11	1,024.18	30	909.60	4	1,933.78	16	311.57	6	14,399.74	-1,622.21

(Source: data of EE&RSD)

Chart 2.2: Changes in water area of 63 test-checked Lakes



From the **Table 2.3**, it can be noticed that:

- The water area of 1,024.18 hectares in the case of 11 Lakes had disappeared.
- The water area of 909.60 hectares⁸ in respect of 30 Lakes⁹ had decreased which included four Lakes wherein the decrease in water areas was more than or

⁸ 1,933.78 hectares (Decrease in area which includes area of disappeared Lakes) minus 1,024.18 hectares (area of disappeared Lakes).

⁹ 41 Lakes (Decreased Lakes includes disappeared Lakes) minus 11 Lakes (Disappeared Lakes).

equal to 50 *per cent*. As a result, these Lakes were fraught with the risk of extinction.

- The water area of 16 Lakes had increased by 311.57 hectares.
- The water area of 14,399.74 hectares in six Lakes had remained static.

The disappearance of Lakes and decrease in the area of Lakes was primarily attributable to change in land use within the Lakes and their catchments as discussed in the subsequent paragraph. Apart from that, Audit noticed that deforestation, climate change and change in dynamics of catchment areas also contributed to disappearance of Lakes and decrease in water area of Lakes.

The change in the areas of Lakes was due to inadequacies in the Conservation and Management of Lakes in J&K as discussed in succeeding paragraphs of the Report.

2.3 Land use changes

There were changes in land use/ classification use in test-checked Lakes mainly due to continuous anthropogenic activities in and around Lakes, which had remained unchecked. No Lake-specific Centralised Development and Regulatory Authority was in place. Consequently, neither the evaluation nor the monitoring of land use changes could be conducted. Due to temporal change in land use, ecosystem of these Lakes had been critically affected.

Land use changes in Lakes indicate conversion of original land use to other uses through human interventions and other factors.

EE&RSD provided data and satellite images of 63 sampled Lakes for the period 2014-2020. However, images and data for the period prior to 2014 were not available¹⁰ with the Department. Audit noticed that MoEF&CC had prepared (June 2011)¹¹ Atlases for each State and Union Territory of India, which contained only quantitative information depicting altitude and district-wise number of Lakes, but did not include names of Lakes.

Audit analysis of the data of EE&RSD indicated land use changes in the test-checked Lakes as discussed below: -

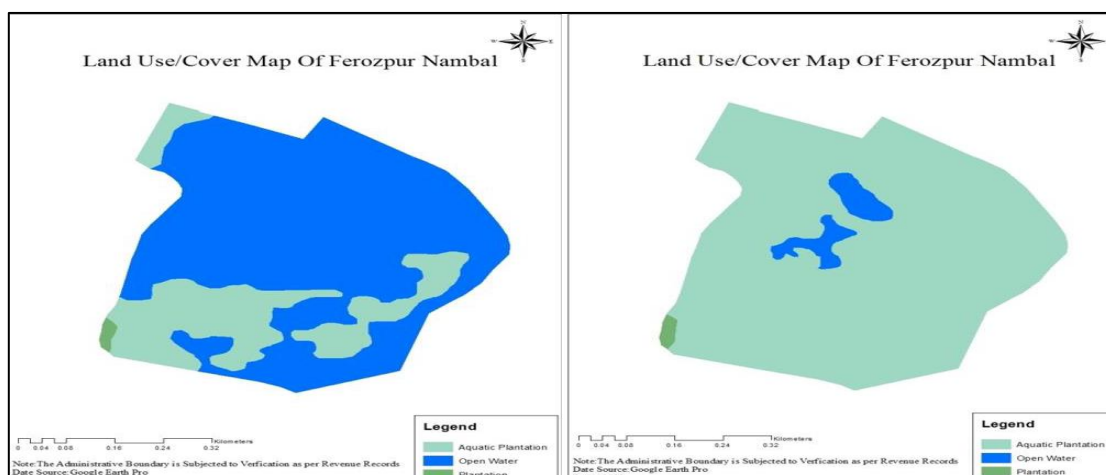
2.3.1 Analysis of remote sensing data to ascertain land use changes in Lakes

Audit analysis of remote sensing data of 63 test-checked Lakes provided by the EE&RSD, revealed land use changes between 2014 and 2020. For illustration, maps of four Lakes (**Maps 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7 and 2.8**) depict land-use changes in these Lakes during the period.

¹⁰ Except that of Dal and Wular Lakes

¹¹ Under a project "National Wetland Inventory & Assessment- NWIA"

Ferozpur Nambal (Maps 2.1 and 2.2)

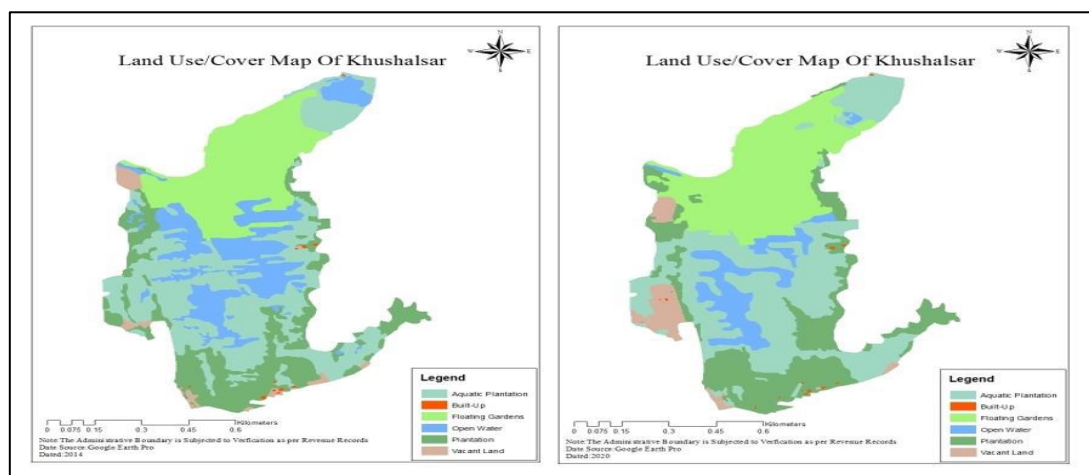


Area Ha (2014)

Area Ha (2020)

Class Name	Area Ha (2014)	Area Ha (2020)
Open Water	20.37	1.14
Aquatic Plantation	6.35	25.56
Plantation	0.13	0.15
Total	26.85	26.85

Khushal Sar (Maps 2.3 and 2.4)

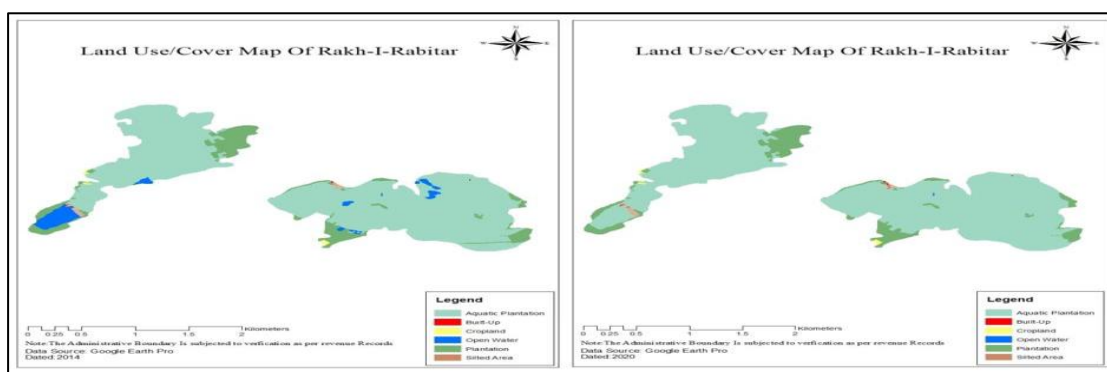


Area Ha (2014)

Area Ha (2020)

Class Name	Area Ha (2014)	Area Ha (2020)
Open Water	15.40	7.58
Aquatic Plantation	29.97	30.70
Floating Gardens	19.88	23.52
Plantation	16.97	18.42
Vacant land	1.63	3.65
Built-up	0.18	0.16
Total	84.03	84.03

Rakh-i-Rabitar (Maps 2.5 and 2.6)

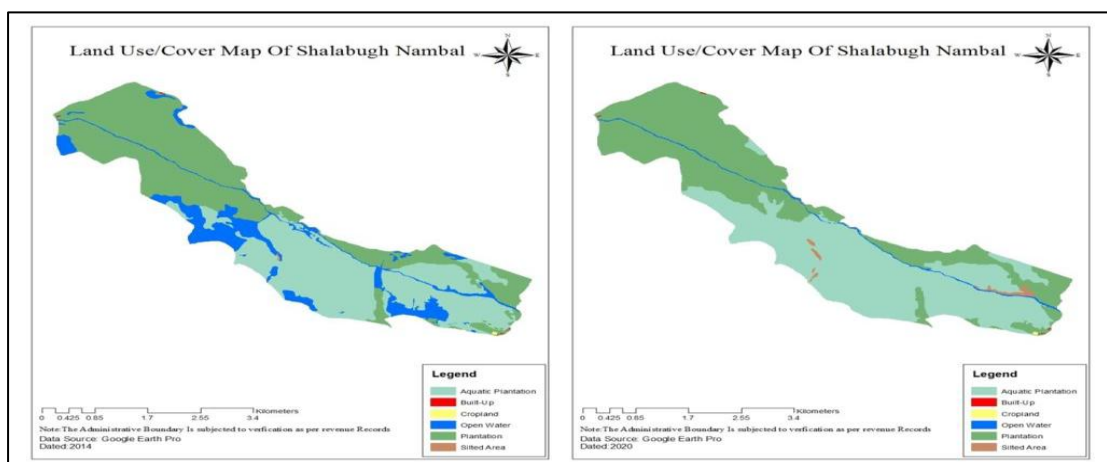


Area Ha (2014)

Area Ha (2020)

Class Name	Area Ha (2014)	Area Ha (2020)
Open Water	16.12	0.08
Aquatic Plantation	340.19	358.43
Plantation	46.53	44.26
Vacant land	1.83	1.79
Cropland	1.15	1.15
Built-up	0.21	0.32
Total	406.03	406.03

Shalabugh Nambal (Maps 2.7 and 2.8)



Class Name	Area Ha (2014)	Area Ha (2020)
Open Water	204.06	20.46
Plantation	698.87	696.31
Aquatic Plantation	569.75	744.03
Silted Area	0.62	12.53
Built-up	0.82	0.79
Cropland	0.51	0.51
Total	1,474.63	1,474.63

Thus, there was consistent drop in open water in these four Lakes with corresponding increase in aquatic plantation in four Lakes and increase of floating gardens/ vacant land in one Lake.

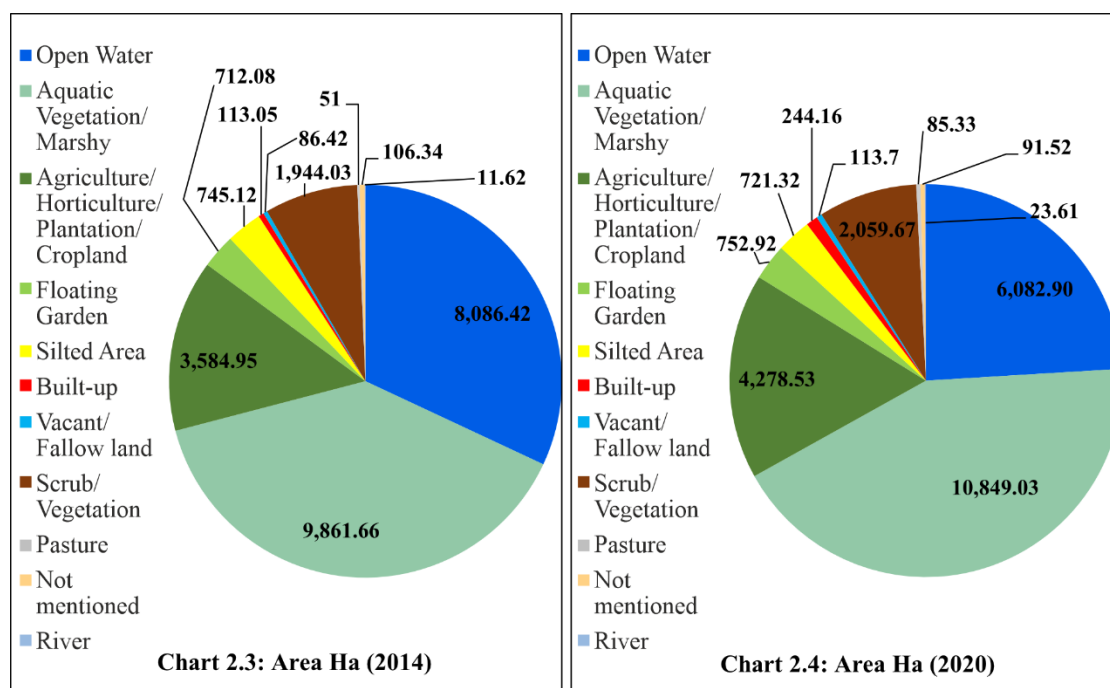
Audit analysis of remote sensing data for the period 2014-2020 related to 63 test-checked Lakes revealed overall land use/ classification use changes in these Lakes as summarised in **Table 2.4**, **Charts 2.3 and 2.4** and detailed in *Appendix-2.4*.

Table 2.4: Land Use/ Classification use changes in 63 test-checked Lakes

(Area in hectare)			Decrease/ Increase and its percentage (2014 – 2020)			
Land Use/ Classification Use	2014	2020	Decrease	Increase	Percentage Decrease	Percentage Increase
Open Water	8,086.42	6,082.90	2,003.52		25	
Aquatic Vegetation / Marshy	9,861.66	10,849.03		987.37		10
Agriculture / Horticulture / Plantation/ Cropland	3,584.95	4,278.53		693.58		19
Floating Garden	712.08	752.92		40.84		6
Silted Area	745.12	721.32	23.80		3	
Built-up	113.05	244.16		131.11		116
Vacant / Fallow land	86.42	113.70		27.28		32
Scrub / Vegetation	1,944.03	2,059.67		115.64		6
Pasture	51	85.33		34.33		67
Not mentioned	106.34	91.52	14.82		14	
River	11.62	23.61		11.99		103
Total	25,302.69	25,302.69	2,042.14	2,042.14		

(Source: audit analysis of data provided by EE&RSD)

Charts 2.3 and 2.4: Land use/ Classification use changes in Lakes



It may be seen from the **Table 2.4** that there were overall land use/ classification use changes in 2,042.14 hectares within Lake areas. These changes included decrease of 2,003.52 hectares in open water, while there was increase in other land use changes viz. 131.11 hectares under built-up (116 *per cent*), 34.33 hectares under pasture (67 *per cent*), 27.28 hectares under vacant/ fallow land (32 *per cent*), 693.58 hectares under agriculture/ horticulture/plantation/ cropland (19 *per cent*), 115.64 hectares under scrub/vegetation (six *per cent*), etc. Lake-wise land use/ classification use changes are detailed in *Appendix-2.4*.

• Anthropogenic pressures on 44 Lakes

There were land use/ classification use changes (2014-20) in 44 Lakes against 63 audit sampled Lakes. The affected area was 2,086.67 hectares which included decrease of 2,062.87 hectares in open water (28 *per cent*) due to anthropogenic pressures, such as increase in other land use changes viz. 131.11 hectares under built up (116 *per cent*), 34.33 hectares under pasture (67 *per cent*), 726.39 hectares under agriculture/ horticulture/ plantation (21 *per cent*), 115.64 hectares under scrub/vegetation (six *per cent*) etc. within a short span of six years. Details of Lake-wise land use/ classification use changes due to anthropogenic pressures are summarised in **Table 2.5**, **Charts 2.5 and 2.6** and detailed in *Appendix-2.5*.

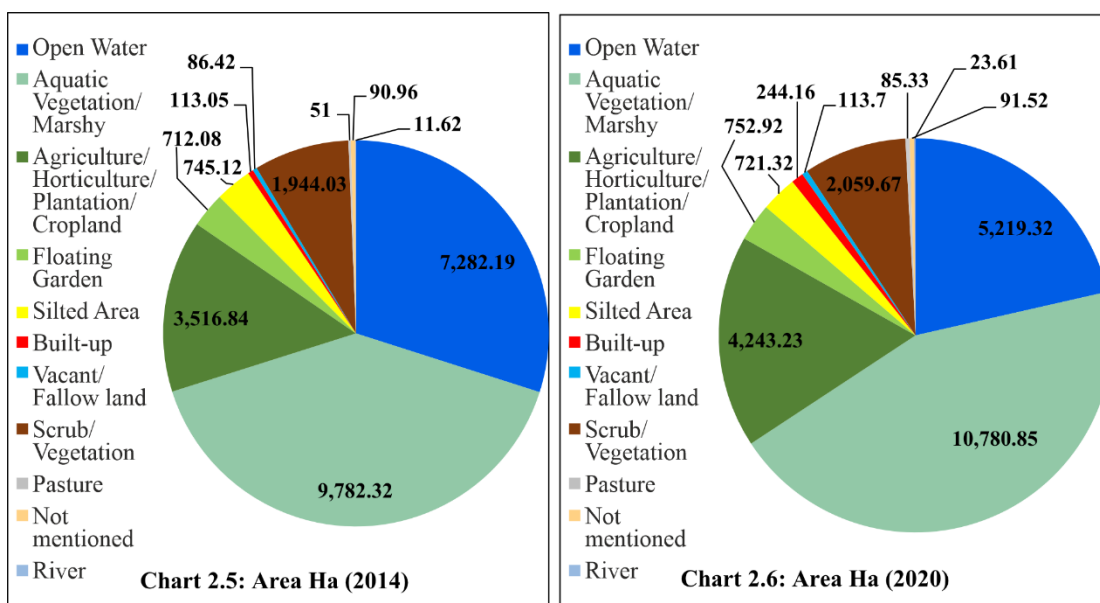
Table 2.5: Overall change in land use/ classification use in 44 Lakes due to anthropogenic pressures

(Area in hectares)

Decrease/ Increase and its percentage (2014–2020)						
Land Use/ Classification Use	2014	2020	Decrease	Increase	Decrease Percentage	Increase Percentage
Open Water	7,282.19	5,219.32	2,062.87		28	
Aquatic Vegetation / Marshy	9,782.32	10,780.85		998.53		10
Agriculture / Horticulture / Plantation/ Cropland	3,516.84	4,243.23		726.39		21
Floating Garden	712.08	752.92		40.84		6
Silted Area	745.12	721.32	23.80		3	
Built-up	113.05	244.16		131.11		116
Vacant / Fallow land	86.42	113.70		27.28		32
Scrub/ Vegetation	1,944.03	2,059.67		115.64		6
Pasture	51.00	85.33		34.33		67
Not mentioned	90.96	91.52		0.56		1
River	11.62	23.61		11.99		103
Total	24,335.63	24,335.63	2,086.67	2,086.67		

(Source: audit analysis of data provided by EE&RSD)

Charts 2.5 and 2.6: Overall change in land use/ classification use in 44 Lakes due to anthropogenic pressures



The concerned four Administrative Departments and Forest Department did not have Lake generic management programmes and as such they failed to check growing anthropogenic pressures around Lakes resulting in loss/ decrease in open water area and increase in aquatic vegetation. This adversely affected the ecosystem of the Lakes.

Thus, failure to formulate Conservation and Management programmes and to undertake Lake generic management activities by the District Administrations concerned and the Forest Department in respect of 44 Lakes resulted in anthropogenic pressures. These anthropogenic pressures led to land use changes in these Lakes. Neither the District Administrations concerned nor the Forest Department took any measures to check the land use changes.

The GoJ&K may analyse in detail the reasons for the change in land use of these Lakes, with expert assistance as required, for taking suitable rectificatory action.

• Absence of open water area in 21 Lakes

In 21 Lakes, there was no open water area and these Lakes had an overall change in land use of 338.02 hectares. There was decrease of 338.02 hectares (14 per cent) in aquatic vegetation due to increase in built-up (2,940 per cent), agriculture/ horticulture/ plantation/ cropland use (18 per cent) silted area (10 per cent), etc. Details of Lake-wise absence of open water, decrease/increase in aquatic vegetation are summarised in **Table 2.6, Charts 2.7 and 2.8** and detailed in **Appendix-2.6**.

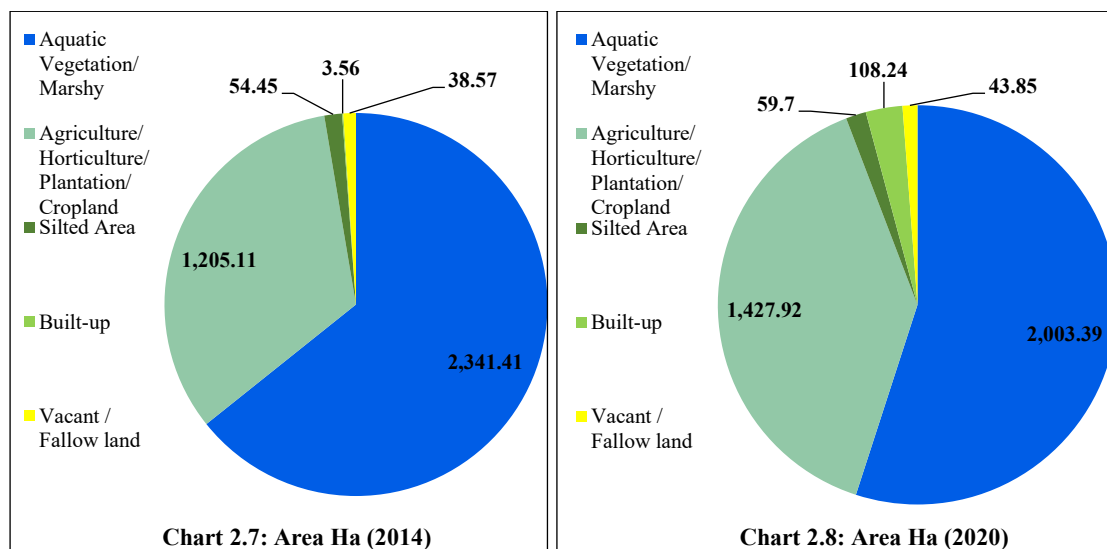
Table 2.6: Absence of open water and decrease in aquatic vegetation in 21 Lakes

(Area in hectares)

Decrease/ Increase and its percentage (2014–2020)						
Land Use/ Classification Use	2014	2020	Decrease	Increase	Decrease Percentage	Increase Percentage
Open Water	0.00	0.00	0.00			
Aquatic Vegetation / Marshy	2,341.41	2,003.39	338.02		14	
Agriculture / Horticulture / Plantation /Cropland	1,205.11	1,427.92		222.81		18
Silted Area	54.45	59.70		5.25		10
Built Up	3.56	108.24		104.68		2,940
Vacant / Fallow land	38.57	43.85		5.28		14
Total	3,643.10	3,643.10	338.02	338.02		

(Source: audit analysis of data provided by EE&RSD)

Charts 2.7 and 2.8: Absence of open water and decrease in aquatic vegetation in 21 Lakes



• Decrease in open water area of 20 Lakes

In respect of 20 Lakes, there was overall change in land use of 2,117.29 hectares with substantial decrease of 2,088.24 hectares (29 per cent) in open water area. This was due to increase in other land use such as aquatic vegetation by 1,335.51 hectares (18 per cent), agriculture/horticulture/plantation/cropland by 528.22 hectares (41 per cent), scrub/vegetation by 115.64 hectares (six per cent) etc. Details of Lake-wise decrease in open water are summarised in **Table 2.7, Charts 2.9 and 2.10** and detailed in **Appendix-2.7**.

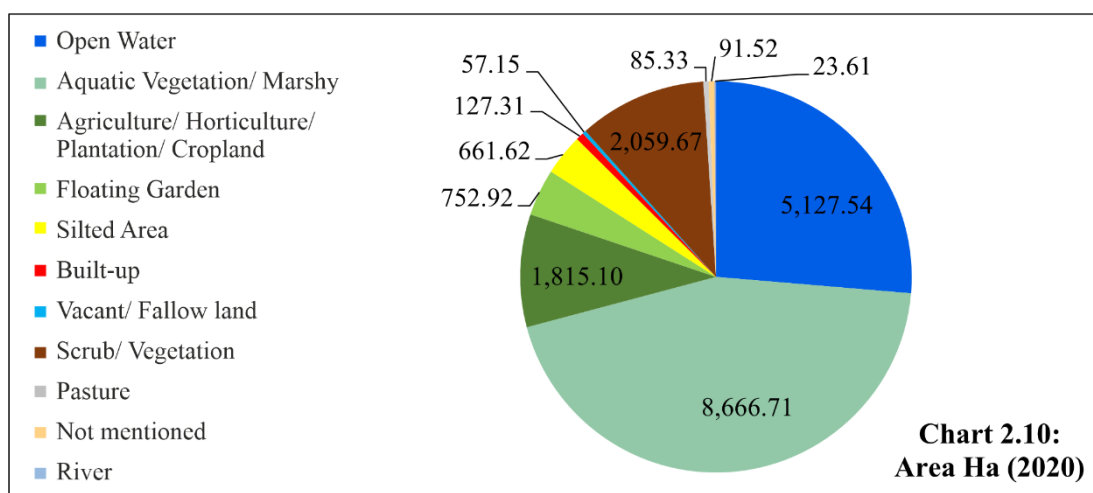
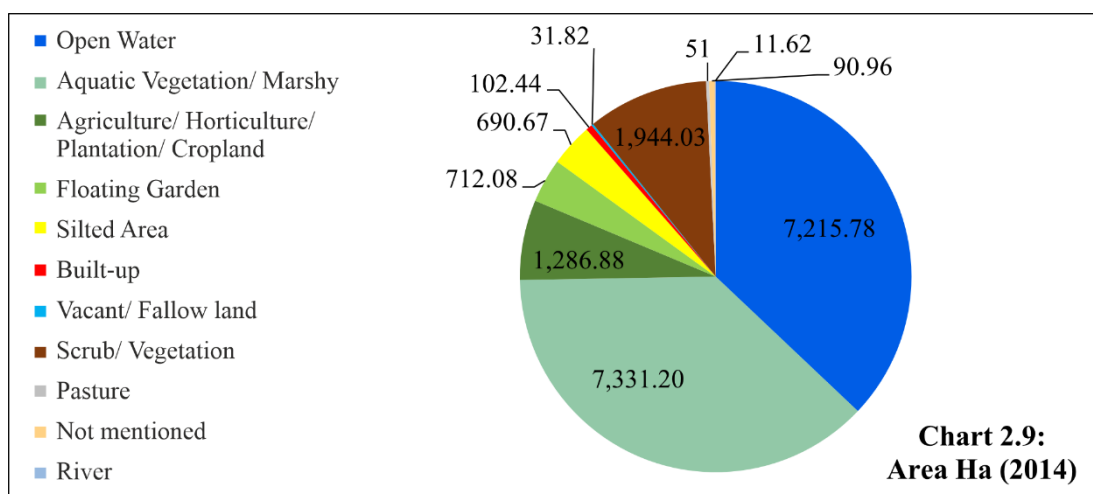
Table 2.7: Decrease in open water and change in other land use in 20 Lakes

(Area in hectares)

Decrease/ Increase and its percentage (2014 – 2020)						
Land Use/ Classification Use	2014	2020	Decrease	Increase	Decrease Percentage	Increase Percentage
Open Water	7,215.78	5,127.54	2,088.24		29	
Aquatic Vegetation/ Marshy	7,331.20	8,666.71		1,335.51		18
Agriculture/ Horticulture / Plantation/Cropland	1,286.88	1,815.10		528.22		41
Floating Garden	712.08	752.92		40.84		6
Silted Area	690.67	661.62	29.05		4	0
Built Up	102.44	127.31		24.87		24
Vacant/ Fallow land	31.82	57.15		25.33		80
Scrub/ Vegetation	1,944.03	2,059.67		115.64		6
Pasture	51.00	85.33		34.33		67
Not mentioned	90.96	91.52		0.56		1
River	11.62	23.61		11.99		103
Total	19,468.48	19,468.48	2,117.29	2,117.29		

(Source: audit analysis of data provided by EE&RSD)

Charts 2.9 and 2.10: Decrease in open water and change in other land use in 20 Lakes



• Increase in open water area of 22 Lakes

In respect of 22 Lakes¹², there was overall change in land use of 86.28 hectares which included a meagre increase of 84.72 hectares (10 *per cent*) in open water which was due to decrease in aquatic vegetation, area being placed under agriculture/ horticulture/ plantation etc. As these Lakes were located inside forests, it was not known whether or not increase in open water was due to siltation, choking up of Lake outlets, melting of glaciers or heavy rainfall etc. in the areas of these Lakes. Details of Lake-wise increase in open water is summarised in **Table 2.8, Charts 2.11 and 2.12** and detailed in **Appendix-2.8**.

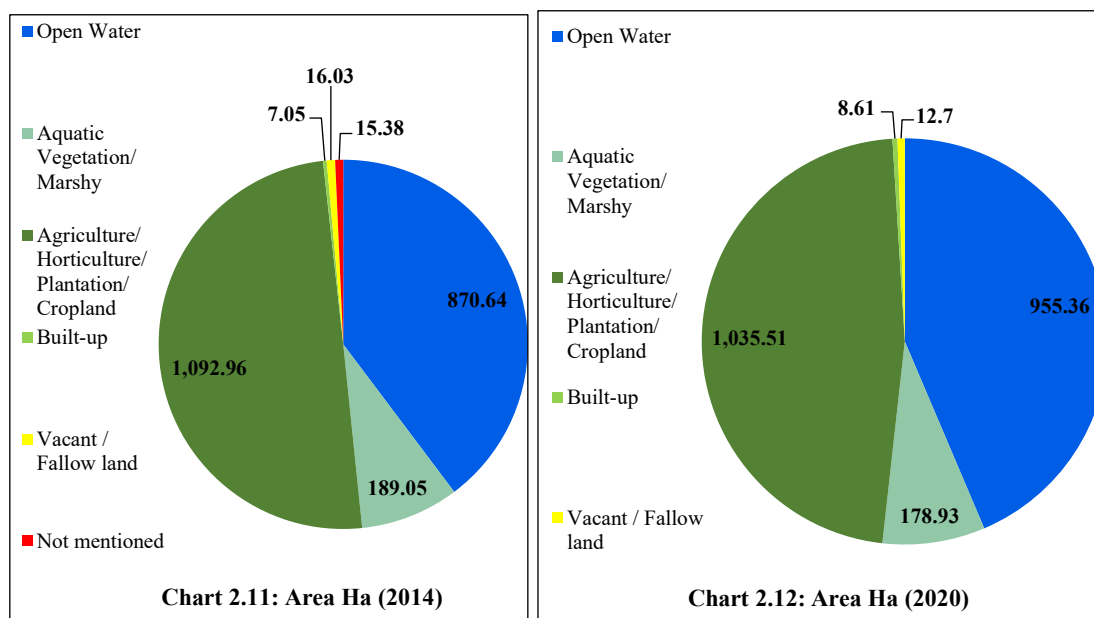
Table 2.8: Increase in open water and change in other land use in 22 Lakes

(Area in hectares)

Land Use/ Classification Use	2014	2020	Decrease	Increase	Decrease Percentage	Increase Percentage
Open Water	870.64	955.36		84.72		10
Aquatic Vegetation/ Marshy	189.05	178.93	10.12		5	
Agriculture/ Horticulture/ Plantation /Cropland	1,092.96	1,035.51	57.45		5	
Built Up	7.05	8.61		1.56		22
Vacant/ Fallow land	16.03	12.70	3.33		21	
Not mentioned	15.38	0.00	15.38		100	
Total	2,191.11	2,191.11	86.28	86.28		

(Source: audit analysis of data provided by EE&RSD)

Charts 2.11 and 2.12: Increase in open water and change in other land use in 22 Lakes



¹² Includes two Lakes (Kaplasar and Gagasar) where there was no change in the open water area.

The spatio-temporal changes in land use/ classification use in the test-checked Lakes was mainly due to anthropogenic activities, which had remained unchecked. As a result, ecosystem of these Lakes had been critically affected.

Director, EE&RSD stated (September 2022) that the data regarding water bodies was prepared by EE&RSD as a basic inventory for identifying water bodies so that the stakeholders may use it as reference data. It was further stated that the data of wetlands identified through remote sensing methodology require ground truth verification coupled with comparative date of satellite imagery, season, angle of pass, cloud cover etc. and reference to “disappearance” of Lakes should be taken as not being identifiable/ traceable on the satellite imagery used. It was also stated that data of land use/ land cover of water bodies may be treated as indicative and not conclusive.

During the exit conference (September 2022), it was stated that the data provided by EE&RSD regarding land use/ classification use changes need to be validated by ground truthing. It was further stated that detailed remote sensing for all Lakes of J&K was not possible due to budget constraints, however it could be carried out for some major Lakes.

The reply of EE&RSD is not convincing as the Department had acknowledged in the Directory of Lakes and water bodies of J&K (November 2018) that the final status of Lakes was prepared using latest high-resolution data supported by limited field checks/ ground truthing. This was also corroborated by paragraph 5 (b) “Inventorisation and collection of information on Water Bodies (Lakes and ponds)” in the revised action plan [submitted (March 2020) in compliance with the directions issued by the National Green Tribunal (NGT)] wherein it was mentioned that a Directory of Lakes and water bodies of J&K has been prepared by the EE&RSD using latest high resolution Linear Imaging and Self Scanning Sensor-III satellite data by Remote Sensing and GIS.

The reply of EE&RSD should also be seen in the light of ‘Introduction of Atlas of wetlands of J&K of 2014’ which stipulates that the Atlas outlines spatial extent of each Lake with geo-coordinates and location which will be an useful source of information for formulating an effective management action plan and regulatory mechanism for sustainable wise use and conservation of water resources of J&K. Further, the reply should be considered in light of the fact that while validation through ground truthing may provide the exact extent of land use/ classification use changes in Lakes, the data provided by EE&RSD offers a reasonably accurate representation of the changes in Lake areas.





2.3.2 Analysis of Google Earth Pro images to ascertain land use changes in Lakes and their catchments

The geo-coordinates of the 63 audit sampled Lakes provided by the EE&RSD were plotted (October 2022) by Audit on Google Earth Pro on various timelines. It was found

that seven Lakes¹³ were not visible or had almost dried up. These seven were among the 11 Lakes that had disappeared as per the analysis of EE&RSD data, as detailed in **Paragraph 2.2.2**. There were land use changes in Khushal Sar Lake and degrading/shrinking of Anchar Lake. Audit also conducted (November 2022) field verification, along with concerned Tehsildars, of Lakes and noticed that:

• Lakes not visible or dried up

Out of seven Lakes, Audit conducted joint physical verification of the four Lakes which were found to be dried up. The Lake areas were covered with weed, plantation and vegetation and roads had been constructed through Lake areas. The observation was also corroborated by the EE&RSD data which showed that these Lakes had disappeared during 2014-20. The photographs showing growth of weed, plantation, vegetation and constructed roads are given below:

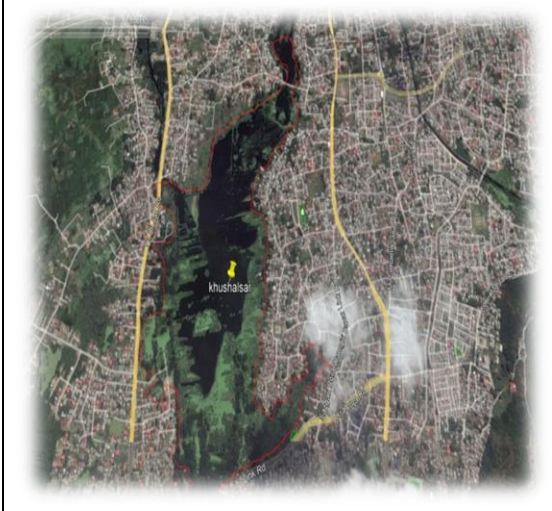





<p>Sethergund – Plantation</p> 	<p>Sethergund–Crop, weed and Plantation</p> 
<p>Marhama -Weed and Plantation</p> 	<p>Marhama Built-up at the fringe of Lake (marked in yellow)</p> 





¹³ (i) Rakh-a-Arth, (ii) Sethergund Numbal, (iii) Marhama, (iv) Devpursar, (v) Mahtan, (vi) Chandargar Numbal and (vii) Galwal Talao.

Rakh-i-Arth- Plantation and weed	Rakh-i-Arth-Road
	
Devpursar- Plantation	Devpursar Vegetation and Weed and road
	

- Land use change in Khushal Sar Lake and degrading/ shrinking of Anchar Lake**

In respect of Khushal Sar and Anchar Lake, we noticed escalating anthropogenic pressure leading to abundance of weed, plantation, built-up and discharge of untreated sewage into the Lakes, as shown in satellite images 2.1, 2.2, 2.3 and 2.4 and following photographs. Restoration of open water of Khushal Sar Lake was being done by de-silting of the Lake through a Non-Governmental Organisation under Ahsaas scheme launched (2021) by the Government.

Google Earth Pro images of Khushal Sar Lake	
Satellite Image 2.1: 1 May 2014	Satellite Image 2.2: 4 July 2015
	
Khushal Sar Lake	
Lake area being restored by de-siltation	Weed and Plantation
	
Khushal Sar Lake	
Built-up at the fringe of the Lake	Discharge of sewage from households into the Lake
	

Google Earth Pro images of built-up area coming up in the Anchar Lake area (marked in yellow)	
Satellite Image 2.3: 6 Aug 2012	Satellite Image 2.4: 7 May 2022
	
Vegetation, plantation and weed in the Lake	Area marked in yellow shows car washing stations, automobile workshops and tin sheds in the vicinity of the Lake
	

• **Land use changes in catchment areas of six Lakes checked in detail over a larger time span**

Audit analysed images of Google Earth Pro of six detailed-checked Lakes over a larger time span to detect periodic changes in these Lakes. Clear images for a uniform time period of all these Lakes were not available, and time period of clear images varied from Lake to Lake. The clear images available ranged from 2002 to 2022, with 2022 being the latest as detailed in *Appendix-2.9*.

Audit analysis of the images revealed that changes in land use as built-up in catchment areas including fringes of these Lakes had increased over a period of time. Encroachments within Lakes were also noticed.

The details and images of Lakes with changes in the catchments which included fringes and encroached areas of these Lakes are detailed in **Paragraphs 2.3.2, 4.3.2, 5.4.2 and sub-paragraphs of 6.1.3, 6.2.3 and 6.3.3.**

2.4 Absence of legal statute/ Act and Centralised Development and Regulatory Authority for Conservation and Management of Lakes

There was no Centralised Development and Regulatory Authority and no specific legal statute/ Act for Conservation and Management of Lakes had been put in place.

Although several legislations as discussed in the **Paragraph 1.5** were enacted for protection of environment which included provision for Conservation and Management of Lakes, no Authority with regulatory backing was established to restore, preserve and protect Lakes in Jammu and Kashmir.

A draft bill was prepared (April 2000) by J&K, Lakes Conservation and Management Authority to establish a Development and Regulatory Authority for Conservation and Management of Lakes. Due to the indifferent approach of GoJ&K, the proposed legislation could not be approved as of March 2022 despite lapse of over 22 years since preparation of bill.

Due to the absence of a Lake specific Centralised Development and Regulatory Authority and specific legal statute/ Act, there were diffused functions across various institutions, inadequacies in institutional arrangements for discharge of environmental functions related to Lakes, lack of cross-sectoral institutional convergence, monitoring/ evaluation and absence of Lake generic management activities related to conservation of Lakes as detailed in **Paragraphs 2.5 and 3.2.**

2.5 Lack of institutional arrangements for discharge of environmental functions related to Lakes

The Departments/ Authorities had fragmented mandate and responsibilities and had failed to fully comply with the entrusted mandate

Nine institutions¹⁴ were assigned different functions related to environmental issues including those related to Lakes as detailed in **Appendix-2.10**. Out of these nine institutions, six¹⁵ were falling under the administrative control of the Forest Department which had a major role in discharging functions relating to Conservation and

¹⁴ (i) Ecology, Environment and Remote Sensing Department (EE&RSD) (ii) Principal Chief Conservator of Forests (PCCF) (iii) Wildlife Protection Department (WPD) (iv) Union Territory Wetland Authority (UTWA) (v) Biodiversity Board (BDB) (vi) Pollution Control Board (PCB) (vii) Development Authorities, (viii) Rakhs and Farms Department and (ix) Water Resource Regulatory Authority (WRRRA).

¹⁵ EE&RSD, PCCF, WPD, PCB, BDB and UTWA.

Management of Lakes. Audit noticed inadequacies in discharge of specific functions by these institutions as discussed below:

1. J&K, Ecology, Environment and Remote Sensing Department (EE&RSD)

GoJ&K assigned (October 1989) EE&RSD to conduct a detailed survey of Lakes, study their physical, chemical and biological dynamics and on the basis of the data so collected, prepare detailed plans for development and monitoring of each Lake.

However, EE&RSD had not carried out detailed survey of Lakes due to which physical, chemical and biological dynamics of Lakes were not available for preparing development plans for these Lakes. Plans were prepared by the respective Departments/ Authorities (to which these Lakes were transferred) only in respect of six Lakes¹⁶.

EE&RSD stated (February 2021) that it was deficient in technical manpower such as environmental and hydrological engineers, ecologist, limnologists, biologists, remote sensing and GIS specialist, although proposals for requirement of manpower resources were submitted to the Forest Department time and again (latest in August 2019). EE&RSD further stated that they did not have a laboratory and technical wing for devising strategy for planned development and maintenance of Lakes.

The fact remained that J&K Ecology, Environment & Remote Sensing Department had failed to carry out detailed survey of 697 Lakes and hence physical, chemical and biological dynamics of Lakes were not available for preparing development plans for these Lakes.

2. Principal Chief Conservator of Forest (PCCF), J&K

No comprehensive Conservation and Management programme/ plan was prepared for 255 Lakes falling under the jurisdiction of PCCF, although Annual Plan of Operations (APOs) for other forest management works¹⁷ were prepared and executed.

Out of 255 Lakes under the jurisdiction of PCCF, 441.05 hectares of area of 178 Lakes had decreased/ disappeared (including five test-checked Lakes by Audit with an area of 121.12 hectares). The decreased area included an area of 80 disappeared Lakes which had area of 217.85 hectares (including one Lake test-checked by Audit with an area of 90.96 hectares) as detailed in **Table 2.2 and Appendix-2.2 and Table 2.3 and Appendix-2.3.**

Divisional Forest Officers of Lidder, Kulgam, Mahore and Baderwah Divisions stated (February 2021) that the Forest Department did not have clear responsibility for Conservation and Management of Lakes and that due to lack of technical/ scientific manpower and laboratory the Conservation and Management of Lakes could not be carried out.

¹⁶ Dal, Wular, Hokersar, Surinsar, Mansar and Manasbal

¹⁷ Plantation of degraded forests, fencing/ demarcation of forest areas, establishment of nurseries etc.

The fact remains that the aforesaid 255 Lakes were under the jurisdiction of PCCF and no comprehensive Conservation and Management programme had been formulated for conservation of these Lakes.

3. Wildlife Protection Department (WPD)

There was no comprehensive Conservation and Management programme/ plans for 39 Lakes under the jurisdiction of WPD. Although APOs prepared and executed for management and habitat improvement of wildlife in protected areas included activity plans in respect of Lakes, the works executed as per APOs were not based on thorough survey and did not address the root causes of degradation of Lakes. As a result, there was decrease of 156.78 hectares in 20 Lakes (which included four Lakes test-checked by audit) having area of 132.76 hectares i.e. 85 *per cent*¹⁸ of total area of these Lakes as detailed in **Table 2.2, Appendix-2.2 and Table 2.3, Appendix-2.3.**

Audit, however, observed that WPD had carried out Lake Management activity plans such as survey, demarcation, de-silting, de-weeding and plugging of breaches in respect of three Lakes such as Hokersar, Surinsar and Mansar. These have been discussed in **Chapter-VI.**

WPD stated (October 2022) that as 53 high altitude Lakes were free from human pressures, they do not require any kind of intervention, management or restoration.

The reply does not address the fact that all the Lakes in J&K are high altitude Lakes as per the National Wetland Atlas. Also, the guidelines of MoEF&CC do not prescribe that Conservation and Management is not needed for high altitude Lakes. Further, although Lakes in protected areas are free from anthropogenic pressures, they may be facing problems of siltation and issues relating to water sources. As such, they also require Conservation and Management efforts.

4. Union Territory Wetland Authority (UTWA)

In J&K, Union Territory Wetland Authority (UTWA) was established (November 2020) after a lapse of over 11 years after issue (June 2009) of National Wetland Conservation Program Guidelines¹⁹. UTWA is responsible for identification, conservation and regulation of wetlands (including Lakes) in UTs as per Wetlands (Conservation and Management) Rules, 2017.

Although UTWA was to meet at least thrice a year, it had convened its first meeting in March 2021 after a lapse of more than one year since its establishment. UTWA fixed a timeline (between April 2021 and July 2021) for preparation of a Brief Document (BD) for 12 Lakes. Preparation of the brief document included geographic delineation of Lakes, demarcation of Lake boundary supported by accurate digital maps with coordinates and validation by ground-truthing and list of activities to be regulated and

¹⁸ Decreased area of four sampled Lakes/ total decreased area (132.76/156.78)

¹⁹ Superseded in 2017

permitted within the Lakes. However, no such brief document has been prepared as of 31 March 2022. Besides, no post/staff was sanctioned by GoJ&K for UTWA. Thus, J&K UTWA had remained non-operational.

UTWA stated (October 2022) that due to COVID-19 pandemic, the field work regarding preparation of BDs suffered and subsequently the BDs of Wular Lake and Dal-Nigeen Lakes were finalised. It was further stated that preparation of BDs of Ahansar, Waskusar, Khushal Sar-Gilsar, Narkara and Sanasar was in final stage. The reply of UTWA is not convincing as the Government business had continued during Covid-19 with Standard Operating Protocols. Further, the reply of UTWA is silent regarding not conducting statutory meetings.

5. Biodiversity Board, J&K (BDB)

J&K, Biodiversity Board (BDB) was established (February 2013) after a lapse of over 11 years since the Biological Diversity Act, 2002 was enacted.

Members of the Board were appointed (February 2013) for two years. Thereafter, no Board members were appointed for over three years up to August 2018. After the Board was reconstituted (September 2018) for two years, the Board met only twice till December 2020. During meetings, issues relating to staff creation and budget requirement were discussed but policy matters relating to plans and measures for conservation of biodiversity (including biodiversity of Lakes) in J&K were not addressed.

In contravention to the provisions of Biological Diversity Act, 2002, BDB had not carried out any survey to assess and evaluate details of biodiversity in respect of any of the 697 Lakes of J&K. It had not created the Biodiversity Fund and as such conservation and promotion of biological resources could not be carried out. Further, no post/ staff was sanctioned by GoJ&K for BDB. However, its affairs were being run by the staff in position in the Director, Research Institute of Forest.

UTWA and BDB stated that after enactment of J&K Reorganisation Act, 2019, BDB ceased to exist and GoJ&K constituted (September 2019) J&K Biodiversity Council (BDC) as per provisions of the Biological Diversity Act, 2002 and the Biological Diversity Rules, 2004. It was further stated that three meetings of BDC had been held to decide on matters pertaining to biodiversity conservation and its sustainable utilisation and that newly constituted BDC had taken several initiatives during the last two years including documentation of biodiversity by the Biodiversity Management Committee in the form of People's Biodiversity Registers (PBDRs) containing details of water bodies and flora and fauna. It was further stated that the BDC had initiated the process for creation of Biodiversity Fund Account.

The fact remains that no meetings of BDB were held between its establishment in February 2013 and reorganisation of J&K in August 2019. Further, the BDB had failed

to carry out survey to assess and evaluate details of biodiversity in respect of the 697 Lakes of J&K.

6. Jammu and Kashmir Pollution Control Board (JK-PCB)

JK-PCB had not taken measures for restoration and maintenance of natural water bodies and had not prepared plans/ programmes for prevention and control of water pollution as mandated under Water (Prevention and Control of Pollution) Act, 1974.

Although the PCB was to regularly monitor water quality of water bodies (including Lakes), the JK-PCB had conducted water quality testing of only five Lakes²⁰ as against 697 Lakes in J&K. Further, the testing was confined to only physico-chemical parameters and no testing for other parameters such as zooplankton and phytoplankton was done. J&K Pollution Control Board also failed to take measures for restoration and maintenance of natural water bodies and had not prepared plans/ programmes for prevention and control of water pollution of Lakes in J&K.

7. Development Authorities

Four Development Authorities²¹ were established (between March 1997 and September 2012) under the Development Act 1970 for development of areas transferred to these Authorities. The areas transferred to these Authorities also included Lake areas. However, there was no specific mandate with any of the Development Authorities for Conservation and Management of Lakes.

8. Agriculture Production Department (*Rakhs* and Farms Department)

The *Rakhs* and Farms Department under Agriculture Production Department controls the land appurtenant to Lakes that are submerged in water during the rainy season and dry up during summers or autumn.

R&FD, in violation of Wetland Rules²², transferred land appurtenant to three Lakes²³ measuring 712.30 hectares to other Departments for construction activities. Further, 210 hectares of land were under transfer as on March 2022 to other Departments. Transfer of land for construction purposes had caused shrinkage in these Lakes and disappearance of Gangbug Lake.

9. Water Resource Regulatory Authority (WRRRA)

Water Resource Regulatory Authority (WRRRA) was established (October 2012) after a lapse of two years since enactment (November 2010) of the Water Resources (Regulation and Management) Act, 2010. Functions of WRRRA were to be discharged

²⁰ Dal, Surinsar, Mansar, Hokersar and Wular Lakes

²¹ Lakes Conservation and Management Authority, Surinsar Mansar Development Authority, Wular Conservation and Management Authority and Wular Manasbal Development Authority.

²² 2010 (modified in 2017)

²³ Rakh-i-Rabtar, Gungbug and Rakh-i-Arth

through a Committee which was constituted (October 2012) for a period of three years (up to October 2015). Thereafter, the second committee was appointed in October 2017 after a gap of over two years. The Committee discussed (July 2019) the progress of ongoing conservation works only for Wular Lake, instead of all 697 Lakes in J&K, as required under the provisions of the Water Resources (Regulation and Management) Act, 2010.

Water Policy and Plan (WP&P) was prepared (October 2017) by the WRRRA after a lapse of about seven years since the WRRRA Act was passed.

No plans were prepared for protection of water sources and prevention of encroachment on existing water bodies (includes Lakes) and improvement in water quality of water bodies (including Lakes) deteriorated due to pollution.

Thus, there was no Centralised Development and Regulatory Authority and no specific legal statute/ Act for Conservation and Management of Lakes. Even the Departments/ Authorities having fragmented mandate and responsibilities had failed to carry out Conservation and Management of Lakes in Jammu and Kashmir resulting in degradation of ecosystem of Lakes.

Commissioner Secretary, Forest, Ecology and Environment Department assured (September 2022) that the matters raised by Audit would be considered seriously and it was hoped that the working of the concerned Departments would show an assimilation of the issues raised which would lead to better performance in future.

The fact remained that the Forest Department and other Departments/ Authorities concerned had not only failed to prevent the land use change in Lake areas but had themselves carried out violation of Wetland Rules 2010 and 2017, by constructing roads through Lakes of Hokersar, Rakh-i-Arth and Devpursar. The Authorities may closely ascertain the causation for violation of the extant laws (under Section 15 of Environment (Protection) Act 1986, Section 3 of Forest (Conservation) Act 1980, Section 170 of J&K Water Resources (Regulation and Management) Act, etc. for Conservation and Management of Lakes.

2.6 Conclusion

There were significant changes in land use and classification use of areas in respect of Lakes. Audit analysis of the data obtained from EE&RSD revealed that out of total 697 Lakes, 315 Lakes (45 *per cent*) having water area of 1,537.07 hectares had disappeared, while water area of 203 Lakes²⁴ (29 *per cent*) had decreased. Further, Audit analysis of remote sensing data for the period 2014-2020 related to 63 test-checked Lakes revealed that there was decrease in area of open water expanse and increase of area under other land uses like built-up, pasture, vacant land, fallow land, agriculture, horticulture,

²⁴ 518 Lakes (disappeared & decreased Lakes) minus 315 Lakes (disappeared Lakes)

plantation and cropland. Although various existing laws, rules, and policies contained sporadic provisions for conservation and management of Lakes, there was no specific and comprehensive legal statute /Act dedicated to Conservation and Management of Lakes. Although Development Authorities were established for the development of areas including the areas of six detailed-checked Lakes, no clear and specific mandate had been put in place by these Authorities in their Acts for Conservation and Management of Lakes.

2.7 Recommendations

- *Specific and comprehensive legal statute/Act for conservation and management of Lakes needs to be put in place by the GoJ&K.*
- *Instead of the existing multiple agencies vested with the Administrative control over Lakes, GoJ&K may explore the possibility of establishing a Central and Specialised Authority through appropriate legislative enactment to ensure focused, coordinated and accountable Conservation and Management of Lakes and proper monitoring and evaluation of efforts in this regard.*
- *Manpower with technical and domain expertise including environmental and hydrological engineers, wetland ecologists, limnologists, remote sensing and Geographic Information System specialists, ornithologists and microbiologists should be provided for Conservation and Management programmes of the Lakes.*
- *Laboratories with sophisticated equipment should be established for carrying out research studies relating to Lakes. Besides, Scientific Advisory Committee needs to be constituted for scientific guidance regarding Conservation and Management of all Lakes in J&K.*

Chapter-III

Overview of Conservation and Management Programmes/ activities for Lakes

Chapter-III

Overview of Conservation and Management programmes/ activities for Lakes

3.1 Conservation Programmes for Lakes

Conservation and Management programmes of 691 Lakes in J&K could not be implemented by GoJ&K, as the Forest Department had neither identified the eligible Lakes nor formulated any plans to seek assistance under various programmes launched by MoEF&CC.

Ministry of Environment, Forest and Climate Change of India (MoEF&CC) in 1985, identified Conservation and sustainable Management of wetlands (including Lakes) as one of its important programmatic themes. The National Wetlands Conservation Programme (NWCP) was launched (1986) by MoEF&CC, GoI to provide financial assistance to the State Governments to prevent degradation of wetlands (including Lakes) and ensure wise use of wetlands for the benefit of local communities and overall conservation of biodiversity. Also, recognising the importance of urban and semi-urban Lakes degraded due to waste water discharge into Lakes, GoI launched (June 2001), the National Lake Conservation Plan (NLCP) to restore and conserve these Lakes by restoring their water quality and ecology.

In February 2013, to avoid overlap of activities and promote better synergies, NLCP and NWCP were merged into a National Plan for Conservation of Aquatic Ecosystems (NPCA). The objectives of NPCA were to stop and reverse the continued degradation and loss of Lakes and to achieve desired water quality and improvement in biodiversity by holistic conservation and restoration of Lakes. To seek financial assistance from GoI, the State Governments/ UT Administrations were to formulate integrated management plans for Lakes with minimum area equivalent to or greater than five hectares by identifying a comprehensive set of activities needed for conservation and sustainable Management of Lakes.

Audit observed that GoJ&K prepared Conservation and Management programmes/ plans for only six Lakes viz. Dal, Wular, Surinsar, Mansar, Manasbal and Hokersar. In respect of the remaining 691 Lakes, the GoJ&K neither identified the eligible Lakes nor were any plans formulated to seek assistance under various programmes launched by MoEF&CC.

Audit further observed that GoJ&K had also not formulated a comprehensive plan for scientific and effective conservation of Lakes. Comprehensive planning would have enabled formulation of action plans for restoration of health, serenity and sanctity of polluted Lakes. GoJ&K had neither conducted any survey for source water protection of Lakes nor was assessment of critical risk parameters carried out in respect of Lakes.

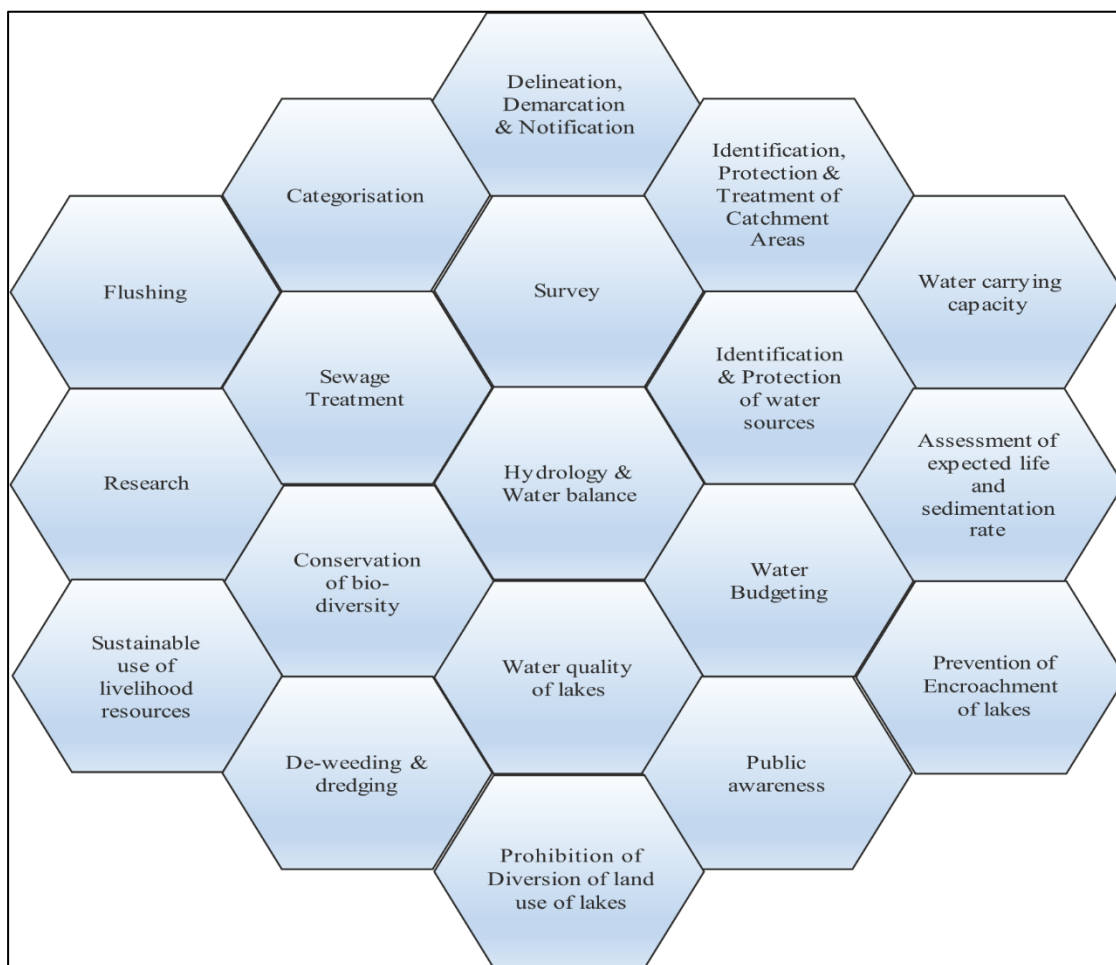
Due to lack of comprehensive programmes/ plans by GoJ&K, Conservation and Management could not be carried out for 691 Lakes in J&K as detailed in following paragraphs.

3.2 Generic activities for Lake management

No comprehensive survey, delineation, demarcation and notification of area of Lakes had been carried out for identification/ treatment of catchment areas, identification and protection of water sources, evaluation of water budget, improving water quality of Lakes by flushing, sewage treatment, biodiversity conservation, de-weeding and dredging, sustainable development of Lake resources, assessment of life of Lakes, research on Lakes and public awareness.

According to National Wetland Conservation Program (NWCP) and related Guidelines, Wetland Rules, books and publications on Lake management and Detailed Project Reports, the primary tasks for Conservation and Management of Lakes are survey, delineation, demarcation and notification of area of Lakes. These are to be followed by identification/ treatment of catchment areas, identification and protection of water sources, water budgeting, improving water quality of Lakes by flushing, sewage treatment of point and non-point sources, biodiversity conservation, de-weeding and dredging, sustainable development of Lake resources, assessment of life of Lakes, researches on Lakes and public awareness. Further, Wetland Rules (Conservation and Management), Rules 2010 and 2017 envisage prohibition of diversion of land use of Lakes. The pictorial representation of Lake generic management activities is given in **Chart 3.1:**

Chart 3.1: Pictorial representation of Lake generic management activities



Audit noticed the following deficiencies in the Lake generic management activities:

- Survey of Lakes**

GoJ&K assigned (October 1989) EE&RSD to conduct a detailed survey of Lakes, study their physical, chemical and biological dynamics and on the basis of the data so collected, prepare detailed plans for development and monitoring of each Lake.

EE&RSD had conducted (May 2012) a survey in J&K and prepared a directory of Lakes and water bodies. An atlas of Lakes and wetlands of Kashmir/ Jammu Divisions was prepared (November 2018/ July 2020). These records indicated only the location and area of Lakes. The survey did not include assessment of physical and chemical dynamics such as topography, geology, soil quality and status of Private/ Government land in the vicinity of Lakes. This assessment was imperative for preparation of development plans for each Lake. In absence of this data, the impact of these factors on the Lake ecosystem could not be evaluated in respect of 697 Lakes.

EE&RSD had failed to conduct detailed survey of Lakes despite lapse of 31 years between its establishment in October 1989 and November 2020.

After establishment of J&K UTWA in November 2020, the responsibility for surveying of Lakes was transferred to UTWA. However, as of October 2022, UTWA had also not conducted any detailed survey of Lakes despite lapse of two years since its establishment. Non-conduct of detailed survey of Lakes exhibited a lackadaisical approach in Conservation and Management of Lakes.

• **Delineation, demarcation and notification of Lakes**

For Lakes outside forests, Wetland (Conservation and Management) Rules, 2010 and 2017 envisage that States/ UTs have to prepare a ‘Brief Document’ comprising broad geographic delineation of Lakes with demarcation of Lake boundary supported by accurate digital maps with coordinates and validation by ground truthing. The document should outline the list of activities to be regulated and permitted within the Lakes. After preparation of Brief Document, 402 Lakes (outside forest areas) were to be notified. The Brief Document had not been prepared by GoJ&K for these Lakes. Also, GoJ&K had not notified any Lake under Wetland Rules. Out of the remaining 295 Lakes falling in forest areas, the Forest Department notified (1945 and 1981) only 14 Lakes located in Wildlife areas.

Thus, geographic delineation of Lakes with demarcation of Lake boundary and notification of Lakes could not be done resulting in exposing Lakes to the threat of encroachments. Besides, non-notification of Lakes resulted in lack of focused effort for planning Conservation and Management of these Lakes.

District-wise details of Lakes outside forest areas which have disappeared and Lakes whose area had decreased by more than 50 per cent since 1967 are given in **Table 3.1**.

Table 3.1: District-wise details of disappeared Lakes and Lakes in which area had decreased by more than 50 per cent

Sl. No	District ¹	No. of Lakes outside forest areas	No of Lakes disappeared	Area of disappeared Lakes (in ha)	No. of Lakes of in which area decreased by 50 per cent	Area of these Lakes (in ha)
1.	Anantnag	2	2	306.29	0	0
2.	Bandipora	35	8	86.95	9	117.28
3.	Budgam	16	1	464.05	0	0
4.	Ganderbal	19	9	120.55	5	126.36
5.	Doda	7	2	1.06	0	0
6.	Jammu	79	57	44.84	3	1.6
7.	Kathua	33	31	13.62	2	1.29

¹ Out of 20 districts in J&K, in the two districts viz. Kulgam and Rajouri, no Lake falls outside forest area.

Sl. No	District	No. of Lakes outside forest areas	No of Lakes disappeared	Area of disappeared Lakes (in ha)	No. of Lakes of in which area decreased by 50 per cent	Area of these Lakes (in ha)
8.	Kishtwar	8	4	10.64	0	0
9.	Poonch	11	5	3	2	1.08
10.	Ramban	3	2	1.55	0	0
11.	Reasi	27	27	11.1	0	0
12.	Samba	73	62	38.48	2	1.64
13.	Udhampur	18	15	12.27	1	0.53
14.	Baramulla	10	0	0	4	37.77
15.	Kupwara	41	1	0.92	2	3.13
16.	Pulwama	9	4	56.60	1	3
17.	Srinagar	10	5	147.30	0	0
18.	Shopian	1	0	0	0	0
	Total	402	235	1,319.22	31	293.68

(Source: data obtained from EE&RSD)

As can be seen from the **Table 3.1**, 235 Lakes having an area of 1,319.22 hectares in 16 districts had disappeared. Besides, in 10 districts more than 50 per cent area (293.68 hectares) of 31 Lakes had decreased implying that these Lakes also face the risk of extinction.

• **Categorisation of Lakes**

Lakes are categorised as oligo trophic (having low nutrient content and usually having water of drinking quality), meso trophic (having medium-level nutrient content with usually clear water and submerged aquatic plants), eutrophic (having high nutrient content and abundance of plants due to high levels of oxygen) and hyper eutrophic (having high nutrients causing excessive plant/ algal growth).

No assessment was made in respect of 63 test-checked Lakes to determine their original category, changes in their category from time to time due to factors such as anthropogenic pressure, change in dynamics of catchment area and deforestation etc. As a result, changes in category of Lakes, if any, were not evaluated. For instance, in respect of Manasbal Lake, a research² conducted (March 2014) by the scholars indicated that the classification of the Lake had changed from mesotrophic to eutrophic.

² Ajaz Ahmad Magray and Tasleema Jan (Department of Education, University of Kashmir), India

• Identification, protection and treatment of catchment areas

The interconnectivity between Lakes and their catchments is a central tenet in Lake Management. Lakes receive tonnes of sediment each year from the catchment areas due to *nallah* cuts, loose soils, denuded mountains and other natural geological processes. Water quality of a Lake depends largely on the conditions and dynamics of its catchment. Eutrophication related problems observed in Lakes are primarily linked to the nature of contributing catchment of the Lake. As the health of catchments is critical for existence of Lakes, it is vital to conduct survey of catchment area of Lakes and to identify, assess, understand, evaluate, protect and treat catchment areas³ of Lakes. Instances of four test-checked Lakes where catchment area identification, evaluation, protection and treatment were absent are shown in **Satellite Images 3.1, 3.2, 3.3 and 3.4.**

Yellow line boundary indicates area of Lakes. The area marked in red (Ahansar Lake & Narkara) and green (Mansar & Surinsar Lake) is the built-up.

Satellite Image 3.1: Ahansar Lake



Satellite Image 3.2: Mansar Lake



Satellite Image 3.3: Narkara Numbal Lake



Satellite Image 3.4: Surinsar Lake



³ In absence of a formally identified catchment area, a reasonable portion outside the open water boundary of the Lake has been considered as catchment area.

In respect of 61 out of 63 test-checked Lakes, the concerned Departments with whom Administrative control of these Lakes is vested had neither conducted any survey to assess, evaluate and understand catchment area of the Lakes nor were silt settling basins constructed to address siltation coming into these Lakes from catchment areas. In respect of remaining two test-checked Lakes⁴, survey was conducted for assessment of catchment area and treatment was also carried out to redress the problem of siltation (discussed in **Chapters IV and V** of the report).

Due to non-identification, protection and treatment of catchment areas, there was change in land use within areas of Lakes. As a result, there was absence/ decrease of open water area in 41 Lakes critically affecting the ecosystem of these Lakes as discussed in the **sub-paragraphs “Absence of open water and decrease in open water” of Paragraph 2.3.1.**

• **Identification and protection of water sources of Lakes**

Snowfall and rainfall in the catchment areas of Lakes form the main source of water in the Lakes. The water from these sources reaches the Lakes through *nallahs*, springs and ground-water. For study of hydrology and water balancing of Lakes, it is very important to identify and protect water sources of Lakes. Under J&K Water Resources (Regulation and Management) Act 2010, J&K WRRRA was mandated to identify and protect water sources of Lakes.

In respect of 63 test-checked Lakes, J&K WRRRA had failed to fulfil its mandate, as no detailed survey was conducted to identify and quantify inflow from water sources of Lakes. As a result, water sources in catchment areas of Lakes could not be assessed, regulated and protected by Departments with whom jurisdiction of these Lakes was vested.

This was one of the causes for absence of open water area in 21 Lakes and decrease in open water of 20 Lakes as discussed in the **sub-paragraph “Absence of open water and Decrease in open water” of Paragraph 2.3.1.**

The concerned Departments attributed non-identification of water sources of Lakes to lack of Conservation and Management programme for Lakes.

• **Sewage treatment**

The sewage and untreated human waste entering the Lakes are the main causes responsible for pollution in Lakes. Out of 63 test-checked Lakes, 15 Lakes⁵ are located inside forests. These 15 Lakes included 12 Lakes which were free from sewage and untreated human waste as there was no human population around these Lakes and the

⁴ Catchment area of Dal Lake is 33.70 sq. kms and Wular is 333.74 sq. kms.

⁵ Out of 15 Lakes inside forests, 12 Lakes (Munwar Sar, Sheshnag, Tson, Sarbal sar, Nilnag, Nundkul, Gangbal, Chirsar, Konsarnag, Mandik Sar, Gaga Sar and Simarsar) are free from sewage and untreated human waste.

remaining three⁶ Lakes were surrounded by populated areas. Further, the remaining 48 test-checked Lakes (outside forests) were also surrounded by human population.

Audit noticed that sewage and other pollutants were treated only in respect of Dal Lake out of 63 test-checked Lakes, where Sewage Treatment Plants (STPs) were in place to treat sewage and untreated human waste entering the Lake. However, sewage was entering into the 50 Lakes⁷ (includes six Lakes in Jammu Division and 44 Lakes in Kashmir Division) without any treatment. Division / District-wise details of Lakes into which sewage was entering without any treatment are given in *Appendix-3.1*. An instance of Haigam Lake where untreated sewage and animal waste were directly entering the Lake is shown in the following picture:

Cow dung at the fringe of the Lake is marked in yellow. Area marked in blue indicates the place where run-off from sewage and animal waste finds its way into the Lake resulting in deterioration in water quality of the Lake.

Haigam Lake



Out of 50 Lakes where sewage was entering the Lakes, it was noted from the responses of Tehsildars to the questionnaire based survey prepared by Audit that sewage from 0.91 lakh households (having 4.55 lakh human population and 2.75 lakh animal population) was entering into 34 Lakes. Out of these 34, in case of 29 Lakes there were 69 identified source point pollution locations wherefrom sewage was entering the Lakes and solid waste was dumped by the local population on the fringes of the Lakes (details are in *Appendix-3.2*). In the five Lakes, the sources of pollution were not identified. However, in respect of remaining 16 Lakes, information regarding number of households, human population, animal population and identified sources of pollution was not available with the concerned authorities.

Neither did the J&K Pollution Control Board take any action against the violators of environment laws/rules causing pollution in the Lakes nor did the local municipal authorities provide proper sites for dumping of waste and sewage treatment facilities.

⁶ Surinsar, Mansar and Shalbugh.

⁷ 63 test-checked Lakes minus 12 Lakes (within forests) free from sewage minus one Lake (Dal Lake) where STP is in place to treat sewage.

Hydrology and Water Balance

• Water carrying capacity of Lakes

For study of hydrology, water mass, depth and water balancing⁸ of Lakes, it is important to assess water carrying capacity of Lakes.

Audit noticed that in respect of the 63 test-checked Lakes, water carrying capacity was not evaluated from time to time. As such, neither flood mitigation strategies could be evolved nor could water reserves be regulated.

• Water Budgeting



Water budget is accounting of water that flows into and out of a Lake. To maintain water carrying capacity of Lakes, it is essential to regularly monitor water budget of a Lake. In respect of 62⁹ test-checked Lakes by Audit, water budget was neither evaluated nor monitored. In the questionnaire based survey conducted by Audit, it was reported that in 61 Lakes¹⁰, entry and exit regulatory gates were not in place for regulating and maintaining of water budget of Lakes. Due to absence of gates, there was absence/decrease of open water area in 41 test-checked Lakes as discussed in the **sub-paragraph “Absence of open water and Decrease in open water” of Paragraph 2.3.1**. Out of these 41 Lakes, water was lifted from nine Lakes for irrigation and drinking purposes. However, the quantity for lifting of water was not fixed to regulate water budget of these Lakes as shown in the following images:

Haigam Lake without regulatory gate but having wooden logs and cement bags at its exit point	Water escaping from Haigam Lake on the other side of exit point due to non-availability of regulatory gate
	

⁸ Water budgeting, flushing, flood mitigation etc.

⁹ In respect of Dal Lake, it was done up to 1998-99.

¹⁰ Dal Lake and Manasbal Lake have regulatory gates.

<p>Hokersar Lake without regulatory gate but having iron needles and blocks at its exit point resulting in escaping/ loss of water in the Lake</p>	<p>Water escaping from Hokersar Lake on exit point due to non-availability of regulatory gate resulting in escaping/ loss of water in the Lake</p>
	

• Flushing of Lakes

Flushing of a Lake has to be done to regulate re-circulation of Lake water and to improve the health of the Lake. Flushing rate of a Lake is worked out by dividing total outflow of Lake water by average water carrying capacity of the Lake.

Responses to the questionnaire based survey conducted by Audit revealed that in respect of 62¹¹ out of 63 test-checked Lakes there was no system in place for flushing of Lakes.

• Assessment of expected life and acceleration/ deceleration of sediment accumulation rates in Lakes

Sedimentation is a major problem in the Lakes. The rate of sedimentation through natural geological processes in the catchment of Lakes leads to their rapid shrinkage. Apart from these natural factors, the increasing population growth in and around the Lakes area leads to sedimentation of the Lakes and inflow of sewage and human wastes. All these factors accelerate degradation of the Lake environment.

The life of a Lake is estimated on the basis of bathymetric survey taking into account the sediment accumulation rate in the basin of the Lake and volume of the Lake.

Departmental replies to the questionnaire based audit survey revealed that except for Dal Lake, in respect of 62 test-checked Lakes, the volume of Lakes and sediment accumulation rates in their basins were not evaluated. As a result, the expected life of

¹¹ Flushing was done in Dal Lake but not in a scientific manner.

Lakes and pace of acceleration/ deceleration of sediment accumulation rates in their basins could not be estimated.

• **Water quality of Lakes**

Deterioration in water quality of a Lake severely affects its biodiversity, health, aesthetic view and recreational uses. For Conservation and Management of Lakes, their water quality has to be monitored and regulated.

JK-PCB is mandated with restoring and maintaining natural water bodies (including Lakes). It has to prepare plans and programmes for prevention and control of water pollution and regularly monitor water quality of water bodies (including Lakes). In 63 test-checked Lakes¹², neither plans and programmes for prevention and control of water pollution were in place nor was water quality of Lakes monitored by JK-PCB. As a result, changes in water quality of these Lakes from time to time could not be assessed.

Testing conducted by research scholars in respect of six detailed-checked Lakes¹³ showed deterioration in water quality of these Lakes as discussed in **Chapters IV, V and VI** of this report.

• **De-Weeding and Dredging**

Unwanted plants or plant parts in a Lake are removed by harvesting of aquatic vegetation. Dredging of sediments is done for improving water flow in a Lake by removal of solid land masses accumulated due to siltation.

Out of 63 test-checked Lakes, de-weeding and dredging was not carried out in 57 Lakes, while in six Lakes¹⁴ de-weeding and dredging was done without adhering to laid down mechanism as discussed in **Chapter IV, V and VI** of this Report. Due to absence/ improper de-weeding there was increase of 1,358.72 hectares¹⁵ of aquatic vegetation in 23 Lakes. Further, due to absence/ inadequate dredging, there was net increase of 1,927.72¹⁶ hectares in other land use¹⁷ in 40 Lakes. Details of Lakes with land-use changes viz. increase/ decrease in aquatic vegetation, agriculture, built-up etc. are given in **Appendix-3.3 and 3.4**.

¹² In case of Dal Lake, the water quality assessment was conducted by Research and Monitoring Wing of Lakes Conservation and Management Authority.

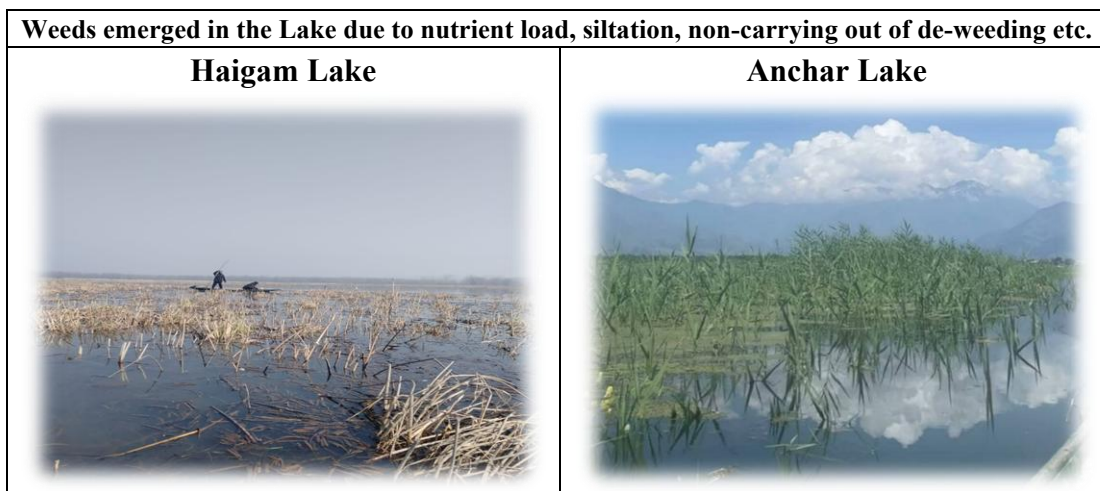
¹³ Dal, Wular, Manasbal, Surinsar, Mansar and Hokersar

¹⁴ Dal, Wular, Manasbal, Surinsar, Mansar and Hokersar.

¹⁵ From 8,318.23 hectares (2014) to 9,676.95 hectares (2020).

¹⁶ From 12,915.94 hectares (2014) to 14,843.66 hectares (2020).

¹⁷ Cropland, floating garden, silted area, built-up, vacant/fallow land, agriculture, pasture, vegetation etc.











• **Conservation of Biodiversity of Lakes**

Biodiversity of a Lake refers to a variety of life (plants, animals, fungi and micro-organisms) that have their habitat in and around a Lake. It is a key measure of the quality of the ecosystem of the Lake. The Biodiversity Board (BDB) is mandated with conservation and promotion of biological resources. As such, its role regarding conservation of biological diversity relating to Lakes for sustainable use of its components is vital.

In respect of 63 test-checked Lakes, BDB had not inventoried and monitored data of biodiversity existing in the ecosystem of these Lakes. Measures were not taken for conservation and promotion of biological resources of these Lakes. Information/ data of species already extinct, nearing extinction and exotic species with their impact on local flora and fauna of test-checked Lakes was not available with BDB. This information was not provided in response to the questionnaire based audit survey. Research conducted by various scholars of Universities indicated disappearance/ dwindling of indigenous fishes and native species of aquatic plants besides invasion of exotic species in three Lakes as discussed in **Paragraphs 5.8.1, 6.1.9 and 6.3.7.**

• **Sustainable use of Livelihood resources existing in the Lakes**

Lakes provide economic benefits to the local communities living in and around the Lake. They carry out fishing and extraction of aquatic vegetation for food and fodder. Economic resources generated from Lakes need sustainable development for sustaining the economy and livelihoods of those dependent on it. Some economic resources derived from Lakes are indicated in the following photographs:

<p>Extraction of <i>Nelumbo nucifera</i> (Nudroo) from Anchar Lake</p>	<p>Nudroo put on sale</p>
	
<p>Extraction of water Chestnut, (<i>Trapa bispinosa</i>) from Wular Lake</p>	<p>Collection of trapa for sale</p>
	
<p>Fishing being carried out in Anchar Lake</p>	<p>Fish being harvested from Wular Lake</p>
	
<p>Sale of vegetables produced in the floating gardens of the Dal Lake</p>	<p>Sale of vegetables produced in the floating gardens of the Dal Lake</p>
	

(Source: publications of EE&RSD)

Responses to the questionnaire based audit survey revealed that out of 48 test-checked Lakes located outside forests, 35 Lakes were used by the local community for fishing and extraction of aquatic vegetation. No information was provided in respect of the remaining 15 Lakes. No checks and balances were in place to ensure sustainable/

controlled fishing and extraction of aquatic vegetation in these Lakes. Lake-wise details of fishing and extraction of vegetation species are given in *Appendix-3.5*.

- **Prevention of Diversion of Lake areas and encroachment of Lakes**

Lake areas had been encroached upon by conversion to built-up areas, plantation, agriculture fields, playgrounds etc., and the land of Lake area had been transferred by the Government for construction purposes in contravention of the Wetland Conservation and Management Rules, 2010 and 2017.

With the growth in population, the pressure on the Lakes and its surroundings as potential settlement areas has increased resulting in environmental degradation of Lakes. Wetland Conservation and Management Rules, 2010 and 2017 prohibit encroachment of Lake land and its conversion for non-Lake use. Audit noticed that in violation of the Rules, the Government had transferred Lake areas for non-Lake use and there was encroachment of Lake areas as detailed below:

- **Prevention of Diversion of Lake areas for construction purpose**

Out of 48 test-checked Lakes located outside forest areas, in 10 Lakes, 765.30 hectares of watery area had been transferred by the authorities of District Administration to various Government Departments for purposes including construction of residential quarters, office buildings, universities and schools. District Administration was in the process of further transferring 217.50 hectares of land in respect of two Lakes¹⁸. Details are given in *Appendix-3.6 and 3.7*.

- **Prevention of Encroachment of Lakes**

Out of 48 test-checked Lakes located outside forest areas, in 39 Lakes, District Administration Authorities reported encroachment by way of illegal constructions, plantation, reclamation of land masses etc. However, extent of encroachment was not quantified by the Authorities of District Administration in respect of 34 Lakes. In respect of five Lakes¹⁹, the concerned Tehsildars had quantified that 712.55 hectares of area of Lakes was under encroachment done by construction of roads, structures, plantation and paddy fields. No action was taken for clearing of encroachments by the Departments/ Authorities with whom jurisdiction of these Lakes was vested. Details are given in *Appendix-3.8*.

- **Public awareness**

Successful Conservation and Management of Lakes depends upon involvement and cooperation of people who are associated directly with the Lakes. Public awareness programmes are required to highlight objectives of Conservation and Management of

¹⁸ Hakimgund Numbal and Gungbugh-I.

¹⁹ (i) Haigam Lake, (ii) Mirgund-II, (iii) Hokersar, (iv) Anchar and (v) Khushal Sar.

Lakes and how these would be helpful to the local population in bringing about better living conditions and improving the quality of life. Notice boards displaying instructions regarding “Dos and Don’ts” are to be put up in the surrounding areas of Lakes.

Departmental replies to the questionnaire based audit survey revealed that except for Dal Lake, in respect of 62 Lakes no public awareness programmes were held to apprise people about the importance of conservation of Lakes in bringing about better living conditions and improving the quality of life. Due to lack of public awareness, cow-dung and house-hold garbage was dumped in and around 34 Lakes as discussed in **sub paragraph “Sewage Treatment” of Paragraph 3.2.**

• **Research for management of Lakes**

Management of Lakes calls for continuous research to address drivers of change in the Lakes. However, Departmental replies to the questionnaire based audit survey revealed that except for Dal Lake, in respect of 62 Lakes, no research studies were carried out by the concerned Authorities to evaluate changes in water quality, assess condition of fishes, water birds, native species of flora and fauna and invasion of noxious species, if any, due to heavy inflow of silt, sewage into Lakes from catchment areas. As a result, changes in the ecosystem of the Lakes from time to time could not be evaluated.

3.3 Lack of emphasis on Conservation and Management of Lakes by the GoJ&K

For Conservation and Management activities of the Lakes, funds were allocated by GoJ&K to only six Lakes (selected for detailed-checked) as against 697 Lakes while there was no funding in 691 Lakes. However, the funds provided for the six Lakes were inadequate for their Conservation and Management. Funds of ₹ 560.65 crore were allocated (2017-22) for Conservation and Management of these six Lakes which was approximately one *per cent* of disbursement (2017-22) of ₹ 50,228.11 crore under CAPEX Budget of J&K. Apart from this, there was absence of Lake generic management activities and change in land use of Lakes noticed in the Audit test-checked Lakes as discussed in the preceding paragraph of this chapter. As a result, there were land use/ classification use changes in 518 Lakes²⁰ (74 *per cent*) in J&K due to lack of emphasis on Conservation and Management of Lakes. Details are in **Appendix-3.9.**

3.4 Conclusion

GoJ&K had Conservation and Management programmes for only six Lakes viz. Dal, Wular, Hokersar, Manasbal, Surinsar and Mansar. In respect of the remaining 691 Lakes, the concerned Departments neither identified the eligible Lakes nor were any

²⁰ Out of 697 Lakes.

plans formulated to seek assistance under various programmes launched by the MoEF&CC. Lake management was deficient, since there was no delineation, notification and demarcation of any of the 697 Lakes of Jammu and Kashmir. In case of the 63 test-checked Lakes, changes in trophic level in the catchment area of Lakes had not been evaluated from time to time. Further, there was lack of assessment of water carrying capacity and water budget of Lakes. Flushing on scientific grounds, restoration of water quality of Lakes to their origin levels, evaluation and preservation of biodiversity, assessment of expected life of Lakes had not been done. Identification and treatment of source point and non-source point pollutions, de-weeding/ dredging as per laid down norms and public awareness creation activities among masses had also not been carried out in respect of the test-checked Lakes. Lake areas had been encroached upon by conversion to built-up areas, plantation, agriculture fields, play grounds etc. The land of Lake area had been transferred by the Government for construction purposes in contravention of Wetland Conservation and Management Rules. GoJ&K had not laid emphasis on Conservation and Management of Lakes as approximately one *per cent* of its CAPEX Budget was allocated only to six Lakes.

3.5 Recommendations

- *Generic Lake management activities such as survey, categorisation, sewage treatment, flushing etc. need to be planned and carried out in a time-bound manner.*
- *The provisions of Wetlands (Conservation and Management) Rules should be enforced to delineate, demarcate and notify the boundaries of Lakes and to prohibit such activities that can harm the ecosystem of the Lakes.*
- *Clearing of encroachment in Lake areas and launching of public awareness programmes should be prioritised.*
- *The GoJ&K should place emphasis on Conservation and Management of Lakes by earmarking increased percentage of its budget for Conservation and Management of Lakes.*

Chapter-IV
Conservation and Management of
Dal Lake

Chapter-IV

Conservation and Management of Dal Lake

4.1 Introduction

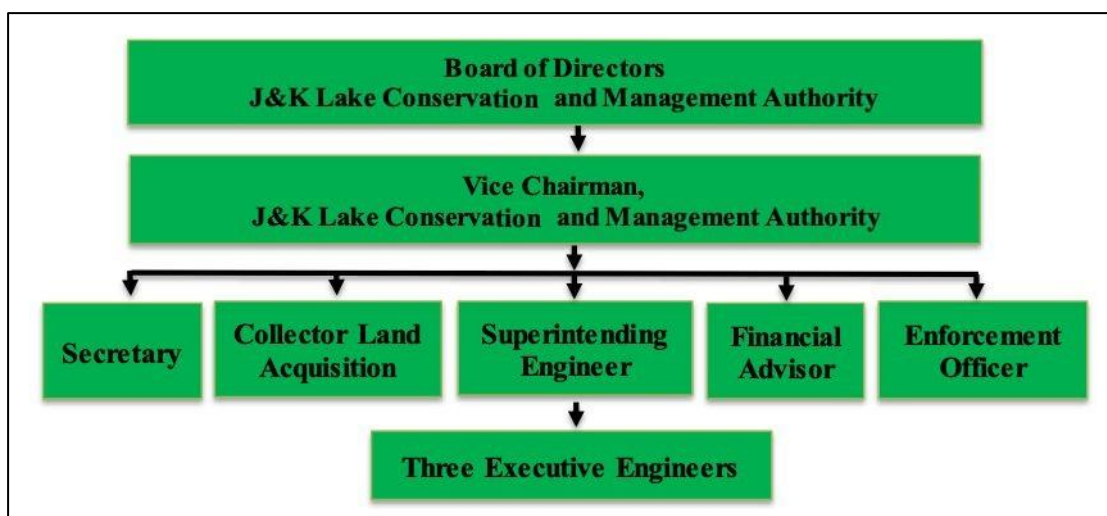
The Dal Lake is located in Srinagar (34° 5'N and 74° 50'E) at an altitude of 1,583 meter above mean sea level. The Lake is regarded as the “liquid heart” of Srinagar. It is included among the most beautiful national heritage sites of the country.



4.2 Organisational Setup

The responsibility for Conservation and Management of Dal Lake lies with Lakes Conservation and Management Authority (LC&MA). Formerly known as the Lakes and Waterways Development Authority, LC&MA was constituted (1997) for development of Dal-Nigeen and Anchar Lakes. The administrative control of LC&MA, vests with Principal Secretary to Housing and Urban Development Department (H&UDD), GoJ&K. The executive decisions of LC&MA which includes programme implementation for Conservation and Management of Dal Lake are taken by the Board of Directors (BoD). BoD of LC&MA comprise nine members including a Chairman and a Vice-Chairman, appointed by the GoJ&K. The organisational setup of the LC&MA is illustrated in the **Chart 4.1**:

Chart 4.1: Organisational Setup of LC&MA



4.3 Land use changes within Dal Lake and its catchment

There were land use changes in the Dal Lake and its catchment due to non-acquisition of land from Dal Lake dwellers, malfunctioning of Sewage Treatment Plants, inadequate sewage treatment facilities, improper de-weeding mechanism and inadequate monitoring or surveillance mechanism. As a result, open water area in the Lake could not be restored or increased and inflow of nutrient load into the Lake caused prolific growth of weed in the Lake.

4.3.1 Analysis of remote sensing data of Ecology, Environment & Remote Sensing Department (EE&RSD) to ascertain Land use changes in Lake

There were Spatio-temporal changes in land use and water cover of Dal Lake during 2007-2020 as detailed in Map 4.1, 4.2 and 4.3, Table 4.1 and Charts 4.2, 4.3 and 4.4.

Map 4.1, 4.2 and 4.3: Spatio-temporal changes in land use and water cover of Dal Lake during 2007-2020

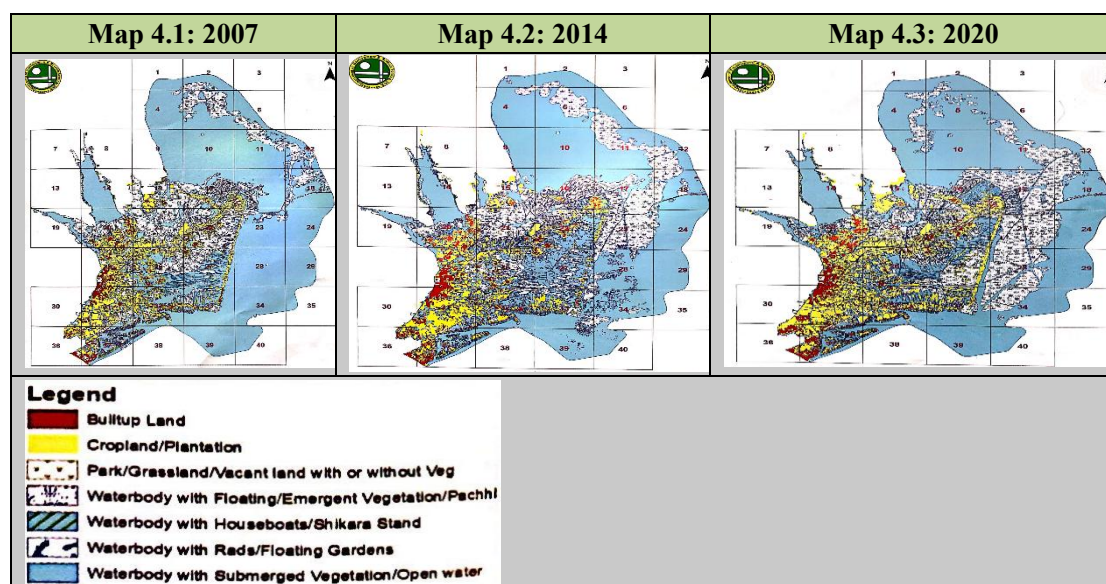
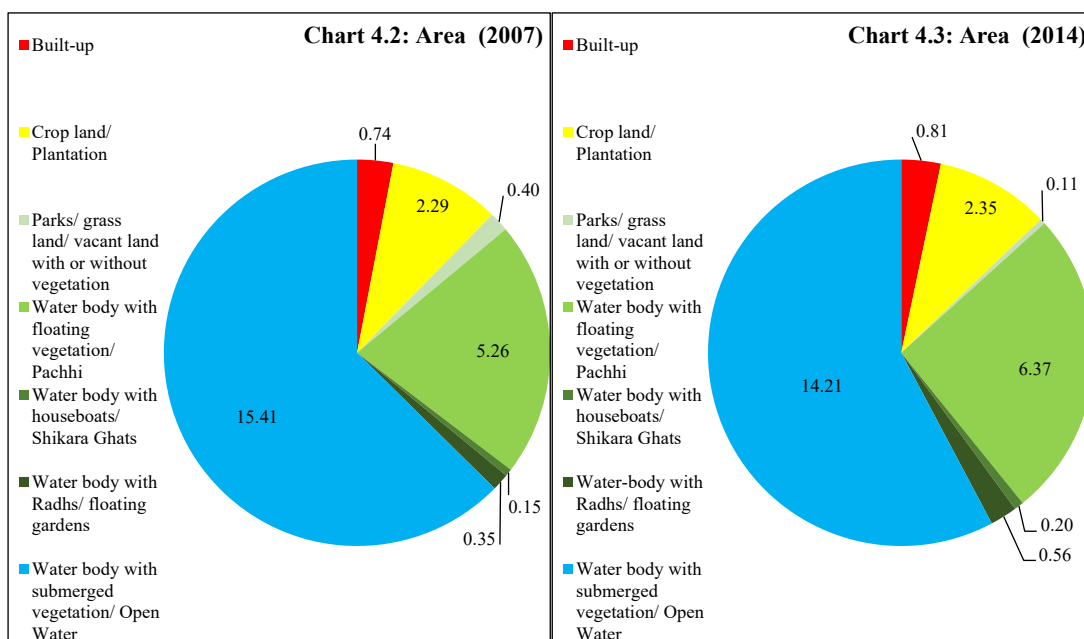


Table 4.1: Change in open water and other land use of Dal Lake

Area in sq. kms						
Sl. No	Name	2007	2014	2020	Change in area during the period 2007 to 2020	Percentage change in area with respect to total area of Lake
1	Built-up	0.743	0.812	1.025	0.282	1.15
2	Crop land / Plantation	2.29	2.351	2.849	0.559	2.27
3	Parks/ grass land/ vacant land with or without vegetation	0.403	0.11	0.36	-0.043	0.17 (Decrease)
4	Water body with floating vegetation/ Pachhi ¹	5.262	6.366	6.796	1.534	6.23
5	Water body with houseboats/ shikara Ghats	0.15	0.196	0.17	0.02	0.08
6	Water body with radhs ² / floating gardens	0.352	0.556	0.498	0.146	0.59
7	Water body with submerged vegetation/ Open water	15.405	14.214	12.907	-2.498	10.15 (Decrease)
Grand Total		24.605	24.605	24.605		

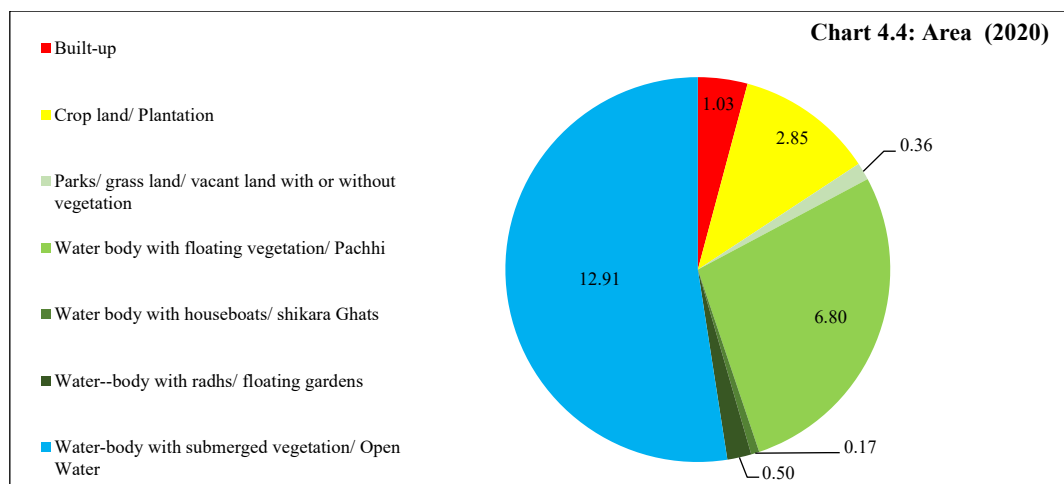
(Source: data of EE&RSD)

Charts 4.2, 4.3 and 4.4: Change in open water and other land use of Dal Lake



¹ Floating vegetation in Kashmiri language.

² Floating gardens in Kashmiri language.



It may be seen from **Table 4.1** that during 2007-2020, there was a decrease from 15.405 to 12.91 sq. km. (10.15 *per cent*) in the water body with submerged vegetation/ open water of the Lake, while there was increase in other land uses such as water body with floating vegetation/ *Pachhi* from 5.262 to 6.796 sq. km. (6.23 *per cent*), crop-land/ plantation from 2.29 to 2.85 sq. km. (2.27 *per cent*), built-up from 0.743 to 1.025 sq. km. (1.15 *per cent*) etc. There was decrease in parks/ grass land/ vacant land with or without vegetation from 0.40 to 0.36 sq. km. (0.17 *per cent*) due to dredging of some acquired land. The decrease in open water at the cost of other land use changes indicated anthropogenic pressures on the Lake. Neither were any concrete measures taken by LC&MA to regulate the land use of the Lake nor were reasons analysed for these land use changes.

Audit analysis revealed that land use changes were due to:

- non-acquisition of land from Dal Lake dwellers and non-dredging of land already acquired from them;
- malfunctioning of STPs and non-arresting of all point source/ non-point source of pollutions entering the Dal Lake from its catchments;
- improper de-weeding mechanism and;
- inadequate monitoring/ surveillance mechanism.

As a result, the open water area in the Lake decreased, could not be restored/ increased and inflow of nutrient load into the Lake resulted in prolific growth of weed. There were encroachments paving way for increase in floating vegetation and gardens, crop land, plantation, water area under houseboats and built-up as discussed in **Paragraphs 4.6.1, 4.6.2, 4.6.3, 4.6.4, 4.6.5, 4.6.6, sub-paragraph 3 of 4.6.8 “De-weeding of Lake” and Paragraphs 4.6.10, 4.6.11 and 4.11.**

H&UDD stated (December 2022) that yearly de-weeding Action Plan had been formulated in consultation with Research & Monitoring (R&M) wing of LC&MA and 4.8 sq.km. of lily pad was extracted during the previous two years. H&UDD further

added that CCTV cameras had been installed all along the periphery of the Lake and inspection motorboats had been procured for proper monitoring and surveillance.

The reply is not convincing as there was no progress in respect of six out of seven land uses and only part action had been taken in respect of ‘Waterbody with submerged vegetation/ Open Water’.

4.3.2 Analysis of Google Earth Pro images to ascertain Spatio-temporal changes in the Lake and its catchments

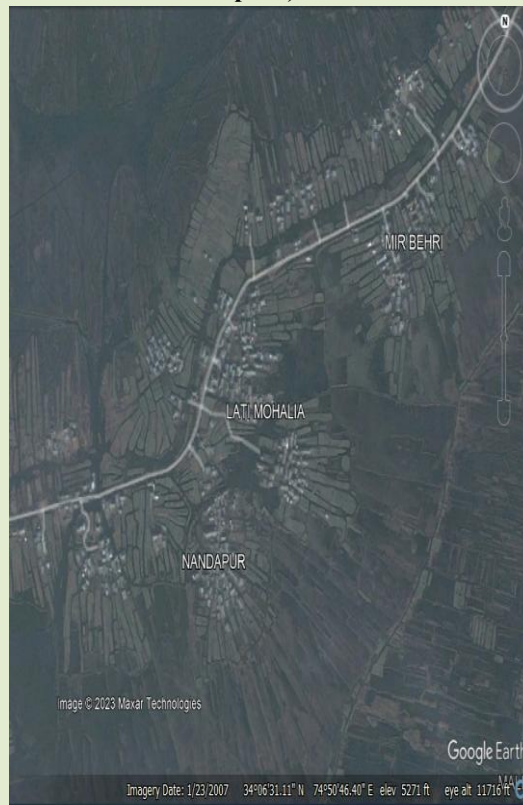
Clear images of Dal Lake and its catchment areas available on Google Earth Pro for the period 2004 to 2022 indicated land use changes within the Lake and its catchment areas as detailed below:

- Gradual encroachments inside the Lake in areas of Mir Behri, Lati *Mohalla* and Nandapora.
- Increase in built-up in the catchment areas of Takiya Sangreshi, Danihama, Shalimar, Koshpora, Banigam etc. These areas are without sewer networking and sewage treatments and more than 80 *per cent* of water inflow in the Lake is received from tributaries passing through these catchment areas.
- Intensification in the habitation in catchment areas of Hazratbal, Habak and Nishat having non-upgraded/ inefficient Sewage Treatment Plants (STPs).
- Dense increase in the built-up in Rainawari area having partial sewer networking/ treatment system.

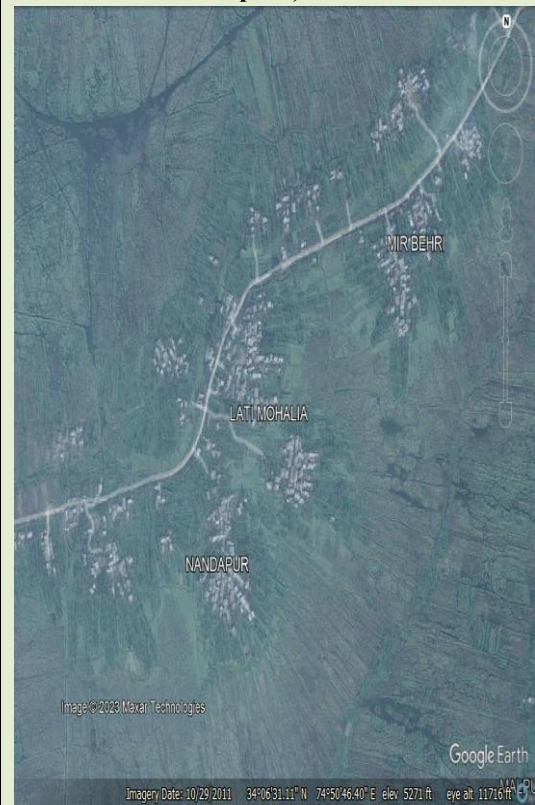
The Google Earth Pro images of catchment and encroached areas of Lake are shown in **Satellite Images 4.1 to 4.21.**



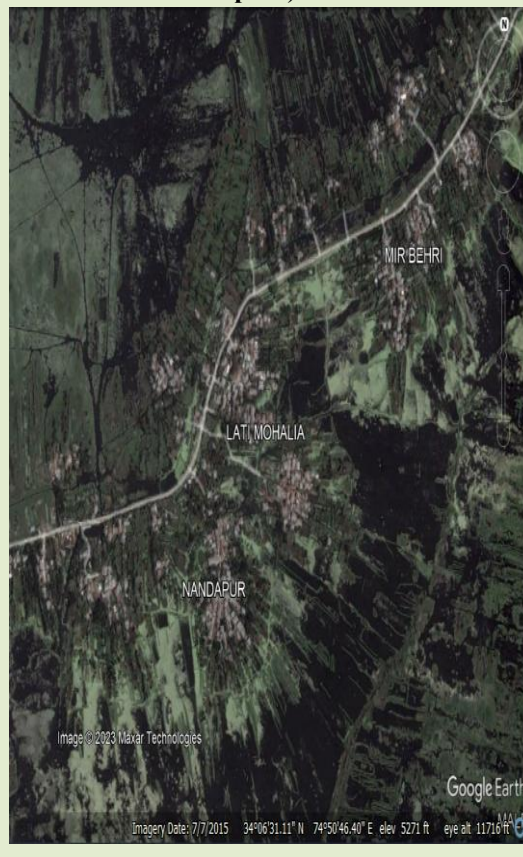
Satellite Image 4.2: A (Mir Behri, Lati Mohalla and Nandapura) -2007



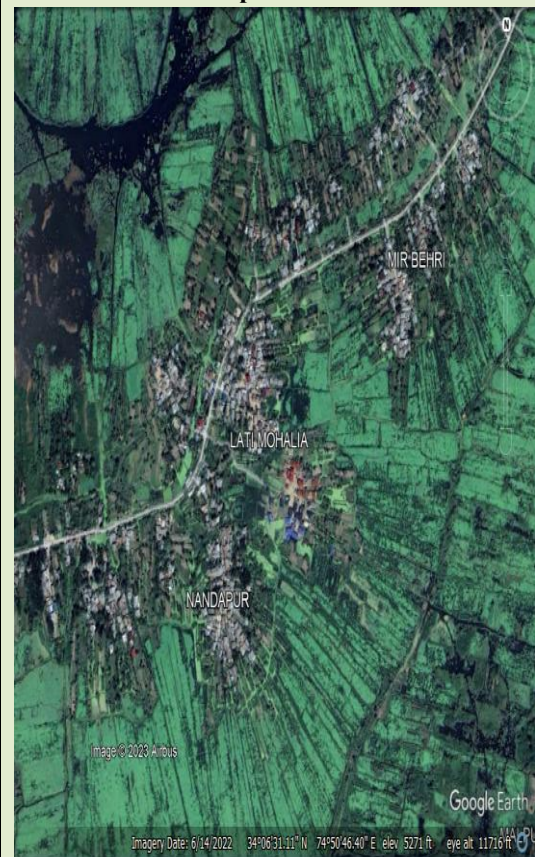
Satellite Image 4.3: A (Mir Behri, Lati Mohalla and Nandapura) -2011



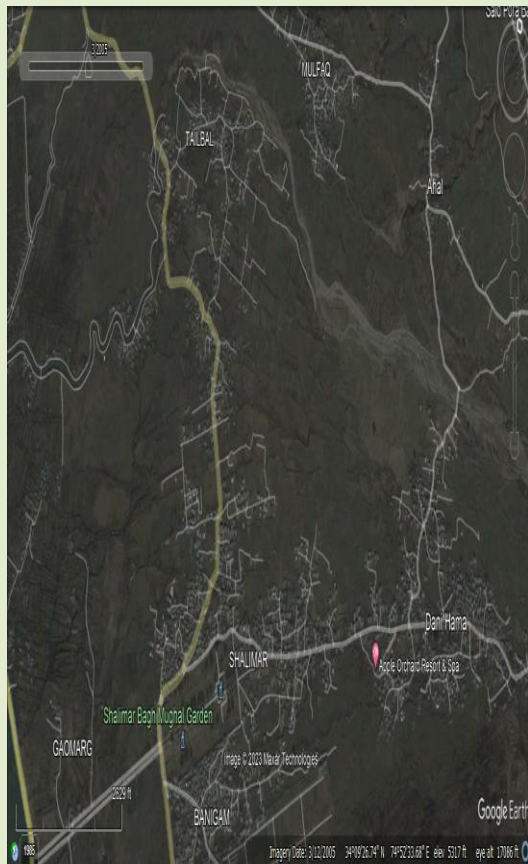
Satellite Image 4.4: A (Mir Behri, Lati Mohalla and Nandapura) -2015



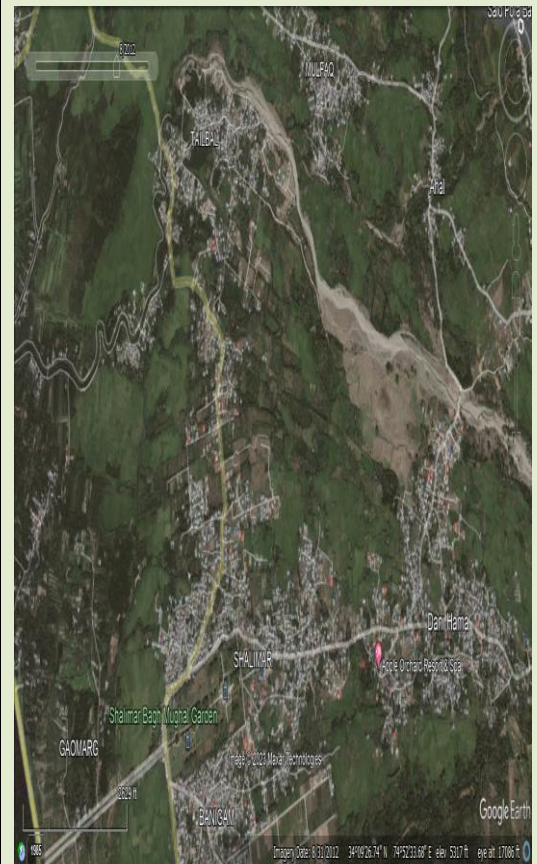
Satellite Image 4.5: A (Mir Behri, Lati Mohalla and Nandapura) -2022



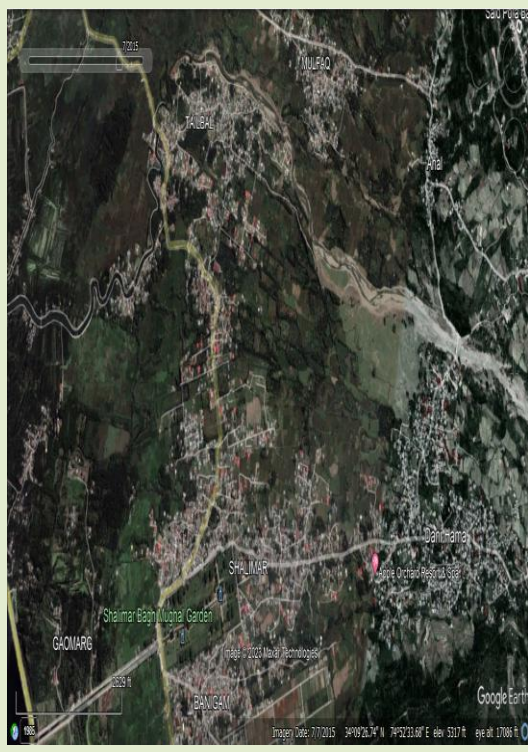
Satellite Image 4.6: B-Shalimar, Dhanihama, Akhooon Mohalla etc.-2005



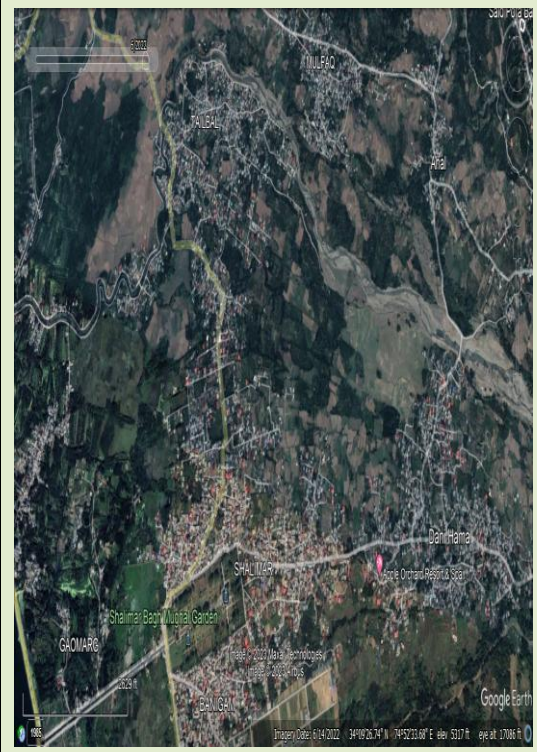
Satellite Image 4.7: B-Shalimar, Dhanihama, Akhooon Mohalla etc.-2012

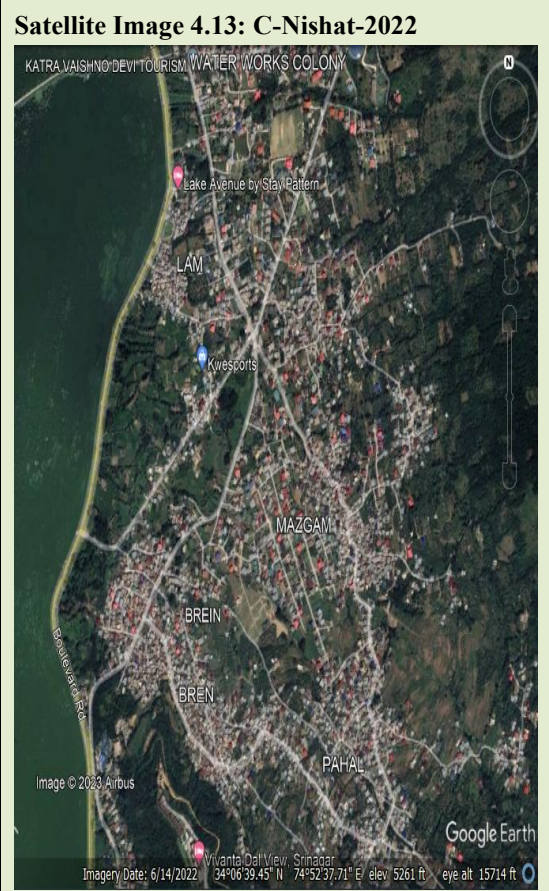
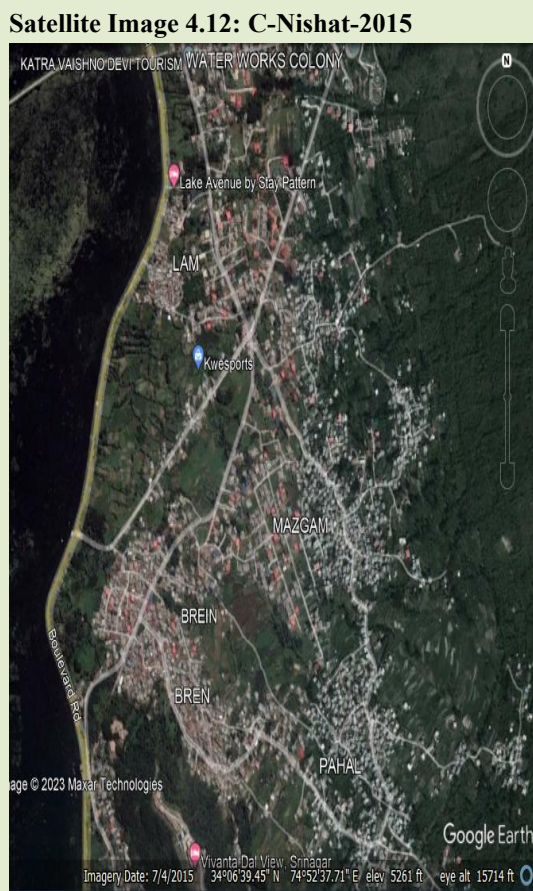
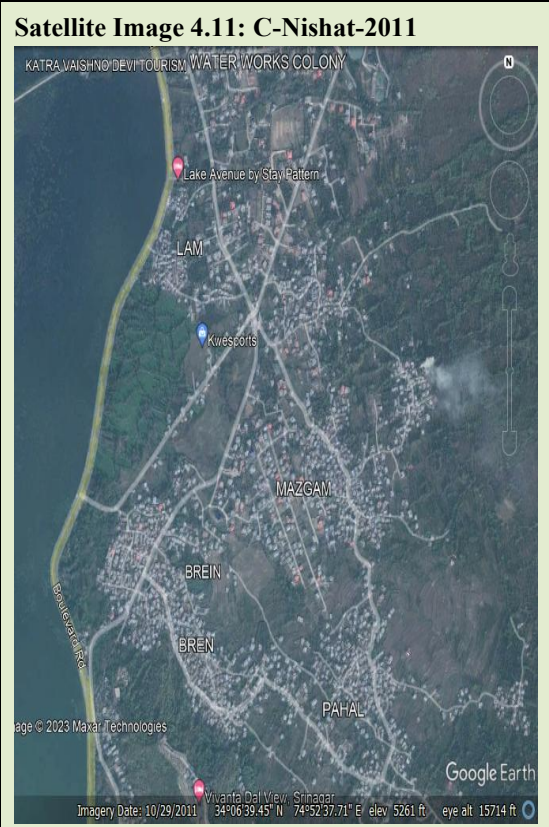
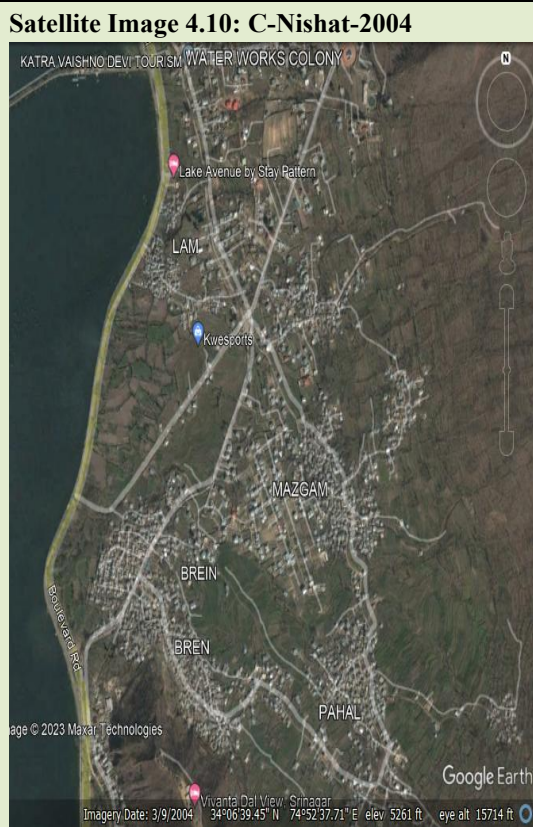


Satellite Image 4.8: B-Shalimar, Dhanihama, Akhooon Mohalla etc.-2015

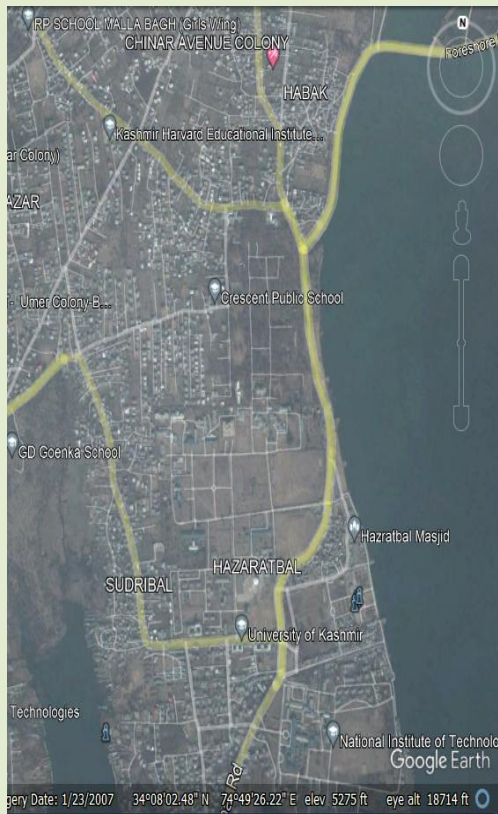


Satellite Image 4.9: B-Shalimar, Dhanihama, Akhooon Mohalla etc.-2022

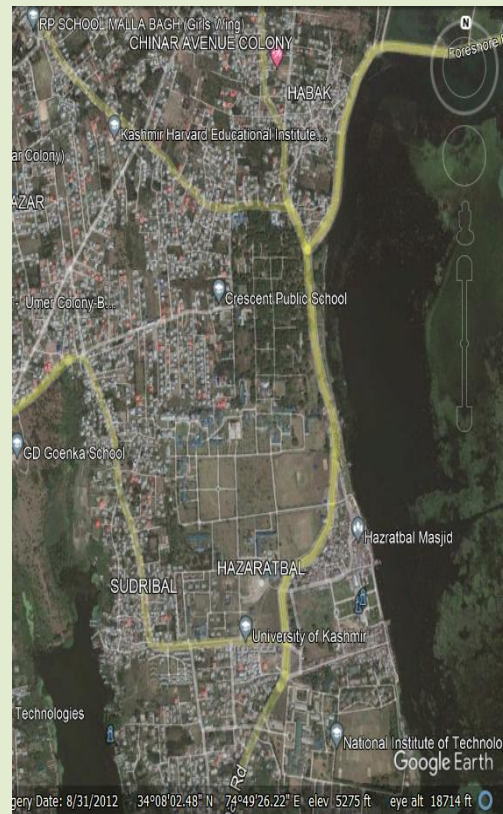




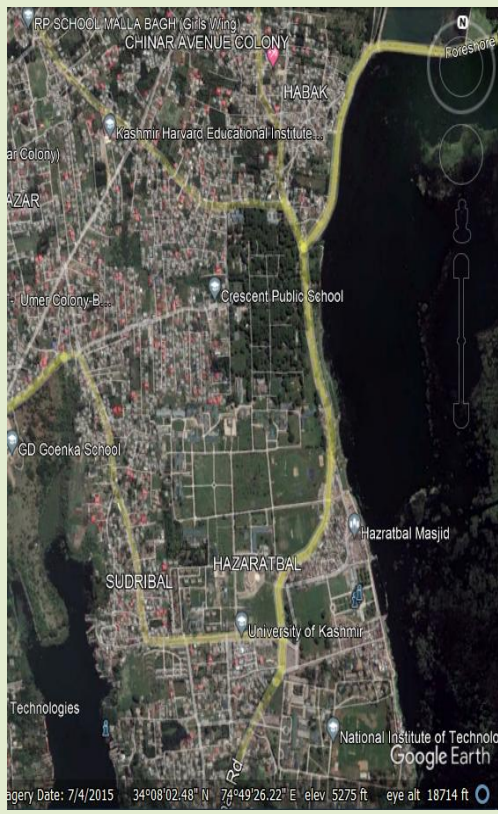
Satellite Image 4.14: D-Hazratbal and Habak catchments-2007



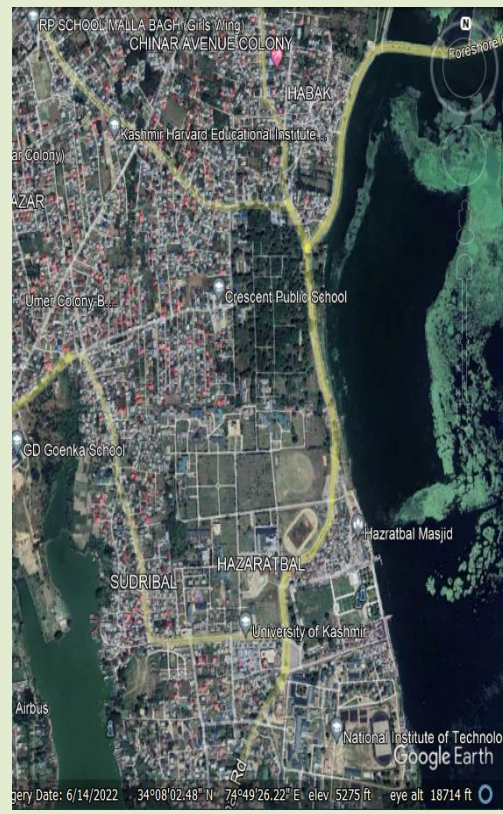
Satellite Image 4.15: D-Hazratbal and Habak catchments-2012



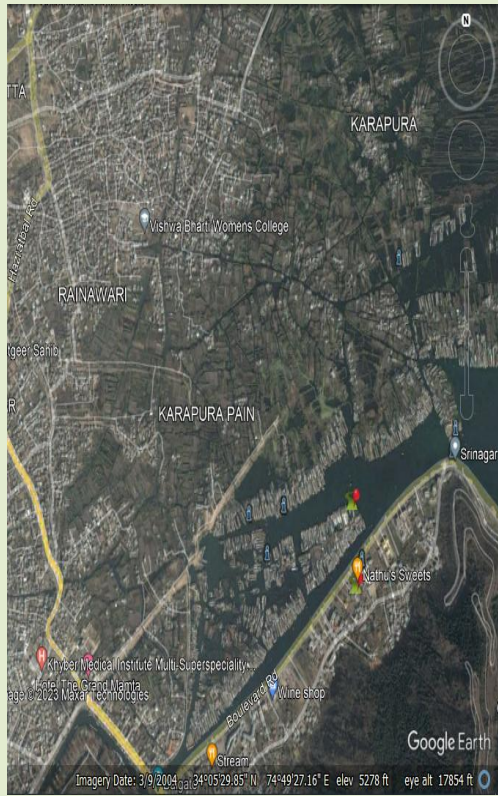
Satellite Image 4.16: D-Hazratbal and Habak catchments-2015



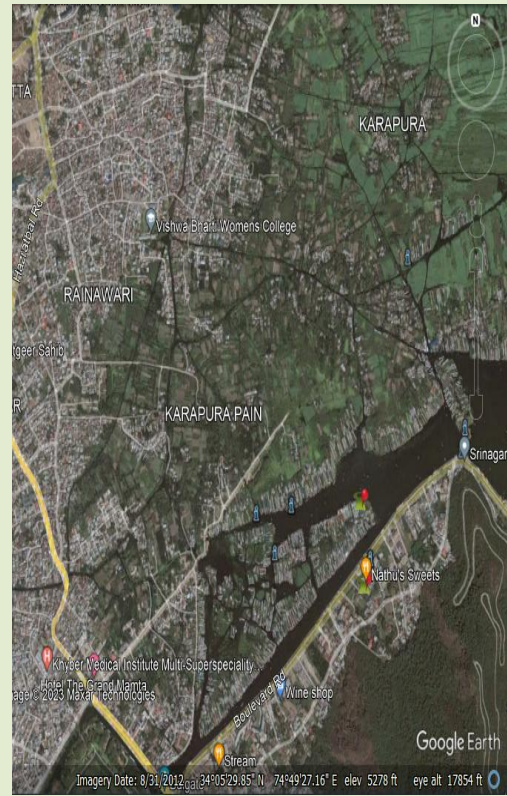
Satellite Image 4.17: D-Hazratbal and Habak catchments-2022



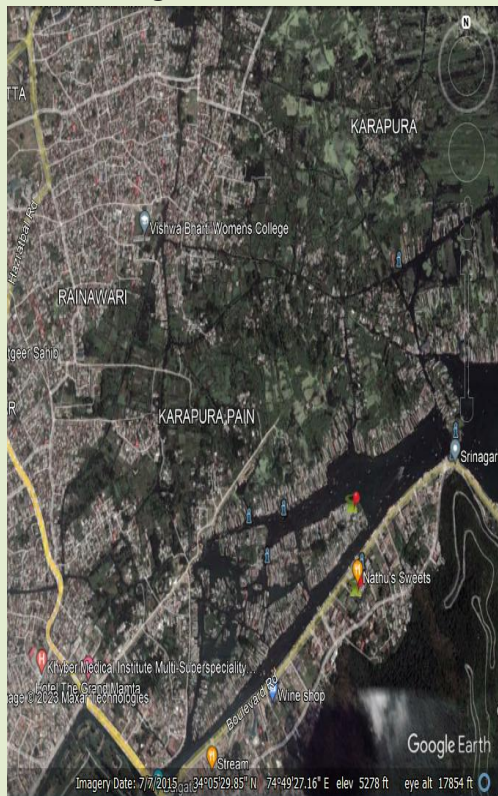
Satellite Image 4.18: E-Rainawari-2004



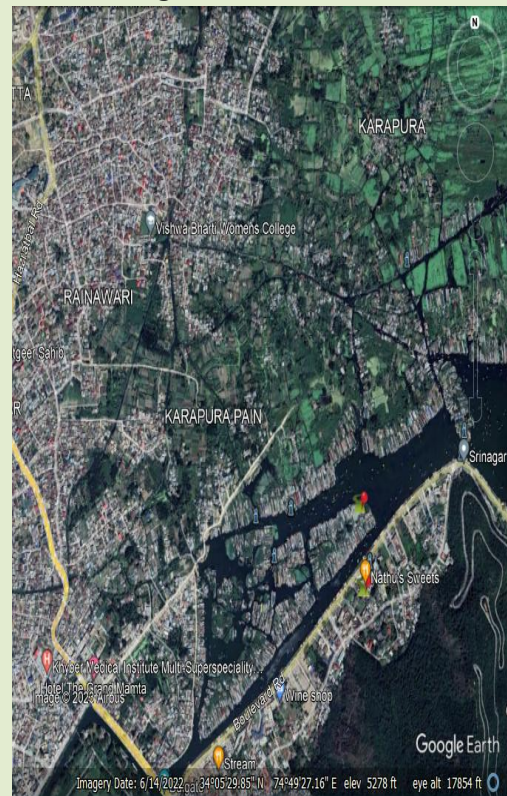
Satellite Image 4.19: E-Rainawari-2012



Satellite Image 4.20: E-Rainawari-2015



Satellite Image 4.21: E-Rainawari-2022



4.4 Planning

LC&MA did not prepare DPR for left out activities in the initially approved DPR. Project Management Consultant had not been appointed by LC&MA. Discrepancies had not been sorted out in the Vision Document in respect of land proposed to be acquired from Dal-dwellers and a detailed damage report regarding damage caused by floods of September 2014 had not been prepared.

To improve water quality of Dal Lake and also to save it from degradation, GoJ&K launched (1977) the project 'Conservation of Dal Lake'. Works of the project were executed through Urban Environmental Engineering Department (UEED) up to 1996-97. Thereafter the project was transferred (March 1997) to J&K, Lakes and Waterways Development Authority which was renamed (November 2021) as Lake Conservation & Management Authority (LC&MA). LC&MA was entrusted with (August 1997) execution of two main components viz. Lake Conservation and Rehabilitation.

From September 2005, Conservation of Dal Lake Programme was included by MoEF&CC under National Lake Conservation Programme (NLCP). Detailed Project Report (DPR) for Conservation and Management of Dal Lake prepared by Indian Institute of Technology (IIT), Roorkee was approved (September 2005) by MoEF&CC under NLCP at a cost of ₹ 298.77 crore. The target date for completion of the project was 2010, which was extended by MoEF&CC from time to time with the latest extended date being March 2018. The project could not be completed as of March 2022 as discussed in the succeeding paragraphs of this chapter.

NLCP had two components viz. Lake Conservation & Management Programme and Rehabilitation and Resettlement Programme. The funding of Conservation and Management Programme was to be borne by the MoEF&CC, GoI while Resettlement and Rehabilitation Programme of families living in the Lake was to be funded by the State/ UT Government. The approved activities with sub-components along with their costs are detailed in *Appendix-4.1*.

Rehabilitation and Resettlement Programme (RRP) for resettlement of hamlet population living within/ along the Lake in new colonies by developing residential plots, initiated by GoJ&K in August 1997, was approved (May 2001) by the State Government at a cost of ₹ 135 crore. The cost of the programme was revised from time to time with the latest revised (March 2013) cost being ₹ 416.72 crore.

Further, Special Plan Assistance (SPA) of ₹ 356 crore was also approved (February 2012) by GoI under Prime Minister's Reconstruction Programme (PMRP) for acquisition of land pertaining to Dal-dwellers, relocation of Dal-dwellers and dredging of acquired land for Eco-restoration of land. The current Performance Audit covers implementation of activities approved under the NLCP for Conservation and Management of Dal Lake from September 2005 till March 2022.

Audit observed that one of the reasons for delay in the implementation of programme activities was due to not holding the scheduled meetings by the Board of Directors of LC&MA. As such, policy matters related to Conservation and Management of Dal Lake could not be addressed timely, and there was delay in utilisation of funds and underutilisation of funds as discussed in succeeding paragraphs of this chapter.

4.4.1 Non-preparation of DPR for left out activities in the initially approved DPR

MoEF&CC in a meeting (April 2006) pointed out various discrepancies in the DPR approved for NLCP, such as non-inclusion of a pedestrian mall along the Western Foreshore of the Lake and removal of bund at Nishat basin. It further suggested a mechanism for disposal of extracted weed and sludge from STPs. BoD was advised (April 2006) by MoEF&CC to include the left-over items in the project.

Audit examination revealed the following deficiencies:

- No follow up action was taken by the BoD of LC&MA for over eight years up to December 2014. The Coordination-cum-Monitoring Committee (CMC)³ viewed (January 2015) the inaction of the LC&MA in preparation of the DPR of left-over activities seriously.
- Taking into consideration the impact of floods of the year 2014 on Dal Lake and non-coverage of sewerage networking of adjacent areas of Shalimar, Harwan and Khona Khan, the CMC directed LC&MA to prepare an in-house Project Report for taking up the matter with NITI Aayog. However, no action was taken by LC&MA as of March 2022.

Due to inaction of LC&MA and non-monitoring by BoD, the DPR for the left-out components was not prepared despite lapse of over 16 years since project was sanctioned (September 2005) under NLCP. As a result, the envisaged purposes of increasing water circulation in the Lake, delineation of the Lake and proper disposal of extracted weed and sludge could not be carried out. Further, sewage of Shalimar, Harwan and Khona Khan areas continued to be discharged into the Lake.

The Executive Engineer, Lake Division-I stated (June 2022) that action could not be taken due to prevailing conditions in the valley after abrogation of Article 370 followed by Covid-19. It was further stated that the proposals for left over activities would be formulated and laid before the Board of Directors for appropriate decision.

The reply should be seen in light of the fact that the proposals for left-over activities could have been prepared and placed before the BoD at least seven years prior to the abrogation of Article 370 and outbreak of Covid-19.

³ Headed by Chief Secretary of Jammu and Kashmir with 16 members (eight from State Government, six from GoI and one each from two renowned universities)

H&UDD stated (December 2022) that DPR of ₹ 1,383.25 crore for construction of Western Foreshore Road from Khona Khan to Saida Kadal had been approved. They further added that since Nishat Bund prevented waves caused by gusty windstorms, which were disastrous for *shikaras*, houseboats and other structures, from entering into other basins, it was decided not to remove it. It was also stated that Memorandum of Understanding (MoU) had been signed between National Agricultural Cooperative Marketing Federation of India Limited (NAFED) and LC&MA for scientific disposal of waste (extracted weed and sludge from STPs) and its conversion into manure/ biogas.

The reply in respect of removal of Nishat Bund is not convincing as it was included in the pre-feasibility report prepared by IIT, Roorkee but was not incorporated in the DPR approved under NLCP and the need for removal of Nishat Bund was repeatedly felt with the latest being in the 2nd Coordination cum Monitoring Committee of LC&MA held in January 2015. Further, the assertion that gusty winds would prove disastrous to *shikaras* and other structures inside the Lake is not based on any technical survey report.

4.4.2 Project Management Consultant

NLCP envisaged appointment of Project Management Consultant (PMC) for planning the project schedule with respect to available funds and making amendments in the project, besides monitoring progress of the project to ensure quality standards and timely completion of the project.

Audit observed that despite a lapse of over 17 years since the Dal Lake was included under NLCP in September 2005, no PMC had been appointed by LC&MA as of December 2022.

While accepting the audit observation, the Executive Engineer, Lake Division-1 stated (June 2022) that the process for seeking expression of interest for appointment of PMC would be initiated.

H&UDD stated (December 2022) that although the LC&MA had not appointed any PMC, it had utilised the services of various experts engaged with UEED, experts from IIT, Roorkee and Council of Scientific & Industrial Research-National Environmental Engineering Research Institute, Nagpur from time to time. It was further stated that the LC&MA is now hiring Project Management Consultants for its future projects as needed.

The fact remains that no PMC had been appointed by LC&MA for over 17 years to provide continuous monitoring and to ensure quality standards and timely completion of the project.

4.4.3 Vision Document

On the directions (August 2013) of the Hon'ble High Court, Jammu and Kashmir, LC&MA was to get a Vision Document (VD) prepared in respect of land that was proposed to be acquired in the Lake area from the Dal-dwellers. The VD was to specify whether to develop the land in the shape of small islands as tourist attraction parks or add the land to water expanse of the Lake.

LC&MA invited (January 2014) tenders for preparation of VD and allotted work to Rites Limited (GoI enterprise). However, the allotment was cancelled without any reasons on record. Subsequently, LC&MA allotted (January 2016) preparation of VD to IIT, Roorkee which prepared draft VD for which LC&MA paid (March 2016) ₹ 1.26 crore to the Institute. Scientific Advisory Committee (SAC) of LC&MA pointed out various discrepancies⁴ in the draft VD. The discrepancies pointed out were forwarded (September 2017) to IIT, Roorkee which stated that observations were outside the Terms of Reference (ToR) of the work allotted to it. The matter was placed before the Hon'ble High Court. The Hon'ble High Court observed (2016-17) that the VD had to be finalised at the earliest, and directed that the scope of the work be expanded to incorporate the comments/ observations of the SAC. Accordingly, LC&MA expanded (September 2017) the scope of work.

Audit observed that LC&MA had not taken any further action in this regard as of December 2022 resulting in unproductive expenditure of ₹ 1.26 crore on preparation of Vision Document. Further, 2,299 *kanals* of land acquired⁵ by the LC&MA could not be added to the Lake to increase its water area or small islands as tourist attraction parks could also not be developed.

H&UDD stated (December 2022) that the decision of the Hon'ble High Court was conveyed to IIT, Roorkee in October 2017. It was further stated that an official from IIT Roorkee conducted extensive tour of the Dal Lake on 12 September 2022 in connection with finalisation of VD and Vice Chairman LC&MA requested the official to share final report as per directions of Hon'ble High Court.

The fact remained that even after communication of the Hon'ble High Court's decision in October 2017, the Vision Document had not been finalised as of December 2022.

4.4.4 Assessment of damages due to floods

After heavy floods in September 2014, LC&MA prepared a tentative damage report by which funds of ₹ 3.40 crore was sought for restoration of damaged infrastructure including damaged embankments, parapet walls, STPs etc.

⁴ Lack of reference to data used, inaccuracy in vegetation map of the Lake, errors in bathymetric data, lack of suggestions on future interventions in catchment areas

⁵ Under PMRP

Audit observed that no detailed damage report indicating losses caused in the catchment areas of the Lake and quantum of silt/ sediment that would have entered the Lake due to flow of water from River Jhelum and other catchment areas had been prepared. Consequently, impact assessment of damages to the Lake due to floods had not been made. It was further observed that LC&MA had received only ₹ 0.50 crore⁶ as against ₹ 3.40 crore projected in the tentative damage report. Silt water in Dal Lake due to floods of September 2014 was also verified on Google Earth Pro as shown in **Satellite Image 4.22:**



H&UDD stated (December 2022) that LC&MA had conducted detailed assessment of damages caused by flood including damage due to siltation and sedimentation. Further, it had conducted bathymetric survey in 2018-19 to identify pockets where impact of siltation was more and no significant siltation had taken place from Jhelum river side. It was further stated that siltation coming from Tailbal *Nallah* and other channels was removed on regular basis.

The reply is not acceptable as damage survey report appended with the reply furnished by H&UDD indicated that a large amount of silt had entered the Dal Lake through one of the tributaries of the Jhelum River (Chunti Khul).

⁶ ₹ 0.25 crore in October 2014 and ₹ 0.25 crore in January 2015

Thus, the fact remained that LC&MA had not assessed in detail the quantum of silt/sediment that had entered the Lake from River Jhelum and other catchment areas during the floods of September 2014.

4.5 Financial Management

4.5.1 Fund receipts and its utilisation

Apart from funds received under NLCP, LC&MA also received funds from GoI under PMRP, Basic Services to Urban Poor (BSUP) and from GoJ&K under Revenue/CAPEX budget. There was underutilisation of funds ranging between ₹ 48.63 crore (44 per cent) and ₹ 280.68 crore (81 per cent) during 2017-22 as detailed in *Appendix-4.2*. Under NLCP, underutilisation of funds ranged between ₹ nine crore (96 per cent) and ₹ 23.26 crore (74 per cent) as detailed in the *Appendix-4.3*.

Underutilisation of funds was attributed to non-upgradation of STPs, non-establishment of common STP, non-shifting of house boats, non-construction of Padshahi canal, non-procurement of CCTVs/ other equipment, tardy implementation of PMRP Programme, non-holding of awareness programmes and third-party evaluation. This led to delay in completion of the NLCP and PMRP programmes due to which further assistance under PMRP could not be availed.

Further, funds released by LC&MA to the executing agencies were booked as expenditure without ascertaining actual expenditure incurred by them. There were balance amounts ranging between ₹ 1.08 crore and ₹ 2.16 crore, lying unspent with executing agencies at the end of each financial year as detailed in *Appendix-4.4*.

The Financial Advisor, LC&MA attributed (June 2022) underutilisation of funds to late release of funds and limited working season available for executions of works during winters. H&UDD stated (December 2022) that the unspent balance would be refunded to GoI.

The reply does not provide specific reasons for underutilisation of funds during the period.

4.6 Programme implementation

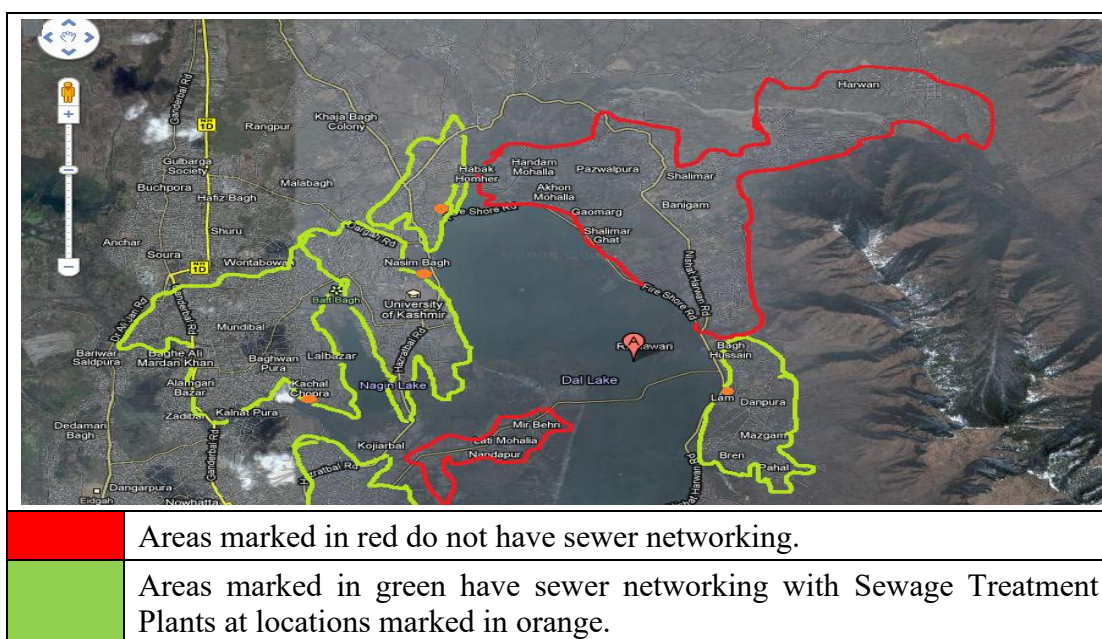
Inadequacies were noticed in implementation of Lake conservation programme under NLCP, PMRP and other programme activities such as installation and upgradation of Sewage Treatment Plants (STPs), treatment of solid waste, extracted weed and sludge, sewage disposal facilities of households, sewer networking of mohallas, relocation and alignment of houseboats, shifting of hotels, augmentation of water budget of the Lake, restoration and development works, catchment management works, installation of CCTV surveillance and relocation/ rehabilitation of Dal dwellers.

Audit noticed inadequacies in implementation of Lake conservation programme under NLCP, PMRP and other programme activities⁷ such as installation and upgradation of Sewage Treatment Plants (STPs), treatment of solid waste, extracted weed and sludge, sewage disposal facilities of households, sewer networking of *mohallas*, relocation and alignment of houseboats, shifting of hotels, augmentation of water budget of the Lake, restoration and development works, catchment management works, installation of CCTV surveillance and relocation/ rehabilitation of Dal dwellers as discussed in the succeeding paragraphs:

4.6.1 Sewage Treatment Plants

Areas having STPs and areas without sewer networking in the vicinity of Dal Lake is shown in the **Satellite Image 4.23** downloaded from Google Earth Pro:

Satellite Image 4.23: Areas having STPs and areas without sewer networking



➤ To treat the water flowing into the Lake from nearby habitations with liquid and solid wastes, construction of six STPs having capacity of 36.70 Minimal Liquid Discharge (MLD) was sanctioned under NLCP at a cost of ₹ 21.46 crore. The details of sanctioned STPs and sewer networking to be covered for these STPs are detailed in **Appendix-4.5**.

The STPs were installed (2006 to 2013) by M/s Thermax Limited (the firm) at a cost of ₹ 45.01 crore. Audit analysed test reports (January 2016 to December 2018) of these

⁷ Activities undertaken by GoJ&K from time to time for conservation and management of Lake such as construction of Sewage System for peripheral area of Saida Kadal to Ashai Bagh Bridge, installation of CCTV Surveillance and other activities carried out in respect of water bodies connected with the Dal Lake together with works executed in accordance with the DPR approved under NLCP.

STPs and found that sewage inflows were not treated as per desired parameters specified in the DPR/ NIT/ allotment order as detailed in **Table-4.2**.

Table 4.2: Treatment of sewage inflow by STPs

Name of STPs	Required norm for removal of physico-chemical indicators	Range of removal		Nitrate Nitrogen (NO ₃ -N) (Average percentage increase)	Norm for Chemical Oxygen Demand (COD)	Actual COD
		Ammoniacal Nitrogen (NH ₃ -N)	Total Phosphorus (PO ₄)			
Hazratbal	> 90 per cent removal	15-49	14-52	41-148	< 50	61-100
Habak		14-43	18-53	35-108		120-137
Laam		14-47	39-56	26-161		45-102
Brari Numbal ⁸		57-65	59-66	13-36		57-72
Nallah Aamir Khan		31-41	39-53	14-19		47-78

(Source: records of LC&MA)

It may be seen from the **Table 4.2** that against requirement of removal of more than 90 per cent physico-chemical indicators:

- Ammoniacal nitrogen was removed in the range of 14 to 49 per cent in respect of three STPs⁹ while in two STPs¹⁰ it ranged from 31 to 65 per cent.
- Total phosphorus was removed in the range of 14 to 56 per cent¹¹ in respect of three STPs while in two STPs¹² it ranged from 39 per cent to 66 per cent.
- There was an average increase in Nitrate Nitrogen from 13 to 161 per cent.
- Chemical Oxygen Demand (COD) was also mostly higher than 50 per cent, ranging up to 137.

Despite incurring expenditure of ₹ 45.01 crore on STPs, the STPs were not treating sewage as per the required parameters resulting in deterioration of water quality of the Lake.

Further, a performance certificate from the technology provider was required to be furnished by the firm for allotment of work of installation of STPs.

Audit however noticed that despite the firm not furnishing the required performance certificate, the work of installation of five STPs was allotted to the firm. No action was taken against the firm for unsatisfactory performance of STPs despite non-fulfillment of conditions¹³ of NITs and contract allotment order.

⁸ The sixth STP at Welcome Hotel was amalgamated with STP Brari Numbal

⁹ Installed in 2006 (which needed upgradation) and installed in 2013.

¹⁰ Installed in 2013.

¹¹ Installed in 2006 (which needed upgradation) and installed in 2013.

¹² Installed in 2013.

¹³ In violation of contract conditions, the firm had not made any specific assessment of its own of sewage characteristics. It had also not made necessary modifications in design parameters to ensure that the plant was able to function as per the desired outcome.

Audit further noticed that:

- LC&MA had not co-opted three experts, one each from Ministry of Environment and Forests, GoI, National Environmental Engineering Research Institute (NEERI) and J&K State Pollution Control Board (J&KSPCB), as required under the terms of allotment order, to monitor the functioning of STPs.
- A thick green belt, required to be developed around the STPs to match with surrounding landscape and to overcome the problem of odour in the area due to presence of STPs, was not developed.

H&UDD stated (December 2022) that the three existing STPs did not have the facility to remove ammoniacal nitrogen. As such, it has been decided to merge these old technologies-based STPs with upcoming 30 MLD capacity STP which was approved under Atal Mission for Rejuvenation and Urban Transformation (AMRUT) 2.0 and UT CAPEX Plan. It was further stated that as an interim measure, the existing STPs have been refurbished and are functioning in accordance with JKPCB norms. It was added that in the green belt, LC&MA had constructed artificial wetlands for STP Habak and STP Hazratbal whereas red belt could not be developed for STP Laam due to non-availability of land.

The reply is not acceptable as the STPs had not performed as per the parameters specified in the approved DPR under NLCP. Further, the assertion that the existing STPs had been refurbished in accordance with JKPCB norms was not supported with any documentary evidence. It is to be further noted that in one of the research reports¹⁴ it had been pointed out that the STPs are not only malfunctioning but are exacerbating the problem of Lake pollution.

➤ With regard to the peripheral area (in the area from Saida Kadal Bridge to Ashai Bagh Bridge), there was no provision included under NLCP for treatment of sewage generated by the households and these were being discharged directly into the Lake. For this purpose, a DPR was prepared (2018) by Urban Environmental Engineering Department (UEED) with estimated cost of ₹ 8.48 crore under 'Atal Mission for Rejuvenation and Urban Transformation' (AMRUT). The project scheduled to be completed within eight months included construction of one STP, laying of 2.60 km of main trunk sewer line, five km of lateral sewer lines and requisite house connections.

Audit observed that 27 *per cent* physical progress was reported in respect of the main trunk sewer line and lateral sewer lines, however, there was no financial progress as of March 2022. Due to non-completion of sewage networking system from Saida Kadal to Ashai Bagh Bridge, untreated sewage from the area continued to be discharged into the Lake.

¹⁴ Impact of sewage treatment plant effluent on water quality of Dal Lake, Kashmir, India of January 2020 by Hafsa Farooq Chashoo, Adnan Abu-Bakr, MH Balkhi and others.

While admitting that the sewage networking system from Saida Kadal to Ashai Bagh Bridge is incomplete, H&UDD stated (December 2022) that the work of Intermediate Pumping Station (IPS) and sewer network from Saida Kadal bridge to Ashai Bagh had been commissioned and out of 750 households, 400 were connected with sewer lines and the remaining households would be covered shortly.

4.6.2 Non-upgradation of STPs and lack of sewer networking/ treatment facilities

As STPs were not meeting the required standards of nutrient reduction and there were no sewage treatment facilities in the catchment areas of Shalimar, Tailbal, Batapora etc., a proposal was placed (December 2015) before the BoD of LC&MA for preparation of Detailed Project Reports (DPRs) for upgradation of three STPs¹⁵ and for construction of STP for catchment areas. Accordingly, preparation of DPR for upgradation of STPs and construction of STP for catchment areas was entrusted (January 2016) without invitation of tender to IIT, Roorkee at a cost of ₹ 0.91 crore. The decision to award this work to IIT, Roorkee was made by the BoD of LC&MA on the rationale that IIT, Roorkee had already prepared the basic DPR of Dal Lake. The DPR for upgradation of STPs, at a cost of ₹ 45.73 crore, was prepared (August 2016) for which LC&MA paid ₹ 0.44 crore to IIT, Roorkee.

Subsequently, LC&MA asked (August 2016) IIT, Roorkee to suggest if establishment of a common STP having capacity of 22-35 MLD would be advantageous instead of four separate STPs¹⁶. IIT, Roorkee suggested that establishment of a common STP was advantageous due to being cost effective and it could accommodate future pollution load in a better way. However, Monitoring Committee of LC&MA decided (April 2017) in favour of upgradation of three STPs and establishment of one common STP. One of the three STPs was to be upgraded by the end of 2018-19. Two STPs were to be upgraded and one common STP was to be installed by September 2020.

GoJ&K released (between September 2016 and March 2019) ₹ 7.36 crore to LC&MA for upgradation of three STPs and for works of sewer networking.

Audit observed that out of the released amount of ₹ 7.36 crore, only ₹ 0.44 crore was spent on preparation of DPR and the remaining amount of ₹ 6.92 crore remained unutilised for a period ranging up to 54 months¹⁷. Due to non-upgradation of three STPs and non-establishment of a common STP, excess nutrient load from the STPs and untreated sewage from the catchment areas continued to enter the Lake. Non-availability of sewage facilities in the catchment area and effluents entering the Lake through various *nallahs* were also noticed during joint physical inspection conducted (March 2020) by the audit team with officials from LC&MA.

¹⁵ Habak, Laam and Hazratbal with cumulative capacity of 15.2 MLD.

¹⁶ Upgrading of three and installation of one more for other catchment areas.

¹⁷ September 2016 to March 2021.

The Executive Engineer, Lake Division-II stated (June 2022) that refurbishment of three STPs, instead of upgradation, had been carried out by UEED at a cost of ₹ 8.68 crore and the matter regarding establishment of one common STP at Gupt-Ganga was under process in UEED.

H&UDD stated (December 2022) that in a meeting held (2016) with the representative of IIT, Roorkee, it was concluded that up-gradation of existing STPs was not a feasible option as it would result in loss to the exchequer. Instead, the Committee of Experts suggested refurbishing these STPs which was done through UEED. It was further stated that a DPR of ₹ 291.48 crore had been approved for sewerage network of left out areas including merging of the three existing STPs along with construction of one common STP at Gupt Ganga.

Thus, in absence of sewerage network in left out areas and due to non-construction of common STP, the untreated sewage continued to enter the Lake affecting its water quality as can be seen from the photographs taken during joint physical inspection carried out by audit with the officials of LC&MA.

<p>Blood and residue from slaughtered chicken (Shalimar area) entering the channels through which water enters the Lake</p>	<p>Untreated sewage from households finding its way into the inlet channel of the Lake</p>
	
<p>Untreated sewage from households (Tailbal area) finding its way into the inlet channel of the Lake without treatment</p>	<p>Garbage and untreated sewage from households (Tailbal area) finding its way into the inlet channel</p>
	

4.6.3 Sewage disposal facilities of households on either side of backwater channels

Intermediate Pumping Stations (IPSs) are to be set up in areas where sewer lines are so deep that no further related work can be executed. Accordingly, 11 IPSs were to be constructed at specific locations at a cost of ₹ 12.99 crore under NLCP. As of March 2014, seven IPSs were completed at a cost of ₹ 8.11 crore and in respect of the remaining four IPSs, ₹ 3.70 crore was spent with shortfall in execution of works ranging between 11 and 47 *per cent*. The shortfall was due to non-connectivity of sewer lines of the concerned households which were located at a very low level and could not be connected with four IPSs. Thus, sewage released from these households was discharged directly into the backwater channels of the Lake.

Audit examination further disclosed the following:

- Although the proposal for connecting these households by a common sewer line to the nearest IPSs was approved (June 2010) by the BoD, no further action was taken due to non-availability of funds under NLCP and delay in formulation of the project proposal.
- Eventually, sewer networking works¹⁸ were approved (December 2016) under AMRUT at a cost of ₹ 26.50 crore. Besides providing sewer network to more locations by providing 13 low line pumping stations, main trunk sewer line, secondary and lateral sewers, house-to-house connectivity, mechanical and electric works and operation and maintenance for five years, the project works included pending works of connecting households to four IPSs. The works to be completed within 18 months were awarded (October 2017) by the UEED to a contractor at a cost of ₹ 18.85 crore. Out of ₹ 17 crore released to UEED for these works, ₹ 16.32 crore was spent as of December 2019. Expenditure of ₹ 12.94 crore was incurred on civil works with physical progress ranging between 36 and 85 *per cent* across various components.
- Despite payment of ₹ 1.79 crore made to a contractor for procurement of materials intended for executing mechanical and electric works, these works had not been executed by the contractor and materials were lying unutilised as of March 2022.

As a result, sewer networking works for connecting households on either side of the backwater channels could not be completed resulting in unproductive expenditure of ₹ 16.32 crore, while untreated sewage from these households continued to be released into the Lake.

H&UDD stated (December 2022) that low lying households could not be connected with the sewer line of STP Brari-Numbal and a DPR was being framed by UEED in collaboration with Srinagar Smart City to address the issue.

¹⁸ Low Line Pumping stations, Secondary sewer lines, Lateral Sewer lines and house to house connectivity.

4.6.4 Sewer networking of Khona Khan area and its connectivity to the STP

There was no sewer network system in the catchment area between Dal Lake Gate and Khona Khan in the Western foreshore including house boats. Untreated waste water from this area was discharging into the Lake. Providing sewer network system and connecting it to one of the commissioned STPs was not included under NLCP.

After a lapse of 10 years from approval (September 2005) of conservation and management of Dal Lake under NLCP, a DPR was prepared (April 2015) for laying sewer network system at a cost of ₹ 8.28 crore in the area between Dal Lake Gate and Khona Khan in Western foreshore including houseboats. The sewer network to be connected to STP at Brari Numbal included works of trunk sewer, lateral sewers, house to house/ houseboat connectivity with laterals, intermediate pumping station etc. The works were to be completed within one year.

Audit noticed that as of March 2022, LC&MA had spent (2016-22) ₹ 6.16 crore¹⁹ (74 per cent of DPR cost of ₹ 8.28 crore) on laying of sewer network system and 68 to 100 per cent of works were completed. Due to delay in tendering process and allotment of works as well as land dispute, works of connecting houses to main sewer lines, laying of pipes for 164 house boats, and laying of lateral sewer pipes were not executed despite a lapse of over seven years, after preparation of DPR.

Thus, expenditure of ₹ 6.16 crore could not yield the desired result as untreated sewage from households and houseboats of the area continued to be discharged into the Lake.

H&UDD stated (December 2022) that the main trunk sewer line, lateral and secondary sewers, IPS and rising main had been completed and the scheme was functional since 2018 but land dispute regarding a small patch of secondary sewers delayed house connection which would be completed by March 2023. With regard to houseboats, it was stated that the work for connecting the houseboats with the existing sewer line has been started.

The fact remained that untreated sewage from households continued to flow directly into the Lake as can be seen from the following pictures:

¹⁹ ₹ 5.48 crore (2016-19) and ₹ 0.68 crore (2020-22).

<p>Drains from households (marked in red) directly discharging into the Lake (Khona Khan)</p>	<p>Drains from households not connected to main drain</p>
	
<p>Sewer (marked in red) from houseboats discharges untreated sewage into the Lake (Western foreshore area). Area marked in yellow depicts water quality at the place where water from sewer discharges directly into the Lake</p>	
	

4.6.5 Disposal of solid waste, extracted weed and sludge

During the review meeting (April 2006) of MoEF&CC and LC&MA, it was decided that under ‘Clean Development Mechanism Projects’ (CDM) sponsored by MoEF&CC, bio-degradable component of solid waste, extracted weed and sludge from STPs would be combined for generating electrical power. LC&MA was to formulate a project report in accordance with CDM guidelines for submission to MoEF&CC.

Audit however noted that no such project report was prepared by LC&MA. After a lapse of over nine years, although LC&MA requested (December 2015) UEED to spare 1.5 kanal of land for creation of sludge beds for drying of generated sludge, no further action was taken by LC&MA as of December 2022. Thus, the problem of disposal of sludge generated from STPs, bio-degradable component of solid waste and extracted weeds remained unresolved.

The Executive Engineer-LD-I stated (June 2022) that DPR for treatment of bio-degradable component of solid waste and sludge at a cost of ₹ 13.54 core had been submitted to the Administrative Department. Further, it was stated that the project report regarding converting weed into compost, submitted by the Sher-i-Kashmir University of Agricultural Sciences & Technology, Kashmir (SKUAST-K) to LC&MA, was under consideration.

H&UDD stated (December 2022) that an MoU had been signed between National Agricultural Cooperative Marketing Federation of India (NAFED) and LC&MA for installation of weed processing compost plant, which would process more than 25,000 Metric Ton (MT) of weed per year. It was further stated that the disposal of sludge would be taken up under 30 MLD STPs to be built at Gupt Ganga Ishber for sludge disposal.

4.6.6 Relocation of House Boats and Hotels from Dal Lake

• Houseboats

Under NLCP, LC&MA spent (2005-11) ₹ 0.70 crore on pilot studies related to disposal of solid waste generated by people living in houseboats on the Lake. Pursuant to the directions (May 2013) of the Hon'ble High Court of J&K, LC&MA decided to relocate houseboats to Dole-Demb area. For this purpose, LC&MA was required to acquire land measuring 219 *kanal* and 11 *marla* out of PMRP funds. Information regarding land acquired and payments made for land acquisition was not provided by LC&MA to audit.

Audit further noticed that without floating tenders, LC&MA had hired (August 2013) the services of a private firm for preparation of project report for disposal of sewage and grey water generated by houseboats and decongestion of the area occupied by houseboats. The firm was paid ₹ 0.11 crore for preparation of the project report. The estimated cost of the works in the project report was ₹ 29.81 crore²⁰. After accord (November 2015) of Administrative Approval (AA) to the project, ₹ 11 crore was released (2016-19) to LC&MA under CAPEX.

As of March 2022, the main project component of sewerage networking system was not executed. Out of ₹ 11.69 crore projected for civil component, only civil works amounting to ₹ 4.85 crore²¹ (41 *per cent*) were allotted to nine contractors for which ₹ 2.28 crore was paid (March 2022) against work done claims. LC&MA also paid (March 2016) ₹ 0.50 crore to Public Health Engineering (PHE) Department for water works, ₹ 0.50 crore (March 2016) to Electrical Maintenance & Rural Electrification Department for electric works and ₹ 2.70 crore to Smart City agency. Detailed account

²⁰ The project report included components of sewerage system (₹ 15.15 crore), civil works (₹ 11.69 crore), electrical System (₹ 1.99 crore) and water supply (₹ 0.98 crore)

²¹ ₹ 4.85 crore (works of civil project component works allotted) to ₹ 11.69 crore (total civil project component works)

in respect of these payments amounting to ₹ 3.70 crore was not obtained from the concerned Departments/ agencies. This had resulted in unfruitful payment of ₹ 5.98 crore²² incurred on the project and locking up of ₹ 5.02 crore²³ in LC&MA for over three years.

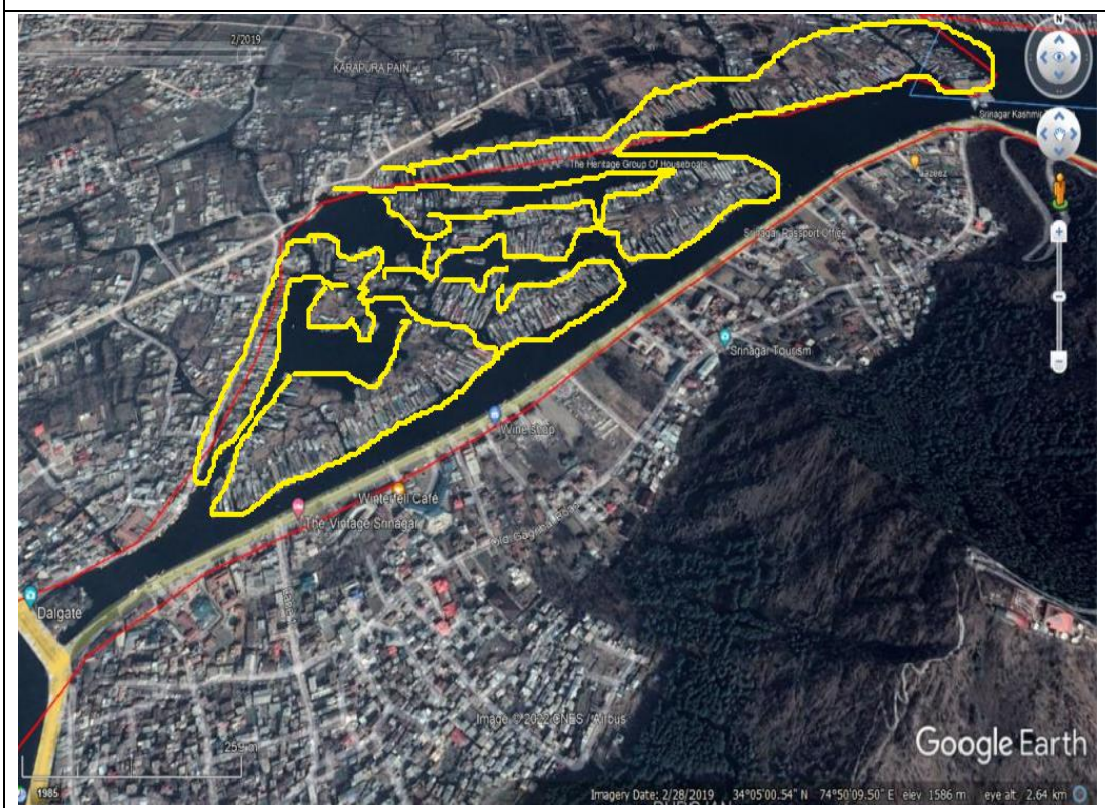
H&UDD stated (December 2022) that the plan for relocation and realignment of houseboats to Dole-Demb area was dropped keeping in view various environmental concerns raised by stakeholders. It was further stated that instead of relocating houseboats to Dole-Demb area, they were being connected with main existing sewer line of 16.1 MLD STP.

The fact, however, remains that untreated sewage from houseboats continues to be discharged into the Lake as of December 2022.

Thus, proper disposal of sewage generated by houseboats and decongestion of the area occupied by houseboats could not be carried out. As a result, untreated sewage from houseboats continued to be discharged into the Lake affecting its ecosystem.

Dense population of houseboats in Dal Lake was also verified from **Satellite Image 4.24** obtained from Google Earth Pro:

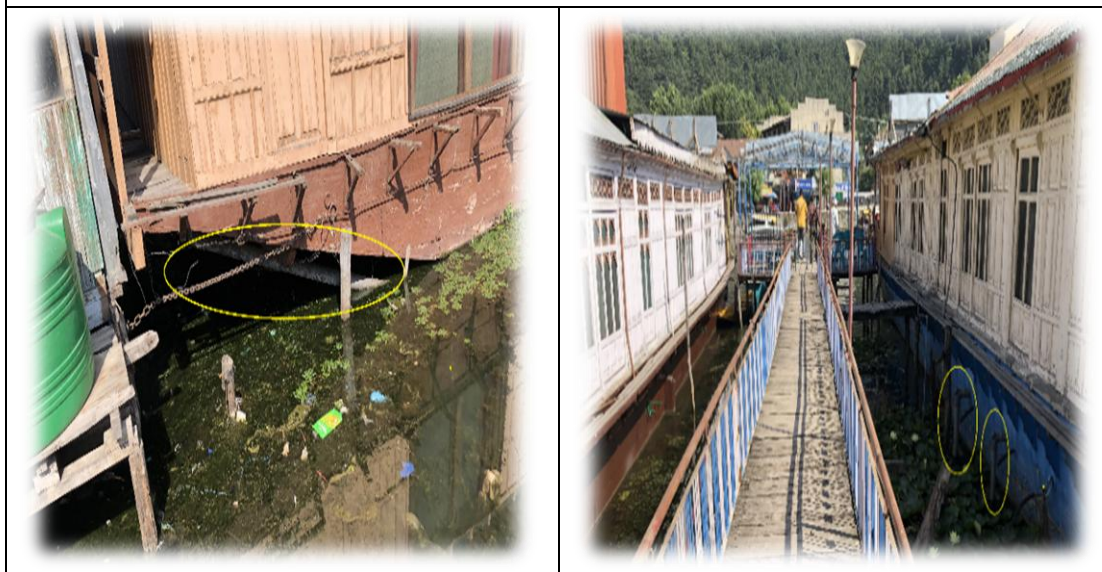
Satellite Image 4.24: Yellow marked areas of the Lake are densely populated with houseboats (February 2019)



22 ₹ 2.28 crore plus ₹ 3.70 crore

23 ₹ 11 crore minus ₹ 5.98 crore

Untreated sewage from houseboats entering the Lake









• Hotels

Sewage from 13 hotels situated inside/ alongside the Lake was directly entering the Lake. For shifting of these hotels, LC&MA took up (February 2009) the matter regarding transfer of land measuring 18 *kanals* at Lasjan with H&UDD. As H&UDD did not take any action for transfer of land, the BoD of LC&MA decided (July 2010) to relocate these hotels to its own land at Chandpora. Thereafter, LC&MA did not take any action in this regard for about 11 years. As of December 2022, shifting of hotels situated in the vicinity of the Lake could not take place and untreated sewage from hotels continued to be discharged into the Lake.

The Executive Engineer-Lake Division-I stated (June 2022) that the matter would be placed before Board of Directors for appropriate action.

H&UDD stated (December 2022) that the proposal to relocate 13 hotels situated inside the Lake to Lasjan could not mature due to non-transfer of land to LC&MA at Lasjan. It was further stated that in a High-Level Committee meeting chaired by the Divisional Commissioner, it was decided not to carry forward the rehabilitation process and onus was on hotels to either use existing peripheral sewer lines or install portable STPs for sewage discharge.

The reply is not acceptable because shifting the responsibility of sewage treatment entirely to the hotels does not absolve LC&MA of its commitments under NLCP.

<p>Restaurant running inside the Lake</p>	<p>Washroom facilities (hoarding marked in yellow) at the cost of water quality of the Lake</p>
	
<p>Front view of a Hotel inside Dal Lake</p>	<p>Untreated sewage (marked in yellow) behind the hotel discharging into the Lake</p>
	
<p>Front view of a Hotel inside Dal Lake</p>	<p>Untreated sewage (marked in yellow) behind the hotel entering into the Lake</p>
	

4.6.7 Augmentation of water budget of the Lake through Padshahi Canal

To improve water budget of the Lake during the lean/ dry period (June-July) and help flushing of the Lake by bringing additional two cubic meter (cum) of water per second from Sindh *Nallah* through Padshahi Canal, funds of ₹ 2.61 crore were earmarked under

NLCP as per approved DPR. The Padshahi canal was to be connected by a 580-meter-long link channel to Batapora *Nallah* of the Lake. The Batapora *Nallah* was to be improved by widening and raising embankments at spots.

The BoD decided (June 2010) to constitute a team of technical experts from LC&MA and Irrigation and Flood Control (I&FC) Department to work out modalities of the project. The recommendations of the team of experts were to be sent to the Administrative Department for approval. However, there was no further progress in this regard as of December 2022. Against earmarked funds of ₹ 2.61 crore, expenditure of only ₹ 0.35 crore was incurred on office and travel expenses. Besides capital funds of ₹ 2.26 crore²⁴ under the activity remained unutilised during the project implementation period.

Thus, the indifferent approach of LC&MA and lack of monitoring by the BoD resulted in non-augmentation of water budget of the Lake for over 16 years²⁵.

H&UDD stated (December 2022) that construction of link channel to Batapora *Nallah* was not possible. This was because a road had been constructed along its proposed alignment and removal of constructions which had come up on either side of Grata Kul up to Batapora *Nallah* was not possible, as it involved huge financial implications. It was further stated that funds under NLCP were being returned by LC&MA and the matter stood taken up with GoI.

The fact remained that alternative measures were not undertaken to augment water budget of the Lake.

4.6.8 Restoration and Development works

• Dredging of the blocked channels

Due to accumulation of sediment, channels inter-connecting different parts of the Lake were blocked to varying extents over a period of time. This was not only impeding circulation of water within the Lake but also hindering movement of boats and *shikaras*. One of the activities under NLCP was to widen and deepen channels which included dredging of 38 blocked channels. LC&MA was to prepare a bathymetric map of the Lake to have a clear picture about basin morphology to help in marking areas to be dredged.

Funds of ₹ 8.01 crore available under NLCP were utilised up to 2017-18 on dredging works and further expenditure of ₹ 3.01 crore²⁶ was incurred on dredging works under CAPEX. As of March 2022, a total expenditure of ₹ 11.02 crore was incurred on dredging of the Lake. Audit observed the following in this regard:

²⁴ ₹ 2.61crore minus ₹ 0.35 crore.

²⁵ Since September 2005 i.e. launch of NLCP.

²⁶ ₹ 0.67 crore during 2020-21 and ₹ 2.34 crore during 2021-22.

- Dredging of the Lake was carried out without conducting bathymetric survey of Lake morphology till 2018-19. Further, the bathymetric survey conducted in 2018-19 did not contain the details of location and quantum of silt deposited in Lake and its catchment area.
- Dredging works were not monitored properly, as no record indicating location/channel-wise width and depth of the Lake where dredging was carried out was kept on record. Instead, mere year-wise physical and financial achievements were documented.
- No study was conducted to assess the impact of dredging carried out in the Lake.

H&UDD stated (December 2022) that bathymetric survey was conducted in 2018-19. They admitted that no bathymetric survey had been conducted prior to 2018-19.

The reply is not justified, as bathymetric survey conducted in 2018-19, annexed with the reply, is not comprehensive since it does not indicate locations and quantum of silt deposited in the Lake and its catchment area.

• Dredging of settling basin

Tailbal *Nallah* is the main source of water for the Lake and brings a lot of sediments from its catchment areas. The water of Tailbal *Nallah* along with water from other sources enters a natural auxiliary basin before entering the Lake. To prevent sediments from entering the Lake, a settling basin was constructed at the point where water of Tailbal *Nallah* enters the Lake. A study conducted (May 1998 to June 2000) by LC&MA revealed that the settling basin had an efficiency²⁷ of only 07 to 57 per cent.

Audit noticed that LC&MA had not conducted any bathymetric survey to ascertain the quantum of silt entrapped in the settling basin after its construction. No de-siltation of settling basin was carried out to improve its efficiency. A study conducted (March 2015) by J&K, EE&RSD indicated a decrease of 0.08 hectare in silt retention capacity of the basin in 2014 with respect to 2007. Decrease in silt retention capacity of the basin had the potential to hasten ageing process of the Lake.

The Executive Engineer (EE), Lake Division-I admitted (June 2022) that bathymetric survey of the settling basin had not been conducted and stated that de-siltation of the settling basin to improve its efficiency was in progress from 2020 onwards. The EE added that due to non-availability of dykes for dumping of dredged out material, the material was being thrown into the auxiliary basin being part of the settling basin. The EE further stated that the auxiliary basin would also be retrieved as auctioning of dredged out material was under process. The EE further added that bathymetric survey

²⁷ Settling basin had an efficiency of 57 per cent. This means that if 100 metric tonnes of silt enters the settling basin through the *nallah*, only 54 metric tonnes of silt would be retained in the settling basin. Consequently, 46 metric tonnes of silt would still enter the Lake.

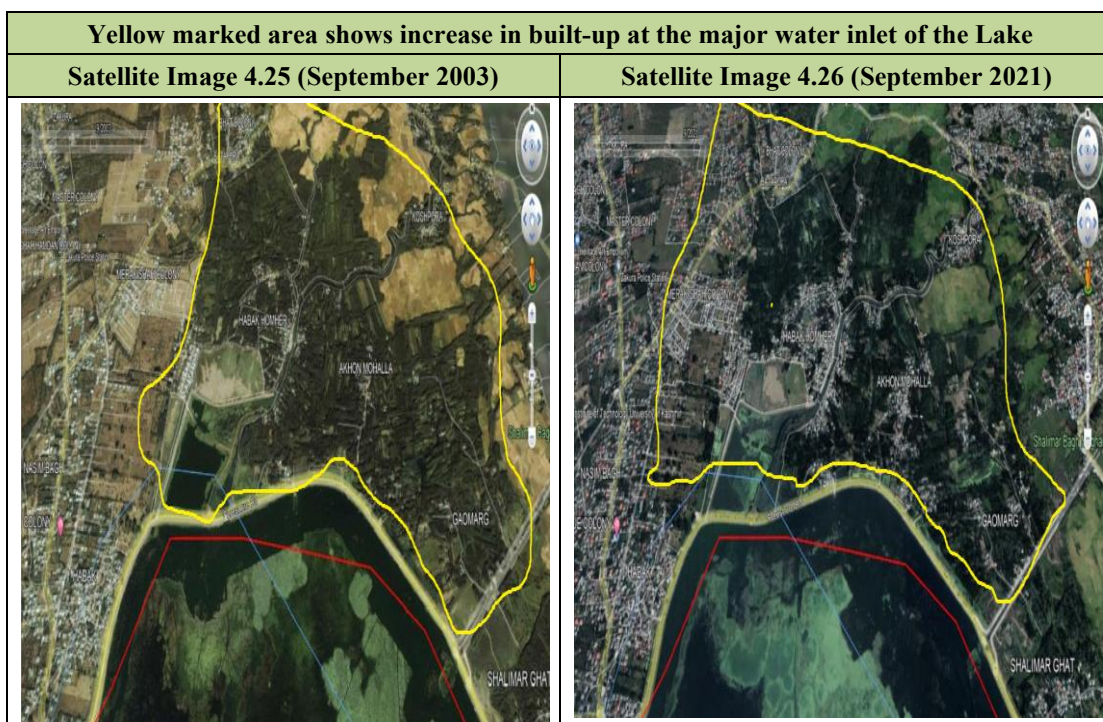
of the basin would be conducted and a schedule for the dredging process would be formulated.

H&UDD stated (December 2022) that based on the bathymetric survey report of 2018-19, 1.5 lakh cum of silt had been removed from the settling basin which resulted in improving its efficiency.

The reply should be seen in light of fact that the bathymetric report, annexed with the reply, does not indicate locations and quantum of silt deposited in the Lake and its catchments. Further, the report also does not indicate the dykes/ areas in which the removed silt was dumped. Moreover, the following photographs show silt dumped in the auxiliary basin of the Lake.

<p>Material dredged out from the settling basin dumped into auxiliary basin (which acts as buffer zone against nutrients, silt and other materials) which is only about 15 feet from the settling basin</p>	<p>Part of the auxiliary basin which had been converted into play field due to dumping of material dredged out from the Lake</p>
	

Increase of habitations in major inlet catchment areas of Dal Lake were also seen in the **Satellite Images 4.25 and 4.26** from Google Earth Pro.



• **De-weeding of Lake**

NLCP, inter alia, envisaged de-weeding first in late spring and thereafter during late summer. The exercise was to be carried out before flowering/ fruiting and formation of propagules in plants. Weeds were to be removed at a controlled rate of 40 to 50 per cent (maximum up to 75 per cent) of submerged vegetation. Some selected areas were to be left undisturbed for fish spawning and waterfowl feeding.

Test check of records revealed that ₹ 28.01 crore²⁸ was spent on de-weeding carried out through contractors and Departmentally by harvesting machines. The expenditure included ₹ 16.18 crore spent²⁹ during the months other than the months specified for de-weeding. Untimely de-weeding leads to re-growth of vegetation in the Lake.

Records of the Lake Division-I wing of LC&MA did not clearly depict whether controlled de-weeding by removing only 40 to 50 per cent (maximum up to 75 per cent) of submerged vegetation had been carried out, to leave out areas undisturbed for fish spawning and waterfowl feeding.

The Executive Engineer, Lake Division-I stated (June 2022) that the needful would be done.

H&UDD stated (December 2022) that selective manual de-weeding operations were carried out annually in specified areas, during specified periods and to the extent of specified percentage as per recommendations of NLCP. It was further stated that as

²⁸ ₹ 18.28 crore (2016-20) spent under NLCP and ₹ 9.73 crore (2020-22) spent under CAPEX.

²⁹ ₹ 13.22 crore spent under NLCP and ₹ 2.96 crore (2020-22) spent under CAPEX.

envisaged in the DPR, impact of de-weeding for periods prior to, ongoing and afterwards were regularly studied by R&M wing. It was also added that skimming and removal of floating material were taken up regularly to maintain aesthetics of the Lake and for navigation of *shikaras*.

The reply is not acceptable as no documentary evidence was provided to audit regarding any survey conducted for identification of locations for de-weeding, quantification of weed growth or determination of optimal months for de-weeding. Further, details regarding the percentage of weed removal, excluding areas for fish spawning, were also not furnished during audit.

• **Development of Shalimar Channel**

For maintenance of 941 m Shalimar Channel from which water enters Dal Lake and to restore its navigational routes for tourists visiting the Shalimar garden and stop flow of garbage and silt into the Lake, the BoD decided (July 2012) to carry out dredging and shoreline treatment of channel together with construction of pedestrian mall.

For development of Shalimar Channel, 13 works to be completed in one to three months were allotted³⁰ (between 2014-15 and 2018-19) to 10 contractors at a cost of ₹ 3.59 crore. As of September 2019, the LC&MA had spent ₹ 2.73 crore on construction of channel. Audit noticed that only 366 m channel³¹ had been completed. There was no progress in execution of works in respect of 87 m channel³² and physical progress in respect of works of 488 m channel ranged between 10 and 88 *per cent*. However, these works taken up during 2014-15 were damaged and had not been restored as of December 2022.

Thus, restoration of Shalimar Channel by way of dredging, shoreline treatment and construction of pedestrian mall could not be completed despite lapse of over seven years from the timeline fixed for completion of works. As a result, expenditure of ₹ 2.73 crore could not yield expected results and sediments from banks of the Lake continued to be deposited into the Lake thereby contributing to ageing of the Lake.

The Executive Engineer, Lake Division-1 stated (June 2022) that the damaged works would be allotted to contractors afresh for restoration and trash chambers/ silt retention basins would be constructed to stop flow of garbage and silt into the Lake.

H&UDD stated (December 2022) that some slope stability works including works of ornamental parapet walls on either side of the channels and dredging had been completed. It was further stated that remaining development works such as those related

³⁰ Seven were allotted during 2014-15, one during 2017-18 and five during 2018-19.

³¹ From RD-615 mtr to 981 mtr.

³² RD- 289 mtr to 376 mtr.

to pedestrian mall, ornamental foot bridges and jetties are now being executed under Srinagar Smart City Ltd project, which would be completed in April 2023.

The reply should be seen in light of the fact that high siltation was noticed (March 2022) during joint physical verification of the channel.

Area marked in red indicates channel without any toe-walling and area marked in yellow is damaged toe-wall. Cow-dung dumped (marked in white) at the fringe of the Shalimar Channel and run-off from it finds it way in the Lake through the channel.



4.6.9 Increase in area of floating gardens/ land masses

The floating gardens are made of heaps of weed and mud extracted from the Lake. These are used by cultivators for growing vegetables. Besides, fertile marshy land masses formed in shallow areas of the Lake are also used by cultivators for growing vegetables and willow/ poplar trees. Increase in area of floating gardens reduces water expanse, and use of fertilisers therein deteriorates water quality of the Lake. Decrease in silt retention basin increases siltation in the Lake as the basin retains silt before water enters in the Lake.

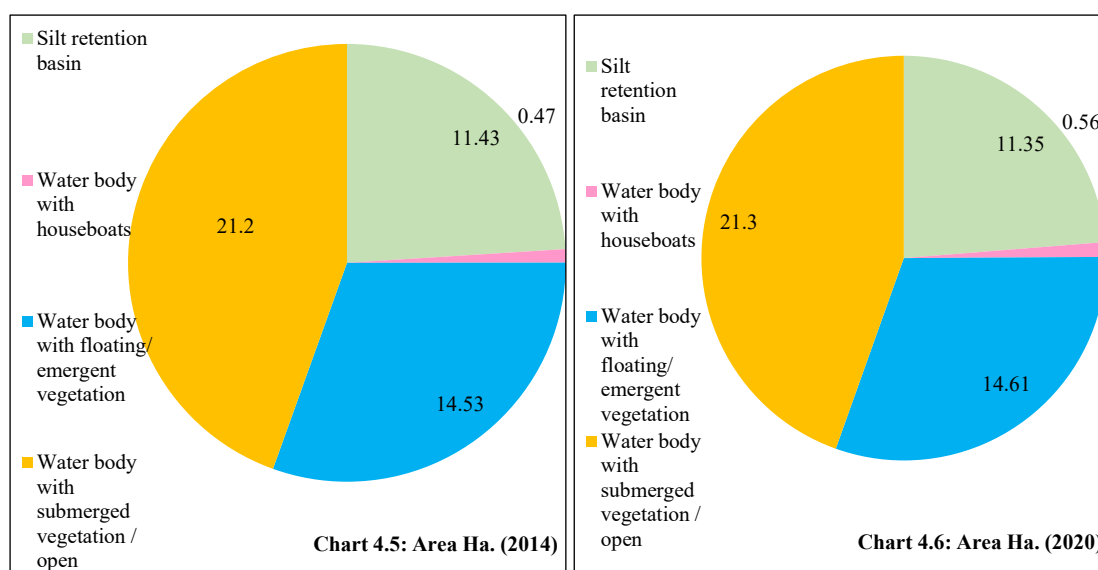
A comparison of data of the Lake furnished by J&K, Remote Sensing Department for the year 2007 and year 2014 indicated expansion of floating gardens/ houseboats and decrease in silt retention basin as detailed in **Table 4.3, Charts 4.5 and 4.6.**

Table 4.3: Changes in silt retention basin and coverage of water body

Category	Area in hectares (ha)		
	2007	2014	Change (2014-2007)
Silt retention basin	11.43	11.35	(-) 0.08
Water body with houseboats	0.47	0.56	0.09
Water body with floating/ emergent vegetation	14.53	14.61	0.08
Water body with submerged vegetation/ open	21.20	21.30	0.10

(Source: data of EE&RSD)

Charts 4.5 and 4.6: Changes in silt retention basin and coverage of water body



H&UDD admitted (December 2022) that there was significant area under vegetation till 2020. They further added that the Department had launched a massive operation to check the proliferation of unwanted species and 4.8 sq.km. of area was cleared. It was further stated that dredging of detention ponds in the hinterland of Dal Lake to Northern Foreshore had been started to create more silt retention capacity and to increase its capacity to act as bio-filter for reducing influx of nutrients into the Lake.

4.6.10 Catchment Management Works

The lifeline of a Lake is its water sources. The catchment area of Dal Lake is spread over an area of 33,717 hectares. The Lake receives 80 *per cent* of its water budget from Tailbal *Nallah* and 18 *per cent* from small *nallahs* flowing from catchments on the other side of the Lake. To keep the Lake rejuvenated with substantial inflow of water from catchment areas, sediment/ sewage free inflow of water from catchment areas has to be ensured.

Audit observed that against 15 Micro Watershed Management Areas (MWMAs) identified in the DPR for Dal Lake, only four MWMAs³³ were sanctioned for Catchment Management Activities (CMAs) at a cost of ₹ 25.84 crore under NLCP.

Watershed Manager, LC&MA stated (June 2022) that the DPR of CMAs was unrealistic as no comprehensive survey was carried out by the firm which prepared DPR under NLCP. As a result, treatment of major 11 MWMAs (73 *per cent*) and major works of four catchment areas were missed under NLCP.

³³ Asthanpur, Saidpur, Hodura, and Bidan.

Further, against ₹ 25.84 crore earmarked for four MWMAAs, ₹ 28.47 crore was spent³⁴ on structural, vegetative and livelihood improvement measures and on training/evaluation and institutional strengthening.

Audit noticed the following shortcomings in catchment management works:

- **Structural Measures:** Structural measures included civil works for construction of retard gabion, stone walls and check dams in feeding *nallahs* of the Lake on which ₹ 13.31 crore was spent. Although physical achievement was 100 *per cent* in respect of four components, achievement ranged between 01 and 93 *per cent* in respect of five components³⁵.
- **Vegetative Measures:** Vegetative measures included afforestation, rejuvenation of degraded forests, pasture and horticulture development, trenching, fencing etc. ₹ 9.55 crore was spent for execution of these works. Physical achievement was 100 *per cent* in respect of four components, while it ranged between 20 and 86 *per cent* in respect of other four components. There was no progress in respect of three components despite allocation of ₹ 0.99 crore and in respect of two components no targets were set. ₹ 0.92 crore was spent on four works³⁶ which were not approved for catchment works. Although ₹ 5.24 crore was spent on plantation of 26.91 lakh saplings, no physical verification was carried out to ascertain survival/ mortality of plantations and maintenance of plantation was not ensured.
- **Improvement to Livelihood Strategies:** Under this component, ₹ 3.70 crore was approved for construction of water tanks and water trough for inhabitants of the catchment areas of the Lake. The component also included provision for carrying out entry point activity to provide thrift and credit facility to the local people. Against approved cost of ₹ 3.03 crore in respect of three components (water tanks, water trough and entry point activity), ₹ 4.02 crore was booked but ₹ 3.81 crore was actually spent (₹ 0.78 crore in excess of approved cost). ₹ 0.21 crore was diverted towards activities which were not part of livelihood strategies. Although ₹ 0.67 crore was allocated for thrift and credit facility meant for improvement of livelihood of inhabitants of the catchment areas, no expenditure was incurred on thrift and credit facility and ₹ 0.67 crore was diverted towards other activities.
- **Training and Evaluation:** ₹ 0.29 crore approved under the component included allocation of ₹ 0.13 crore in respect of training programmes for farmers to involve them in understanding their role in catchment farming. The component also included ₹ 0.16 crore for establishment of four gauge stations to monitor silt control in the catchment areas, and training programme for Watershed Development Teams

³⁴ ₹ 27.67 crore spent as on March 2015 plus ₹ 0.80 crore spent from April 2015 to March 2020.

³⁵ Contour stone wall, loose bold check dams, retard (lined), stabilisation of quarry and spur (gabion) hac.

³⁶ earthen contour bunding, earthen bag embankments, crib structures and brush wood check dam.

(WDTs) to look after watershed works and their maintenance. Against target of holding 200 training Programmes for farmers, only 13 training programmes (seven *per cent*) were held as of March 2022. Gauge stations were not established and WDTs were not constituted.

- **Institutional Strengthening:** ₹ 1.86 crore approved for Institutional Strengthening included provision for procurement of equipment, setting up GIS observatory/ silt monitoring system and establishment charges (including travelling expenses, purchase of vehicle and fuel). An expenditure of ₹ 1.56 crore was incurred on these purposes³⁷ except for GIS observatory and silt monitoring systems which had not been set up.
- Expenditure of ₹ 2.63 crore³⁸ was incurred in excess of allocation on catchment activities under NLCP.

Due to non-procurement/ establishment of gauge station and silt monitoring systems efficacy of catchment treatment works in arresting and bringing down the sediment load in the Lake could not be ascertained despite incurring expenditure of ₹ 28.47 crore on catchment activities. However, research reports detailed in *Appendix-4.6*, indicated increase in nutrient and silt loads from catchment areas of the Lake which was one of the reasons for deterioration of water quality of the Lake. Audit analysed that shortfall in execution of activities was due to inadequate funding in the DPR under NLCP.

The Project Manager-Watershed stated (June 2022) that shortfall in achievement of targets was due to preparation of unrealistic DPR by the firm without conducting any survey to assess the problems in the catchment areas. The Project Manager added that for protection of water sources of the Lake, there was a need to get a comprehensive DPR for the entire catchment area prepared by a well-versed consultant/ firm.

H&UDD stated (December 2022) that cognisance had been taken regarding the audit observation in respect of non-procurement/ establishment of gauge station and silt monitoring systems. No specific reply was furnished by H&UDD in respect of the other observations.

• **Joint Inspection of catchment area**

During joint inspection of the catchment areas of Dal Lake conducted (03 March 2022) by the audit team with Watershed Management Team and officials of LC&MA, it was noticed that:

- There was shrinkage of *nallahs* due to encroachments.
- Plantation was being carried out by people on the fringes and inside *nallahs*.

³⁷ Procurement of equipment/ computer, expenditure on establishment charges, Travelling Allowance/ Daily Allowance, Petrol Oil and Lubricants and purchase of vehicle.

³⁸ ₹ 28.47 crore minus ₹ 25.84 crore.

- At four locations, *nallahs* were blocked by construction of roads by the Roads and Buildings (R&B) Department.
- A four-storey building was under construction on a wetland and the construction material was dumped into a *nallah*.
- There was siltation in *nallahs* and drains of households were flowing into *nallahs* and ultimately into the Lake.
- Heaps of garbage and cow dung were seen in the *nallahs* at various places.
- No dustbins and garbage lifting facility were seen around *nallahs*.

These factors led to deterioration in the water budget/ quality of the Lake. Photographic evidence is given below.

H&UDD stated (December 2022) that the reported illegal constructions which were influencing the topography of catchment area would be looked into through Enforcement Wing of LC&MA for appropriate action.

Toe walling of Tailbal *nallah* (a major source of water for Dal Lake) at Khawaja Colony done 25 feet inside the existing old toe wall resulting in shrinkage in the width of *nallah*



Extracted material dumped at the Lake fringe resulting in shrinkage of *nallah*











Huge private building under construction (without permission) in a *nallah* at Azad Colony, Batapora, from which water enters the Lake and construction material dumped into the *nallah*



Earth filling in Bata Khul and waste material dumped on fringe of *nallah*



<p>Road constructed through <i>nallah</i> at Chatterhama, and cow dung dumped at the fringe of the <i>nallah</i></p> 	<p>Road constructed through <i>nallah</i> at DFO Bagh</p> 
<p>Road constructed through <i>nallah</i> at DFO Bagh</p> 	<p>Check dams and road constructed through <i>nallah</i> at Chatterhama causing stoppage of water flow</p> 
<p>Road constructed through <i>nallah</i> without constructing culvert at Chatterhama</p> 	<p>Road constructed through <i>nallah</i> without constructing culvert at Chatterhama</p> 
<p>Width of Chatterhama <i>nallah</i> which was between 60 and 70 feet reduced to a width of 3-4 feet due to encroachment</p> 	<p>Sign board showing the road (constructed from Darbagh to Chatterhama) which passes through the <i>nallahs</i></p> 

Illegal constructions at Saidpora (catchment area of the Dal Lake)



Illegal constructions at Saidpora (catchment area of the Dal Lake)



Encroachment of Lake tributary at Mirza bagh colony



Illegal constructions at Saidpora (catchment area of the Dal Lake)



Dumping of garbage at one of the *nallahs* at Chatterhama



Plantation being done in *nallah* at Saidnar



Spot work done inside the Saidnar *nallah* thereby reducing the width of the *nallah* from 100-150 feet to 25 – 30 feet



Plantation done in the Maloori *nallah* near Saidpora bridge



4.6.11 Installation of CCTV Surveillance

To stop illegal constructions along the periphery of the Dal Lake by responding faster to illegal transportation of construction material and to help in collection of evidence for such incidences, LC&MA proposed (December 2015) installation of 20 Closed Circuit Television (CCTV) cameras on poles along the Lake periphery and laying of 40 km of cable networking with a control room at a cost of ₹ 2.16 crore. For this purpose, ₹ 4.55 crore³⁹ was released (2017-22) by GoJ&K under CAPEX. The work for installation of CCTVs was allotted (April 2017) to a firm⁴⁰ at a cost of ₹ 1.62 crore. Terms and conditions of the contract stipulated that 90 *per cent* payment was to be made only after completion of installation work and the remaining 10 *per cent* of payment was to be made after commissioning of the project.

Against target of laying 40 km of cable, the firm laid only 19 km of cable and against requirement of installing 20 poles for cameras the firm installed only nine. However, payment of ₹ 0.46 crore was made (December 2017) to the firm in contravention of the contractual terms and conditions.

The work of providing power supply units to the CCTVs was allotted (January 2018) to a second firm at a cost of ₹ 0.10 crore. The second firm completed the work but only ₹ 0.06 crore was paid (June 2018) for the work. Thereafter, the second firm left the work and there was no further progress for about three years in laying of cable for remaining 21 km, establishment of control room and installation of the remaining cameras till May 2021. The work was re-allotted (June 2021) for which expenditure of ₹ 0.97 crore was incurred for completion of CCTV surveillance over already laid cable for 19 km in Phase-I and work stood completed. The control room had not been installed and capacity building by imparting training to officials of enforcement wing of LC&MA was not done.

Thus, surveillance against illegal construction and illegal transportation of construction material could not be ensured despite lapse of over seven years since CCTV surveillance project was proposed in December 2015.

H&UDD stated (December 2022) that the project under Phase-I including video wall and control room at dock yard has now been completed. It added that monitoring was being done through display units at Mechanical Division Dockyard and the process would be started during 2023 to cover the area from Dalgate to Habak under Phase-II.

The fact remains that despite lapse of seven years since the project was proposed in December 2015, Phase-II of the project under which vulnerable areas were to be covered, had not been completed.

³⁹ ₹ 70.00 lakh in 2017-18, ₹ 50.00 lakh in 2018-19, ₹ 60.00 lakh in 2019-20, ₹ 75.00 lakh in 2021-21 and ₹ 200.00 lakh in 2021-22

⁴⁰ M/s Ador Powertron limited

4.6.12 Relocation and Rehabilitation of Dal-dwellers

• Under PMRP

➤ GoI approved (February 2012) a Special Plan Assistance (SPA) of ₹ 356 crore under PMRP for payment of compensation in respect of acquisition of 14,992 *kanals* of land and 1,994 structures belonging to people living in and along the Dal Lake. These people were to be relocated to a place called Rakh-i-Arth in Bemina locality situated at a distance of six kilometers from the Lake.

The programme of SPA also envisaged purchase of dredging and allied machinery for dredging of acquired land masses to improve water quality, increase water expanse, aerate stagnant areas, prevent discharge of wastes and pollution of the Lake due to chemical and fertiliser usage for agricultural practices in the Lake. The project was to be completed within five years i.e. by (January 2017). ₹ 83.18 crore was released (February 2012) under SPA in the first phase. The programme could not be taken up till 2013 due to delay in release of funds at various levels⁴¹.

As of December 2019, ₹ 63.73 crore was spent by LC&MA on acquisition of land and structures. Only 15 *per cent* land (2,299 *kanal* out of 14,992 *kanal*) and 16 *per cent*⁴² structures had been acquired over a period of six years (2013-19). A total of 1,994 structures were targeted to be acquired in four phases. Out of 482 structures targeted to be acquired in phase-I, only 319 structures could be acquired.

Audit however noted that out of these 319 structures, 99 were acquired in first phase instead of the intended second (72), third (26) and fourth (1) phase. This indicated that acquisition of structures was done in an unplanned manner. In respect of 2,299 *kanal* of acquired land, no dredging was carried out for its reclamation to the Lake.

Failure of LC&MA in implementation of the project within the timeline of five years had resulted in non-release of funds of ₹ 272.82 crore from GoI under SPA, and degradation of the Lake continued due to discharge of wastes and chemical fertilisers by Lake dwellers into the Lake. Reasons for non-achievement of targets in the first phase as observed by audit were as follows:

- No meeting of the Board of Directors was convened by LC&MA during July 2012 to December 2015.
- The Collector wing of LC&MA lacked technical expertise due to which land compensation cases could not be settled during the period. There was delay ranging up to 42 months in execution of sale deed with the beneficiaries after their cases were decided by the High-Level Committee. There was also delay

⁴¹ J&K Planning Department delayed release of funds to H&UDD by seven months which had further delayed releases in favour of LC&MA by three months. LC&MA also delayed release of funds to its implementing wing which ranged upto 24 months

⁴² 319 out of 1,994 structures

ranging up to 82 months by LC&MA in taking possession of land for which compensation was paid and in making payments to the beneficiaries.

- Instead of holding full-fledged charge for a tenure of two years, the Vice Chairmen posted to LC&MA were holding additional charges⁴³ during April 2014 to July 2017.

H&UDD stated (December 2022) that structure owners whose cases were decided in HLC often resort to inordinate delays in execution of sale deed and completion of other formalities to seek additional plots or enhanced compensation. It added that since there was no provision of compulsory acquisition, no coercive measure could be taken by LC&MA to make Dal-dwellers comply with the decision/ instructions of the High-Level Committee.

The fact remains that the intended objective of relocating Dal Lake dwellers to Rakh-i-Arth could not be achieved despite lapse of over 10 years since launch of SPA in February 2012 as of March 2022.

➤ Audit also noted that out of 16 different dredging/ de-weeding machines costing ₹ 27.89 crore required to be purchased by LC&MA, only one machine was purchased (2018-19) for ₹ 0.50 crore.

The Executive Engineer, Lake Division-I stated (June 2022) that the slow pace of project work was due to demand for increase in land compensation by Dal dwellers who earn their livelihood from vegetables produced on the land proposed to be acquired. It was further stated that over time cost of compensation for land and structures to be acquired had escalated for which MoEF&CC expressed inability to provide for cost escalation.

H&UDD stated (December 2022) that considering the representation and demands of Dal dwellers who were reluctant to part with their properties as per existing rehabilitation scheme, LC&MA framed a revised DPR of ₹ 4,500 crore for acquisition of land, which was not approved. It was further stated that in a meeting of HLC and the Board, it was decided in principle to maintain status quo and a policy for the same was being framed.

The fact remains that the untreated sewage of Dal dwellers had continued to enter the Lake.

⁴³ 730 days {Mr. Shafat Noor Barlas (IAS) from 02.4.2014 to 22.7.2014 (112 days), Mr. Showkat Ahmad Zargar (KAS) from 15.10.2015 to 14.07.2016 (243 days) and Mr. Thaseen Mustafa 15.07.2016 to 24.07.2017 (375 days)}

• **Expenditure for Rehabilitation programme under CAPEX**

Rehabilitation programme under State plan envisaged resettlement of families residing inside the Lake on small islands and in the vicinity of Dal Lake by providing them with residential plots outside the Lake area.

The State Government initially approved (May 2001) the project for ₹ 135 crore which was revised from time to time. The project included land acquisition, development of plots, construction of roads, providing water and electricity, sewer networking and STPs and other basic amenities. Two sites were identified at Chandpora and Rakh-i-Arth for resettlement of concerned families.

Out of 1,132 *kanal* and 11 *marla* of land identified by LC&MA at Chandpora Srinagar, land measuring 581 *kanal* was acquired up to October 2003 at a cost of ₹ 8.32 crore. Since the land was falling in the green belt area of Srinagar Master Plan, it could not be developed into plots.

The State Government transferred (April 2006) land measuring 7,526 *kanal*⁴⁴ and seven *marla* at Rakh-i-Arth, Budgam to LC&MA for development of a colony. The colony was to be developed within five years at a cost of ₹ 402 crore. The land was falling within 10 km of a wildlife sanctuary for which environment clearance was to be obtained.

Audit observed that LC&MA had applied (September 2011) for environmental clearance after a lapse of over five years since transfer of land by the Government. Clearance was granted by the Government in July 2012. Thus, there was a delay of over six years in processing and obtaining of environmental clearance.

An amount of ₹ 62.07 crore was spent (March 2013) on acquisition of 3,390 *kanal* of land (₹ 16.37 crore) and on development of acquired land (₹ 45.70 crore). Due to delay in the rehabilitation process and inadequate funding, LC&MA submitted (June 2012) a revised DPR at a cost of ₹ 416.72 crore which was approved (March 2013) by GoJ&K with extended timeline for completion of rehabilitation process up to March 2018.

Against project cost of ₹ 416.72 crore, only ₹ 189.27 crore⁴⁵ was released and ₹ 181.90 crore was spent as of March 2022. The component wise physical and financial targets *vis-a-vis* achievements regarding rehabilitation of Dal-dwellers are detailed in **Table 4.4.**

⁴⁴ Including 50 *kanals* of proprietary land for which compensation at the rate of ₹ three lakh per *kanal* was to be paid and 7,050 *kanals* of land which was under occupation of *kamas* to whom compensation at the rate of ₹ 0.40 lakh per *kanal* was to be paid

⁴⁵ ₹ 164.27 crore ending March 2020 + ₹ 25 crore during 2020-21

Table: 4.4: Physical and financial targets vis-à-vis achievements regarding rehabilitation of Dal dwellers

Sl. No	Activity	Unit	Project Targets		Physical Achievement	Expenditure Incurred (₹ in crore)	Percentage of Physical Achievement
			Physical	Financial (₹ in crore)			
1.	Land acquisition	Kanals	7,050	29.50	5,632.00	23.03	80
2.	Earth filling	lakh cum	21.5	140.96	18.71	62.46	87
3.	Housing units	No.	10,600	111.30	485.00	3.07	5
4.	Development of Roads	Kms	82.5	82.41	23.10	29.63	28
5.	Laying of Sewerage Network	Kms	36.76	20.70	22.79	43.15	62
6.	Construction of Park	No.	26	2.44	4.00	0.67	15
7.	Electric & Water Supply	No.	84.5	40.01	Nil	11.63	Nil
8.	Solid Waste Management/ Environment Impact Assessment / Contingency	Job	3	17.29	Nil	8.24	Nil
Total						181.88	

(Source: records of LC&MA)

It may be seen from the **Table 4.4** that although LC&MA acquired 80 *per cent* of land, only 485 housing units constituting five *per cent* of the target were developed. Further, the physical progress of electric and water supply as well as Solid Waste Management/ Environment Impact Assessment / Contingency was found to be nil.

Further, out of total earth works, earth filling of 21.5 lakh cum comprised 16 works for development of plots which were allotted (2012-14) to three contractors at a cost of ₹ 8.25 crore. After spending ₹ 5.27 crore, physical progress of works ranged between 20 and 80 *per cent*. As of March 2022, the works had remained abandoned for over six years resulting in unfruitful expenditure of ₹ 5.27 crore as sections 1-7 of bay 16 at Rakh-i-Arth could not be developed as plots for allotment to Dal dwellers. Neither reasons for abandoning of 16 works by the contractors nor documents regarding re-tendering/ re-construction of these works were provided to audit.

Against the target of acquiring 1,994 structures, only 319 (16 *per cent*) were acquired as of December 2022.

Inadequate funding, delay in obtaining environmental clearance and inadequate monitoring by the BoD resulted in delay in rehabilitation of 84 *per cent*⁴⁶ of Lake

⁴⁶

319/1,994 structures

dwellers. As a result, Conservation and Management of Dal Lake got hampered as sewage generated by dwellers continued to be discharged into the Lake body.

H&UDD stated (December 2022) that LC&MA would prepare revised DPR of Phase-I of Rakh-i-Arth housing colony which would be complete in all respects. Regarding abandonment of 16 works, it was stated that these works were abandoned due to land dispute.

4.7 Other programme activities

LC&MA had not carried out studies to evaluate the impact of conditions in the catchment area of the Lake on Lake ecosystem. Impact of inflow of nutrients into the Lake was not monitored. Bathymetric survey was not carried out to evaluate impact of sediment inflow into the Lake. Water budget of the Lake had not been measured. Flushing of Lake was not done as per prescribed mechanism. Assessment of biodiversity of the Lake was not made for monitoring the ecosystem of the Lake. Study of seed bank to understand vegetative history of the Lake was not carried out. Rate of sedimentation in the Lake was not gauged to ascertain expected life of the Lake and interconnected Lakes of Anchar and Gilsar had remained without any conservation programme

4.7.1 Research studies in Catchment Area

NLCP envisaged study of various aspects of the Lake ecosystem including geological/hydrological study of catchment area of the Lake and Lake bed, impact of snowfall/rainfall on temporal discharge, behavior of ground water movement from catchment area and impact of drains flowing into the Lake.

Audit observed that no such study was carried out by LC&MA. In absence of study of catchment area, the impact of conditions in catchment area on the Lake ecosystem could not be evaluated.

Audit had highlighted presence of heavy metals like manganese, copper, lead, nickel, cadmium and arsenic which were far above permissible limits in the Lake in **Paragraph 3.2.10.5** of the CAG's Audit Report of Jammu and Kashmir for the year ended March 2006. Thereafter, LC&MA had not carried out any tests for detection of heavy metals in the Lake and its impact on aquatic life/ food chain as of March 2022.

Concentration of heavy metals in the Lake water results in high level of these elements in aquatic life such as fish which are being consumed by the humans at the top of the food chain. Pathological effects of these elements can cause damage to brain, liver and kidney.

H&UDD stated (December 2022) that it has decided to hire consultants from relevant fields to carry out studies in the catchment area and in this regard the matter had been taken up with Kashmir University and National Institute of Technology, Srinagar.

4.7.2 Nutrient load monitoring

Dal Lake receives large quantity of nitrogen and phosphorus from Dachigam *nallah*, Dara *nallah* and high altitude Marsar Lake. These snow-fed *nallahs* join to form Tailbal *nallah* which enters the Lake at the northern shore. Phosphorus and nitrogen promote prolific growth of weeds which results into retrogressive change in the ecosystem and reduction in open water area of the Lake.

As per data in the DPR approved (1998-99) under NLCP, total phosphorus inflow into the Lake was about 156.62 tons and outflow from the Lake was 80.62 tons. Inflow of organic nitrogen was 241.18 tons whereas outflow was 109.22 tons. Thus, 76 tons of phosphorus and 131.96 tons of inorganic nitrogen were entrapped within the Lake system.

Audit noticed that after 1998-99, inflow of phosphorous and nitrogen into the Lake and its impact on ecosystem of the Lake and on growth of weed and open water area of the Lake was not monitored.

H&UDD stated (December 2022) that nutrient load of nearly 50 sites was being monitored by scientists of Research and Monitoring wing of the LC&MA on a monthly basis and quarterly health report cards were issued.

The reply is not convincing as no monitoring reports with data of nutrients was provided in support of the reply.

4.7.3 Hydrology and water balance studies

Bathymetric study to measure underwater features⁴⁷ and rate of sedimentation of Dal Lake was carried out by IIT, Roorkee in October 2000. Although LC&MA had got Bathymetric survey conducted in 2018-19, the survey was not comprehensive as it did not indicate quantum of silt deposited and rate of sedimentation in the Lake. Thereafter, no such comprehensive survey was undertaken by LC&MA as of March 2022. Consequently, the impact of NLCP on sediment inflow into the Lake, water volume and depth of Lake could not be evaluated.

H&UDD stated (December 2022) that bathymetric survey of the Lake carried out by Indian Navy indicated the depth of the water body and identified the locations for dredging.

⁴⁷ Mean water level, minimum/ maximum/ average depth, minimum/ maximum/ average water of the Lake.

The reply should be seen in light of the fact that bathymetric report annexed with the reply does not indicate locations and quantum of silt deposited in the Lake and its catchment area.

4.7.3.1 Water budget of the Lake

For maintaining the water budget of the Lake, water inflow into and outflow from the Lake was needed to be measured for providing scientific basis for validation of other water balance studies.

Audit noticed that after measuring water budget up to 1998-99, LC&MA had not carried out any further measurement of water budget though it was provided for in the approved DPR of NLCP. As a result, decrease, increase, uniformity in the water budget of the Lake could not be determined by LC&MA.

H&UDD stated (December 2022) that water budget of the Lake was being regularly monitored by scientists of R&M wing of LC&MA.

The reply is not convincing as no monitoring reports with data regarding water budget was provided in support of the reply.

4.7.3.2 Flushing of the Lake

Flushing of a Lake means reducing the pollution by clean inflow of water with an equivalent outflow of polluted water. In the process, the clean water both displaces and mixes with the polluted water. Flushing of the Lake has to be done to ensure re-circulation of Lake water. Flushing rates of Dal Lake were to be worked out by dividing total outflow by average Lake capacity of 15 million cum as was laid in the approved DPR under NLCP.

Audit observed that this system had not been adopted for flushing of the Lake. The water outflow of the Lake was carried out without any laid down mechanism through three gates (two at Dal gate and one at Brari-Numbal) where crest level/ scale had been installed. No crest level/ scale was installed at the fourth outlet at Amir Khan *nallah*. Although the three outlets located at distant places from one another were required to be simultaneously controlled, audit noted that the outlets were manually and concurrently operated by only two persons casting doubt over the authenticity of the manual readings recorded in the log books of these outlets.

The Executive Engineer, Lake Division-I stated (June 2022) that the matter would be looked into and necessary action would be taken.

H&UDD stated (December 2022) that the water level of the Lake was being regulated by four outlet gates and flushing of discharge at outlet gates was being done strictly as per quantum of water inflow from sources of the Lake. It was further stated that water

level in Dal Lake was being maintained at 1,583.43 meters above sea level, and that any excess flow received from inflow channels was being flushed out from outlet gates.

The reply was silent regarding the audit concerns raised about the fact that the outlets were manually and concurrently operated by only two persons casting doubt over the authenticity of manual readings recorded in respect of these outlets.

4.7.4 Biodiversity in the Lake Ecosystem

DPR approved under NLCP envisaged the need for planned assessment of biodiversity of the Lake including preparation of species inventory and distribution pattern of species, identification of fugitive species, study of native and introduced populations, individual studies on invasive species and their impacts on native flora and fauna and identification of rare/ endangered species.

Audit observed that as of March 2022, no assessment of biodiversity of the Lake was made by LC&MA to monitor its ecosystem.

H&UDD stated (December 2022) that assessment of biodiversity was being done on a monthly basis and findings of these studies were included in the annual reports of LC&MA.

The reply is not acceptable as no monthly reports of assessment done in respect of biodiversity and annual reports were furnished to audit nor were these documents annexed with the reply.

4.7.4.1 Seed bank inventory

To understand vegetative history of the Lake and to explore possible restoration measures involving renewal of seed bank, a study of seed bank was to be carried out as per approved DPR under NLCP. Permissible limits of aquatic weeds were to be gauged and the Lake area was to be monitored and managed accordingly. Besides, the negative impact of excessive propagation of economically important plants was to be investigated for stability of the Lake's ecosystem.

Audit observed that as of March 2022, study of seed bank to understand vegetative history of the Lake was not carried out and permissible limits of aquatic weeds in the Lake were not gauged. Negative impact of excessive propagation of plants also was not investigated.

H&UDD admitted (December 2022) that no such study was conducted, since it was a research based study and infrastructure of LC&MA did not support such elaborate and extensive studies. It was further stated that LC&MA would consider and place the proposal before the Administrative Department for undertaking such a study.

4.7.5 Assessment of life expectancy of Lake

Expected life of a Lake is estimated by bathymetric study which measures underwater features of a water body and determines the rate of sedimentation therein. The Dal Lake has four basins of Hazratbal, Bod-dal, Gagribal and Nigeen.

Audit noticed that during implementation of NLCP, no survey was conducted in any of the four basins of the Dal Lake to gauge the rate of sedimentation to assess increase/decrease in expected life of the Lake. As a result, impact of implementation of Conservation and Management Programme in overcoming ageing of the Lake by reducing sedimentation rate in the Lake was not ascertainable.

H&UDD stated (December 2022) that as per study conducted by Roorkee University, due to construction of settling basin in 1989, sedimentation rate in Hazratbal sub-basin had reduced considerably after 1986-87 as compared to the year 1963-64. It was further stated that LC&MA had carried out many works both in the catchment area as well as in the inflow channels to reduce further silt load from entering the Lake and dredging of settling basin to increase its efficiency was also in progress.

The reply does not address the specific audit observation regarding survey, which had not been conducted during implementation of NLCP to gauge the rate of sedimentation in the Lake and to determine the expected life of the Lake.

4.7.6 Conservation and Management Programme for interconnected water bodies

Interconnected Lakes of Anchar and Gilsar act as exit channels for outflow of water from Dal Lake. These two water bodies are essential for sustenance of the ecosystem of Dal Lake. The two water bodies were handed over by Revenue Department of GoJ&K to LC&MA between November 2002 and April 2003. Over time there has been reduction in the expanse of Anchar and Gilsar Lakes and water quality of these Lakes has also deteriorated due to encroachment and earth filling. Solid waste generated by inhabitants of shoreline areas of these water bodies also finds its way into these water bodies.

LC&MA prepared a Pre-Feasibility Report (PFR) for restoration and conservation of Anchar and Gilsar Lakes at a cost of ₹ five crore and submitted (June 2004) it to the H&UDD. Tenders invited (August 2005) for preparation of the project report could not be finalised by H&UDD. Centre and State coordination and monitoring committee⁴⁸ suggested (January 2007) a conservation programme for water bodies of Anchar, Gilsar and Khushal Sar through Department of Wetlands, MoEF&CC.

⁴⁸

Constituted by MoEF&CC for Conservation and Management of Dal Lake under NLCP.

Audit observed that no action had been taken by LC&MA up to May 2013 despite lapse of over seven years.

For restoration of these water bodies, LC&MA took up matter (June 2013) with MoEF&CC which conveyed (March 2014) that the proposal be submitted after finalisation of Guidelines in respect of National Plan for Conservation of Aquatic Ecosystem (NPCA). No action was taken by LC&MA up to August 2017.

LC&MA submitted (September 2017) a revised PFR with a cost of ₹ 100 crore to the Economic Reconstruction Agency (ERA) for funding by Asian Development Bank. As of March 2022, there was no further progress.

GoJ&K released (2016-18) ₹ 1.40 crore to LC&MA for preparation of project report for Conservation and Management of Anchar and Gilsar water bodies. LC&MA spent ₹ 0.34 crore on Electronic Total Station (ETS)⁴⁹. No further action was taken for preparation of the project report resulting in blockage of ₹ 1.06 crore for over two years.

Thus, these two Lakes remained without any conservation programme for over 17 years since they were handed over to LC&MA.

Audit also observed that:

- Wet land and land under plantation/ paddy of Anchar and Gilsar Lakes measuring 6,261 *kanal* had neither been demarcated by boundary pillars nor included in asset records by LC&MA.
- Work for installation of ETS was allotted (January 2018) to M/s Sky Tech Engineers without inviting tenders.

The Executive Engineer (EE) admitted (June 2022) that there was no progress in the Conservation & Management of these two Lakes though these Lakes were directly or indirectly associated with Dal Lake. EE added that demarcation of the Lakes and maintaining of asset records would be done.

H&UDD stated (December 2022) that the Conservation and Management of Gilsar and Anchar water bodies had not been formally assigned to LC&MA. It added that conservation of these Lakes had been handed over to Srinagar Municipal Corporation (SMC)/ Irrigation & Flood Control Department (I&FCD) under AMRUT 2.0.

The reply is not satisfactory as Commissioner Secretary to Government, H&UDD had informed (2004) Vice Chairman, LC&MA that the latter was responsible for maintenance of these two Lakes. Moreover, the reply should be considered in light of the fact that H&UDD had released (2016-18) ₹ 1.40 crore to LC&MA for preparation of project report for Conservation and Management of Anchar and Gilsar water bodies,

⁴⁹

It is an electronic/optical instrument used for surveying and building construction.

which was not prepared. Further, the assertion of Department that these Lakes had been handed over to SMC and I&FCD under AMRUT 2.0 is not based on fact as only a few developmental measures concerning these Lakes are being carried out under AMRUT 2.0 and the Lakes remain in the custody of LC&MA.

4.8 Public Awareness

A field office had not been set up for creating public awareness to give boost to Tourism industry and a website for dissemination of information to tourists was not developed.

An amount of ₹ 5.41 crore was sanctioned under NLCP for creating public awareness about objectives of conservation of the Lake including steps taken by Government and other agencies for boosting the Tourism industry. A *Doonga* Boat⁵⁰ was to be used as field office for “Awareness Campaign Plan” and a website for dissemination of information to tourists was to be developed at an estimated cost of ₹ 0.75 crore.

Audit examination disclosed the following deficiencies:

- Although an amount of ₹ 1.39 crore was spent on activities relating to public awareness as of March 2022, no records detailing activity-wise targets/ achievements and monitoring reports were maintained.
- Out of expenditure of ₹ 0.41 crore incurred between April 2014 and March 2020, ₹ 0.26 crore was spent on activities not connected with public awareness such as advertisement of tenders, travelling expenses, hiring of taxis, refreshments etc.
- Only ₹ 0.11 crore was spent on public awareness and voucher details were not available in respect of expenditure of ₹ four lakh.
- No *Doonga* Boat and the requisite website for dissemination of information was created. Besides, ₹ 4.02 crore remained unutilised as of December 2022.

The Executive Engineer, Lake Division-I stated (June 2022) that due to time and cost overrun of components of public awareness, the NLCP funds got exhausted as such office could not be established in a *Doonga* Boat and website could not be created.

H&UDD stated (December 2022) that LC&MA had reached out to the general public through print, electronic and social media for creating mass awareness and had launched cleanliness drives in and around Lake through active participation of students, NGOs, public representatives etc. It was further stated that the website had been created and was being updated regularly. It added that *Doonga* boat was not required as two

⁵⁰ *Doonga* is a type of houseboat where many families live in Srinagar. The *Doonga* boat can also be used for various other purposes.

main offices entrusted with awareness programmes were located near the shoreline itself.

The reply was silent about diversion of ₹ 0.26 crore towards activities not connected with public awareness. Further, as per the DPR, the field office was to be established in a *Doonga* boat, which was not done.

4.9 Manpower Management

For effective implementation of Conservation and Management programme of Dal Lake, five Directors had not been appointed and Information Technology/ Management Information System/ Planning wings had not been created in LC&MA.

For effective implementation of Conservation and Management programme of Dal Lake, five Directors were projected for appointment under NLCP. Wings of Information Technology/ Management Information System and Planning were also to be created. Audit noted that Directors had not been appointed in LC&MA and Information Technology/ Management Information System/ Planning wings had not been created in LC&MA as of December 2022. The laboratory of LC&MA had remained without a Manager and Environment Engineer. Besides, three Assistant Directors were also not appointed in the wings of Rehabilitation, Regulation and Enforcement.

As per Government policy regarding posting of employees, a Government employee shall be posted on a post for a minimum tenure of two years and maximum of three years. In respect of important projects required to be completed in a time bound manner, maximum extension of five years can be granted.

Audit observed that the policy had not been followed in respect of LC&MA during April 2014 to March 2020, as out of seven regular Vice-Chairmen, five had tenures ranging between one and five months and two had tenure of about one year each. Besides, five Vice-Chairmen had additional charge of LC&MA for about three years.

H&UDD stated (December 2022) that it had already submitted a re-organisation plan approved by BoD to the Government and Finance Department had been requested by LC&MA to expedite the process of approval of the plan. The reply was silent about non-adherence to the Government policy regarding posting of Vice-Chairman in LC&MA.

4.10 Accounting Deficiencies

In terms of Section 21 of the Jammu and Kashmir Development Act, 1970, LC&MA is required to prepare annual accounts including balance sheet in consultation with the Government appointed auditor who should certify these accounts for forwarding to the Government which in turn has to lay them before both houses of the Legislature.

Audit noticed that LC&MA had not prepared annual accounts including balance sheet since its creation. Thus, the true picture of assets and liabilities of the authority was not known.

The Financial Advisor & Chief Accounts Officer stated (June 2022) that the process for appointment of CA to prepare the Annual Accounts is underway.

4.11 Monitoring Mechanism

Due to non-holding of required meetings by the statutory bodies such as Project Coordination-cum-Monitoring Committee, Board of Directors, Scientific Advisory Committee and High-Level Committee, there were inadequacies in monitoring mechanism for implementation of programmes for Conservation and Management of Lake.

For proper implementation of NLCP, PMRP and other programmes, the monitoring mechanism should have been efficient and effective so that objectives of Conservation and Management of the Lake were attained fully and within time. However, Audit noticed the following inadequacies in the monitoring mechanism for implementation of programmes for Conservation and Management of Dal Lake.

• Coordination-cum-Monitoring Committee (CMC)

To monitor and evaluate the work done under NLCP, Coordination-cum-Monitoring Committee (CMC) was constituted in June 2006. CMC, headed by Chief Secretary of Jammu and Kashmir with 16 members (eight from State Government, six from GoI and one each from two renowned universities), was required to meet quarterly. The first meeting scheduled to be held in September 2006, was held in January 2007 with only nine members. The second meeting held (January 2015) after a gap of eight years was attended by eight members from the State Government. No meeting was convened thereafter.

H&UDD stated (December 2022) that considering its size and status, the CMC had met as and when required.

The reply is not acceptable as according to the fund sanction order of NLCP, the CMC was required to meet quarterly.

• Board of Directors (BoD)

Against the requirement of meeting 56 times since launch of NLCP, the BoD had met only 23 times up to September 2019. Only four meetings were held between January 2015 and March 2022.

H&UDD stated (December 2022) that meetings of BoD were subject to requirement and as of August 2022, BoD had conducted 25 meetings.

The reply is not satisfactory as BoD itself had decided to meet more frequently and preferably every three months.

• **Monitoring Committee (MC)**

To monitor and oversee the mechanism for preserving and protecting the Lake, the State Government constituted (April 2016) the Monitoring Committee after a lapse of over 10 years from launch of NLCP.

Audit noted that frequency of meetings to be held by the MC during a year was not prescribed by the Government. As of March 2019, though the MC had met 17 times, no follow up action was taken in respect of issues discussed in the meetings.

H&UDD stated (December 2022) that Hon'ble High Court had disbanded (April 2021) all existing committees.

The reply is not satisfactory as the audit observation pertains to the period before April 2021.

• **Scientific Advisory Committee (SAC)**

To give scientific guidance for Conservation and Management of the Lake in various matters including aquatic ecology, hydrology and watershed management, Scientific Advisory Committee (SAC) was constituted (prior to 2012) by the Government.

Audit noticed that the SAC had not been reconstituted till November 2016 after expiry of its tenure in June 2012. The Committee had met only eight times falling short of requirement of quarterly meetings per year.

H&UDD stated (December 2022) that SAC had met on multiple occasions and its meetings were subject to availability of members.

The reply is not convincing as Government Order (November 2016) had envisaged that SAC will conduct quarterly meetings.

4.12 Impact Assessment

GoJ&K had not appointed Third Party Inspectors resulting in non-monitoring of performance of NLCP launched for Conservation and Management of Dal Lake.

Impact evaluation helps to demonstrate success or failure of a programme and provides accountability to all stakeholders. Besides, it provides evidence to make informed decisions for redesigning the current programme or for planning future interventions. However, Audit noticed as follows:

To monitor performance of NLCP, MoEF&CC accorded (December 2010) approval for conducting Third Party Inspection (TPI). TPI was to cover construction, commissioning, trial run and post-construction phases of the projects undertaken. The expenditure incurred on TPI was to be reimbursed by MoEF&CC against claims submitted by GoJ&K.

Audit noticed that as of March 2022, GoJ&K had not appointed TPI despite lapse of over nine years since approval for appointment of TPI was accorded by GoI. Thus, performance of NLCP launched for Conservation and Management of Dal Lake could

not be monitored by TPI and ₹ 1.50 crore released (March 2016) by GoJ&K to LC&MA for engagement of TPI also remained unutilised as of March 2022.

H&UDD stated (December 2022) that instead of TPI, LC&MA had utilised the services of experts from National Environmental Engineering Research Institute (NEERI), IIT Roorkee and Committee of Experts.

The reply is not satisfactory as approval for engagement of TPI was accorded by MoEF&CC and services of NEERI, IIT Roorkee and Committee of Experts did not form part of TPI.

4.13 Research carried out by scholars of various universities

Conclusions and suggestions of research reports were not taken into consideration by LC&MA for taking corrective measures in respect of Conservation and Management of Dal Lake.

Management of Lakes calls for continuous research to address the drivers of change in the Lake.

Audit noticed that LC&MA had not got research carried out to evaluate water quality of Dal Lake and to determine fishes and water bird population in the Lake. Dis-appearance of native species and invasion of noxious species, if any, due to heavy inflow of silt, sewage into Lake from its catchment area had also not been assessed. However, research carried out by scholars of various universities (Themes of research papers and conclusions/ suggestions of authors are detailed in *Appendix-4.6* indicated that the health of Lake had deteriorated due to factors detailed below:

- There was increase in nutrient and silt load in the catchment of the Lake.
- There was an increase in cases of encroachment in and around the Lake and increase in tourist influx.
- STPs were malfunctioning.
- Proposals of consultants were faulty.
- Sewerage system around the Lake including that of houseboats was incomplete.
- There was an increase in human settlements, within and around the Lake, discharging solid waste and sewage into the Lake.

Audit noted that LC&MA had not taken conclusions and suggestions of research outputs into consideration for taking corrective measures in respect of Conservation and Management of Dal Lake.

H&UDD stated (December 2022) that Research and Monitoring Division of LC&MA was conducting physico-chemical analysis of the Lake on a monthly basis and data so generated was being used for evaluation of anthropogenic pressures on the Lake. It added that STPs had been refurbished and were functioning as per Central Pollution Control Board norms and bird population was not monitored as LC&MA lacked technical manpower for doing the same. It was further stated that findings of studies referred by Audit were contrary to results observed by R&M wing.

The reply is not convincing as observations pointed out by Audit are based on independent researches carried out by scholars. Besides, no documentary evidence supporting the Department's assertion, that findings of studies referred by Audit were contrary to the results observed by R&M wing, was provided to Audit.

4.14 Conclusion

There were land use changes in Dal Lake due to non-acquisition of land from Dal dwellers, malfunctioning of STPs, improper de-weeding mechanism and inadequate monitoring and surveillance mechanism. Consequently, open water area in the Lake could not be restored. There were inadequacies in implementation of Lake conservation programmes under NLCP, PMRP and other programme activities such as installation and upgradation of Sewage Treatment Plants (STPs), treatment of solid waste, extracted weed and sludge as well as providing sewage disposal facilities of households and sewer networking of *mohallas*. Inadequacies were also noticed in relocation and alignment of houseboats, shifting of hotels, augmentation of water budget of the Lake, restoration and development works, catchment management works and relocation/rehabilitation of Dal-dwellers.

4.15 Recommendations

- *Changes in the area under water in respect of Dal Lake need to be attended to and monitored periodically.*
- *Robust Lake management policy should be in place to ensure effective functioning and upgradation of Sewage Treatment Plants and proper treatment of sewage and solid waste.*
- *LC&MA should prioritise and expedite various tasks such as providing sewage disposal facilities to households, establishing sewer networking of mohallas, relocating and aligning of houseboats, shifting of hotels, augmenting water budget of the Lake, implementing restoration and development works, catchment management works and relocating or rehabilitating Dal dwellers.*
- *Public awareness programmes should be launched to prevent unauthorised constructions in Lake and change in Lake use area.*
- *Impact of inflow of nutrients into the Lake need to be monitored by LC&MA.*

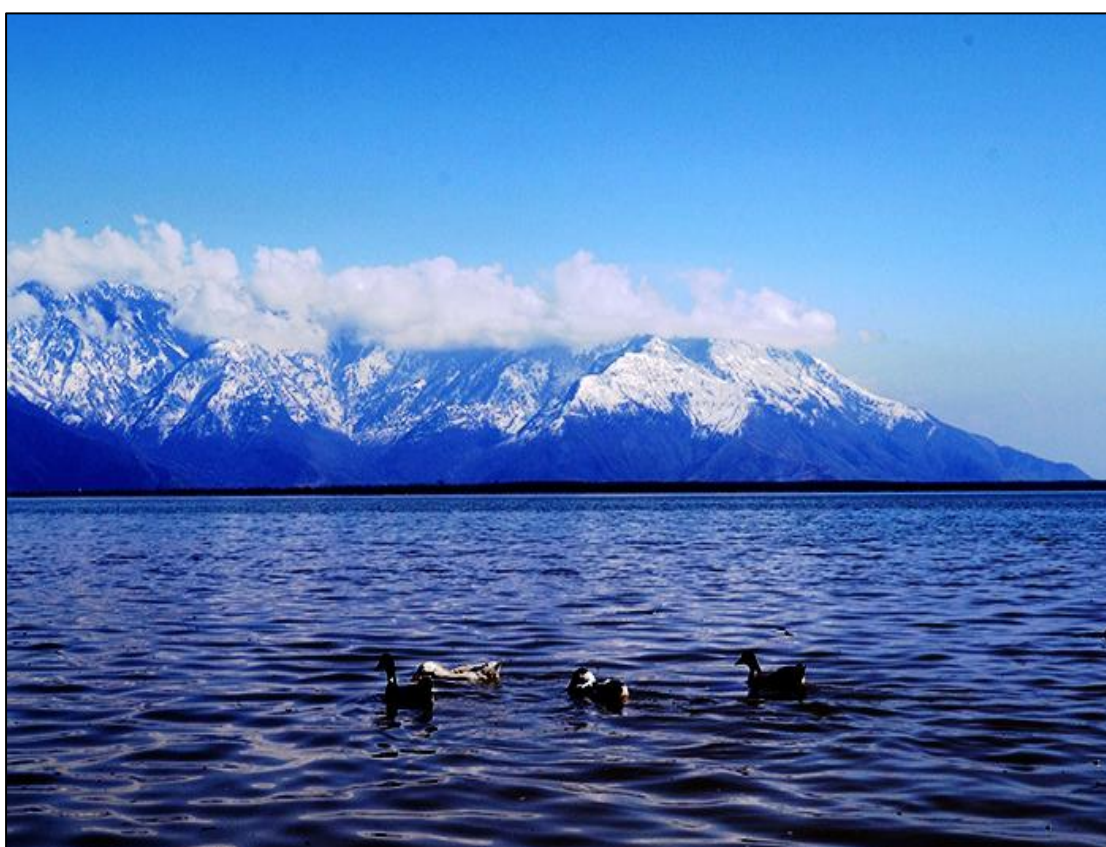
Chapter-V
Conservation and Management of
Wular Lake

Chapter-V

Conservation and Management of Wular Lake

5.1 Introduction

Wular Lake is located in the north-west of Kashmir at a distance of about 35 km from Srinagar. It is the largest freshwater Lake in India. Floating vegetation of the Lake provides fodder for domestic livestock and the Lake also contributes 60 *per cent* of fish production to the fishing industry of Jammu and Kashmir. Lake water is useful for irrigation and domestic needs. The Lake is largely shallow, with a maximum depth of 5.8 meters.

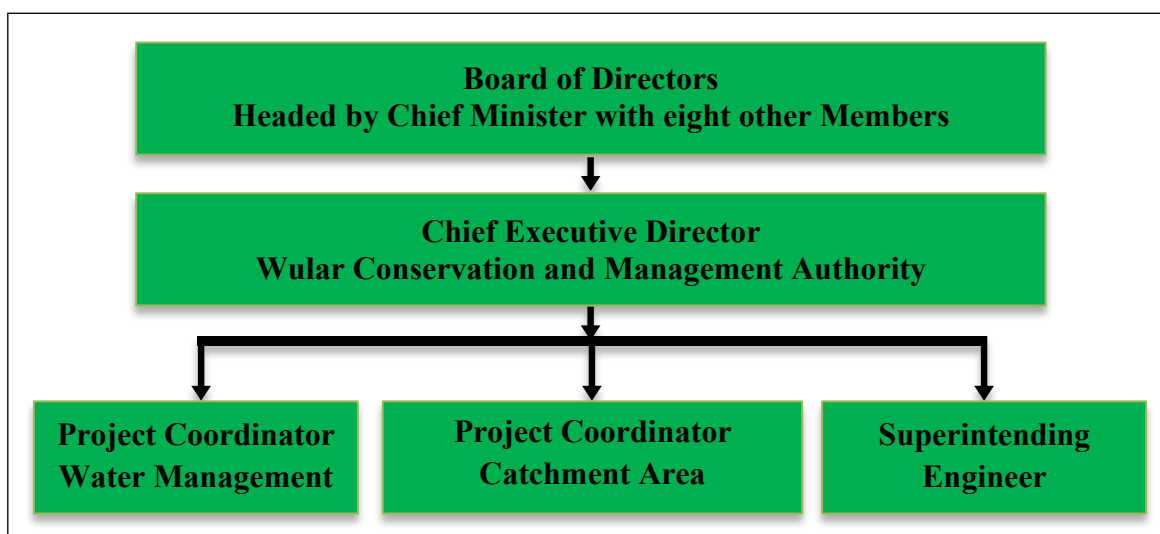


For implementation of Comprehensive Management Action Plan (CMAP) for Wular Lake, Wular Conservation and Management Authority (WUCMA) was established in September 2012 under Section 4 of the Jammu and Kashmir Development Act, 1970.

5.2 Organisational Setup

The Administrative control of the Wular Conservation and Management Authority (WUCMA) vests with Commissioner/ Secretary to the Government, Forest, Ecology and Environment Department, Jammu and Kashmir. The organisational setup of WUCMA is detailed in **Chart 5.1**:

Chart 5.1: Organisational setup of WUCMA



5.3 Establishment of Wular Conservation and Management Authority

There was a delay of over five years in implementation of Conservation and Management Programme of Wular Lake. Governing Body, Steering Committee and a Project Implementing Committee were not constituted. Statutory Body, constituted after a delay of five years, had not held any meeting. In the absence of the Governing Body, Steering Committee, Project Implementing Committee and non-holding of meetings by Statutory Body, Conservation and Management Programme of the Lake suffered as policy matters of Wular Conservation and Management Authority could not be decided.

- CMAP was prepared by M/s Wetlands International in June 2007 on behalf of J&K Wildlife Protection Department. For evaluation of CMAP, a technical committee was constituted (February 2010) by the Forest Department after about three years, which submitted the report in June 2010. For implementation of the Project, WUCMA was established in September 2012 under Section 4 of the Jammu and Kashmir Development Act, 1970 after a delay of over five years since preparation of CMAP. Thus, there was a delay of over five years between preparation of CMAP in June 2007 and establishment of WUCMA in September 2012. This in turn delayed the implementation of Conservation and Management Programme of Wular Lake.
- For running affairs of WUCMA and for providing overall guidance regarding Project implementation in respect of CMAP, Governing Body (GB), Steering Committee (SC), Project Implementing Committee (PIC) and Statutory Body (SB) were to be constituted. GB was to be constituted under the Chairmanship of Chief Minister/ Chief Secretary with 19 members, SC for overall guidance relating to implementation of projects and PIC having senior staff from WUCMA and other concerned Departments,

Audit noticed that no GB, SC and PIC were constituted as of December 2022. Although SB was constituted in September 2012, no meetings of SB were held as of December 2022.

- After the establishment of WUCMA, the Government did not create posts for the Authority. However, 41 officers/ officials were working in WUCMA on deputation from other Departments. Four out of five Chief Executive Directors (CED) held additional charge whereas one Chief Executive Director was deputed to the Authority for only 14 months. Two officers deputed to WUCMA held additional charge of Coordinator, Water Management and Assistant Engineer.

Although it was decided (October 2019) by the Chief Secretary in a review meeting that WUCMA would submit a proposal regarding requirement of staff, no action in this regard was taken as of March 2022. Thus, laxity in staff deployment continued in WUCMA despite lapse of over nine years since its establishment in September 2012.

In absence of key decision making bodies such as GB, SC and PIC and non-holding of meetings by the SB, Conservation and Management Programme of the Lake suffered as policy matters of WUCMA could not be decided and implemented promptly resulting in:

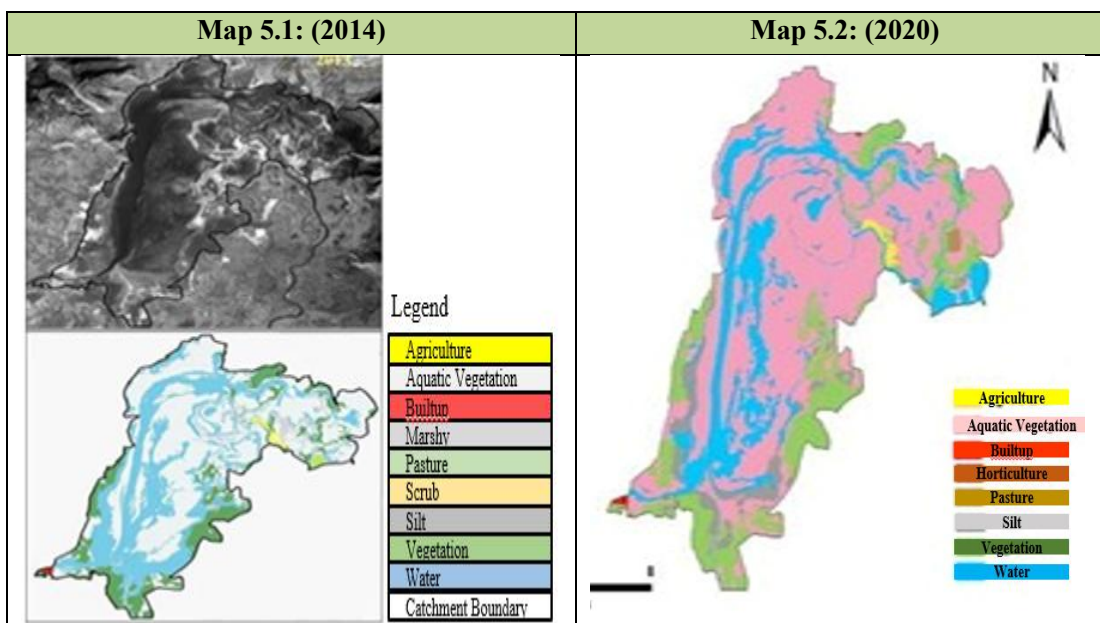
- Laxity in deployment of staff,
- Delay in the implementation of activities laid down under CMAP, and
- Delay in tendering and finalisation of contracts for consultancy services necessary for formulation of Comprehensive Conservation and Management Plan (CCMP) and preparation of DPR for the Lake as discussed in succeeding Paragraphs of this report.

5.4 Land use changes within the Lake and its catchment

5.4.1 Analysis of remote sensing data of EE&RSD to ascertain land use changes in the Lake

There was Spatio-temporal change in land use and water cover of Wular Lake during 2014-20 as detailed in **Maps 5.1 and 5.2, Table 5.1 and Charts 5.2 and 5.3.**

Maps 5.1 and 5.2: Spatio-temporal change in land use and water cover of Wular Lake during 2014-20



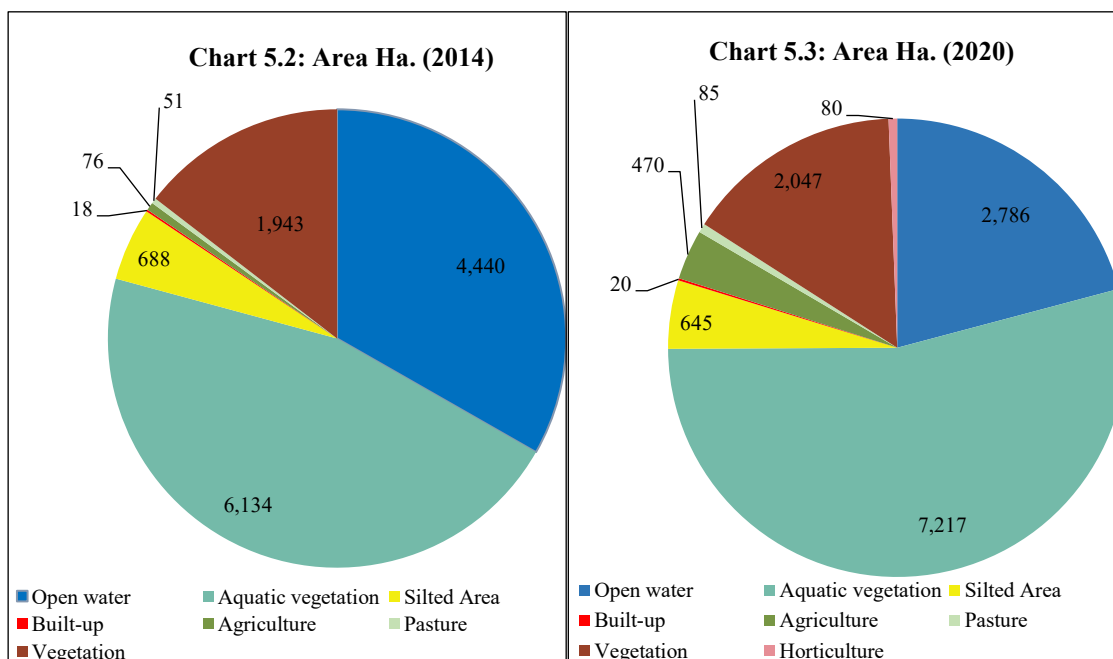
(Source: EE&RSD data)

Table: 5.1: Change in land use/ cover in Wular Lake

(Area in hectares)			Increase/ Decrease & its Percentage (2014 to 2020)			
Land-Use/ classification- Use Changes	2014	2020	Increase	Decrease	Percentage Increase	Percentage Decrease
Open water	4,440.00	2,785.70		1,654.30		37
Aquatic vegetation	6,134.00	7,216.60	1,082.60		18	
Silted Area	688.00	644.90		43.10		6
Built-up	18.00	19.79	1.79		10	
Agriculture	76.00	470.48	394.48		519	
Pasture	51.00	85.33	34.33		67	
Vegetation	1,943.00	2,046.72	103.72		5	
Horticulture	0.00	80.48	80.48		100	
Total	13,350.00	13,350.00	1,697.40	1,697.40		

(Source: data of EE&RSD)

Charts 5.2 and 5.3: Change in land use/ cover in Wular Lake



It may be seen from **Table 5.1** that during (2014-2020), there was an overall land use change of 1,697.40 hectares in the Lake. It included decrease of 1,654.30 hectares under open water area (37 *per cent*) and an alarming increase in other land use changes such as 1,082.60 hectares under aquatic vegetation (18 *per cent*), 394.48 hectares under agriculture (519 *per cent*), 103.72 hectares under vegetation (five *per cent*), 80.48 hectares under horticulture (100 *per cent*), 34.33 hectares under pasture (67 *per cent*) and 1.79 hectares under built-up (10 *per cent*) during the period. Neither were any concrete measures taken by the WUCMA to regulate land use of the Lake nor had it analysed reasons for these land use changes.

Audit analysis revealed that land use changes in Lake were due to delay in the implementation of CMAP and non-formulation of CCMP and DPR for Conservation and Management of the Lake resulting in partial implementation of Lake management activities as detailed in **Paragraph 5.5**.

No sewage treatment system was in place to prevent entry of pollutants into the Lake, measures were not taken to prevent silt from entering into the Lake from its catchment area and there was absence of de-weeding due to which there was increase in aquatic vegetation. Inadequacies in the survey and demarcations coupled with absence of monitoring and surveillance had resulted in increase in other land use changes such as built-up, pastures, agriculture, vegetation and horticulture adversely affecting water quality and biodiversity of the Lake. As a result, there was loss of open water area of the Lake.

However, improvement was witnessed in land use under silted area which had decreased by 43.10 hectares (six *per cent*). This could be attributed to dredging of the

Lake done by WUCMA as discussed under **Sub Paragraph 2 “Dredging of Lake” of Paragraph 5.6.6.**

WUCMA stated (October 2022) that change in land use inferences drawn could not be agreed to on scientific basis, as aquatic vegetation and water expanse were supplementary, since vegetation growth was possible in areas having water. As such there was nothing alarming about the increase of area under aquatic vegetation. It was further stated that field study showed that none of the areas of the Lake was under horticulture, but it was assured that necessary ground truthing would be done and corrective action taken. It was also stated that no built-up area was increasing anywhere in the Lake as changes depicted in built-up were in an area of 21.2 sq. km, which was already in Government records.

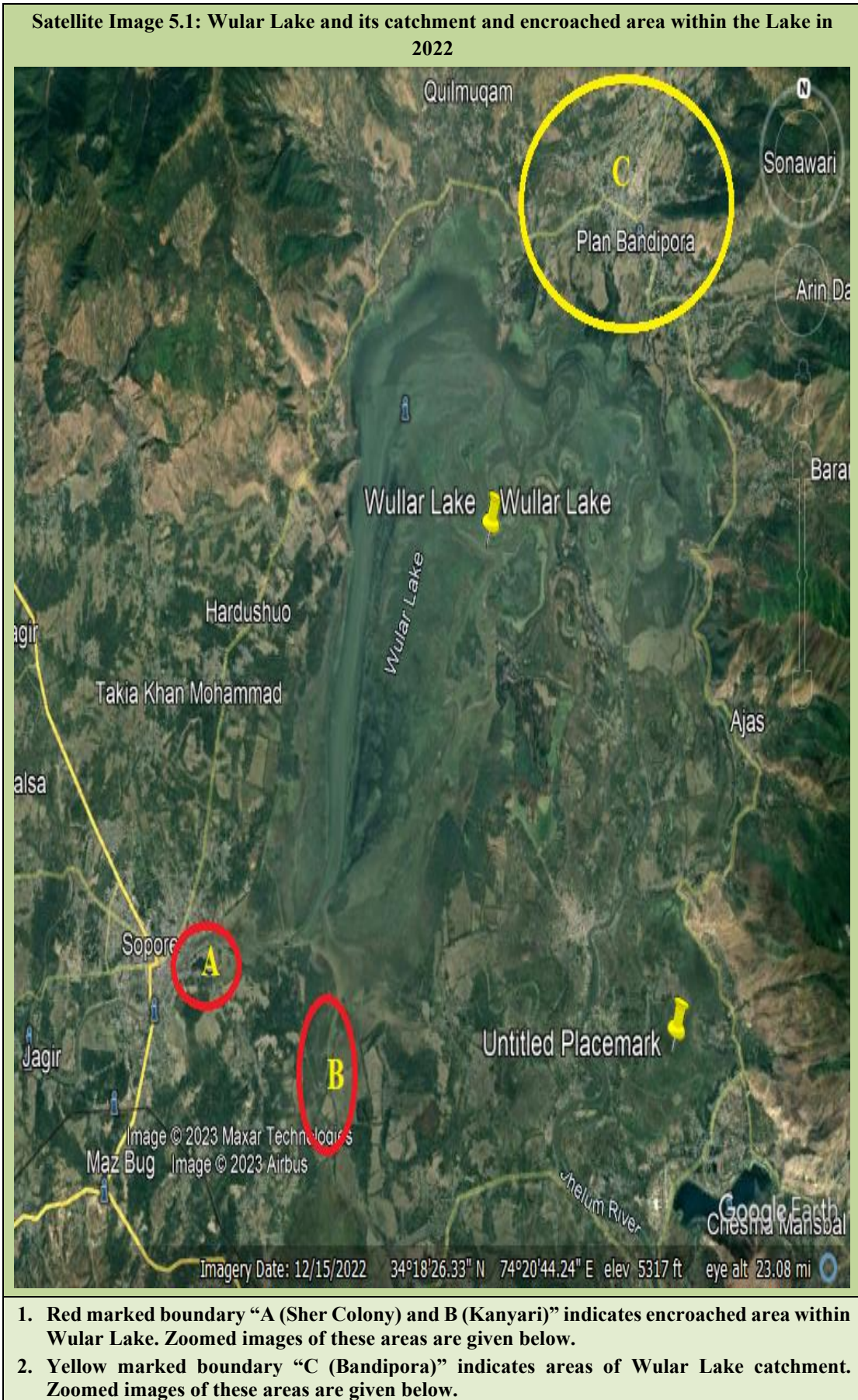
The reply is not acceptable as the audit observation is based on the information provided by EE&RSD and WUCMA. The data provided itself showed that area under built-up and horticulture had respectively increased by 1.79 hectares and 80.48 hectares during 2014-20.

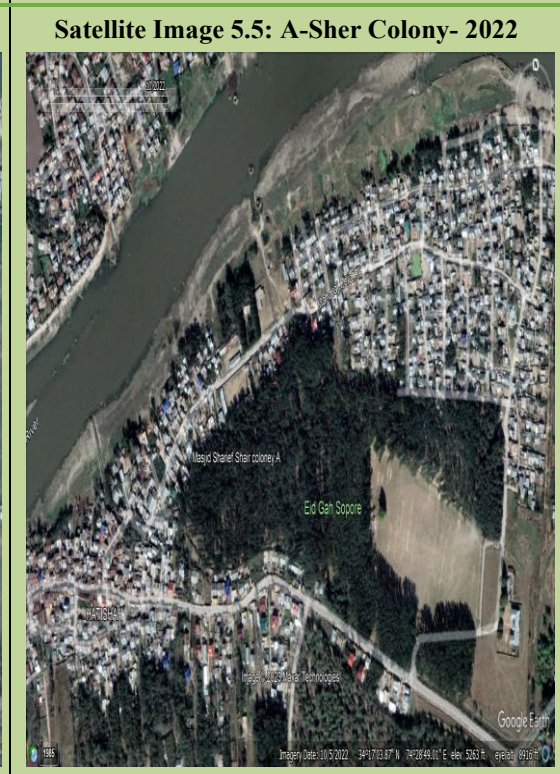
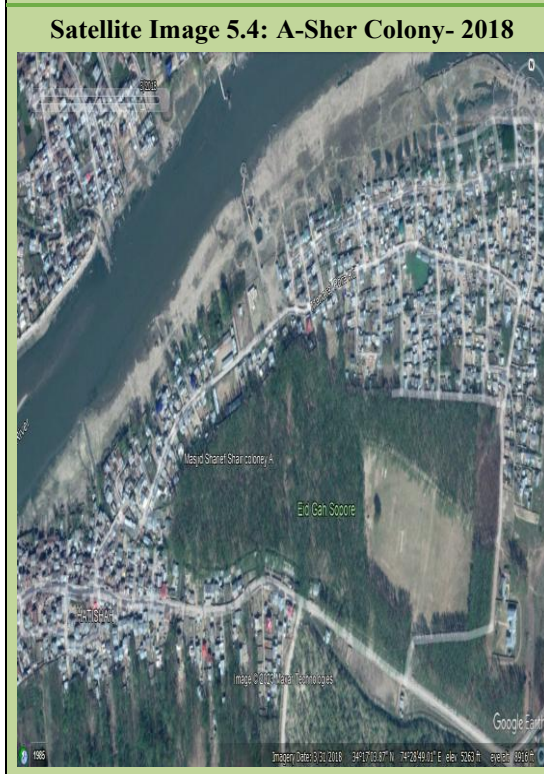
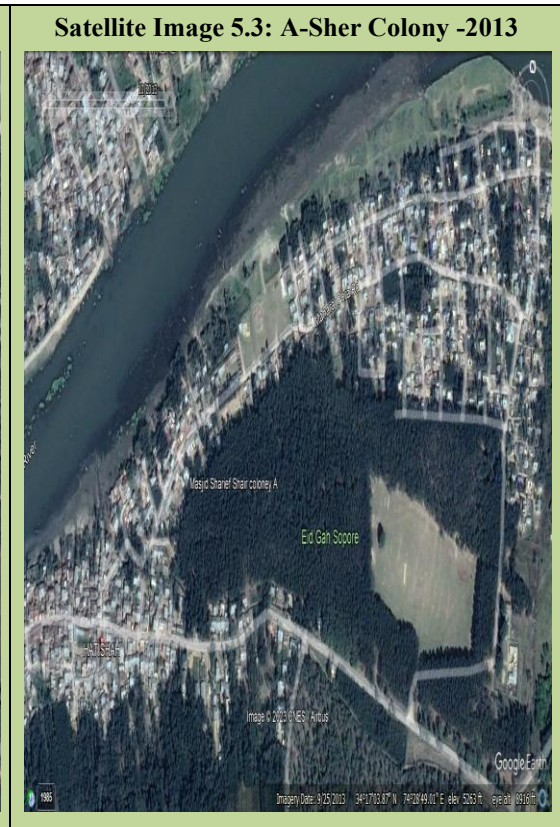
5.4.2 Analysis of Google Earth Pro images to ascertain Spatio-temporal changes in Lake and its catchments

Clear images of Wular Lake and its catchment area available on Google Earth Pro for the period 2006-2022 indicated:

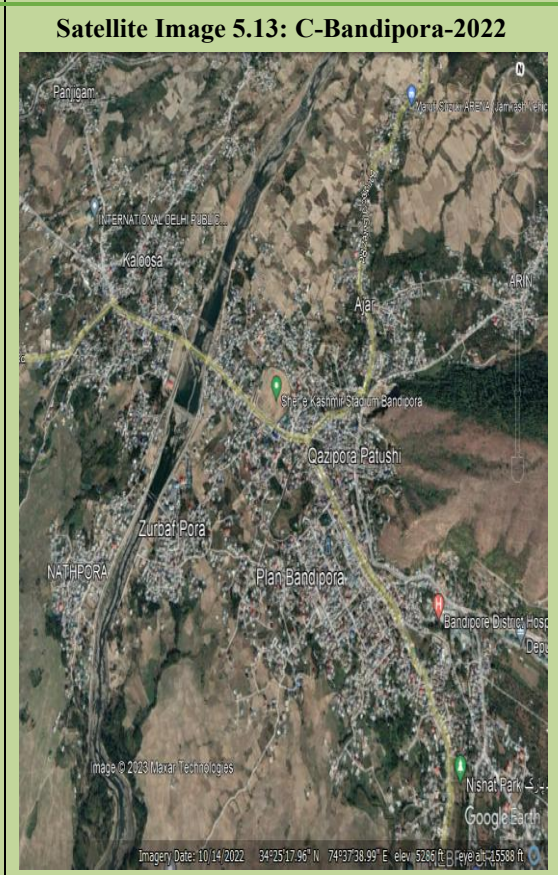
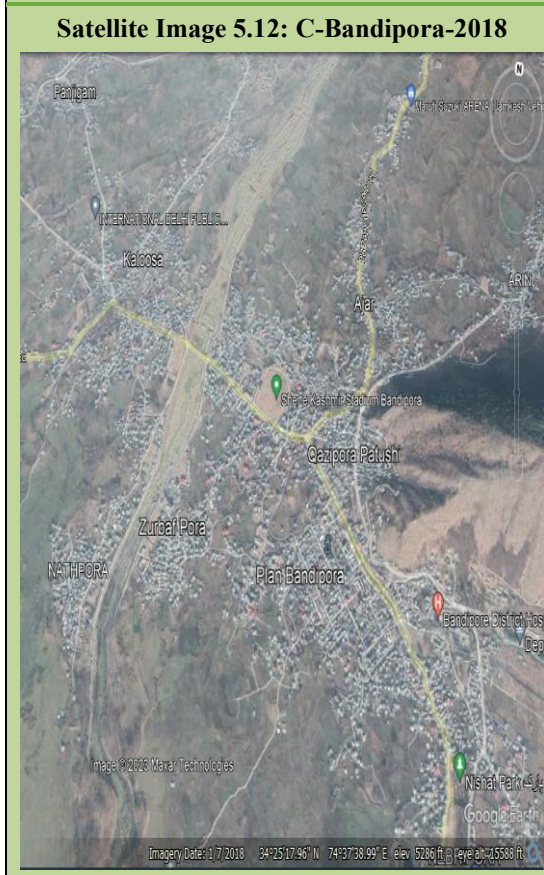
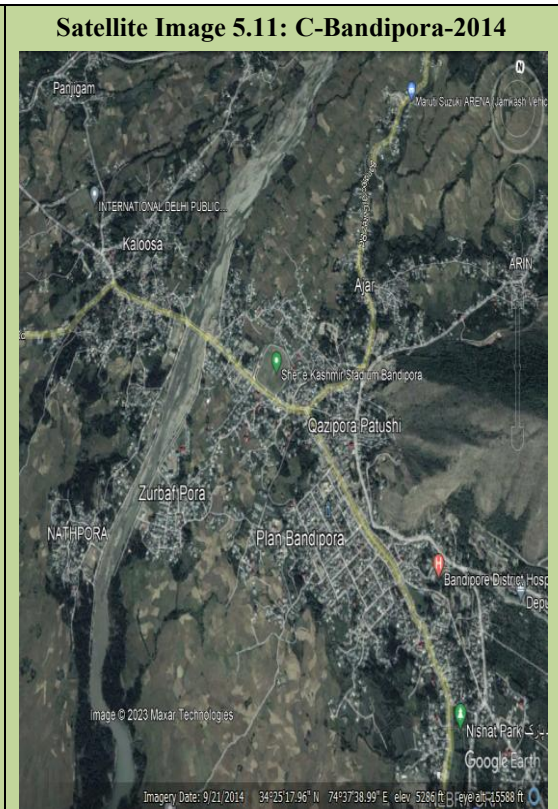
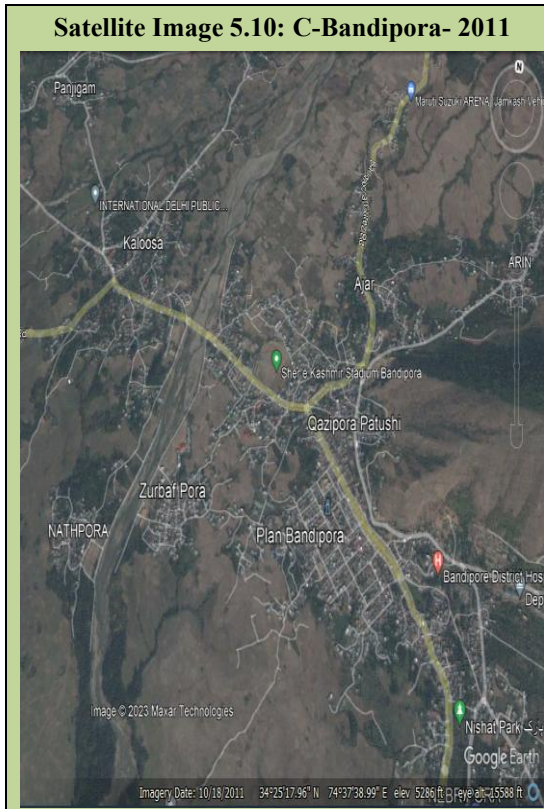
- Increase in built-up in Bandipora catchment area of the Lake. These catchment area are without sewage treatment and the Lake receives water inflow from the *nallahs* of these catchment area and
- Substantial increase in built-up of two colonies viz. Sher Colony and Kanyari, within the Lake over a period of time.

The Google Earth Pro images of the Lake, its catchment and encroached areas within the catchment are shown in the **Satellite images 5.1 to 5.13:**









5.4.3 Decrease in the water area and water holding capacity of the Lake

Audit noticed that WUCMA had made a comparison of toposheets of 1911 with satellite images of 2007 which revealed a reduction of 45 *per cent* in water area of the Lake as the water area had reduced from 157.75 sq. km to 86.71 sq. km. The Lake area had reduced by 24 *per cent* from 176.88 sq. km in 2007 to 133.70 sq. km in 2020. The water holding capacity of the Lake had declined by one-fifth over the last three decades.

In reply, WUCMA stated (October 2022) that on the contrary the water holding capacity of the Lake had increased due to restoration of 4.35 sq.km. of critically silted area of the Lake. This was subsequently harboring economically important hydrophytes like water chestnuts and fishing was also being done in those areas. It was further stated that Wetland Atlas had made comparison with respect to 1967 toposheet and satellite image of 2014 and shown area of 133.25 sq.km. It was also stated that Atlas of wetlands (2006-07 to 2018-19) clearly indicated no significant change in water bodies of Kashmir.

The reply is not acceptable, since the audit observation regarding reduction in Lake area is based on records of WUCMA and EE&RSD.

5.5 Planning

Forest Department of GoJ&K had failed to provide a Detailed Comprehensive Plan for rejuvenation and restoration of Wular Lake. Due to non-hiring of consultancy services for preparation of Comprehensive Conservation and Management Plan (CCMP) and DPR for the Lake, agencies could not be approached for funding for Conservation and Management of the Lake.

Wular Lake Management Action Plan (MAP) and tentative two year action plans were formulated by WUCMA but these Plans were implemented either partially or on ad-hoc basis. Conservation and management of the Lake also suffered due to inadequate funding as discussed in the following paragraphs:

5.5.1 Comprehensive Management Action Plan

J&K Wildlife Protection Department got the Comprehensive Management Action Plan (CMAP), for Conservation and Management of Wular Lake, prepared (June 2007) by the Wetlands International, South Asia, New Delhi for submission to MoEF&CC, GoI. The cost of the CMAP for the Lake was ₹ 386.39 crore with targeted period of completion as five years. The CMAP envisaged seven activities viz. survey and demarcation, catchment conservation, water management, conservation of bio-diversity, eco-tourism development, sustainable resources development and livelihood improvement and institutional development. Against CMAP cost of ₹ 386.39 crore, only ₹ 120 crore was approved under 13th Finance Commission (FC) and only

₹ 60 crore was released between 2011-12 and 2014-2015. The programme was implemented up to 2019-20.

5.5.2 Missed funding opportunities for Conservation and Management of Wular Lake

The Forest Department had opportunities for availing assistance for Conservation and Management of the Wular Lake. However, due to inaction of the Forest Department these opportunities could not be availed as discussed below.

• Failure to provide comprehensive plan for conservation of Lake to GoI

The Forest Department of GoJ&K requested (October 2019) MoEF&CC, GoI to sanction fund of ₹ 1,500 crore for Conservation and Management of the Lake. The MoEF&CC conveyed (December 2019) that the Lake is covered under one of the transformative ideas for 100 days Action Plan for rejuvenation and restoration of 100 Wetlands across the country and asked (December 2019) for a Detailed Plan. As of March 2022, Forest Department GoJ&K had failed to provide a Detailed Comprehensive Plan of the Lake to GoI, which affected the Conservation and Management programme for rejuvenation and restoration of Wular Lake.

WUCMA stated (October 2022) that the entire budget of MoEF&CC for wetlands under NPCA¹ during 2020-21 was ₹ 70 crore, and financing ₹ 1,500 crore plan for Wular Lake was not possible. It was further stated that an Integrated Plan (IP) for ₹ 149.43 crore was prepared by WUCMA and approved by the UT Wetland Authority, which is under consideration of MoEF&CC.

The reply should be seen in light of fact that GoI had asked for a Detailed Action Plan (DAP) in December 2019. However, WUCMA failed to prepare the DAP as sought by the MoEF&CC, and an amount of only ₹ 70 crore was released by GoI during 2020-21. The fact also remains that Integrated Plan (IP) of Wular Lake was not approved as of December 2022.

• Funding of Conservation and Management of Lake

Chief Secretary (CS), GoJ&K held (October 2019) a review meeting on the working of WUCMA. As per decision taken in the meeting, a Detailed Project Report (DPR) was to be prepared for seeking funding from other agencies. WUCMA was to seek assistance from agencies/ consultants dealing with such projects. For preparation of DPR by domain experts, WUCMA sought (December 2019) assistance from the CEO, Economic Reconstruction Agency. Although the latter assured assistance in preparation of DPR, there was no progress in this regard. After over one year, WUCMA floated (December 2020) tenders for hiring consultancy for conducting surveys and studies,

¹ National Plan for Conservation of Aquatic ecosystems

formulation of Comprehensive Conservation and Management Plan (CCMP) and preparation of DPR for the Lake, including its associated wetland and catchment area. The Tender Evaluation Committee of WUCMA proposed (February 2021) to the Forest Department that the allotment of work be awarded in favour of the Rank-1 bidder. As of March 2022, approval of the Forest Department was awaited for allotment of consultancy services to the firm for preparation of CCMP and DPR. In the absence of CCMP and DPR, other agencies could not be approached for funding for Conservation and Management of Wular Lake.

WUCMA stated (October 2022) that although tenders were floated for consultancy and preparation of DPR, its allotment could not be finalised. It was further stated that for having a long term sustainable and scientific plan for the Lake, a study should be conducted by an Institute of national repute. National Institute of Hydrology which was selected for the purpose had submitted a proposal for carrying out such a study.

The reply is not convincing as directions of Chief Secretary (November 2019) for preparation of DPR were not complied with by the Forest Department. The reply should also be seen in light of the fact that no such long term sustainable and scientific plan for the Lake could be finalised as of October 2022.

• **Non-formulation of working plans**

Under 13th Finance Commission, a grant of ₹ 120 crore was approved for Conservation and Management of Wular Lake. However, due to non-formulation of working plans² for all Forest Territorial Divisions, grant of only ₹ 60 crore was released by GoI as release of subsequent grant was linked to the progress of formulation and finalisation of working plans. Non-release of remaining ₹ 60 crore resulted in shortfall in achievement of targets of planned activities as discussed in the report.

WUCMA stated (October 2022) that working plans were prepared for management of forest areas only as per the National Working Plan Code-2014.

The fact remained that non-formulation of working plans for all Forest Territorial Division resulted in non release of remaining grant of ₹ 60 crore which in turn led to shortfall in achievement of targeted activities for management of Wular Lake.

5.5.3 Fund management

5.5.3.1 Delay in release of funds

Due to delay in release/ revalidation of funds there was underutilisation of funds for Conservation and Management of the Lake

² These are an essential plan documents to be prepared for 10 to 15 years for the scientific management of natural Forest areas for each Forest Territorial Division.

Under 13th FC, Government of India released (2011-12 and 2014-15) ₹ 60 crore in two installments of ₹ 30 crore for implementation of CMAP. First instalment was released by the Forest Department to WUCMA in parts and after a delay of up to four months. WUCMA had to get the unspent balances revalidated for utilisation in the ensuing Financial Years. There was also delay by the Forest Department in revalidation of unspent funds ranging up to 360 days. Unspent balances of Financial Years 2016-17 and 2017-18 were revalidated in the last week of the subsequent Financial Years resulting in non-utilisation of funds by the WUCMA. Against unspent balance of ₹ 14.17 crore during 2017-18, ₹ 0.11 crore only was revalidated in the first month of the last quarter of the Financial Year.

Further, funds were also released by the Forest Department at the fag end of the Financial Years to WUCMA under CAPEX from the State Budget. Out of releases of ₹ 95.85 crore during 2020-21, ₹ 25 crore (26 *per cent*) were released on 03 February 2021 and ₹ 45.85 crore (48 *per cent*) was released on 28 March 2021.

Due to delay in release/ re-validation of funds there was underutilisation of funds because of limited working season in the valley.

5.5.3.2 Underutilisation of funds

Against ₹ 120 crore approved for Conservation and Management of Wular Lake only ₹ 60 crore (50 *per cent*) was released between 2011 and 2015 under 13th Finance Commission (FC). Against availability of ₹ 60 crore, underutilisation of funds ranged between ₹ 1.77 crore and ₹ 28.35 crore during 2011-20. The percentage underutilisation ranged between 17 *per cent* and 99 *per cent* during the said period. No further funds were released during 2016-20 under 13th FC due to non-formulation of working plans by WUCMA as discussed under 3rd bullet of **Paragraph 5.5.2**.

Apart from this, GoJ&K approved ₹ 196.15 crore under CAPEX for 2020-22, of which only ₹ 149.87 crore were released, resulting in release of less fund of ₹ 46.28 crore (24 *per cent*) during the period. The details are given in the *Appendix-5.1*.

5.6 Programme implementation

Dropping of three vital activities of bio-diversity conservation, eco-tourism development and sustainable resource development and livelihood improvement due to restricted funding under 13th FC had adversely affected Conservation and Management Programme of Wular Lake.

Under 13th FC, three vital activities of bio-diversity conservation, eco-tourism development and sustainable resource development and livelihood improvement were dropped due to restricted funding. This adversely affected Conservation and Management Programme of Wular Lake. An amount of ₹ 4.02 crore planned for mapping, ground truthing, boundary demarcation and bathymetric studies were not

spent resulting in non-clearing of encroached area of 0.36 sq. km of Lake area for paddy cultivation and increase in built-up area in catchment from 16.80 hectares (2011) to 19.79 hectares (2020). Only 517 hectares out of 1,603 hectares of the eroded pasture land was covered for treatment and only 517 hectares out of 1,251 hectares were covered for promotion of agro-forestry, sustainable horticulture practices and improvement of homesteads.

Against estimated 21.84 lakh willow trees to be removed, only 1.46 lakh were removed between 2007 and 2022. Out of 27 sq. kms of severely silted area, only 4.5 sq. kms area was dredged and dredged out material was dumped in the auxiliary basins of the Lake. Due to non-installation of STPs, untreated sewage from nine villages was being discharged into the Lake. Programme implementation in respect of Wular Lake has been discussed in the following Paragraphs.

5.6.1 Dropping of programme activities and cost reduction in programme activities of CMAP under 13th Finance Commission

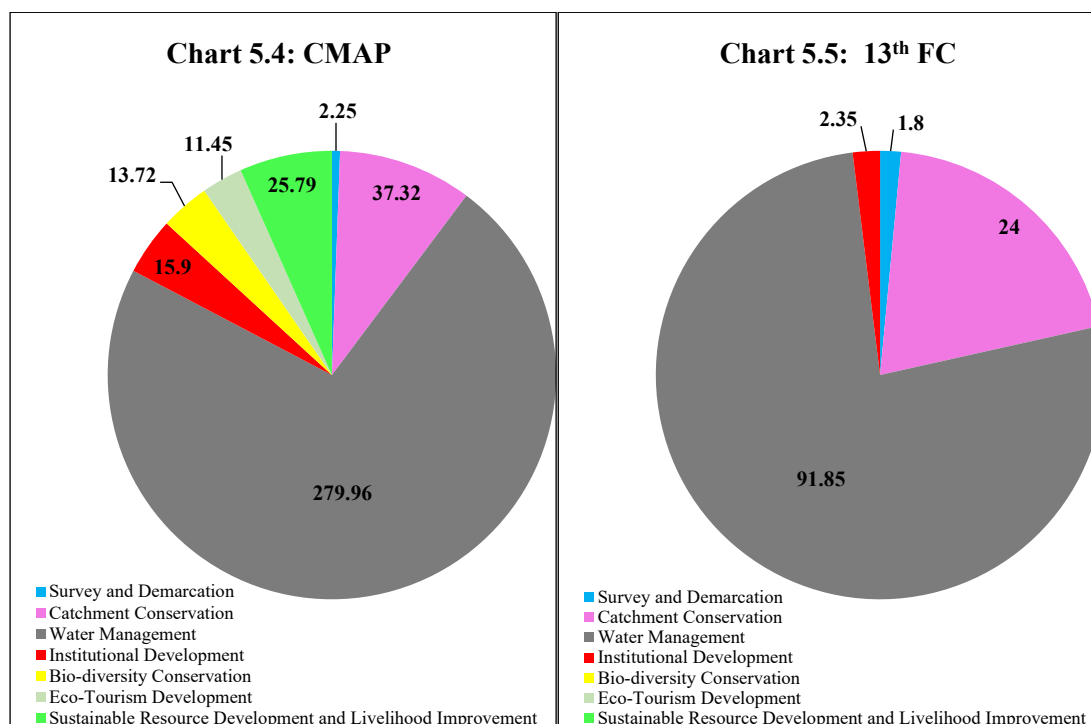
CMAP envisaged execution of seven activities for Conservation and Management of Wular Lake. However, three activities were dropped while cost of four activities was reduced under 13th FC. Details of activity wise cost of programme activities, activities dropped, reduction in cost of activities and expenditure incurred is detailed in Table 5.2, Charts 5.4 and 5.5.

Table: 5.2: Dropping of activities of CMAP under 13thFC

(₹ in crore)					
Sl. No	Activity	Cost approved under CMAP	Cost approved under 13 th FC	Cost reduced/dropped (per cent reduction)	Expenditure
1	Survey and Demarcation	2.25	1.80	0.45 (20)	2.22
2	Catchment Conservation	37.32	24.00	13.32 (36)	13.80
3	Water Management	279.96	91.85	188.11 (67)	42.58
4	Institutional Development	15.90	2.35	13.55 (85)	1.14
Total-A		335.43	120.00	215.43	59.74
1	Bio-diversity Conservation	13.72	0	13.72 (100)	0
2	Eco-Tourism Development	11.45	0	11.45(100)	0
3	Sustainable Resource Development and Livelihood Improvement	25.79	0	25.79 (100)	0
Total-B		50.96	0	50.96	0
Grand Total (A+B)		386.39	120.00	266.39	59.74

(Source: data provided by WUCMA)

Charts 5.4 and 5.5: Dropping of activities of CMAP under 13th FC



The dropping of these three vital activities had adversely affected Conservation and Management Programme of Wular Lake as detailed in **Table 5.3**.

Table:5.3: Probable effects due to dropping of activities

Sl. No	Programme activities dropped	Activities that could not be undertaken	Probable effects of not conducting such activities
1	Bio-diversity Conservation	<ul style="list-style-type: none"> • Baseline studies of distribution of endemic fish and their conservation needs. • Long term data collection to understand annual variation of native and migrant water birds and their linkage with habitat of water birds and climate. • Strengthening of protected bird areas and establishment of new bird sanctuaries. • Demarcation of new wildlife sanctuaries and strengthening of existing protected areas. • Construction of rescue/ rehabilitation centres for wildlife. • Maintaining connectivity of existing bird sanctuaries with other Lakes. 	<ul style="list-style-type: none"> • Non-enhancement of diversity of endemic fish and wetland bird population. • Non-improvement in habitat of wildlife and water birds.
2	Eco-Tourism Development	<ul style="list-style-type: none"> • Comprehensive eco-tourism plan. • Development of key sites for birds and creating facilities for their observance such as watch towers and boat cruises. 	Non-development of eco-tourism in and around the Lake resulting in denial of economic benefits to the local communities.

Sl. No	Programme activities dropped	Activities that could not be undertaken	Probable effects of not conducting such activities
3	Sustainable Resource Development and livelihood improvement	<ul style="list-style-type: none"> • Construction and operationalisation of three fish seed farms and five community owned hatcheries. • Extensive fish stocking measures. • Measures for ensuring non-fishing during May to June and generation of mass awareness against using harmful and illegal fishing methods. • Setting up of fish farm cooperatives. • Ensuring vegetation cutting in the Lake in a sustainable manner without any negative effect on biodiversity. • Creating alternate source of income through apiculture, mushroom cultivation, sericulture etc. 	<ul style="list-style-type: none"> • Non-enhancement of fish yield through development of capture and culture fisheries. • Non-economic utilisation of aquatic vegetation; and • Non-improvement in livelihood of locals.

(Source: records of WUCMA)

WUCMA stated (October 2022) that the activities dropped under 13th FC were incorporated in Wular Action Plan under capital heads and most of the activities were being conducted. It was further stated that for eco-tourism development, sustainable resource management and livelihood improvement interpretation signages have been placed at various locations around the Lake and bird signages with Quick Response (QR) codes have been installed to help the visitors to know about the diversity of Lake harbors. It was also stated that to facilitate bird watching one watch tower and five floating bird hides have been constructed in the Lake and work on non-motorable walkway has been awarded which will help to boost tourism. Regarding biodiversity conservation, it was stated that Asian Water Bird Census was being conducted every year as part of monitoring of wetlands on Central Asian Flyway.

The fact remains that WUCMA had not carried out any detailed research to have a complete picture of biodiversity such as a scientific inventory of flora and fauna existing in and around the Lake. In absence of which, the placement of interpretation and bird signages could not be said to be based on detailed and correct information of existing flora and fauna. Further, in absence of long-term scientific study of the Lake, advantages of construction of non-motorable walkway around the Lake was also questionable, as the area was a buffer zone which minimise entry of silt into the Lake.

Also, merely conducting census of water birds is not sufficient, since it is only a preliminary stage for preparation of Detailed Action Plan for conservation of biodiversity.

5.6.2 Action Plan for implementation of Lake Management activities

For implementation of Comprehensive Conservation and Management Plan (CCMP) (2018-2023) of Wular Lake, WUCMA proposed (November 2020) an estimate of

₹ 2,000 crore to GoI. However, two-year action plan of ₹ 196.15 crore was approved under CAPEX budget for Conservation and Management of Wular Lake during 2020-22. The approved action plan included ₹ 3.67 crore for Bio-diversity Conservation and Eco-Tourism Development (two of the three activities dropped under 13th FC). No provision was made for Sustainable Resource Development and Livelihood Improvement. The funds approved under two-year plan (2020-22) were tentative and far less than the estimate of WUCMA. Thus, the total available funds of ₹ 256.15 crore³ allocated for Conservation and Management of Wular Lake and physical achievement there against was miniscule.

Details of proposed estimates for CCMP of the Lake, approved cost thereof under tentative action plan and expenditure incurred are detailed in *Appendix-5.2*.

WUCMA admitted (October 2022) that Wular Action Plan was a short-term plan drawn from overall Comprehensive Management Action Plan for Wular Lake with specific vision and objectives. It further stated that ₹ 2,000 crore funding was a long-term funding needed for gradual eco-restoration based on adaptive management principle and major activity of dredging of 3.35 sq. km of Wular Lake was achieved within the stipulated time.

The reply may be seen in light of the fact that against the approved amount of ₹ 196.15 crore for two-year action plan, only ₹ 149.87 crore was released, which was not commensurate with the planned activities. Similarly dredging of 3.35 sq. km over a period of 15 years amounted to only 12 *per cent* of 27 sq. km of silted area of the Lake, thereby depicting inadequate implementation.

5.6.3 Programme implementation approved under 13th FC and CAPEX Action Plan

Due to reduction in cost of four components by ₹ 215.43 crore⁴ under 13th FC, physical targets of Conservation and Management of Wular Lake were reduced. Against approved cost of ₹ 120 crore, only ₹ 60 crore was released (2011-15) for execution of work of these four components and expenditure of ₹ 47.16 crore (79 *per cent*) was incurred as of March 2016. During 2016-20, expenditure of ₹ 11.82 crore was incurred only on dredging works. Thus, there was tardy implementation and inadequate funding under 13th FC.

Although two years action plan for ₹ 196.15 crore was approved (2020-21) under CAPEX budget by GoJ&K, only ₹ 149.87 crore was released. Thus, there was short-release of fund of ₹ 46.28 crore (24 *per cent*) during the period.

³ ₹ 60 crore under 13th FC and ₹ 196.15 crore under CAPEX.

⁴ From ₹ 335.43 crore to ₹ 120 crore

Thus, management plan for the Lake was implemented in an adhoc/ partial manner. Besides, inadequate funding and pending approval of Forest Department for allotment of consultancy services to a firm for preparation of CCMP and DPR for Conservation and Management of Wular Lake had resulted in substantial shortfalls in the implementation of management activities of the Lake and other inadequacies as discussed in the succeeding Paragraphs.

5.6.4 Survey and Demarcation

Under 13th FC, ₹ 2.22 crore⁵ was spent (2011-17) on digital mapping of Wular Lake and on construction of 1,159 geo-tagged demarcation pillars which delineated 83.6 km (98 *per cent*) of the Lake.

Under CAPEX Action Plan (2020-22), ₹ 4.02 crore was planned to be spent on mapping and ground truthing, boundary demarcation and maintenance of boundary pillars, bathymetric studies etc. No expenditure was incurred on these works. As such, 0.36 sq. km of Lake area under encroachment for paddy cultivation⁶ could not be cleared and built-up area had also increased from 16.80 hectares (2011) to 19.79 hectares (2020).

WUCMA stated (October 2022) that Wular Lake was fully demarcated and encroachment was meagre, mostly in the form of plantations. It was further stated that out of 0.36 sq km of encroachment approximately only 0.19 sq km had remained to be cleared, which would be done in cooperation with Departments of Revenue and Forest.

The reply should be seen in view of the fact that while the Department had cleared 0.17 sq. km. of encroached area, built-up area had also increased in the catchment area of Lake.

5.6.5 Catchment Conservation

Degradation of catchments of Lake causes high levels of erosion which gives rise to siltation in a Lake. Wular Lake having an area of 1,14,401 hectares has six direct catchments⁷. The area of Lake includes forest area of 44,510 hectares, of which 13,353 hectares (30 *per cent*) is bare and denuded. To mitigate degradation of catchment area of the Lake, catchment works including afforestation of degraded forests, construction of check dams and water harvesting structures, landslide controls, management of high-altitude pastures and providing alternate source of energy to people of catchment area were planned (2011-12) for execution under CMAP.

⁵ Includes ₹ 0.42 crore diverted from other activities of the programme

⁶ As per survey conducted (April 2018) by WUCMA

⁷ Erin, Madhumati, Ningli, Wular-I, Gunder and Wular-II

• **Afforestation**

Under 13th FC, against target for afforestation of 2,620 hectares of land at a cost of ₹ 7.27 crore, only ₹ 5.11 crore⁸ was spent for afforestation of 1,725 hectares (shortfall: 34 *per cent*) on fencing of land and on plantation and maintenance of 12 lakh saplings. No further plantation was done in degraded forest areas between April 2016 and March 2020 and no physical verification was conducted to ascertain survival/ mortality of plantation carried out.

Under CAPEX Action Plan (2020-21), against target for afforestation of 1,870 hectares of land at a cost of ₹ 8.53 crore, 2.42 crore was spent (28 *per cent*) to cover 235 hectares (shortfall: 87 *per cent*) by plantation of 2.28 lakh saplings.

Shortfall in achievement of targets resulted in insufficient afforestation in degraded forests resulting in increase of siltation in the Lake by 201.54 hectares between 2016 and 2020⁹ and consequently contributing to hastening ageing of the Lake.

WUCMA stated (October 2022) that 30 *per cent* area in the catchment was bare and not necessarily denuded, as most of the bare mountains were dominated by shrub growth, which is a unique ecosystem in itself. It was further stated that allied Departments had carried out afforestation and rehabilitation in large areas thus supplementing efforts of WUCMA, which did not have to take up these activities in additional areas depicted in action plans. It was further stated that 80 *per cent* of the water enters the Lake through Jhelum river and as such, attributing siltation to lack of afforestation works in catchment area was not right.

The reply that WUCMA need not carry out afforestation plans contradicts the provision of afforestation activities under the CAPEX action plan. Further, it is pertinent to note that even the planned targets under the action plan could not be achieved, which was indicative of failure of implementation of the catchment conservation activity. The reply was also indicative of injudicious planning of WUCMA for not constructing silt settling basins at the water inflow/ entry points of the Lake. This was also suggested in the draft Environmental Impact Assessment (EIA) report prepared (2014) by the Centre of Research for Development (CORD), Kashmir University on behalf of WUCMA.

• **Control of soil erosion and landslides in degraded areas**

M/s Wetland International-South Asia assessed (June 2007) erosion intensity in six direct catchment area spread over 1,14,401 hectares around the Lake. It concluded that 71,162 hectares (62 *per cent*) of catchment area were of moderate and high erosion category. No details were available with WUCMA regarding geo-location and category

⁸ It includes ₹ 3.33 crore spent as on ending March 2015 and ₹ 1.78 crore during 2015-20

⁹ Source: data of EE&RSD.

(low/moderate/ high) of eroded areas so that erosion control works could be planned and executed.

Under 13th FC, six erosion control works¹⁰ were to be executed at a cost of ₹ 10.07 crore. Only ₹ 5.95 crore¹¹ was spent on these works. There was shortfall in execution of works ranging between 28 and 100 *per cent*. The shortfall included non-construction of water harvesting structures. No erosion control works were executed during 2016-20 except incurring (2018-19) a meager expenditure of ₹ 0.01 crore. Besides, no survey was carried out by WUCMA to ascertain damages, if any, to project executed works.

Under the CAPEX plan of 2020-22, the works included under 13th FC were to be executed (except vegetation spurs/ plantation) at a cost of ₹ 2.49 crore. It was noticed that out of four targeted project works {Dry Random Rubble Masonry Works (DRSM), landslide erosion, gunny bags and water harvesting structures}, only two works of crate wire dams and stream bank protection were carried out at a cost of ₹ 1.41 crore.

• Management of High-Altitude pastures

The pastures in catchment area of Lakes are under constant pressure from nomadic population who graze their cattle and sheep in these areas. Area of 8,600 hectares in the catchment area of Wular Lake were identified (2019) as eroded pasture land by WUCMA.

Under 13th FC, 1,603 hectares of eroded pastures was planned for treatment at a cost of ₹ 3.76 crore. The treatment works included fodder and forage production, engineering works in *nallahs*, development of silvi-pasture, fodder management and veterinary support. Treatment works were carried out only in 517 hectares (32 *per cent*) at a cost of ₹ 1.13 crore. Sowing of fodder seeds was not carried out for development of fodder and forage in an area of 259 hectares during 2011-18. In 2018-19, ₹ 0.06 crore was spent on procurement of 11.27 quintals of fodder seed which was distributed to 585 persons. The criteria adopted for distribution of seed to selected persons was not on record. Production from seed sown by the beneficiaries and subsequent impact on the programme was not monitored and evaluated. Veterinary care and assistance for feed and breed improvement was not provided in respect of domestic animals of catchment area during the project implementation period.

Under the CAPEX action plan (2020-22), four works (development of silvi-pasture, maintenance on, farm fodder production and veterinary support) to be carried out in 623 hectares at a cost of ₹ 1.79 crore were not carried out.

¹⁰ DRSM, crate wire dams, Stream Bank Protection, Land slide erosion, Gunny bags and water harvesting structures

¹¹ It includes ₹ 5.84 crore spent as on ending March 2015 and ₹ 0.11 crore during 2015-20

Thus, only 517 hectares (32 *per cent* of 1,603 hectares) of the eroded pasture land was covered for treatment.

• **Management of Horticulture and Dry Land Agriculture**

An area of 4,600 hectares land in catchment area of the Lake was under dry land agriculture. Ploughing of land across the contours creates channels, *nallahs* and *gullies* due to which there is soil erosion, contributing high sediment inflow into the Lake.

Under 13th FC, three works viz. promotion of agro-forestry, promotion of sustainable horticulture practices and improvement in management of homesteads were planned for execution on 1,251 hectares of land (27 *per cent* of 4,600 hectares of land under dryland agriculture) at a cost of ₹ 1.38 crore. As of March 2015, these works had been executed on only 517 hectares of land, with an expenditure of ₹ 0.70 crore (₹ 0.66 crore: as of March 2015, and ₹ 0.04 crore: during 2018-19).

Shortfall in execution of works during the period ranged between 62 and 68 *per cent*. Out of plantation of 1.29 lakh saplings carried out during 2011-19, 6,500 saplings were distributed to 247 people during 2018-19. Criteria adopted for distribution of saplings was not on record. Execution of work under improved management of homesteads for coverage of 300 hectares was not carried out between the years 2015 and 2019. Physical verification was also not carried out to ascertain survival/ mortality of planted saplings to evaluate impact of plantation on the programme under 13th FC.

Under CAPEX action plan (2020-22), works of promotion of agro-forestry and sustainable horticulture practices by distributing plants and improvement management of homesteads were envisaged to be carried out to cover 233 hectares at a cost of ₹ 0.48 crore. However, these works were not carried out due to non-release of funds.

Thus, only 517 hectares (41 *per cent* of 1,251 hectares) were covered for execution of horticulture/ agriculture works.

• **Alternate source of energy**

To prevent degradation of forests by reducing dependence of villagers on forests for firewood, alternate source of energy was to be provided to the villagers living in forest areas of catchment of Lake as per CMAP.

Under 13th FC, development of village wood lots in 367 hectares and distribution of solar lights and heaters among the villagers were planned at a cost of ₹ 1.51 crore.

An amount of ₹ 0.91 crore (₹ 0.74 crore: as of March 2015, and ₹ 0.17 crore: 2018-19) was spent on development of village wood lots in 114 hectares (31 *per cent*) and 746 solar lanterns were distributed to the villagers.

The expenditure included ₹ 0.17 crore irregularly spent (March 2019) on purchase of 262 home solar lighting systems for distribution among beneficiaries of Antyodaya Anna Yojna/ Below Poverty Line. The expenditure did not form part of Lake conservation activities. No village wood lots were developed using 13th FC funding during 2016-20. No survey was conducted by WUCMA to ascertain total area to be covered for development of village wood lots and number of villagers to whom solar lights and heaters were to be issued.

Under CAPEX action plan (2020-22), the development of village wood lots over 40 hectares and promotion of smokeless hearths were planned at a cost of ₹ 1.15 crore. However, no specific targets were fixed for these activities. Despite the allocation, no such work was executed under CAPEX due to non-release of funds.

5.6.6 Water Management

CMA had envisaged enhancement of water holding capacity of the Lake by removal of plantation from the Lake, carrying out dredging in the Lake, ensuring improvement in water quality of the Lake through sewerage management, allocation of water for human and ecological purposes and purchase of equipment.

• Enhancement of water holding capacity of the Lake

CMA had estimated (June 2007) that 21.84 lakh willow trees were existing around the Lake. It was suggested that these trees need to be uprooted by manual or mechanical means to enhance the water holding capacity of the Lake. WUCMA had not carried out fresh estimation of trees to ascertain whether there was increase in the number of willow trees around the Lake as over 15 years had passed since June 2007.

Under 13th FC, removal of willow plantation of 0.29 lakh trees was carried out till March 2016 at a cost of ₹ 0.16 crore. Stems and roots of trees were not removed leaving high chance of recurrence in growth of willow plantation. No removal of trees was carried out during 2016-20. While under CAPEX action plan (2020-22), 1.17 lakh willow trees were removed along with stems and roots at a cost of ₹ 0.04 crore.

Thus, against estimated 21.84 lakh willow trees, only 1.46 lakh tree (seven *per cent*) were removed (2007-22) over a period of 15 years at a cost of ₹ 0.20 crore.

WUCMA had not carried out survey to ascertain whether willow trees had regrown due to non-removal of stems and roots in respect of 0.29 lakh trees removed under 13th FC. No evaluation was done to ascertain whether removal of willow trees had enhanced water holding capacity of the Lake.

WUCMA stated (October 2022) that water holding capacity of the Lake can only be enhanced if removal of willows is followed by dredging of the silted areas. It was further stated that willow removal was being done in a phased manner to synchronise

with dredging operations, to prevent any shock to the wetland ecosystem and not to create glut in the market. It was also stated that in the last two years, 1.20 lakh willows were removed including grubbing generating a revenue of ₹ 24.34 crore.

The reply is not convincing as achievement of only seven *per cent* of the target of removal of 21.84 lakh willow trees set by WUCMA itself was indicative of failure in implementation of Lake water management activity.

• **Dredging of Lake**

As per CMAP, 27 sq. km. of Lake area was categorised as severely silted. To increase water capacity and open water area of the Lake, the Conservation and Management plans of the Lake under 13th FC and CAPEX funding provided for dredging of silted areas of the Lake.

Although ₹ 185.05 crore¹² was spent (2011-22) on dredging of Lake, only 4.5 sq. km. (17 *per cent*) of 27 sq. km. of severely silted area has been dredged as of March 2022. Dykes for dumping of dredged out material were not identified and dredged out material was dumped in the auxiliary basins of the Lake which remained seasonally submerged.

Native species of plants were not planted along the dumping sites to act as a filter for nutrients that might leach into the Lake. No studies were undertaken on impact of dredging on Lake ecology including invasion of species both in dredged part and in the hinterland of the Lake where the sediment was deposited.

WUCMA stated (October 2022) that all the dykes had been fully identified and pre/post dredging survey of all dykes had been conducted. It was further stated that post dredging study was conducted through National Institute of Hydrology and that no dyke remained submerged in any season as most of the dyke areas were cultivated by people. It was also stated that dredged part did not have any weed and it had economically important plant and fish species envisioned in CMAP.

The reply should be seen in view of the fact that observation of Audit is based on the records of Agriculture Production Department and Irrigation and Flood Control Department, which had complained to WUCMA regarding the dumping of dredged-out material in the auxiliary basins of Lake.

• **Rejuvenating wetlands around Lake**

To rejuvenate wetlands associated with Wular Lake and provide bio-filters against nutrients, silt and other material coming into the Lake from its catchment area, ₹ 0.40 crore was approved without specifying physical targets under 13th FC. As of March 2020, no work was done in this regard. Under CAPEX, against ₹ 3.95 crore sanctioned

¹² ₹ 40.73 crore (2011-16 and 2018-20) under 13th FC and ₹ 144.32 crore (2020-22) under CAPEX

for desilting work of 1.58 lakh cum, de-silting of 0.48 lakh cum (30 *per cent*) was done at a cost of ₹ 1.18 crore. No evaluation was done to ascertain the number of associated wetlands rejuvenated.

Although there was increase in the water area of the Lake from 2,265 hectares (2011) to 2,786 hectares (2020) due to removal of trees, dredging and rejuvenation of wetlands around the Lake, the area of 2,786 hectares constituted only 36 *per cent* of the Lake area of 7,768 hectares recorded in 1969.

Audit noted that as against nil use of land for horticulture in 2011, there was land use of 80.48 hectares for horticulture in 2020. Area of siltation in the Lake had increased from 629 hectares in 2011 to 645 hectares in 2020 and pasture land also had increased from 55 hectares in 2011 to 85 hectares in 2020.

During the exit conference (September 2022), it was admitted that 27 sq. kms of Lake area was silted. It was further stated that forest Lakes would be taken care of by addressing the problems such as desilting, de-weeding, encroachments under mission “Amrit Sarovar”.

WUCMA stated (October 2022) that feeder channel Naz (connecting Malgam *Rakh*) stood completely restored and adjoining Hygam wetland and Malgam *Rakh* were managed by WPD and Forest Department in a coordinated manner. It was also stated that variable of water expanse and aquatic vegetation could not be treated separately as aquatic vegetation could exist only in area having water.

The reply is not acceptable as it did not address the specific observation regarding rejuvenation of wetlands around the Lake.

• Purchase of Equipment

For dredging of the Lake, equipment such as cut section dredger, slurry piping, motorised carriage trucks, hydraulic excavators and weed harvesters were to be purchased by WUCMA under CMAP.

Although purchase of dredging equipment was sanctioned under 13th FC at a cost of ₹ 20.85 crore, the equipment had not been purchased. Instead, an expenditure of ₹ five lakh had been incurred (2015-16) under 13th FC on purchase of photocopiers, computers etc.

Under CAPEX Action Plan (2020-22), although ₹ three crore was sanctioned for purchase of equipment, no equipment was purchased.

WUCMA stated (October 2022) that it was not in favour of purchasing heavy machinery like dredgers as experience of having such equipment had not been encouraging with other Lake management authorities. It was further stated that over

time the technology becomes obsolete and such equipment become a burden on the Departments. Further allotment of work through tendering process ensured efficiency by access to modern technology.

The reply should also be seen in the light of fact that procurement of machinery was laid down in the CMAP (June 2007) approved by GoI.

5.6.7 Water Quality Improvement

For improvement of water quality, CMAP envisaged sewerage management in towns located in the periphery of the Lake by construction of three STPs, setting up of community based solid waste management system for markets and villages, segregation of recyclable and non-recyclable wastes and control of diffused pollution through wetland technology.

• Construction of Sewage Treatment Plants

To treat 8.94 MLD of waste water (containing 21.6 tonnes of inorganic nitrate and 15.6 tonnes of phosphorous) generated in Bandipore urban area and nine villages¹³ in eastern and western sides of the Lake, three Sewage Treatment Plants (STPs) were to be constructed at three locations¹⁴. The STPs were to be constructed at a cost of ₹ 13.92 crore under CMAP till 2021. As the cost of these STPs were neither included under 13th FC nor CAPEX plan (2020-22), these STPs could not be constructed.

Thus, untreated sewage from these nine residential areas continued to be discharged into the Lake causing pollution of inorganic nitrate and phosphorous in the Lake, which accelerates growth of aquatic vegetation and algae thereby affecting the ecosystem of the Lake.

WUCMA stated (October 2022) that water quality assessment was conducted on monthly basis and all parameters fall within the prescribed limits. It was further stated that construction of STPs would be undertaken in future subject to detailed assessment. It added that as villages around Wular Lake were spread all over, installation of STP or an alternative sewerage treatment methodology needed a scientific study before investing in them.

The reply is not justified as deterioration of water quality of the Lake, as pointed out in this report, had also been highlighted in the research conducted by the academicians¹⁵. Further, the discharge of sewage directly into the Lake from catchment area without any treatment and data of tests on physio-chemical properties of Lake by J&K Pollution

¹³ Five villages on eastern side (Kulhama, Nadihal, Rampur, Gundpore and Shok baba) and four villages on western side (Watlab, Zuriman, Kenursa and Kanibathi)

¹⁴ Watlab, Nadihal and Bandipore

¹⁵ Research report by Zubair Ahmad Naik and Rahul Dabra published in International Research Journal of Modernization in Engineering Technology and Science

Control Board disproves the contention of WUCMA that all water quality parameters fall within the prescribed limits. Furthermore, approved CMAP (June 2007) by the GoI had already envisaged construction of three STPs around the Lake.

- **Community based Solid Waste Management systems for markets and villages**

CMAP (2011-2015) envisaged that for treatment of 29 tonnes¹⁶ of solid waste generated by 25 markets and 25 villages in the vicinity of Wular Lake, a community based Solid Waste Management system was to be set up by construction of waste collection centers at common locations and waste was to be carried from households to these collection centres at a cost of ₹ 1.43 crore. An expenditure of ₹ one crore was booked as of March 2015 on establishment of solid waste management system. This expenditure included ₹ 0.83 crore advanced (2013-15) for purchase of garbage lifting vehicles and fabricated dustbins to Municipal Committee (MC) Bandipore which spent ₹ 0.39 crore on purchase of five vehicles and compact dustbins. The vehicles and dustbins did not have means to separate the recyclable and non-recyclable wastes. MC Bandipore did not have a proper dumping site for disposal of garbage which was being dumped on the fringes of Wular Lake at Nussu Zallwan causing pollution in the Lake. ₹ 0.44 crore was lying unspent with MC Bandipore. WUCMA had not devised a plan in collaboration with MC Bandipore to identify spots in the villages for location of collection centers. Consequently, waste collection centres could not be constructed.

Although an amount of ₹ 0.82 crore had been sanctioned under CAPEX plan (2020-22), however no expenditure was incurred in respect of disposal of solid waste.

WUCMA stated (October 2022) that although no scientific municipal waste management plant had been established, an amount of ₹ six crore had been sanctioned for developing a scientific plant for which work was underway. It was further stated that 10 bio-toilets had been constructed under CAPEX and toilet construction for each household had been achieved under Swachh Bharat Mission scheme of GoI.

- **Construction of Low-Cost Sanitation Units, Drains and Sedimentation Tanks**

For managing domestic sewage of 44 villages situated on the periphery of the Lake towards the north and east, 18,600 Low-Cost Sanitation Units (LCSUs) with twin leaching pits and flush latrines were to be constructed. Only six (less than one *per cent*) LCSUs were constructed at a cost of ₹ 0.19 crore under 13th FC as of March 2015¹⁷.

Although construction of 120 LCSUs were planned (2020-22) at a cost of ₹ 1.21 crore under CAPEX action plan, no work was executed in this regard as of

¹⁶ Projection as per year 2007

¹⁷ ₹ 0.10 crore: paid as of March 2015 and liability of ₹ 0.09 crore cleared: 2015-20

October 2022. Thus, untreated human waste of these villages continued to be discharged into the Lake.

Further, for treatment of 1.03 MLD of domestic sewage of 10 villages (rural areas of Sonawari Tehsil) living in immediate southern proximity of the Lake, control of diffused pollution through wetland technology was to be done by constructing drains and sedimentation tanks for these villages. An expenditure of ₹ 0.34 crore was incurred (March 2016) on construction of two drains and sedimentation tanks and on 30 latrines which were not part of the plan. No technical report indicating area or type of pollution that was to be treated, was made available to audit. No further work was executed for construction of remaining eight drains and sedimentation tanks for other villages.

WUCMA stated (October 2022) that 10 bio-toilets had been constructed under CAPEX and toilet construction for each household had been achieved under Swachh Bharat Mission scheme of GoI.

• **Environmental Flows Team (EFT)**

Environmental Flows Team (EFT), with representation from all stakeholder Departments, was to be constituted for assessment of flow regimes of water sources of the Lake. The purpose was to estimate the requirement of water for functions and processes of the Lake while optimising allocation for other development purposes including agriculture, hydropower and domestic water supply.

Audit noted that no EFT had been constituted as of October 2022 and hence the mandated task of assessment of flow regimes of water sources of the Lake could not be carried out. Further, an amount of ₹ 0.26 crore earmarked under 13th FC was spent on the activities not forming part of the component, whereas no targets (physical/ financial) were fixed under CAPEX.

WUCMA stated (October 2022) that regular meetings were held with stakeholders, however formation of committees would be actively considered as pointed out by Audit.

5.7 Institutional Development, Capacity Building, Awareness Generation and Monitoring/ Evaluation

No training programmes were undertaken by WUCMA for capacity building and integrated Lake management and no expenditure was incurred for creation of infrastructure. No eco-rallies, conferences, nature camps, environment days and film shows were held by WUCMA for creating awareness. A laboratory for monitoring ecological, hydrological and socio-economic features of the Lake ecosystem was not established and evaluation of impact of Lake conservation programme by an independent agency was not put in place.

In respect of matters relating to administration and operations of WUCMA including capacity building, monitoring of Lake management activities and awareness generation, audit noticed as follows:

5.7.1 Administrative, operational and maintenance expenses

For administrative, operational and maintenance expenses of WUCMA, out of sanctioned ₹ 0.56 crore, only ₹ 0.28 crore was allocated under 13th FC. As of March 2016, ₹ 0.33 crore was spent for these purposes. The extra expenditure of ₹ 0.05 lakh was met from other heads of account. Under CAPEX, ₹ 2.52 crore was earmarked for construction of building for WUCMA. As of March 2022, construction of building was in progress and expenditure of ₹ 1.12 crore had been incurred thereon.

5.7.2 Capacity building and awareness generation

For capacity building, professional training in Integrated Lake Management was to be imparted to staff and infrastructure (including communication equipment and networking of offices) was to be created for Lake management. No training programmes had been undertaken by WUCMA. Instead, ₹ 29 lakh earmarked for these activities was spent as of March 2015 on activities such as Environment Flow Assessment, Implementation and Monitoring and Evaluation not forming part of the component. No expenditure was incurred during 2016-20.

Out of sanctioned amount of ₹ 21 lakh, only ₹ 11 lakh was allocated for awareness generation programmes which included developing resource material, organising nature camps for schools, holding eco-rallies, environment days and film shows. No eco-rallies, conferences, nature camps, environment days and film shows had been held by WUCMA. Instead, ₹ nine lakh was spent¹⁸ as of March 2020 on unrelated activities such as purchase of furniture, fixtures and wages. No expenditure was incurred during 2016-20 under 13th FC. There was no demand raised for the activity during 2020-22 under CAPEX.

5.7.3 Monitoring and evaluation of impact of Lake conservation programme

The initial cost of implementation of CMAP was ₹ 386.29 crore which was reduced (2011-12) to ₹ 120 crore by a High Level Monitoring Committee (HLMC) headed by the Chief Secretary, GoJ&K. CMAP envisaged result based framework for monitoring and evaluation of impact of Lake conservation programme by an independent agency at a cost of ₹ one crore. As this component was dropped by HLMC, monitoring and evaluation of the programme by an independent agency was not in place. CMAP also envisaged establishment of a laboratory for monitoring ecological, hydrological and socio-economic features of the Lake ecosystem. Against ₹ 120 crore, only ₹ 60 crore was released under 13th FC. Due to reduction in programme cost, the component for

¹⁸ It includes ₹ eight lakh spent as on March 2015 and ₹ one lakh during 2015-20

establishment of laboratory along with allied infrastructure was dropped by HLMC for implementation. As a result, the monitoring laboratory could not be established. Instead, ₹ 0.33 crore was diverted as of March 2016 towards unapproved components. No expenditure was incurred during 2016-20. Thus, monitoring of ecological, hydrological and socio-economic features of the Lake ecosystem could not be carried out.

5.7.4 Environmental Impact Assessment of CMAP

The work of Environmental Impact Assessment (EIA) was entrusted (July 2012) to the Centre of Research for Development (CORD), Kashmir University at a cost of ₹ 0.20 crore. The work was to be completed in six months and an advance payment of ₹ 0.10 crore was made in 2012-13 to CORD. CORD submitted (April 2014) the draft EIA report for evaluation to WUCMA before its finalisation. Despite lapse of over nine years from receipt of draft report, the EIA could not be finalised resulting in unfruitful expenditure of ₹ 0.10 crore. The draft EIA had suggested: -

- Setting up of adequate network of observation stations for monitoring in time and space the environmental, hydrological, metrological, hydro-biological and atmospheric processes in the Lake and its catchment area;
- Setting up of equipped laboratories and testing sites;
- A research study through a reputed research institute;
- Creation of vegetated buffers, carrying out crop rotations, construction of artificial wetlands, rejuvenation of springs and wetlands, water quality improvement measures etc.;
- To build settling basin on all the major inlets of Wular Lake on the pattern of Dal Lake; and
- To carry out analysis of sediment cores of the Lake and conduct bathymetric surveys to determine the appropriate depth and location at which dredging has to be carried out.

Thus, due to non-finalisation of the EIA report, the suggested measures had not been acted upon as of October 2022.

5.7.5 Internal control

WUCMA had not prepared assets register/ records as were required to be prepared under financial norms. Annual accounts including balance sheet which were required to be prepared under Section 21 of Jammu and Kashmir Development Act, 1970 were also not prepared. Thus, true and fair financial/ accounting picture of WUCMA was not ascertainable.

WUCMA stated (October 2022) that necessary action would be taken as pointed out by Audit.

5.8 Impact Assessment

WUCMA had not carried out any research to evaluate water quality of the Lake and to determine fish and water bird population in the Lake and it had not taken into consideration corrective measures regarding mitigation of deterioration in the health of the Lake suggested by research carried out by scholars of universities. Water area of the Lake had reduced (45 per cent) from 157.75 sq.km in 1911 to 86.71 sq.km in 2007, water holding capacity of the Lake had declined by one fifth during the last three decades and there was decrease of 1,654.30 hectares (37 per cent of 4,440 hectares) under open water area of the Lake.

Impact evaluation of a scheme/ programme helps to assess the success or failure of a scheme/ programme and helps in fixing accountability of stakeholders. Besides, it provides evidence to make informed decisions for redesigning the current programme or for planning future interventions. Impact assessment of Conservation and Management Programme of Wular Lake had not been carried out to find out whether implementation of the programme was a success or failure. Audit observed that the health of the Lake was deteriorating as discussed below:

5.8.1 Research activities

WUCMA had not carried out any research to evaluate water quality of the Lake and to determine fish and water bird population in the Lake. Disappearance of native species and invasion of noxious species, if any, due to heavy inflow of silt and sewage into the Lake from its catchment area had also not been assessed. However, research carried out by scholars of universities/ colleges¹⁹ indicated that health of the Lake had deteriorated due to factors detailed below:

- Much of the area of the Lake has been brought under vegetation, agriculture, human settlement, Government Departments, tourist hotels etc.
- There was run-off of fertilisers, pesticides and herbicides from apple orchards and paddy fields in the encroached areas of the Lake. There was also direct discharge of untreated sewage coming from villages adjacent to the Lake.

No effort was made by WUCMA to consider corrective measures suggested in these research papers for ensuring effectiveness in the implementation of management plans of the Lake.

¹⁹ During July-September 2017 by Zahoor ul Hasan, M. Imran Malik and T.A. Kanth of University of Kashmir and Government Degree College, Anantnag respectively.
During November 2016 by Rumysa K, Sharique A. Ali, Bilal A, Tariq Z and Farooq M from GDC Sopore, Safia Science College, Bhopal, Sher-i-Kashmir University of Agricultural Sciences and Technology, Kashmir, Bhoj (Open University), Bhopal, S.P. College, Srinagar respectively.
September 2020 by Zubair Ahmad Naik and Rahul Dabra from Department of Environmental Science Rudrabhishek Enterprises Ltd. India.

The Lake was shrinking at an alarming rate, and had become a reservoir of pollution. Indigenous fishes such as *Schizothorax richardsoni* and *Bangana diplostoma* had disappeared. The themes of research papers of authors with their conclusions and suggestions are detailed in **Appendix-5.3**.

WUCMA stated (October 2022) that it had been conducting water quality assessment of the Lake on a monthly basis in respect of 17 parameters for the last three years in collaboration with Jammu and Kashmir Pollution Control Committee, and all results indicated that water quality of the Lake was within prescribed parameters. It was further stated that the Fisheries Department annually restocked the Lake with necessary fish seed, and during the current year five lakh fish seed were restocked in the Lake but local species such as *Schizothorax* could not be restocked as no scientific breakthrough had been achieved to produce them in seed farms. WUCMA however, accepted that more was needed to be done in this regard.

5.9 Conclusion

Due to non-constitution of monitoring bodies, the Conservation and Management Programme of Wular Lake had suffered as policy matters of Wular Conservation and Management Authority (WUCMA) could not be decided. Failure to provide Detailed Plan resulted in deprivation of financial assistance from GoI for rejuvenation and restoration of Wular Lake. Insufficient afforestation in degraded forests resulted in increase in siltation in the Lake and consequently hastening the ageing of the Lake. Dropping of three vital activities of biodiversity conservation, eco-tourism development and sustainable resource development and livelihood improvement had adversely affected Conservation and Management programme. The planned activities for survey and demarcation, catchment conservation, enhancement of water holding capacity and water quality improvement were inadequately carried out. Training programmes, awareness generation and research activities for ensuring capacity building, public awareness and monitoring of impact of Lake conservation activities were not carried out.

5.10 Recommendations

- *Encroachments in the Lake and impact of inflow of nutrients into the Lake need to be monitored regularly and mitigation measures may be taken expeditiously.*
- *Changes in the area under water in Wular Lake need to be attended to and monitored periodically.*
- *The Government may review the Conservation and Management Programmes undertaken in respect of Wular Lake to make them more effective and result-oriented.*

Chapter-VI

Conservation and Management of Hokersar, Mansar, Surinsar and Manasbal Lakes

Chapter-VI

Conservation and Management of Hokersar, Mansar, Surinsar and Manasbal Lakes

6.1 Conservation and Management of Hokersar Lake

6.1.1 Introduction

Hokersar Lake falls in the districts of Srinagar and Budgam. The Lake is fed by Doodhganga stream in the east and by Sukhnag *Nallah* in the west. The springs in and around the Lake and rainfall are other sources from which the Lake gets its water. The Lake has an outlet from where water discharges into river Jhelum. The Lake was notified¹ in July 1945 and was declared as Conservation Reserve under the Jammu and Kashmir Wildlife (Protection) Act, 1978. Given its value in maintaining livelihoods and ecological balance, the Lake was identified (1987) by the National Wetland Committee as one of the 16 important Lakes in the country. The Lake is being looked after by the Wildlife Warden, Wetland Division (WD), Kashmir.

Hokersar Lake

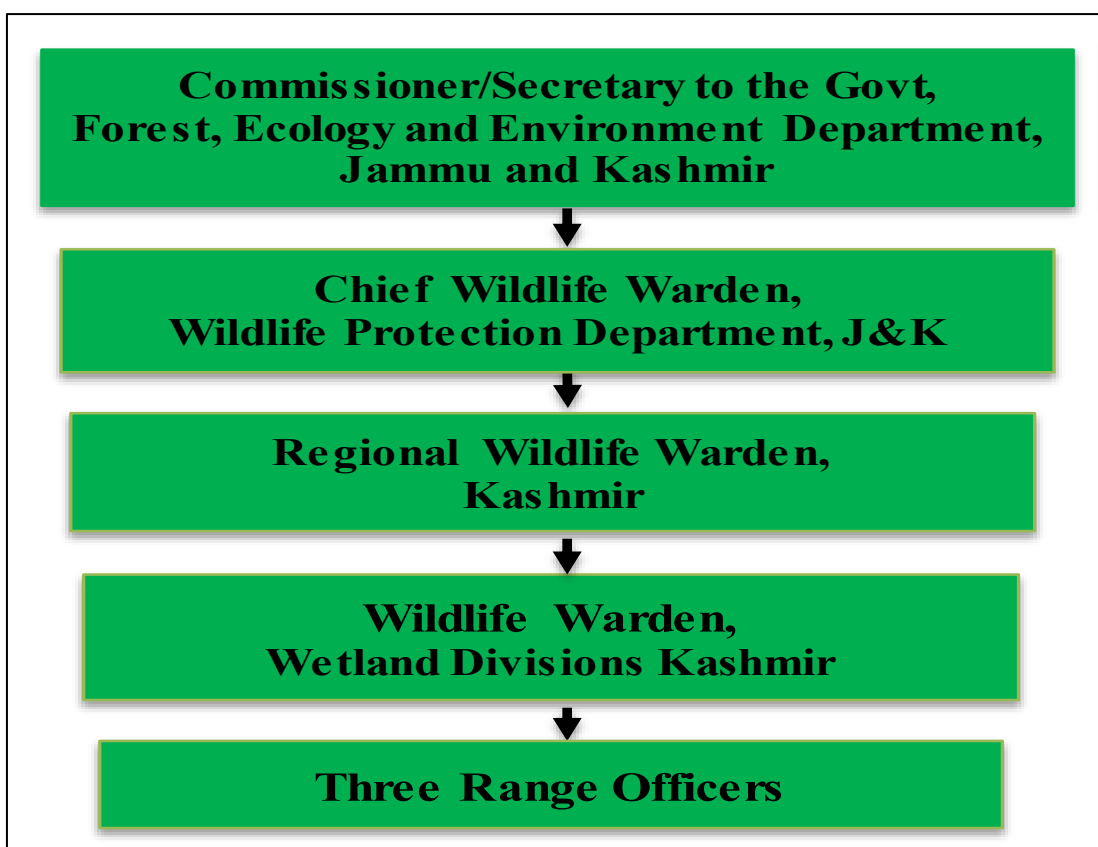


6.1.2 Organisational setup

The organisational set up of the Wildlife Warden, Wetland Division, Kashmir is shown in **Chart 6.1**:

¹ Vide Cabinet Order No: 710/ C of 1945 (G.G) dated 17.07.1945

Chart 6.1: Organisational setup of Wildlife Warden, Wetland Division, Kashmir



6.1.3 Land use changes within Lake and its catchment

Audit observed that due to non-identification of point source/ non-point source of pollution entering the Lake, non-taking of measures to prevent silt from entering the Lake, lack of dredging and construction of flood spill channel through the Lake area, there was decrease of seven *per cent* in open water area of the Lake and increase in other land uses such as 11.92 hectares under scrub (1,157 *per cent*), 2.14 hectares under siltation (104 *per cent*), 11.92 hectares under river (103 *per cent*), 1.72 hectares under built-up (102 *per cent*), 38.77 hectares under aquatic vegetation (42 *per cent*).

In absence of Comprehensive Conservation and Management Programme for Hokersar Lake, there was change in land use of the Lake with consequent deterioration in its health. Thus, the pristine glory of Hokersar Lake, being the queen of wetlands, was at the risk of extinction.

- Analysis of remote sensing data of EE&RSD to ascertain Land use changes in Lake

According to data of EE&RSD, there were spatio-temporal changes in land use of the Lake during 2014-20 as shown in Maps 6.1, 6.2, Table 6.1 and Charts 6.2 and 6.3.

Maps 6.1 and 6.2: Change in land use of Lake during 2014-2020

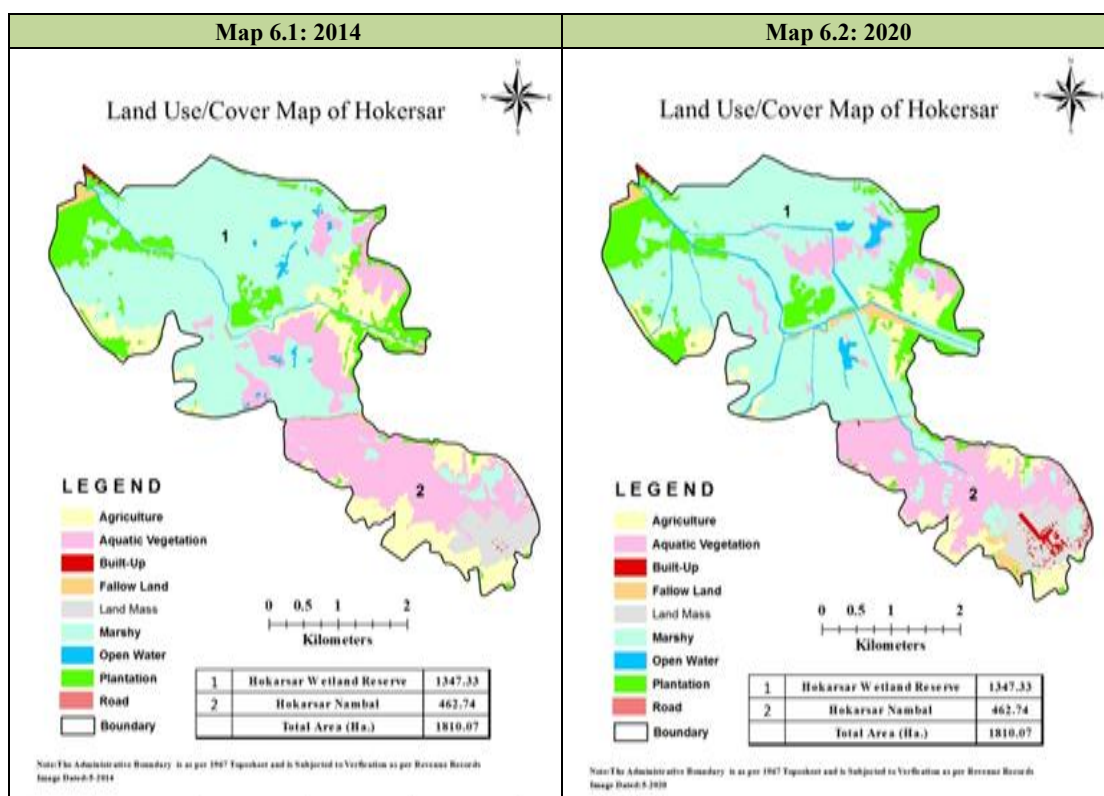
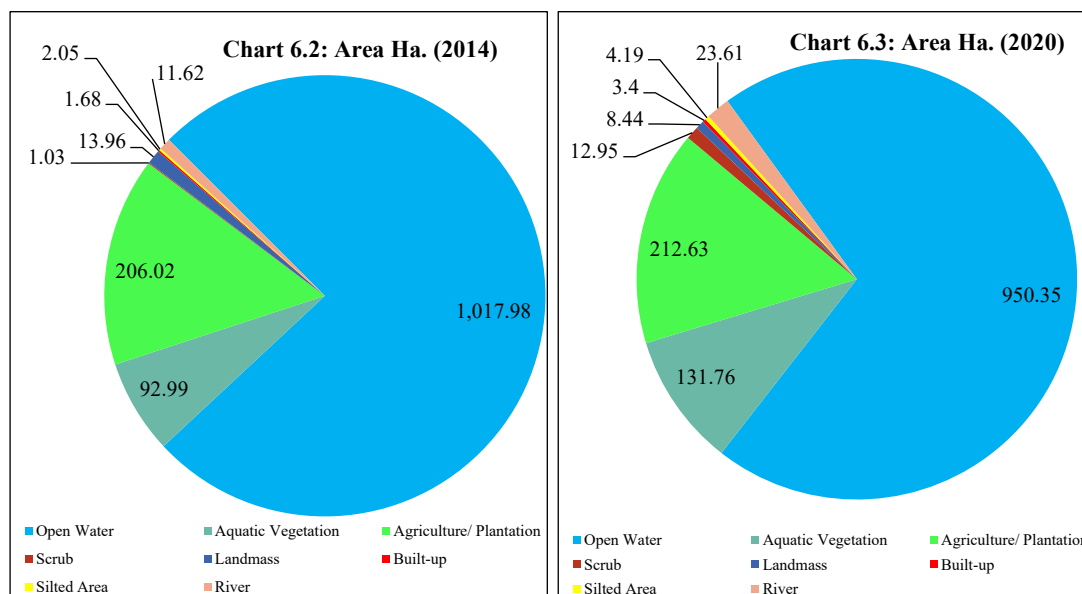


Table 6.1: Change in open water and other land use

Area in Hectares				Increase / Decrease and its Percentage (2014 to 2020)			
Sl. No.	Land use/ Classification	2014	2020	Decrease	Increase	Percentage Decrease	Percentage Increase
1	Open Water	1,017.98	950.35	67.63		7	
2	Aquatic Vegetation	92.99	131.76		38.77		42
3	Agriculture/ Plantation/	206.02	212.63		6.61		03
4	Scrub	1.03	12.95		11.92		1,157
5	Landmass	13.96	8.44	5.52		40	
6	Built-up	1.68	3.40		1.72		102
7	Silted Area	2.05	4.19		2.14		104
8	River	11.62	23.61		11.99		103
Grand Total		1,347.33	1,347.33	73.15	73.15		

(Source: data of EE&RSD)

Chart 6.2 and 6.3: Change in land use of Lake during 2014-2020



It may be seen from **Table 6.1** that during 2014-20, there was decrease of seven *per cent* in open water² of Hokersar Lake, whereas there was increase in other land uses such as 11.92 hectares under scrub (1,157 *per cent*), 2.14 hectares under siltation (104 *per cent*), 11.99 hectares under river (103 *per cent*), 1.72 hectares under built-up (102 *per cent*), 38.77 hectares under aquatic vegetation (42 *per cent*) etc. due to anthropogenic pressure on the Lake.

Audit analysis revealed that some of the contributing factors of land use changes were:

- WD-Kashmir had not identified point source/ non-point source of pollution entering the Lake and sewage treatment system was not in place for treatment of sewage entering the Lake from its catchment area. Nutrients entering into the Lake through sewer had given rise to prolific growth of weed in the Lake and adequate de-weeding mechanism was not in place.
- No measures were taken to prevent silt from entering into the Lake and there was lack of dredging of land masses in the Lake. This led to exploitation of these areas for other land uses such as agriculture, vegetation, crop land etc.
- The increase in the area under river was due to construction of flood spill channel through the Lake area, which was done without following laid down parameters as discussed in **Paragraph 6.1.4.1**.

As a result, there was a decrease in the open water area of the Lake.

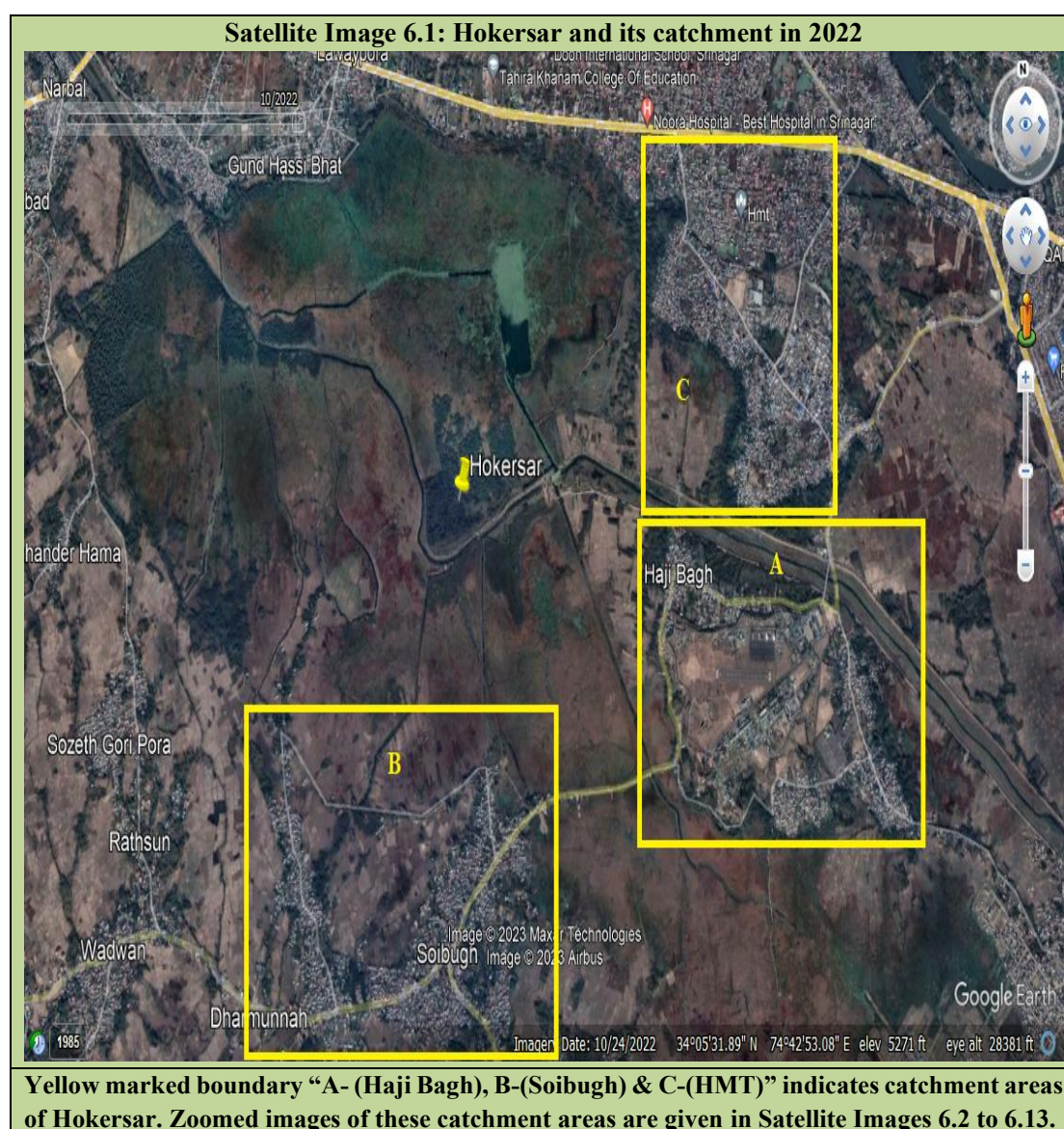
The Forest, Ecology & Environment Department replied (October 2022) that the policy to maintain ecological character of wetlands was under consideration of the

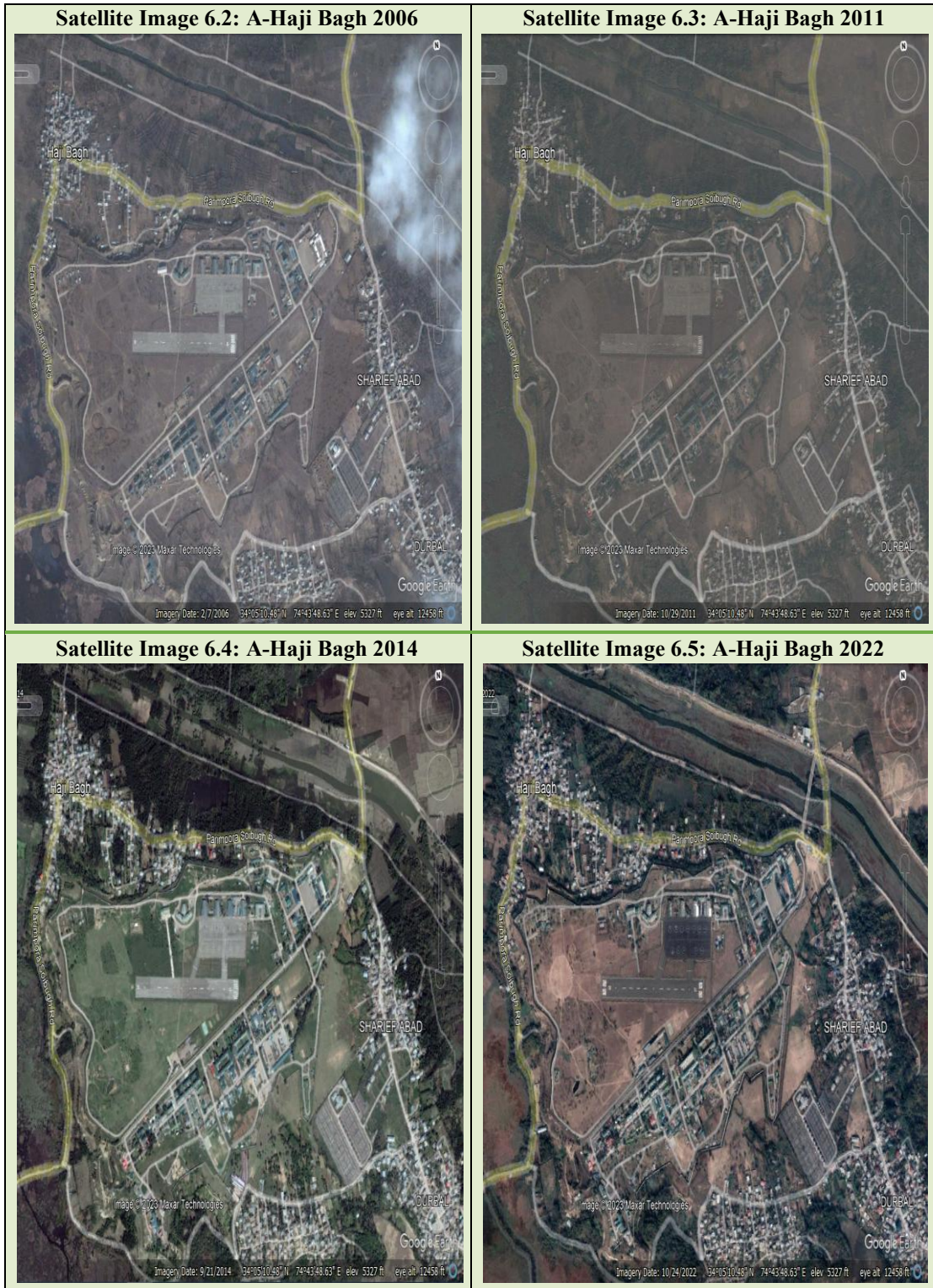
² An area of Lake unobstructed by aquatic vegetation, boulders etc. adequate for navigation or swimming

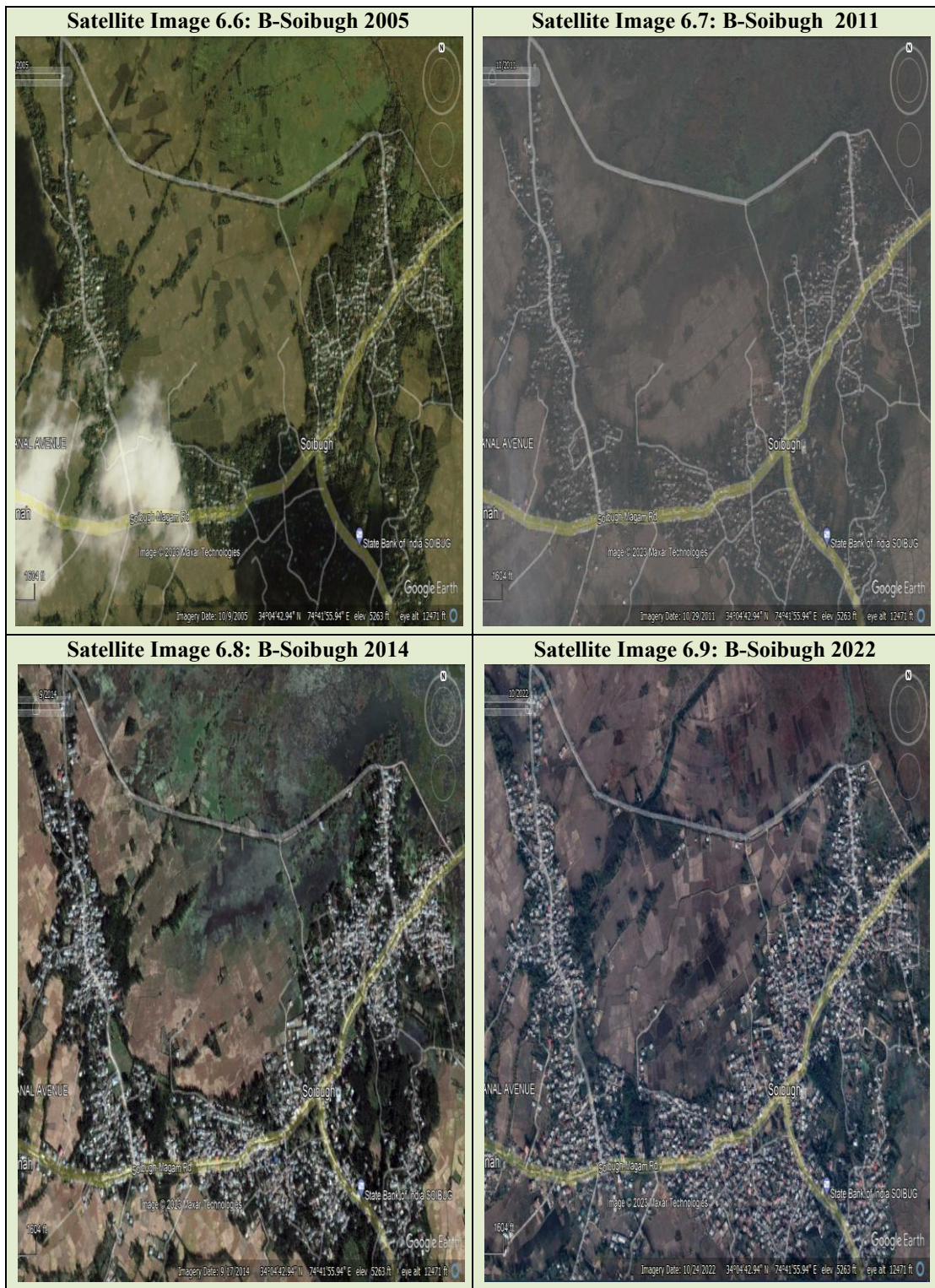
Department. It was further stated that the local villagers who had raised plantations inside the wetland had started to cut and remove the plants to relieve Hokersar from unwanted vegetation. It was also stated that settlements and built-up area which had remained intact were being retrieved.

- **Analysis of Google Earth Pro images to ascertain Spatio-temporal changes in Lakes and its catchment**

Clear images of Hokersar Lake and its catchment area of Haji Bagh, Soibug and HMT (Zainakot) available on Google Earth Pro were taken for the period 2005-2022. These images indicate substantial increase in the built-up in these catchment area of Lake. The catchment area are without sewage treatments and the Lake receives water inflow from tributaries flowing through these catchment area. The Google Earth Pro images of the Lake indicating land use changes within the Lake and its catchment are shown in **Satellite Images 6.1 to 6.13**:









6.1.4 Planning

Instead of a comprehensive plan for Conservation and Management of the Lake, only annual plans were formulated, financed and implemented by the Wildlife Department. These plans did not address the root causes of degradation of the Lake, such as change in hydrological regimes, pollution or loss of biodiversity in the Lake. Water budget of the Lake could not be regulated in absence of hydraulic gate at water entry and exit point of the Lake. Siltation in the Lake could not be mitigated and water quality of the Lake could not be maintained due to lack of silt retention basin, catchment treatment works and STPs.

Instead of a comprehensive plan for Conservation and Management of the Lake, only annual plans were formulated and implemented by the Wildlife Protection Department. The management plans for the Lake were formulated, financed and implemented on annual basis. These plans did not address the root causes of degradation of the Lake, such as change in hydrological regimes, pollution or loss of biodiversity in the Lake.

As per MoEF&CC guidelines (2009) survey and demarcation for taking protection measures to avoid encroachments, water management, biodiversity conservation, sustainable resource development, weed control, pollution control and environmental education were to be carried out for Conservation and Management of the Lake. Inventories had to be prepared for catchment area of the Lake.

Audit observed that WD-Kashmir had not prepared any comprehensive project/ plan to address root causes of degradation of the Lake such as change in hydrological regimes, pollution, loss of biodiversity and encroachments. Instead, WD-Kashmir prepared only Annual Plan of Operations (APOs) which were based on aggregate estimations and cost analysis for a definite period of time. As APOs broadly covered Wildlife Management activities, physical/ financial achievements of meagre activities carried out for Lake management were not monitored and their impact was not evaluated by WPD.

6.1.4.1 Creation of flood spill channel

To safeguard Srinagar city and adjoining districts of Kashmir Province during floods, the Flood Spill Channel (FSC) at Padshahi Bagh was created (1904) for bypassing excess flood water from river Jhelum. The FSC which passes through Hokersar Lake was designed to carry a discharge of 17,000 cusecs of water, but due to siltation and accumulation of unwanted materials, its carrying capacity had reduced to 6,000 cusecs at take-off point.

To address the problem, Phase-I of the Comprehensive Flood Management Programme (CFMP) was prepared (September 2016) by the Irrigation and Flood Control Department (I&FCD), Kashmir at a cost of ₹ 399.29 crore. The CFMP included ₹ 55.27 crore for Lake management works such as drainage works, construction of

escape channels³, dredging for side slope protection, providing hydraulic gates at water entry and exit points, catchment treatment works of Doodh Ganga and Sukhnag *nallah* and construction of STPs. For these works, use of 15 hectares of land of Hokersar Lake was sanctioned (September 2016) by the Wildlife Protection Department to I&FCD against a compensation of ₹ 5.24 crore on account of Net Present Value (NPV)⁴ and fulfillment of the following conditions:

- Five *per cent* of the project cost was to be earmarked by the I&FCD for management of Lake;
- Eco-friendly engineering practice was to be followed during execution of works;
- Water level of at least 3-4 feet was to be maintained in the Lake throughout the year;
- A proper gradient was to be provided to facilitate free flow of water from streams/ channels entering the Lake from all sides;
- Water quality monitoring was to be carried out at frequent intervals to avoid pollution in the Lake;
- Excavated material was to be disposed of outside the Lake;
- Regulator/ lock gate was to be constructed to ensure adequate and regular water supply to the Lake;
- Gabion/ Gabion mattresses⁵ were to be laid on side slopes and on the existing embankments of the channel for ensuring continuous flow of water and for easy discharge of the silt coming with floods;
- Sufficient number of sluice gates were to be constructed in the existing bunds of channel to avoid damage to flora and fauna of the Lake; and
- Wildlife Institute of India (WII) was to advise adequate mitigation measures to be taken in respect of the Lake during implementation of the CFMP.





Audit noticed that I&FCD had spent ₹ 46.29 crore (between May 2018 and March 2022) on construction of channel, dredging and side slope protection. No major works such as construction of hydraulic gates at water entry and exit points of the Lake, silt retention basin and STPs and mitigation measures were taken up for execution as of March 2022.

³ Cunnet passing through Hokersar Lake.

⁴ A mandatory one-time payment that a user has to make for diverting forestland for non-forest use under the Forest (Conservation) Act, 1980.

⁵ These are a type of wired basket filled with various rocks or soil that helps prevent erosion, retain absence of hydraulic gate at water entry and exit point of the Lake slope, or provide a landscape element.

Thus, water budget of the Lake could not be regulated. Siltation in the Lake could not be mitigated due to lack of silt retention basin and catchment treatment works. Also, the water quality of the Lake could not be maintained for want of these works and construction of STPs. Photographic evidence of inadequacies in the execution of works noticed during joint inspection carried out by Audit with the officials of WLW-K is given below.

<p>Flood spill channel is on the left side and on the right side is entry point of the Lake which is without regulatory gate, silt settling basin and effluent treatment plant.</p> 	<p>Exit point of the Hokersar Lake without regulatory gate causing water to flow away from the Lake turning it into land mass and being used as play field.</p> 
<p>Dredged out material dumped in the open water area of the Lake</p> 	<p>Equipment used for dredging by the contractor (I&FCD) at the entry point of the Lake was not removed from the Lake</p> 

6.1.5 Underutilisation of funds for management of Lake

Out of ₹ 15.44 crore received (2017-22) by the WD-Kashmir under Central/ UT Schemes, ₹ 3.12 crore (20 per cent) was for management plans of Hokersar Lake. Audit noticed that only ₹ 1.61 crore was spent on the Lake, whereas ₹ 1.51 crore (48 per cent) had remained unutilised. Due to underutilisation of funds, management plans of the Lake were implemented inadequately.

6.1.6 Programme Implementation

An amount of ₹ 0.88 crore earmarked for survey and demarcation, ground truthing, remote sensing, mapping and delineation of the Lake was not spent by WD-Kashmir on intended purposes leaving the Lake exposed to encroachments. ₹ 0.28 crore was spent on de-weeding during months which were not specified months for de-weeding, while ₹ 0.14 crore was spent on dredging without any bathymetric survey. Point and non-point sources from which pollutants were entering the Lake had not been identified. WD-Kashmir had no comprehensive public awareness plan and no environmental education/ awareness programmes were held.

For Conservation and Management of a Lake, the activities to be carried out include survey and demarcation of the Lake, identification/ treatment of its catchment area, identification and protection of water sources, water budgeting, improving water quality of Lakes by flushing, biodiversity conservation, assessment of life of the Lake, sewage treatment in catchment area, prohibition in diversion of the Lake area. Lake management also included de-weeding and dredging of the Lake and generating public awareness. The deficiencies noticed in implementation of the Conservation and Management activities of the Lakes are discussed below:

6.1.6.1 Survey and Demarcation

To safeguard the Lake from threats of encroachment, survey and demarcation of the Lake was to be done based on revenue records, ground truthing and remote sensing followed by mapping and delineation of the Lake.

Audit observed that WD-Kashmir received ₹ 0.88 crore (₹ 0.79 crore: 2017-18 and ₹ 0.09 crore: 2020-21) for survey and demarcation, against which ₹ 0.04 crore was spent (2017-18) on items⁶ not part of the component, while ₹ 0.84 crore (95 per cent) was surrendered. Thus, no survey of Lake was conducted leaving it exposed to encroachments as discussed in **Paragraph 6.1.8**.

The Forest, Ecology & Environment Department replied (October 2022) that survey and digital delineation of Hokersar wetland had been completed jointly with Revenue Department. Moreover, the process of fixing 100 specially designed cement concrete boundary demarcation pillars would be completed during the first two years of implementation of Management Action Plan. It was further stated that due to proprietary rights claimed by some locals over some portions of wetlands, it was difficult to draw a distinction between ownerships and encroachments in these wetlands. It was added that to ascertain the actual status of the land, the District Administration had ordered serious measures for undertaking joint demarcation of these

⁶ Hiring of legal experts, purchase of equipment etc.

wetlands. The fact, however, remained that survey and demarcation of the Lake was not carried out.

6.1.6.2 De-weeding, De-silting and Dredging of Lake

• De-weeding

As per National Wetland Conservation Programme, Guidelines for Conservation and Management of Wetlands in India (2009), de-weeding is to be carried out for removing unwanted plants from the Lake. The exercise was to be carried out before flowering, fruiting and formation of propagules in plants. Weeds were to be removed at a controlled rate of 40 to 50 *per cent* (maximum up to 75 *per cent*) of submerged vegetation. Some selected areas were to be left undisturbed for fish spawning and feeding of waterfowls.

Out of ₹ one crore allocated (2017-22) for de-weeding/ de-silting of the Lake, an expenditure of ₹ 0.85 crore was incurred.

Audit noticed that expenditure of ₹ 0.85 crore included ₹ 0.71 crore incurred (2017-22) on de-weeding, out of which ₹ 0.28 crore was spent during months which were not specified months for de-weeding. WD-Kashmir did not have year/ basin/ area-wise vegetation map of the Lake alongwith data of weed cover. Data regarding areas from which weeds were removed and areas left undisturbed for spawning of fish and feeding of waterfowls was also not maintained. Impact assessment of de-weeding such as decrease/ increase in visibility and decrease/ increase in dissolved oxygen, nitrogen and phosphorus in Lake water was also not carried out.

During the exit conference (September 2022), it was stated that de-weeding works had been included in recently prepared five-year Integrated Management Plan.

• Dredging

Dredging is carried out to improve water flow in the Lake by removing nutrient rich sediments, shoals and solid land mass. Dredging of Lake has to be based on a bathymetric survey of the Lake, indicating location of blocked channels, area of the Lake to be dredged out, the depth up to which it has to be done, sites where the dredged out material has to be disposed of and cost involved.

WD-Kashmir had spent (2017-22) an amount of ₹ 0.14 crore on dredging without any bathymetric survey. No record was maintained to show locations at which dredging was carried out and places where dredged out material was dumped. No study was conducted to assess the impact of dredging on the Lake.

During the exit conference (September 2022), it was stated that dredging works had been initiated for which two master dredgers had been deployed. It was further stated

that a process was underway to utilise the dredged-out material for production of bricks, for use in roads, paths, and other infrastructure within the Lake.

The Forest, Ecology & Environment Department further replied (October 2022) that the WPD had engaged consultant for conducting bathymetric study and on the basis of the data generated by the Engineering consultant surveyor, e-auction notice had been finalised for processing.

During joint inspection by the audit party with the members of the audited entity, accumulation of silt and dumping of dredged out silt by contractors at the fringes of the Lake were noticed. Photographic evidence is given below.







6.1.6.3 Discharge of untreated effluents into the Lake

Discharge of domestic waste from urban habitations near the Lake, percolation of nutrients due to surface run-off from agricultural activities in the catchment area and discharge of waste water from a hospital located near the Lake had the potential to cause eutrophication of the Lake.

WD-Kashmir had not identified point and non-point sources from which pollutants were entering the Lake.

During joint inspection by the audit party with the members of the audited entity, sewage and wastes entering the Lake from its catchment area were noticed. Photographic evidence is presented in the following photographs:

<p>Garbage dumped at the embankment of flood spill channel at Jhelum Valley College-cum-hospital, due to which pollutants enter the Hokersar Lake</p> 	<p>Water from drains finding its way into one of the water channels of the Lake at Dar Mohalla</p> 
<p>Waste floating in water which finally enters into the Lake</p> 	<p>Waste dumped at the fringe of / inside the Lake</p> 

6.1.7 Public Awareness

As per National Wetland Conservation Programme, Guidelines for Conservation and Management of Wetlands in India (2009), Environmental education and public awareness programmes were to be held by holding seminars/ workshops and way-side exhibits such as display boards and hoardings. Services of media were to be used and Self-Help Groups (SHGs) were also to be constituted for public awareness.

Audit noticed that WD-Kashmir had no comprehensive public awareness plan. Although ₹ 0.26 crore was allocated (2017-22) for public awareness, only ₹ 0.12 crore was spent thereon leaving ₹ 0.14 crore (56 per cent) unutilised. No records indicating annual targets/ achievements and monitoring reports were maintained. The expenditure of ₹ 0.12 crore was incurred on installation of hoardings and providing refreshment to participants. No environmental education/ awareness programmes were held.







6.1.8 Encroachment of Lake

Due to lack of survey and demarcation, land area of the Lake measuring 2,528.10 kanals had been encroached upon for erection of structures, plantation, development of vegetative gardens and cultivation of paddy.

There was no formal takeover of area of land when the Lake came (year 1978) under the control of WD-Kashmir from the Department of Fisheries. The WD-Kashmir did not have details of area (whether Government or proprietary) belonging to the Lake and its fringes. Due to lack of survey and demarcation, land of the Lake measuring 2,528.10 *kanals* had been encroached upon for erection of structures, plantation, development of vegetative gardens and cultivation of paddy. Although the WD-Kashmir had served notices to encroachers, no eviction could be ensured.

During the exit conference (September 2022), it was stated that demarcation of Lake would be followed by identification of encroachments and erection of pillars.

During joint inspection by the audit party with the members of the audited entity, various types of encroachments were noticed. Photographic evidence is given below.

<p>Road illegally constructed through the Lake at Kadalla Mohalla Zainakot</p> 	<p>Dumping of garbage near bridge constructed within Lake for road connectivity to Kadalla Mohalla Zainakot</p> 
<p>Conversion of Lake area into play ground</p> 	<p>Encroachment of Lake by conversion of Lake area into vegetation fields</p> 
<p>Encroachment of Lake by conversion of Lake area into plantation</p> 	<p>Siltation of Lake area giving rise to illegal plantation/ encroachments</p> 

6.1.9 Results of research carried out by scholars of universities and health of Lake

No measures were taken by WD-Kashmir in respect of observations of independent research reports regarding disappearance of some native species of aquatic plants and clogging of non-native species in the Lake. Measures were also not taken for overcoming decrease in depth of the Lake and for mitigation of deterioration in water quality of the Lake due to increase in nutrient loads.

WD-Kashmir had not carried out any research to evaluate water quality of the Lake and to study fishes and water bird population in the Lake. Disappearance of native species and invasion of noxious species, if any, due to heavy inflow of silt, sewage flowing into Lake from its catchment area had also not been assessed. However, research carried out by scholars of various universities on various themes of the Lake indicated that health of the Lake had deteriorated due to different factors as detailed in the succeeding Paragraphs:

• Disappearance of native and invasion of exotic species of aquatic plants

A research report (2019)⁷ revealed that three aquatic plants viz. *Acoruscalamus*, *Euryale ferox*, and *Nelumbonucifera* had disappeared from the Lake, while non-native species such as *Azolla spp.*, *Salvinianatans*, and *Menynanthese spp.* had clogged the Lake.

A research paper⁸ titled ‘Study on Phytosociology and biomass changes (above ground and below ground of emergent microphytes in Hokersar wetland of Kashmir)’ revealed that a major part of the macrophytes (biomass/ organic matter) of the Lake was under the Lake soils and these macrophytes act as a huge carbon sink.

According to the Report, though the Lake was highly productive with a large carbon sequestration potential, there was a risk of losing it if measures were not taken to maintain the trophic status of the Lake by overcoming the problem of decrease in the depth of the Lake. However, no action was taken by the WD-Kashmir on the recommendation of the research reports.

• Water quality of the Lake

A research report (2019)⁹ titled ‘Current status of wetlands in Srinagar city: Threats, management, strategies, and future perspective’ revealed that water quality of the Lake had deteriorated as there was increase in the nutrient loads¹⁰ and decrease in dissolved oxygen in the Lake. This was attributed to untreated discharge of domestic sewage,

⁷ Current Status of Wetlands in Srinagar City: Threats, Management Strategies, and Future Perspectives (January 2020) by Shahid Ahmad Dar, Sami Ullah Bhat, Irfan Rashid and Sajad Ahmad Dar.

⁸ Published in November 2016 (Afreen J Lolu and two others)

⁹ By Shahid Ahmad Dar, Sami Ullah Bhat, Irfan Rashid and Sajad Ahmad Dar.

¹⁰ Phosphate phosphorous, nitrate nitrogen and ammoniacal nitrogen

agricultural effluents and animal waste into the Lake. The report suggested for adoption of proper bioremediation techniques to curtail release of major pollutants from catchments into the Lake. However, WD-Kashmir had taken no action on these suggestions.

These independent research outputs were not taken into consideration by the WD-Kashmir for preparation of plans for Conservation and Management of Hokersar Lake.

The Forest, Ecology & Environment Department replied (October 2022) that the health of Hokersar wetland alongwith all other important wetlands was being assessed by MoEF&CC and the results in the shape of health card were being published and uploaded on the national website.

The reply is not convincing as in the health card uploaded on the Wetlands of India Portal¹¹, the uploaded data pertains to the year 2019. Further, the uploaded health card states that only 60 to 80 *per cent* of samples were meeting the criteria of the BOD¹²/COD¹³/ dissolved oxygen. No data has been uploaded on the Portal after 2019 despite lapse of over three years. Further, by shifting onus on the GoI, the Department cannot absolve from its responsibility to adopt a proper bioremediation technique to curtail release of major pollutants from catchments into the Lake as suggested in the research report.

6.1.10 Conclusion

Point sources/ non-point sources of pollution entering the Lake had not been identified. Lack of dredging and construction of flood spill channel through the Lake area had resulted in decrease in open water area of the Lake and increase in other land uses such as scrub, area under siltation, area under river, area under built-up structures and area under aquatic vegetation. No comprehensive plan was formulated for Conservation and Management of the Lake. Wildlife Protection Department had formulated only annual plans which did not address the root causes of degradation of Lake such as change in hydrological regimes, pollution or loss of biodiversity in the Lake. Due to lack of survey and demarcation, Lake area measuring 2,528.10 *kanals* had been encroached upon.

6.1.11 Recommendations

- *Point sources/ non-point sources of pollution entering the Hokersar Lake need to be identified and treated.*
- *Proper dredging of the Lake should be carried out to increase open water area of the Lake.*
- *Survey and demarcation of the Lake needs to be undertaken so that the Lake area is not susceptible to encroachment and concerted efforts should be made to clear encroachment of 2,528.10 kanals of Lake area.*

¹¹ (<https://indianwetlands.in>)

¹² Biochemical Oxygen Demand

¹³ Chemical Oxygen Demand

6.2 Conservation and Management of Surinsar and Mansar Lakes

6.2.1 Introduction

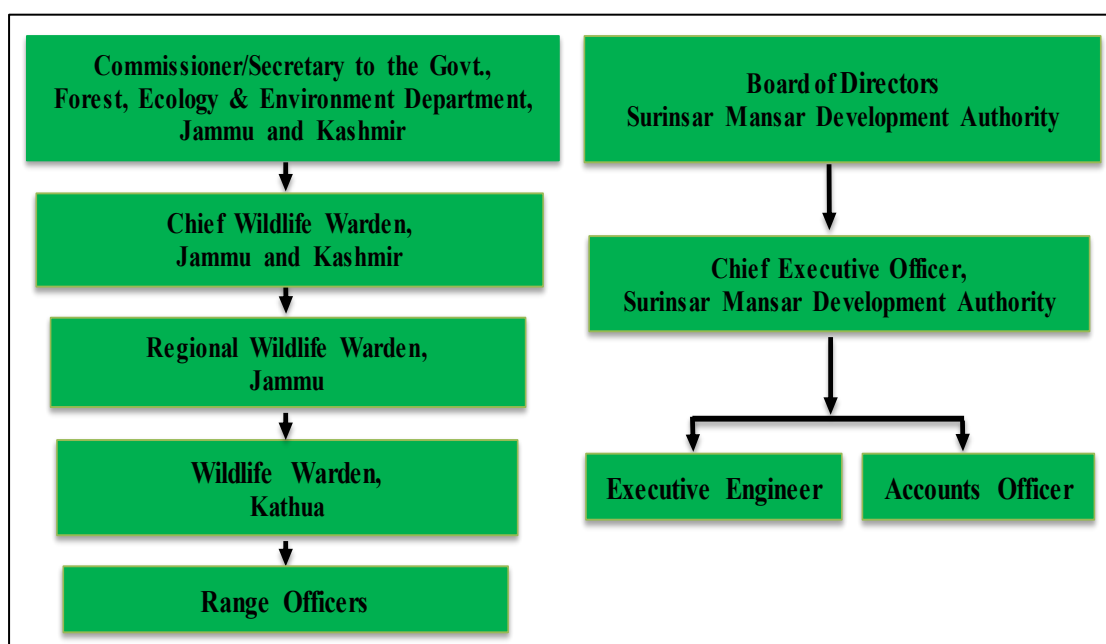
Mansar and Surinsar Lakes are situated about 60 km east of Jammu city in Udhampur and Jammu Districts respectively. The sources of water in the Lakes are springs in and around the Lake, rainfall and surface run-off. The Lake fringes are spread over an area of 0.90 Sq. km. The twin Lakes of Surinsar and Mansar are under the control and management of Wildlife Warden, Kathua (WLW-Kathua) and Surinsar-Mansar Development Authority (SMDA).



6.2.2 Organisational Setup

The administrative control of WLW-Kathua and SMDA vests with Commissioner/Secretary, Forest, Ecology, & Environment Department, GoJ&K and Commissioner/Secretary, Tourism Department, GoJ&K respectively. The organisational setups of WLW-Kathua and SMDA are given in **Chart 6.4**:

Chart 6.4: Organisational setups of WLW-Kathua and SMDA



6.2.3 Land use changes in Surinsar and Mansar Lakes and their catchments

- **Analysis of remote sensing data of EE&RSD to ascertain land use changes within Surinsar and Mansar Lakes and their catchment area**

According to data of EE&RSD, there were spatio-temporal changes in land use of the Lakes during 2014-20 as detailed in **Table 6.2**

Table 6.2: Slight change in the open water of Surinsar and Mansar Lakes

Surinsar Lake		Mansar Lake	
2014	2020	2014	2020
Open water 28.60 hectares	Open water 28.59 hectares	Open water 58.61 hectares	Open water 59 hectares

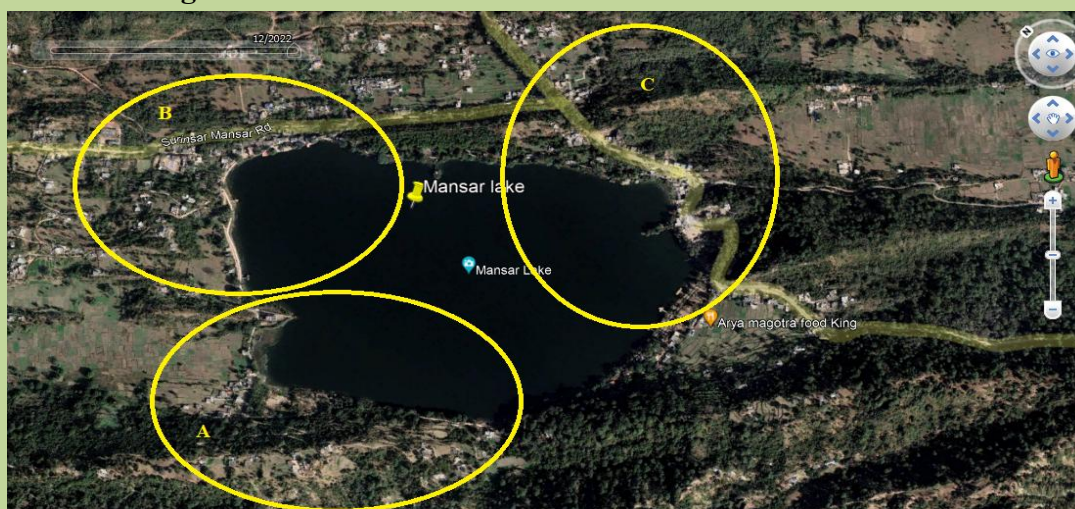
(Source: data of EE&RSD)

Although there was slight change in open water of these Lakes falling within the protected zone of wildlife area, Lake conservation and management had suffered inadequacies as discussed in the succeeding Paragraphs:

- **Analysis of Google Earth Pro images to ascertain spatio-temporal changes in catchment of Mansar Lake**

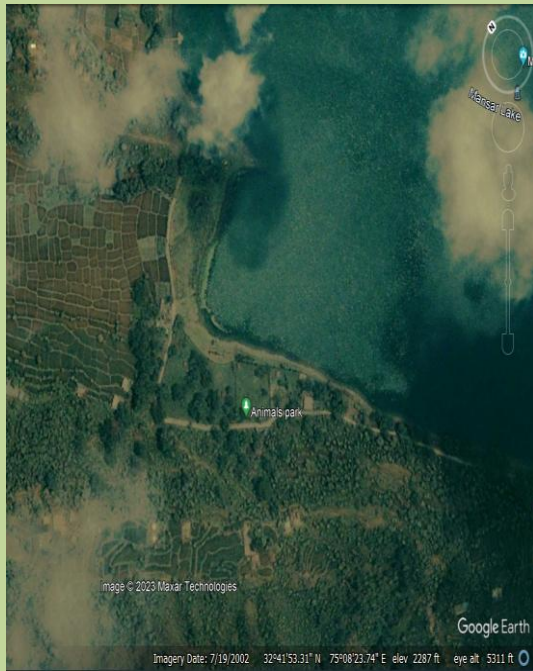
Clear images of Mansar Lake and its catchment available on Google Earth Pro from 2002-2022 indicate gradual increase in built-up in the catchment/ at the fringes of the Lake i.e. in areas of Jassor, Lodili *Mohalla* and Moriyan. The catchment area are without any sewage treatment. The Google Earth Pro images of the Mansar Lake and its catchment area, depicting spatio-temporal changes in Lake, are shown in **Satellite Images 6.14 to 6.26:**

Satellite Image 6.14: Mansar and its catchment in 2022



Yellow marked boundary “A-(Jassor), B-(Lodili *Mohalla*) & C-(Moriyan)” indicates catchment area of Mansar. Zoomed images of these catchment area are given below: -

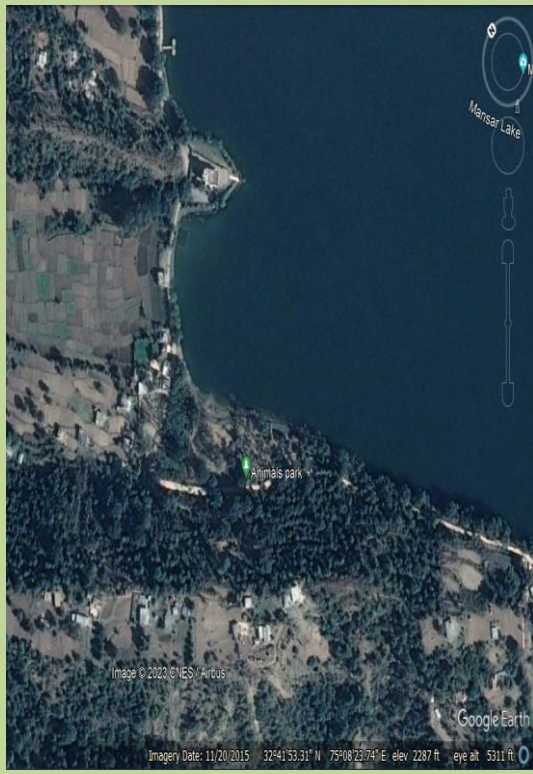
Satellite Image 6.15: A-Jassor-2002



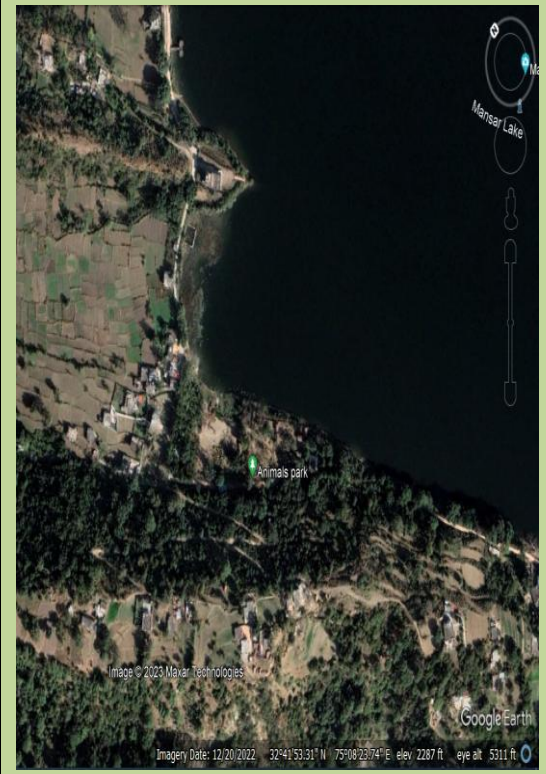
Satellite Image 6.16: A-Jassor-2010

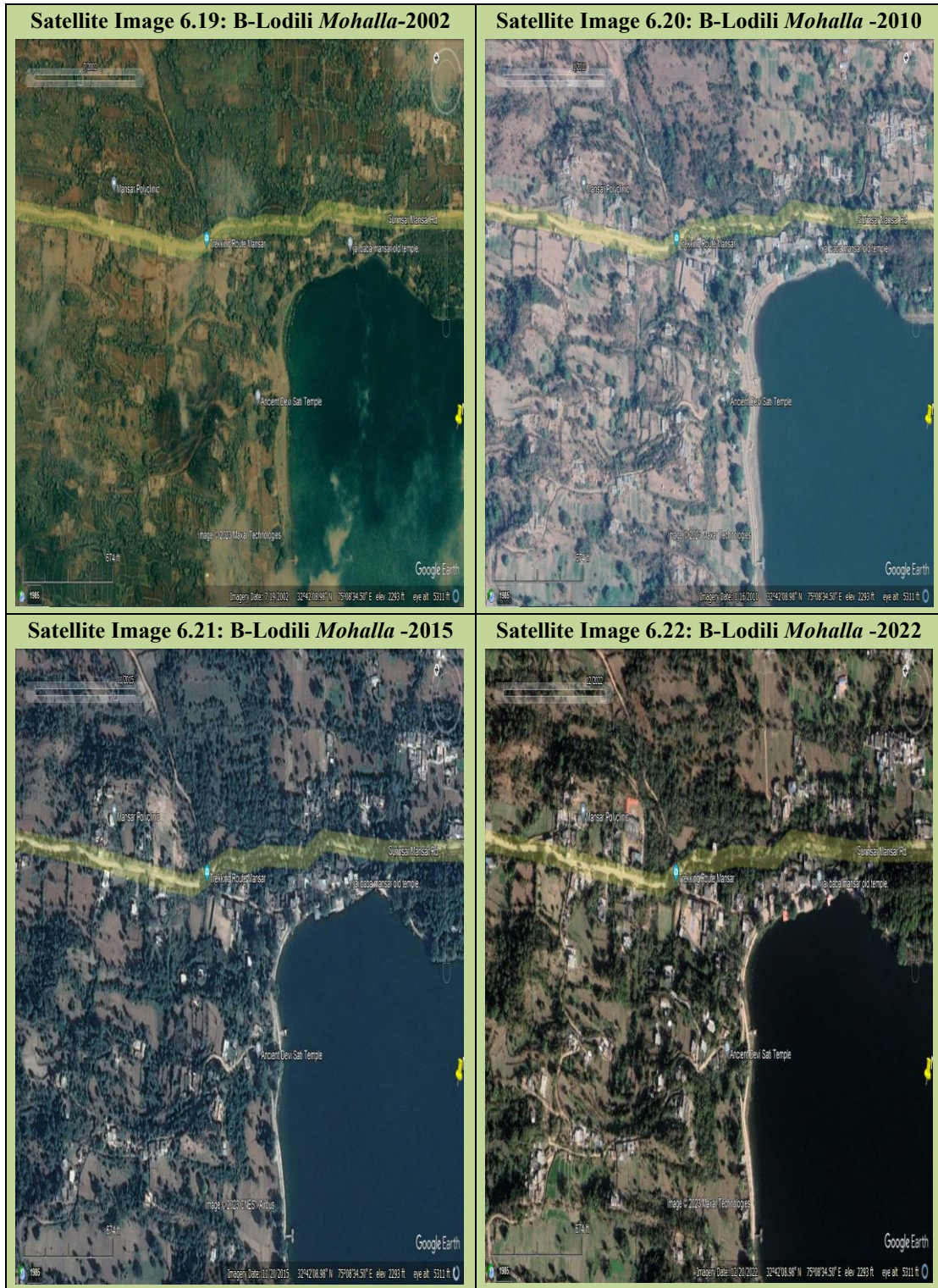


Satellite Image 6.17: A-Jassor-2015

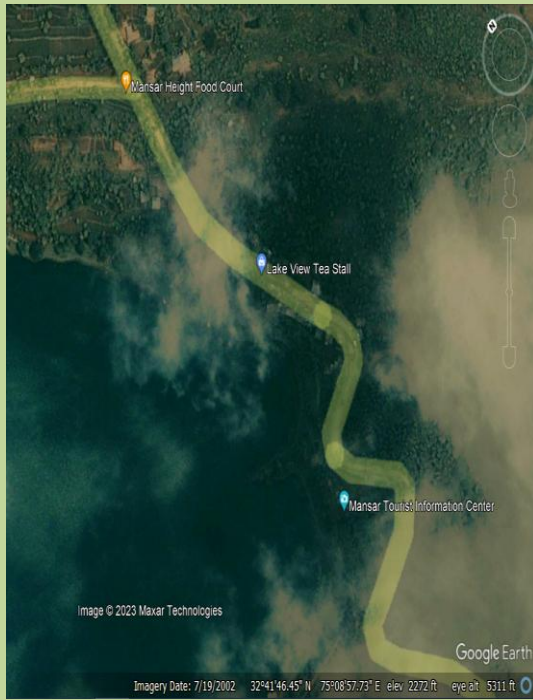


Satellite Image 6.18: A-Jassor-2022

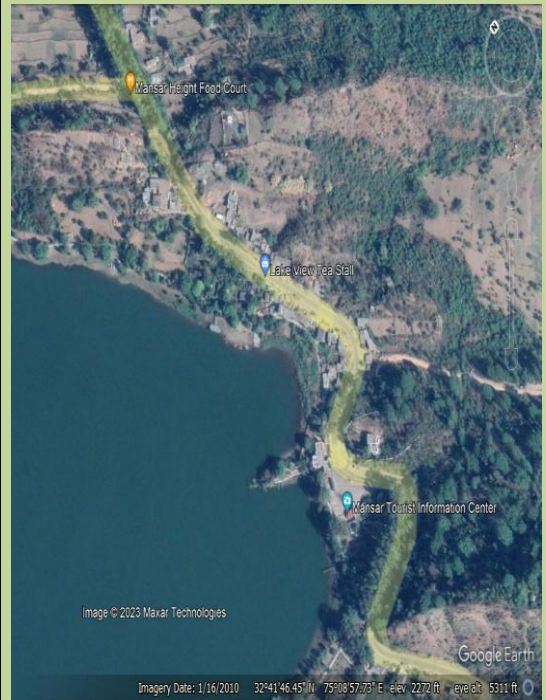




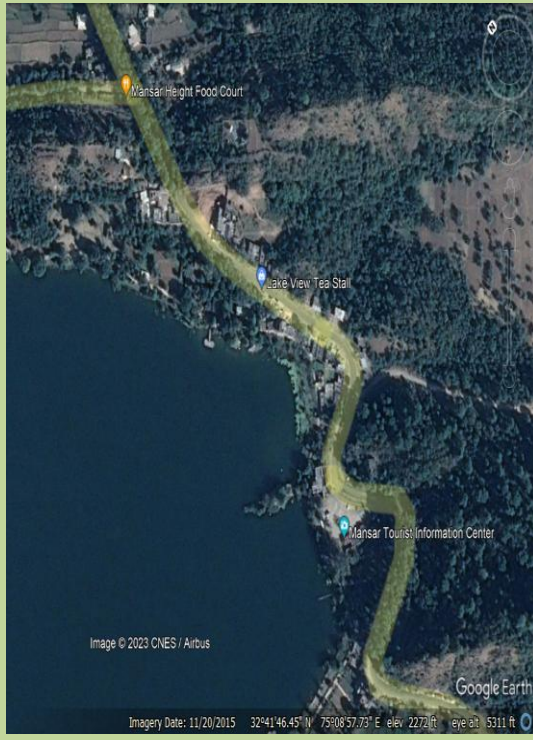
Satellite Image 6.23: C-Moriyan-2002



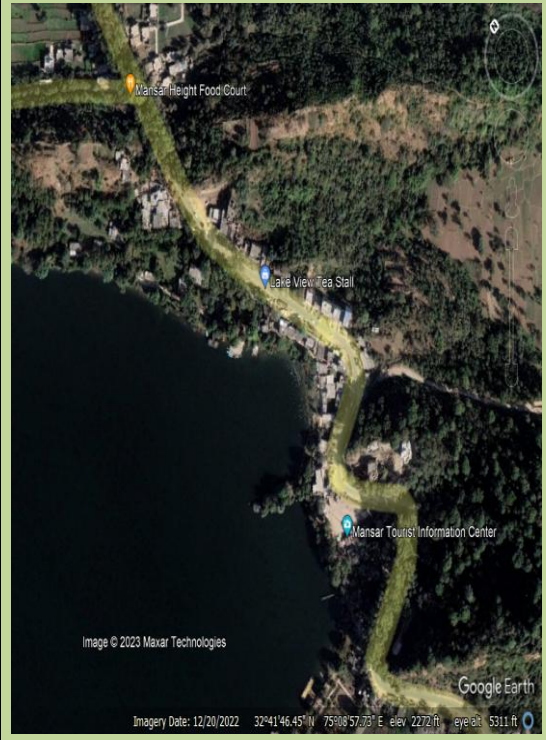
Satellite Image 6.24: C-Moriyan -2010



Satellite Image 6.25: C-Moriyan -2015

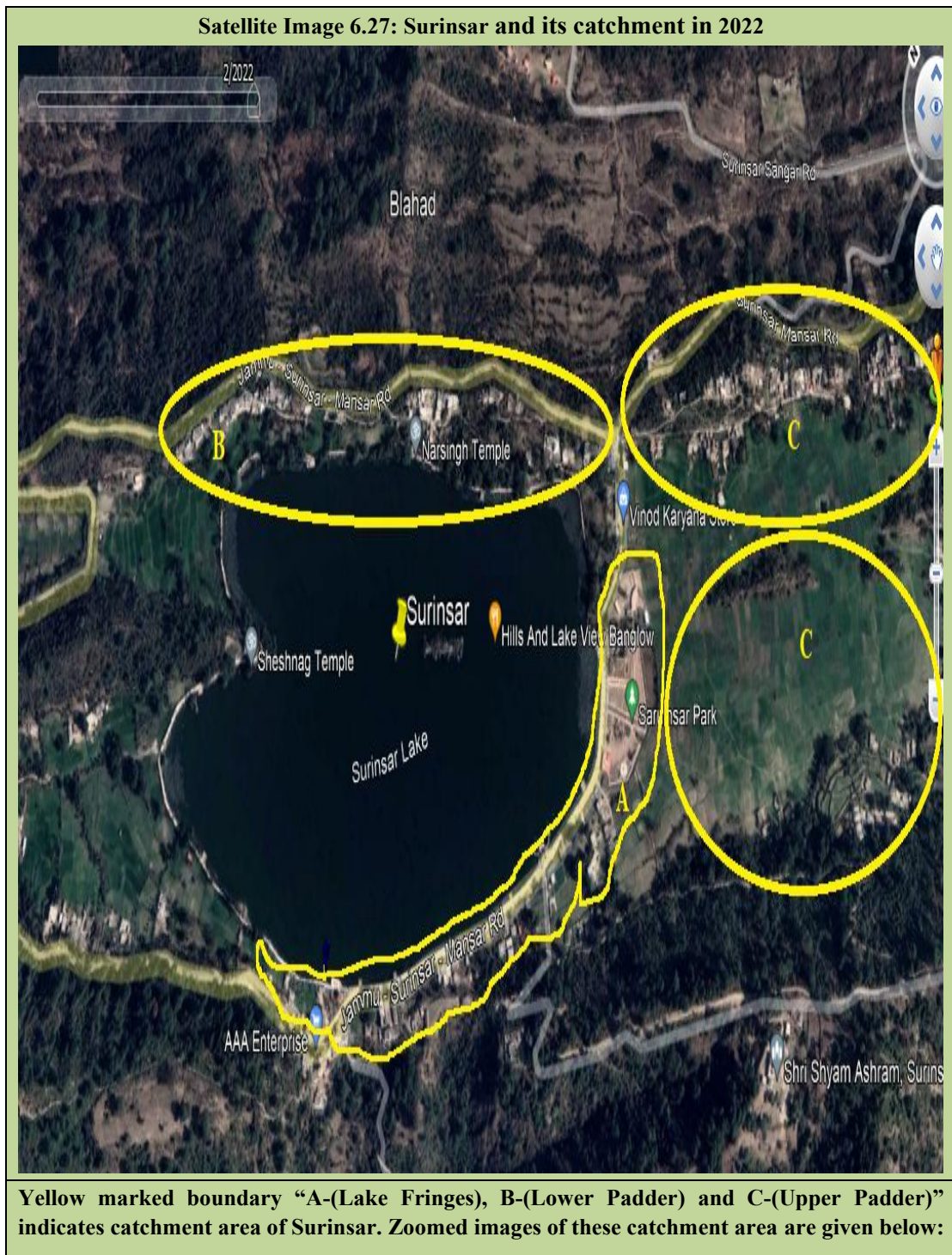


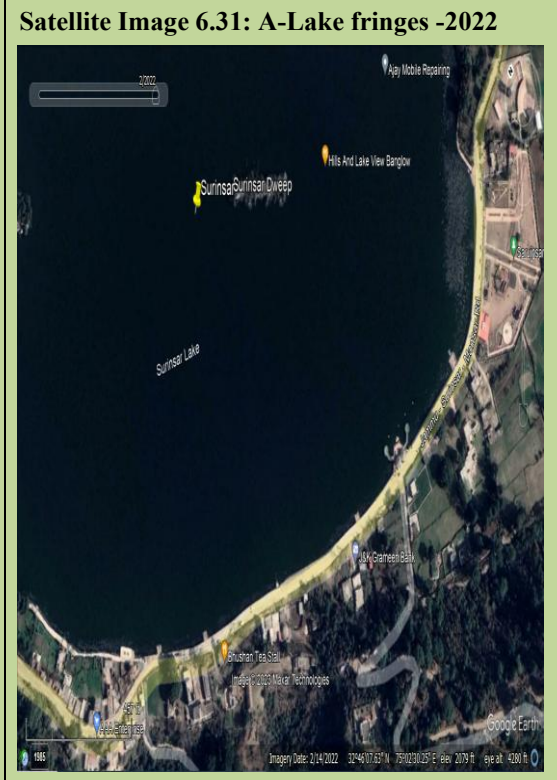
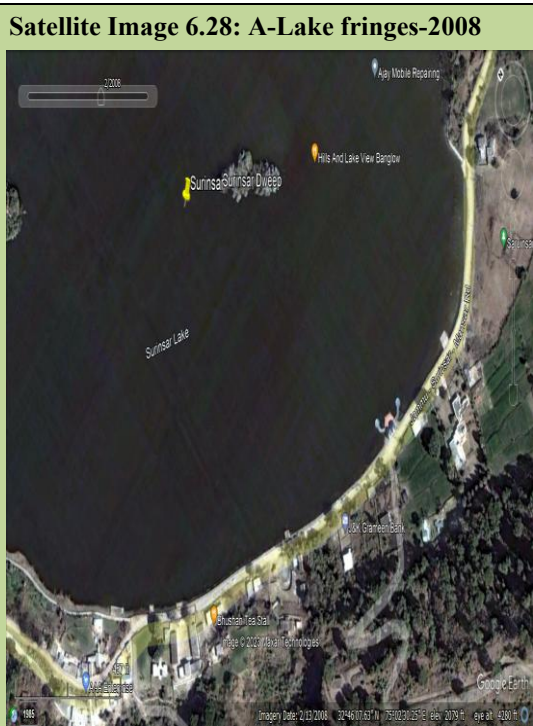
Satellite Image 6.26: C-Moriyan -2022



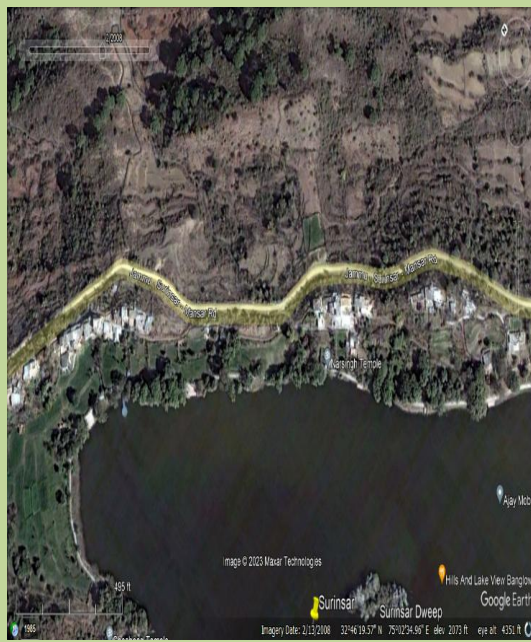
- Analysis of Google Earth Pro images to ascertain Spatio-temporal changes in catchment of Surinsar Lake**

Clear images of Surinsar Lake available on Google Earth Pro from 2008-2022 indicate gradual increase in built-up and denudation of forests in the catchment of Lake i.e. in areas of Lower Padder and Upper Padder. The Google Earth Pro images of the Surinsar Lake and its catchment area, depicting spatio-temporal changes in Lake, are shown in **Satellite Images 6.27 to 6.39**:

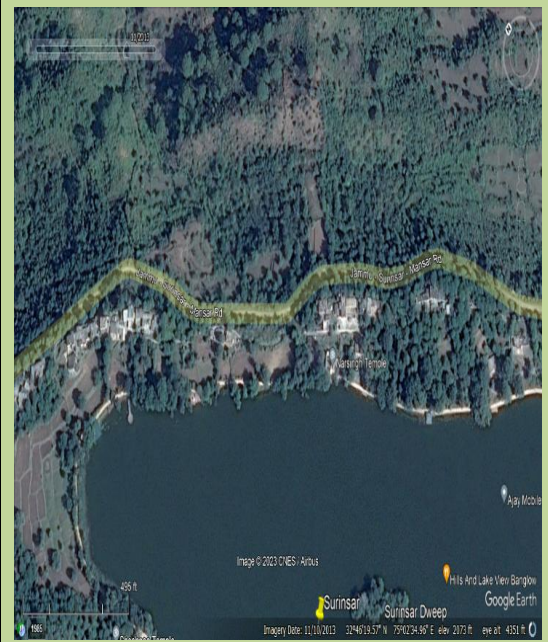




Satellite Image 6.32: B-Lower Paddar-2008



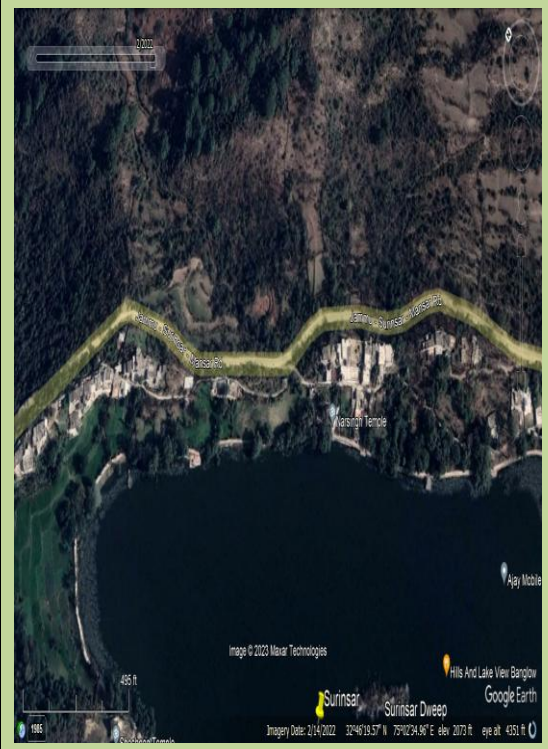
Satellite Image 6.33: B-Lower Paddar -2013



Satellite Image 6.34: B-Lower Paddar -2018



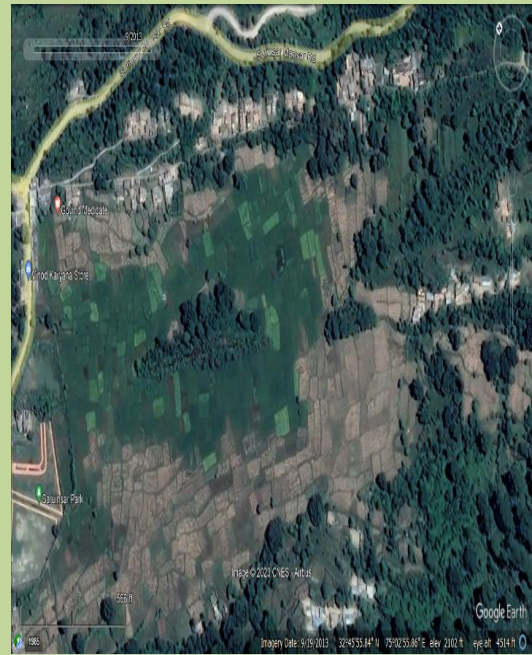
Satellite Image 6.35: B-Lower Paddar -2022



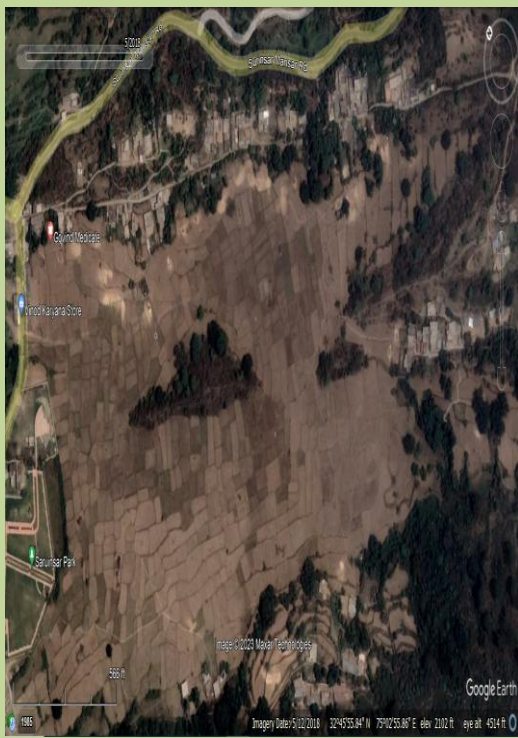
Satellite Image 6.36: C-Upper Padder -2008



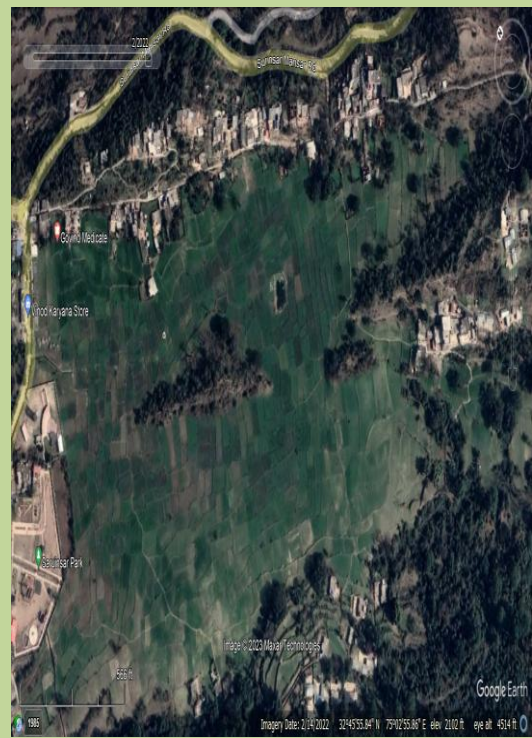
Satellite Image 6.37: C-Upper Padder -2013



Satellite Image 6.38: C-Upper Padder -2018



Satellite Image 6.39: C-Upper Padder -2022



6.2.4 Planning

Neither WLW-Kathua nor SMDA had a specific legal framework and clear demarcation of responsibility for Conservation and Management of Lakes. As of March 2022, SMDA had not finalised a master plan of the area resulting in continuous unplanned development and construction works in and around the Lakes. In absence of any comprehensive Integrated Management Plan for Conservation and Management of Lakes, WLW-Kathua and SMDA were carrying out Lake-related activities in an ad-hoc manner. Monitoring committee constituted (December 2020) to oversee Conservation and Management of the two Lakes had not held any meeting as of March 2022 to monitor Conservation and Management of the Lakes.

6.2.4.1 Mandate of the WLW-Kathua and SMDA

The SMDA was created on 26th June 2006 under Jammu and Kashmir Development Act, 1970 to promote and facilitate development of the area (including Lakes) falling under its jurisdiction. As per provisions of the Act, the SMDA had to prepare a master plan of the designated area for carrying out development of the area, including Mansar and Surinsar Lakes, indicating the proposed land usage and stages of development.

Audit examination revealed the following deficiencies:

- Despite a lapse of 16 years (as of March 2022) since its creation, SMDA could not finalise a master plan of the designated area. This resulted in continuous unplanned development and construction works in and around the Lakes thereby defeating the purpose for which SMDA was formed.
- SMDA had been largely preparing annual plans for execution of works related to tourism development of the area such as construction of view-points in and around Lakes, sanitation/ face-lifting of the area and creation of bathing *ghats* with only limited plans for Conservation and Management of Lakes.
- Lake-related plans were not based on baseline data. Although, a draft master plan for SMDA was submitted (April 2019) by SMDA to the Tourism Department for approval, Tourism Department had made observations (February 2020) regarding the master plan which were to be addressed by March 2020. The issues remained unaddressed and no further action in this regard was taken by SMDA (March 2022).
- There was no clear or specific mandate of WLW-Kathua regarding Conservation and Management of the twin Lakes. As these Lakes are part of Surinsar-Mansar Wildlife Sanctuary, they come under the management and control of WPD which had focused more on Wildlife management and less on Conservation and Management of Lakes.

Due to non-finalisation of master plan, there was unplanned urbanisation of the areas around the Lake because of which Conservation and Management of the Lakes suffered continuously.

The Forest, Ecology & Environment Department replied (October 2022) that SMDA is looking after the tourism related activities whereas WLW-Kathua is looking after the conservation work. It was further stated that WPD had taken up preparation of comprehensive management plan with Wildlife Institute of India (WII) which had recently submitted a draft management plan, which is yet to be finalised.

Thus, neither WLW-Kathua nor SMDA had a specific legal framework and clear responsibility for Conservation and Management of Lakes.

6.2.4.2 Preparation of Management Plans for Lake

As per Guidelines for National Lake Conservation Plan (NLCP) 2001 and National Wetland Conservation Programme 2009, later subsumed into National Plan for Conservation of Aquatic Ecosystems (NPCA), 2017, investment for conservation of wetlands shall be based on Integrated Management Plan (IMP) formulated by State/ UT Administration¹⁴ and financial assistance under NPCA shall be on the basis of IMP.

Audit noticed that WPD had prepared an Integrated Plan for Wildlife Management of the area for the period (2006-11) which was approved (May 2012) by MoEF&CC under Prime Minister's Reconstruction Package (PMRP). The Plan was implemented from the year 2008-09 and stretched up to 2021-22. WII submitted (July 2019) a Rapid Survey Report regarding the course of action that would be followed for preparation of IMP for the period 2020-25. Thereafter, WPD advanced (August 2019) ₹ 18.63 lakh to WII. Subsequently, a draft Management plan of Mansar-Surinsar Wetlands was prepared (December 2021) by WII. The WPD made (December 2021) some observations on the plan for deliberation with WII which remained unaddressed (March 2022) and the IMP was not approved as of March 2022.

WLW-Kathua accepted (January 2021) the audit observation that it had carried out Lake related activities according to the earlier Management plan framed in 2006-11.

While a rejuvenation and development plan for Mansar Lake was drafted by the SMDA, the plan was not approved (March 2022). No management plan in respect of Surinsar Lake was prepared as of August 2022.

The Forest, Ecology & Environment Department replied (October 2022) that WPD had initiated the process for preparation of management plan of Surinsar-Mansar Lakes with WII which has carried out scientific studies for the purpose and final draft has been

¹⁴ The Wetlands Authorities, created as per provisions of Wetlands (Conservation and Management) Rules, 2017, within States/ UT administration will be the nodal agency for all matters concerned with the implementation of NPCA.

received for finalisation. It was further stated that the comprehensive Mansar Rejuvenation Plan had been examined by WPD and comments thereon conveyed to Director Tourism, Jammu.

The reply should be seen in light of the fact that no details have been furnished in the reply such as date of taking up the matter with WII and agreement/ MoU entered into with the latter and date of receipt of draft for finalisation and reasons for its pendency.

Thus, in the absence of any comprehensive IMP for Conservation and Management of the two Lakes, both the Authorities (SMDA and WLW-Kathua) were carrying out Lake-related activities in a directionless and ad-hoc manner.

During the exit conference (September 2022), it was stated that the five-year Integrated Management Plan (IMP) of Lake have been prepared after the matter was raised by NGT and Audit.

6.2.4.3 State Level Monitoring Committee

To oversee the Conservation and Management of the two Lakes, the GoJ&K constituted (December 2020) a State Level Monitoring Committee. However, as of March 2022, no meeting of the committee was held with the result the Conservation and Management of the Lakes could not be overseen.

6.2.5 Underutilisation of funds for management of Lakes

Funds of ₹ 2.22 crore allocated (2017-22) to WLW-Kathua for management of Lakes were partly spent as ₹ 1.40 crore (63 per cent) had remained unutilised. Out of ₹ 5.03 crore received by SMDA under other Central/ State schemes during 2017-22 for Lake-specific activities, ₹ 4.68 crore was said to have been expended on Conservation and Management of twin Lakes.

WLW-Kathua received ₹ 32.28 crore under various Central/ State schemes during 2017-18 to 2021-2022 for Mansar and Surinsar Lakes. The amount included ₹ 2.22 crore (seven per cent) for Lake-specific activities. Audit noticed that ₹ 0.82 crore was spent on restoration of degraded habitat of turtles by construction of turtle breeding farm, providing safe passage for turtles from Lake to land, plantation of fruit bearing trees in the catchment area of the Lake, education and awareness. The meagre funds allocated for management of the Lakes were also partly spent as ₹ 1.40 crore (63 per cent of allocated amount on Lake-specific activities) had remained unutilised.

WLW-Kathua attributed (January 2021) underutilisation of funds to late release of funds in respect of Centrally Sponsored Scheme “NPCA” and non-submission of annual action plan under NPCA to higher authorities.

Similarly, ₹ 14.52 crore received by SMDA under other Central/State schemes during 2017-18 to 2021-22 included ₹ 5.03 crore (35 per cent) for Lake-specific activities.

Audit noticed that out of ₹ 5.03 crore, ₹ 4.68 crore was said to have been expended on Conservation and Management of twin Lakes.

6.2.6 Programme implementation

As of March 2022, SMDA and WPD had not prepared the document indicating demarcation of boundary of Surinsar-Mansar Lakes and as such the two Lakes had remained un-demarcated and open to encroachments. Provision for de-weeding of Surinsar-Mansar Lakes was not kept by WPD in Annual Plan of Operations (APOs) during 2017-21. SMDA and WPD had not conducted any survey to identify the point and non-point sources of waste and sewage entering the Lakes. No STPs were in place for treatment of sewage generated by inhabitants living in the vicinity of the Lakes resulting in discharge of untreated waste and sewage into the Lakes. SMDA had carried out construction works amounting to ₹ 4.36 crore within 50 m of the two Lakes during 2017-18 to 2021-22. WPD had failed to prevent illegal construction of private buildings within the periphery of 50 m of the Lake.

For Conservation and Management of a Lake the activities to be carried out included survey and demarcation of Lake, identification/ treatment of its catchment area, identification and protection of water sources, water budgeting, improving water quality of Lakes by flushing, biodiversity conservation, assessment of life of the Lake, sewage treatment in catchment area, prohibition in diversion of Lake area, preventing encroachments and stopping illegal lifting of water. Lake management also included de-weeding and dredging of Lake and generating public awareness. Against these activities, only catchment management works and efforts for conservation of turtles were done during the period 2017-22. The deficiencies noticed in the implementation of the Conservation and Management activities of the two Lakes are discussed below.

6.2.6.1 Demarcation

Wetlands (Conservation and Management) Rules, 2017 provide that the concerned Department/ Authority of the State Government or Union Territory Administration shall, within a period of one year from the date of publication of these rules¹⁵, prepare a brief document in respect of each wetland identified for notification indicating boundary of wetland supported by accurate digital maps and validated by ground-truthing. Based on the brief document, the Department/ Authority had to make recommendations to the State Government or Union Territory Administration for notifying the wetlands. The document was also to demarcate catchment area (zone of influence) of wetlands and to indicate site-specific activities to be permitted and regulated within the wetland and its zone of influence.

¹⁵

By 26 September 2018.

Records of SMDA and WLW-Kathua showed that the brief document indicating demarcation of the boundary of Surinsar-Mansar Lakes had not been prepared as of March 2022. No survey was conducted to assess the zone of influence (catchment area) including sources of water of the two Lakes. Thus, the two Lakes had remained undemarcated and open to encroachments.

Against ₹ 3.78 crore earmarked by the WPD for catchment management works¹⁶, ₹ 3.76 crore was spent as of March 2022 as afforestation, construction/ widening of drains and de-silting of silt chambers were not taken up. Therefore, flow of sediments and nutrients into the Lakes could not be prevented. Impact of works executed at a cost of ₹ 3.76 crore was also not assessed by the WLW-Kathua.

During the exit conference (September 2022), it was stated that catchment management works would be taken up on scientific lines and silt channels/ traps had been prepared to stop siltation of Lake.

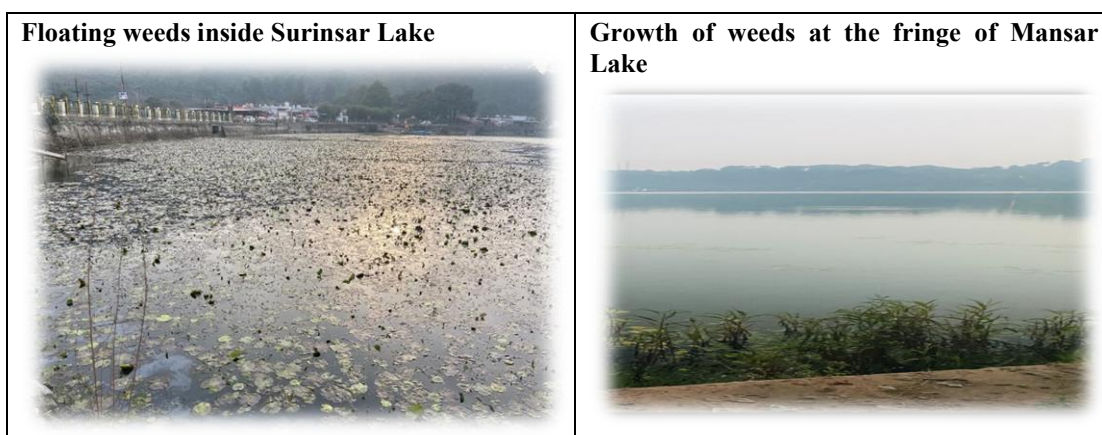
6.2.6.2 De-Weeding

Audit noticed that provision for de-weeding of Surinsar/ Mansar Lakes was not kept by WPD in Annual Plan of Operations (APOs) during 2017-18 to 2020-21. This had resulted in growth of weeds in the two Lakes up to the level of water as can be seen from the pictures below. After being pointed out by audit, WPD made a provision of ₹ 2.98 lakh for de-weeding of both the Lakes in the APOs of 2021-22. An expenditure of ₹ 2.97 lakh was incurred on de-weeding of two Lakes during 2021-22.

WLW-Kathua stated (January 2021) that de-weeding of aquatic vegetation and dredging would be included in future APOs.

During the exit conference (September 2022), it was stated that process of de-weeding of Surinsar Lake had been initiated.

Photographic evidence of floating weeds in the Lakes is given below.



¹⁶ Check walls in dry stones masonry, gully plugging in RS masonry dry, afforestation in area trench plantation etc.

6.2.6.3 Sewage treatment system and disposal of waste

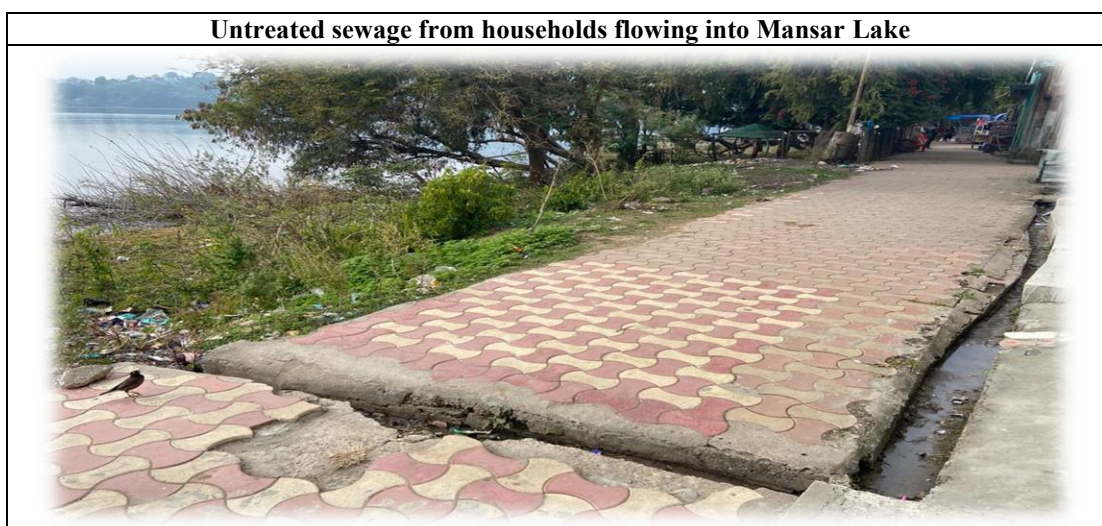
• Sewage system

Wetlands (Conservation and Management) Rules, 2010 and 2017 prohibit discharge of untreated wastes and effluents from villages and other human settlements into wetlands.

Audit examination revealed the following deficiencies:



- SMDA and WPD had not conducted any exhaustive survey to identify the point and non-point sources¹⁷ of waste and untreated sewage entering the Lakes.
- No STPs were in place for treatment of sewage generated by inhabitants living in the vicinity of the Lakes.
- Although SMDA projected (December 2018) requirement of ₹ 5.60 crore under PMDP (Phase-II) for installation of eight STPs¹⁸ for these two Lakes and requested (November 2019) the Chief Engineer (UEED) to depute technical experts/ engineers to explore feasibility for installation of STPs and drainage systems, there was no further progress in this regard. As a result, funds could not be obtained from MoEF&CC for construction of STPs under PMDP (Phase-II).
- A provision of five STPs kept in the Mansar rejuvenation plan (2021) under PMDP Phase-II was yet to be approved as of March 2022.

Thus, untreated waste and sewage generated from the households in the vicinity of the two Lakes continued to be discharged into the Lakes resulting in deterioration in the water quality of these Lakes. Photographic evidence is given below:



¹⁷ Pollution originating from a single, identifiable source, such as a discharge pipe from a factory or sewage plant, is called point-source pollution. Pollution that does not originate from a single source, or point, is called non-point source pollution.

¹⁸ Five at a cost of ₹ 3.50 crore for Mansar Lake and three at a cost of ₹ 2.10 crore for Surinsar Lake.

Drain water flowing into Surinsar Lake near a residential area	Drain water from commercial establishments flowing into Mansar Lake
	

• Solid Waste Management

Rule 4 of Wetlands (Conservation and Management) Rules, 2010 and 2017 prohibits dumping of solid waste within wetlands. Further, Waste Management Rules, 2016 (notified by MoEF&CC) prescribe actions to be taken for collection, transportation, treatment and disposal of waste together with monitoring and evaluation of compliance of these Rules.

Audit noticed that SMDA and WLW-Kathua had not taken measures for source segregation and door-to-door collection and disposal of solid waste generated by households in the vicinity of the Lakes. Though SMDA spent ₹ 0.35 crore during 2017-18 to 2021-22 on disposal of solid waste, it had not identified land for dumping of solid waste with the result waste generated by households, shops, visitors and pilgrims was being dumped on the fringes of these Lakes as depicted in the photographs below. The animal waste generated in the deer park situated along the banks of Mansar Lake was also finding its way into the Lake. Photographic evidence is given below.



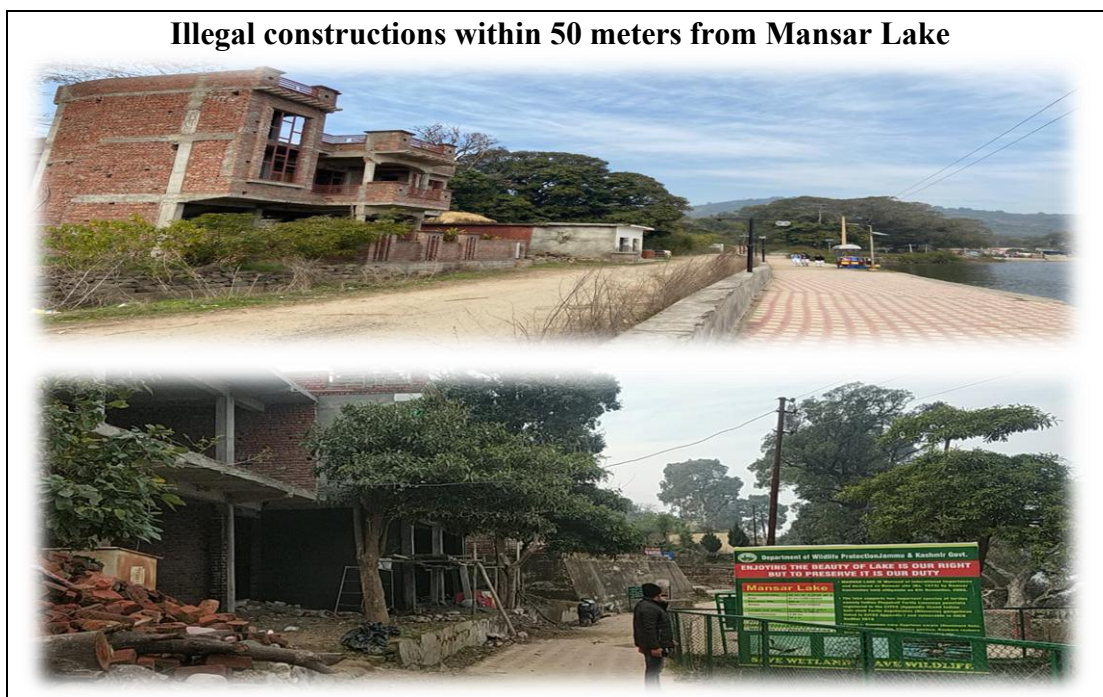
Out of funds of ₹ 6.16 lakh released (2017-18 to 2021-22) by GoJ&K to WLW-Kathua for solid waste management, ₹ 1.74 lakh (28 per cent) was not spent.

SMDA stated (January 2021) that installation of STP and identification of land for dumping site were under process. WLW-Kathua stated (January 2021) that steps would be taken for disposal of garbage/ waste in a scientific manner and that the animal waste from the deer park would be disposed of by vermicomposting.

6.2.6.4 Construction works executed in contravention of wetland rules

Rule 4 of Wetlands (Conservation and Management Rules), 2010 and 2017 stipulates that no construction of a permanent nature except for boat jetties shall be undertaken by any Authority within 50 meters from the mean high flood level of a water body. Audit noticed that in contravention of these rules, SMDA had carried out construction works amounting to ₹ 4.36 crore within 50 meters of the two Lakes during 2017-18 to 2021-22. The works included construction/ upgradation of wooden viewpoints and construction of cemented tiled paths along the periphery of the two Lakes.

It was also noticed that WLW-Kathua had failed to prevent illegal construction of private buildings within the periphery of 50 m of the Mansar Lake, as can be seen in the following photographs.



The CEO, SMDA stated (Jan 2021) that SMDA was in the process of preparing a Master plan in consultation with the stakeholders to define land use of Lakes. It was further stated that the Directorate of Tourism had prepared Mansar Rejuvenation Plan in consultation with the Chief Wild Life Warden, Jammu to undertake the development of the area.

The reply was not relevant as no justification was offered by the CEO, SMDA regarding constructions carried out in the vicinity of the Lakes in contravention of Wetland Rules.

During the exit conference (September 2022), it was admitted that pathways constructed around Surinsar-Mansar were wrongly executed by SMDA. It was further stated that there had been improvement in coordination between WPD and SMDA.

6.2.7 Measures for conservation of turtles

Rapid Survey Report (RSR) of WII revealed (June 2019) that there were 26 turtles belonging to two species¹⁹ in Mansar Lake and 17 turtles belonging to three species²⁰ in Surinsar Lake. Native to northern India, these turtle species enjoy protection under Schedule-I of the Indian Wildlife Protection Act, 1972. *Nilssonia Gangeticus* specie found in Mansar Lake is considered as vulnerable. As such, measures were needed to be taken by providing underground passage for this species, constructing turtle breeding cum basking farms on banks and developing nesting sites to support their population.

WII in its RSR (June 2019) as well as WLW-Kathua apprised (April 2022) CEO, SMDA that construction of concrete tiled path along the periphery of Lakes by SMDA without obtaining NOC from WLW-Kathua had resulted in raising of water level of these Lakes causing obstruction in movement of turtles to the shores of the Lakes for basking/ laying of eggs. As of March 2022, no action was taken in this regard by SMDA. Audit noticed (April 2022) during on spot verification that though construction of turtle breeding cum basking farms was completed (December 2022) by WLW-Kathua in Surinsar Lake, movement of turtles to the shores for laying eggs continued to remain hampered. Due to raising of water level, the breeding cum basking farm constructed (December 2022) in Mansar Lake was submerged in water.

The Forest, Ecology & Environment Department replied (October 2022) that serious efforts had been made by WPD for conservation of two species of turtles and that during the last three years, 10 turtle breeding grounds/ basking sites and five underpasses had been made in the Lakes. It was also stated that the water level in the Lakes had been lowered to expose the shore area.

The reply should be seen in light of the fact that during physical verification (December 2022) of Mansar Lake it was found that there were six breeding farms in the Lake out of which, one had continued to remain submerged, four were improperly fenced exposing turtle eggs to being eaten by stray animals/ birds and only one was in good condition. Photographic evidence is presented in the following photographs:

¹⁹ 15 individuals of *Nilssonia Gangeticus* and 11 individuals of *Lissemys Punctata*.

²⁰ *Lissemys Punctata*, *Nilssonia Gangeticus* and *Pangshura tecta*.

Concrete wall constructed around Mansar Lake



Turtle breeding ground submerged in water



6.2.8 Other issues

Instead of delinking the source of water for water supply scheme from Mansar Lake, Jal Shakti Department continued to irregularly lift water of the Lake for supply of water. Water quality tests of the Lakes conducted (November/December 2018) by the Pollution Control Board (PCB) revealed that Biological Oxygen Demand, Chemical Oxygen Demand, levels of ammonium nitrate and nitrate nitrogen were not within the permissible limits. Unofficial introduction into the Lake of exotic species had resulted in dwindling of native fishes.

6.2.8.1 Irregular Lifting of water

Rule 4 of Wetlands (Conservation and Management), Rules 2010 and 2017 stipulate that the wetlands shall be conserved and managed in accordance with the principle of 'wise use'. Further, these rules prohibit discharge of untreated wastes and effluents into the wetlands.

Under 'Water Supply Scheme Channi Mansar' a water filtration plant using water of Mansar Lake was completed in 1994. A new Water Supply Scheme (WSS) under

Accelerated Rural Water Supply Programme (ARSWP)/ Special Task Force with ‘*Gambhir Nallah*’ as source of water was completed (March 2014) by the Department of Jal Shakti (Public Health Engineering) at a cost of ₹ 5.28 crore to meet increase in demand for water and delink its source from Mansar Lake.

Audit noticed that instead of delinking the source of water from Mansar Lake, Jal Shakti Department continued to irregularly lift water from the Lake for supply of water. Further, the residual waste from the water filtration plant was being discharged back into Mansar Lake in contravention of the Wetlands rules, thus affecting the physico-chemical properties of the Lake.

The fact of change in the physio-chemical properties was also corroborated (August 2019) by the J&K Pollution Control Board. Although several notices were issued (between May 2016 and March 2022) by the Wildlife Protection Department to the Jal Shakti Department, Udhampur, the latter continued to irregularly lift (March 2022) water from the Lake for the WSS.

WLW-Kathua stated (January 2021) that despite repeated reminders, the Jal Shakti Department continued unregulated siphoning of water from the twin Lakes.

Irregular lifting of water by Jal Shakti (PHE) Department from Mansar Lake



6.2.8.2 Water quality of the Lakes

National Green Tribunal (NGT) issued (September 2020) directions regarding prevention of littering of waste near the banks of the Lakes, prevention of direct entry of waste water from surrounding commercial establishments and households directly into Lakes and installation of Sewage Treatment Plants (STPs) around the Lakes. Water quality tests of Lakes conducted (November/ December 2018) by State Pollution Control Board (SPCB) revealed that Biological Oxygen Demand, Chemical Oxygen Demand, levels of ammonium nitrate and nitrate nitrogen were not within the permissible limits.

Although the SPCB (August 2019) had instructed SMDA to ensure that no untreated water is discharged into the Lakes, no action in this regard was taken by SMDA as of March 2022.

WLW-Kathua stated (January 2021) that water quality of the Lakes had deteriorated due to discharge of untreated sewage into the Lakes and that a proposal for installation of STPs around the Lakes under PMDP was under consideration.

6.2.8.3 Dwindling local fish species

As of June 2019, there were nine species²¹ of native fishes in Surinsar-Mansar Lakes and exotic carp (*Cyprinus Carpio*) fish species in these Lakes. Rapid Survey Report of Wildlife Institute of India revealed (June 2019) that the number of native fishes had dwindled in Mansar Lake due to abundance of exotic carp species in the Lake and recommended for periodical removal of common carp species from the Lake.

Audit observed that although WLW-Kathua has put up a notice board for public information regarding prohibition of artificial feeding of fishes in Mansar Lake, no measures were taken by WLW-Kathua and SMDA to enforce the prohibition. It was also noted during joint physical verification (January 2021) that these exotic fishes were being fed with *atta* (flour) by pilgrims and tourists visiting the Lakes. As of March 2022, no action had been taken (March 2022) by the WLW-Kathua for removal of carp species from Mansar Lake.

WLW-Kathua stated (April 2022) that for revival of native aquatic fauna, provision of ₹ six lakh had been kept in the APO of Compensatory Afforestation Fund Management and Planning Authority (CAMPA) for the year 2022-23 for shifting of common carp in the Lakes.

The Forest, Ecology & Environment Department replied (October 2022) that due to religious sentiments of people regarding the fish of the Lakes, consultations were held with them for removal of exotic fish but only stakeholders of Surinsar Lake could be convinced and accordingly provision of ₹ six lakh was kept during 2022-23 for initiating the process in consultation with Fisheries Department.

The fact remained that as of March 2022, no measures were taken by WLW-Kathua and SMDA for removal of common carp species from the twin Lakes. As a result, native fish species in the Lakes continued to be affected. Photographic evidence is presented in the following photographs:

²¹ Mansar Lake: (i) *Channa gachua*, (ii) *Danio rerio*, (iii) *Pethia conchonius*, (iv) *Rasbora daniconius*
Surinsar Lake: (i) *Channa gachua*, (ii) *Channa punctatus*, (iii) *Danio rerio*, (iv) *Puntius chola* and (v) *Rasbora danicanus*



6.2.9 Research carried out by scholars of universities

Management of Lakes calls for continuous research to address the drivers of change in the Lake. Audit noticed that WPD and SMDA had not got any research carried out to evaluate water quality of Mansar-Surinsar Lakes and to determine fishes and water bird population in the Lake. Disappearance of native species and invasion of noxious species, if any, due to heavy inflow of silt and sewage into Lake from its catchment area had also not been assessed. However, research carried out by scholars of various universities indicated that the health of the Lakes had deteriorated due to factors detailed in **Tables 6.3 and 6.4**.

Table 6.3: Mansar Lake-Conclusions and Suggestions in Research Reports

Sl. No.	Research Reports of Mansar Lake	Name of the researchers	Conclusions	Suggestions
1.	Water Quantity and Quality of Mansar Lake Located in the Himalayan Foothills, India of January 2009	Vijay Kumar, S.P. Rai and Omkar Singh of National Institute of Hydrology, Roorkee	Due to anthropogenic pressure around the Lake, wastes from surrounding areas, runoff from catchment area and residues from construction activities carried out around the Lake were entering the Lake causing increase in pollution of Lake water. There was absence of oxygen in the	Developing a buffer zone around the Lake to prevent nutrient inflow into the Lake from point and non-point sources and putting a ban on anthropogenic activities in the zone.

Sl. No.	Research Reports of Mansar Lake	Name of the researchers	Conclusions	Suggestions
			hypolimnion ²² zone of the Lake and increase in fish mortality due to circulation of hypolimnetic water in winter.	
2.	Biomonitoring the Health of Lake Mansar (Jammu), using Phytoplankton of November 2020	Assadullah Sheikh and Deepika Slathia of Department of Environmental Sciences, University of Jammu, J&K	There was high organic pollution in the Lake due to presence of algal genus. (Pollution index score: 36)	Formulation and implementation of sustainable management plan to prevent further deterioration of the Lake and regular monitoring of the Lake.
3.	Arithmetic Water Quality Index for evaluation of drinking water quality of Lake Mansar, J&K, India of 2018	Sheetu Dhar and Deepika Slathia of Department of Environmental Sciences, University of Jammu, J&K	Water quality parameters (electrical conductivity, turbidity, free carbon dioxide, bicarbonate, biological oxygen demand, chloride, calcium, magnesium, total hardness, phosphate, nitrate, silicate, sulphate) at the polluted site of the Lake, were higher in comparison with non-polluted site. The deterioration in quality of Lake water at the polluted site was due to direct discharge of domestic sewage, and agricultural run-off into the Lake. Siltation, deforestation and tourist pressure were also contributing to pollution in the Lake.	The authorities should take concrete steps on urgent basis to prevent the Lake from further deterioration and degradation.
4.	Tourism impact on physio-chemical parameters of the Mansar Lake of 2016	Pallavi Chauhan, Deepali Rana, Anil Bisht and Usha Sharma of Department of Zoology, Uttaranchal College of Biomedical Sciences and Hospital, Dehradun	Seasonal variation in the physio-chemical parameters of the Lake due to visit of tourists.	

²²

Lower region of a stratified water body that extends from the thermocline layer (warm water in the top of the water column and cold water in the bottom and these warm and cold layers do not mix) to the bottom of the Lake, and is isolated from circulation with the upper waters, thereby receiving little or no oxygen from the atmosphere. It is the coldest layer of a Lake in summer and the warmest layer during winter.

Table 6.4: Surinsar Lake-Conclusions and Suggestions in Research Reports

Sl. No	Research Reports of Surinsar Lake	Name of the researcher/ published by	Conclusions	Suggestions
1.	Water quality study of Surinsar Lake of 1994-95	Case study published by National Institute of Hydrology, Jammu	Deforestation and denudation in the catchment area of the Lake were causing degradation of Lake due to siltation.	As the Lake water was found fit for drinking, regular monitoring was needed to retain the quality of water in the Lake.
2.	Analysis of abiotic parameters of Surinsar Lake, Jammu (J&K) of 2013-14	Kunal Sharma, Meenu Sharma and Sapna Jangral of Department of Zoology, University of Jammu	The Lake water was found to be under stress as physio-chemical parameters were above the prescribed limits. As per research report, the surface run-off, waste discharge, bathing of cattle, washing, performing religious rituals, littering by tourists could be contributing factors for increased pollution in the Lake.	Generating public awareness and collective effort by stakeholders including Government, community members and NGOs to prevent the Lake from further deterioration.
3.	Study on zooplankton and water productivity of different Lakes in Jammu division, India of 2018	Sapna Kundal, Arup Giri, Indu Kumari and Rajesh Kumar of Department of Life Sciences, Arni University, Kathgarh, Himachal Pradesh.	Presence of a smaller number of zooplankton might be due to higher level of pollution in the Lake which was not suitable for growth of fishes.	Improvement in the quality of Lake water for sustenance of biodiversity of the Lake.

WLW-Kathua and SMDA had not taken conclusions and suggestions of the above-mentioned research outputs into consideration for taking corrective measures in respect of Conservation and Management of the twin Lakes.

6.2.10 Conclusion

WPD and SMDA did not have a specific legal framework and clear demarcation of responsibility for Conservation and Management of the two Lakes. In absence of any comprehensive Integrated Management Plan for Conservation and Management of Lakes, WPD and SMDA were carrying out Lake-related activities in a directionless and ad-hoc manner. The State Level Monitoring Committee had not monitored Conservation and Management of the twin Lakes. SMDA and WLW-Kathua had not carried out demarcation of boundary of Surinsar-Mansar Lakes due to which the two Lakes had remained open to encroachments. No STPs were in place for treatment of sewage generated by inhabitants living in the vicinity of the Lakes resulting in discharge of untreated waste and sewage into the Lakes. Introduction into the Lake of exotic species had resulted in dwindling of number of native fishes.

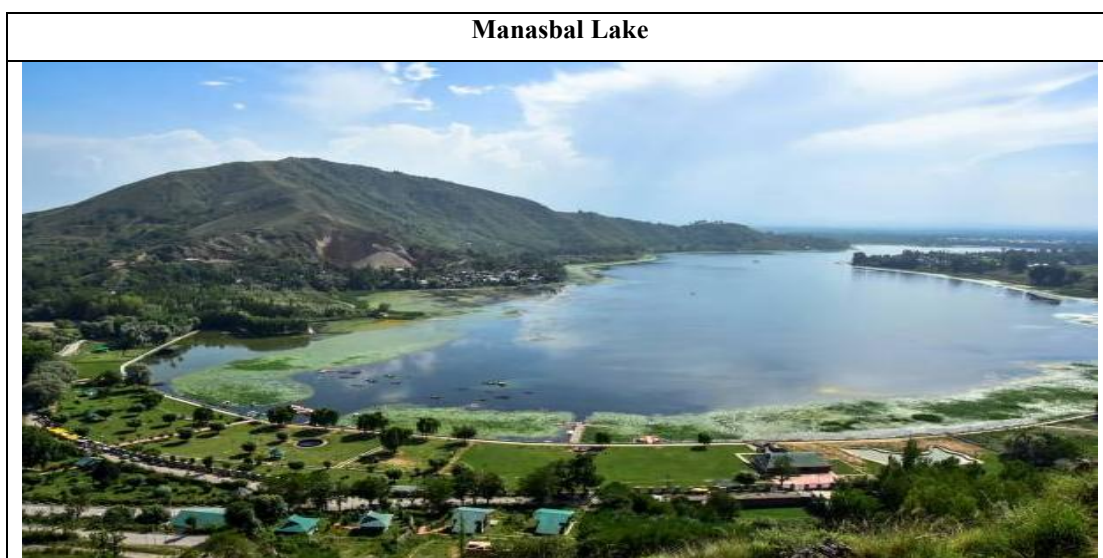
6.2.11 Recommendations

- *Government should provide a specific legal framework and clear demarcation of responsibility to WPD and SMDA for undertaking Conservation and Management of the two Lakes.*
- *Monitoring committee needs to oversee Conservation and Management of the Lakes.*
- *The boundary of the two Lakes needs to be demarcated to avoid chances of encroachment of Lake area.*
- *STPs are required to be installed for treatment of sewage generated by inhabitants living in the vicinity of the Lakes.*
- *Exotic species of fishes need to be controlled to promote growth of native fishes.*
- *Construction works going around the Lake need to be restricted.*

6.3 Conservation and Management of Manasbal Lake

6.3.1 Introduction

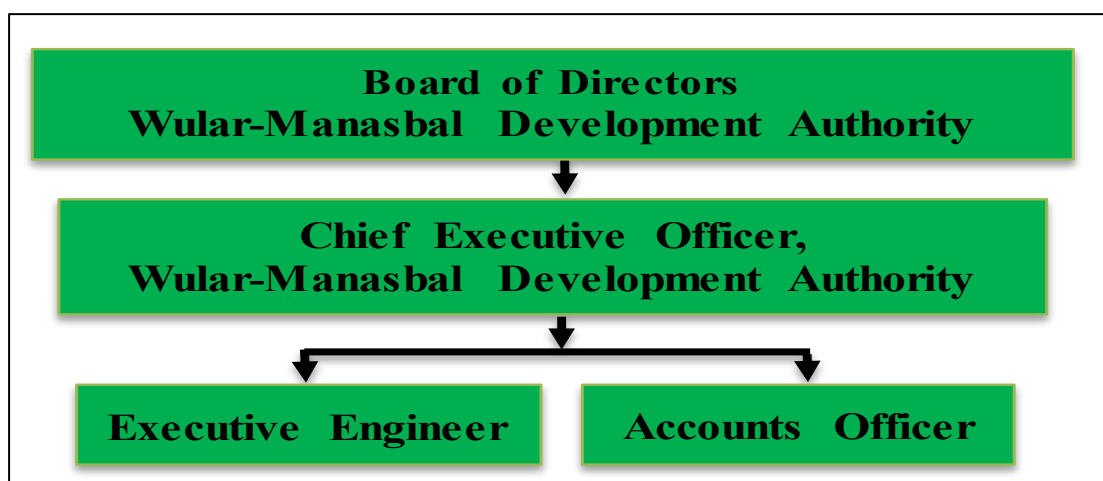
Manasbal, a fresh water Lake, is located in District Ganderbal and is the deepest Lake in Kashmir. The major source of water of the Lake is Lar Irrigation Khul and 1,200 springs existing in and around the Lake. Rainfall and melting snow in the catchment area of the Lake also form a source of water for the Lake. The Lake has an outlet from where water leaves the Lake and enters the river Jhelum. The Lake is looked after by the Wular Manasbal Development Authority (WMDA) which was created under Development Act, 1970.



6.3.2 Organisational Setup

The administrative control of WMDA vests with Commissioner/ Secretary of the Tourism Department, Government of Jammu and Kashmir. The organisational setup of the WMDA is shown in **Chart 6.5**:

Chart 6.5: Organisational setup of Wular Manasbal Development Authority



6.3.3 Land use changes within the Lake and its catchment

- Analysis of remote sensing data of EE&RSD to ascertain land use changes in Lake

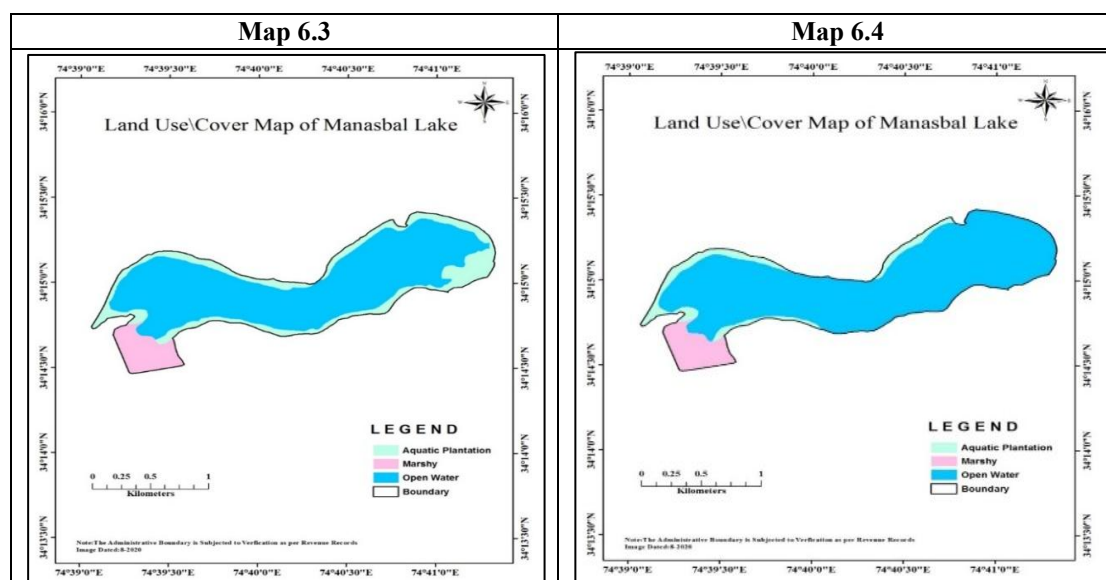
According to data of EE&RSD, there were spatio-temporal changes in land use of the Lake during 2014-20, as detailed in Table 6.5, Maps 6.3 and 6.4 and Charts 6.6 and 6.7.

Table 6.5: Changes in land use of Manasbal Lake

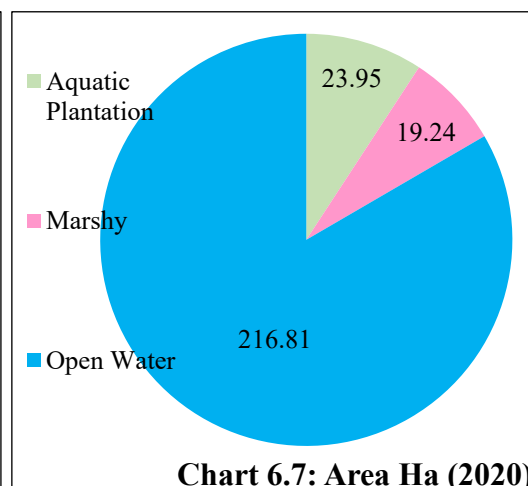
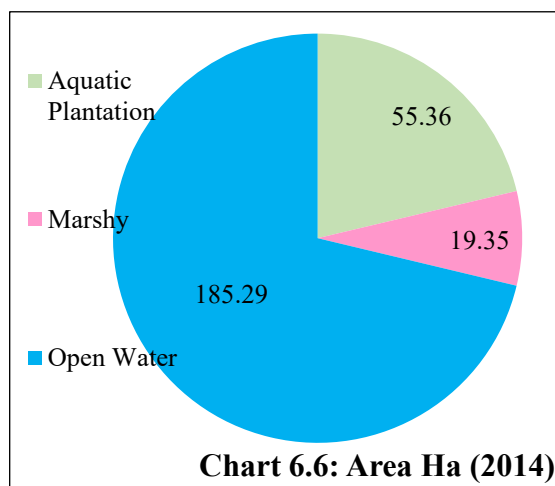
Class Name	Area Ha (2014)	Area Ha (2020)
Aquatic Plantation	55.36	23.95
Marshy	19.35	19.24
Open Water	185.29	216.81
Total	260	260

(Source: data of EE&RSD)

Maps 6.3 and 6.4: Changes in land use of Manasbal Lake



Charts 6.6 and 6.7: Changes in land use of Manasbal Lake

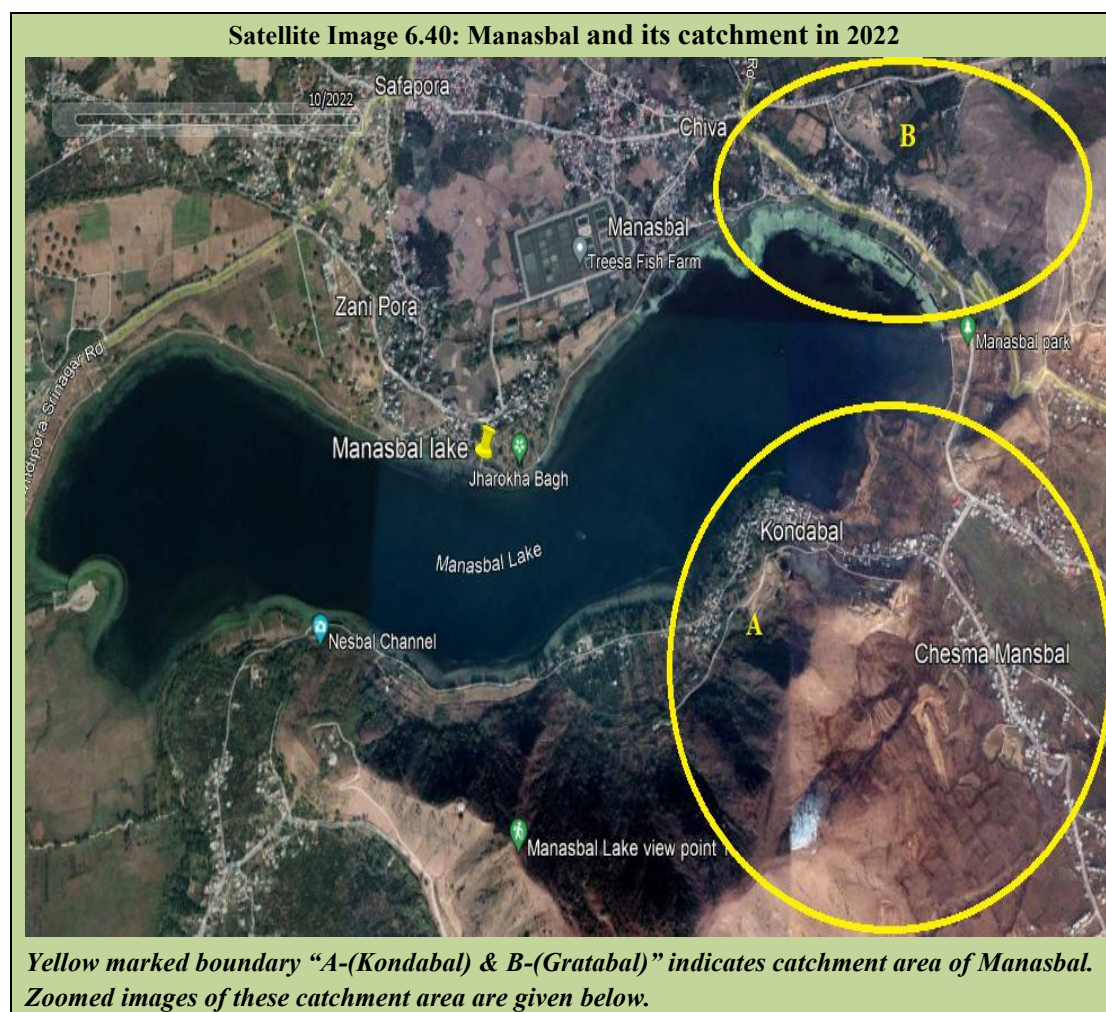


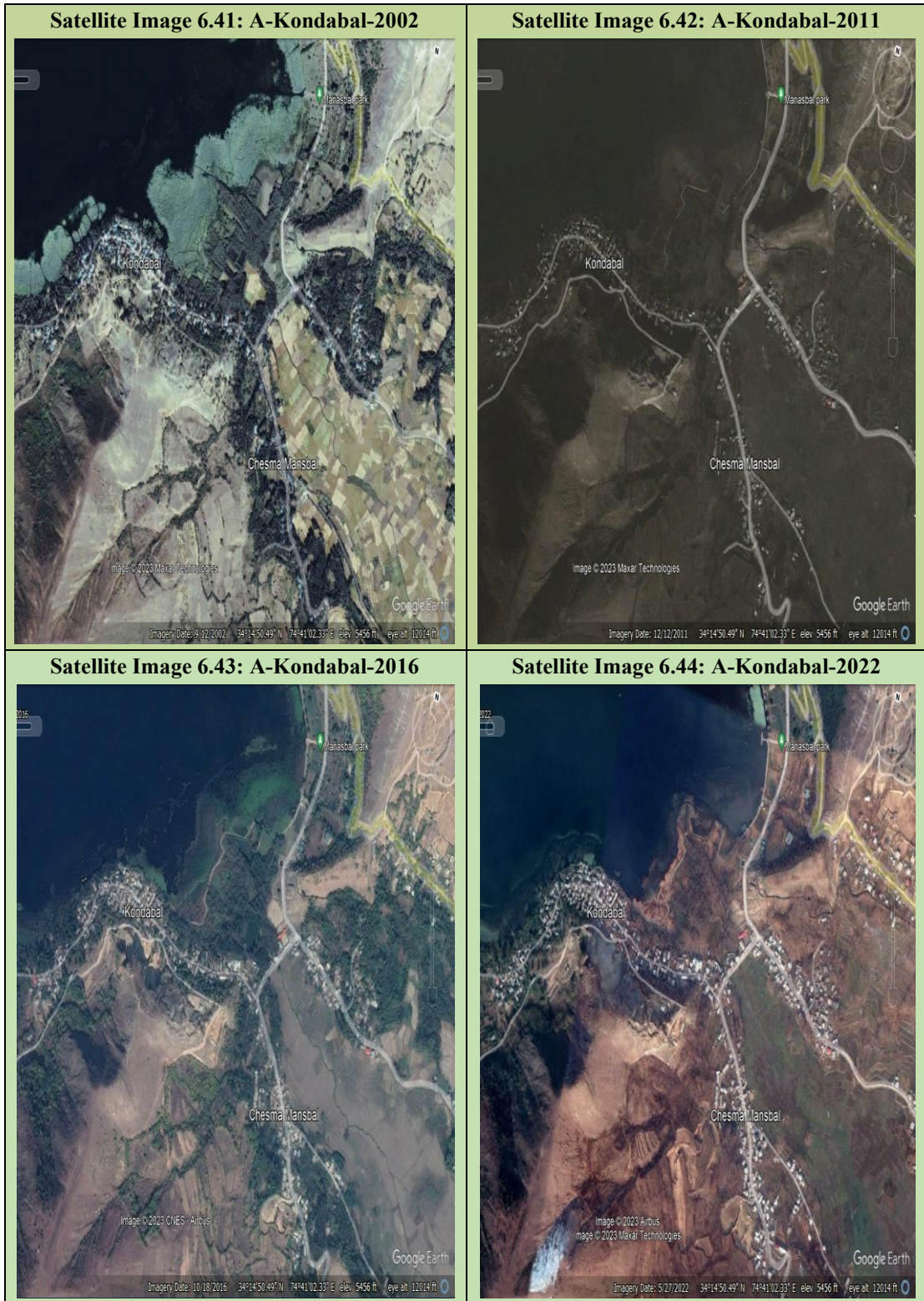
Even though Conservation and Management of the Lake had suffered from inadequacies, there was positive change in the open water area of the Lake which showed an increasing trend. However, causes of increase in water area, whether due to siltation, choking up of Lake outlets, melting of glaciers or heavy rainfall in the areas of these Lakes, were not monitored/ analysed by WMDA.

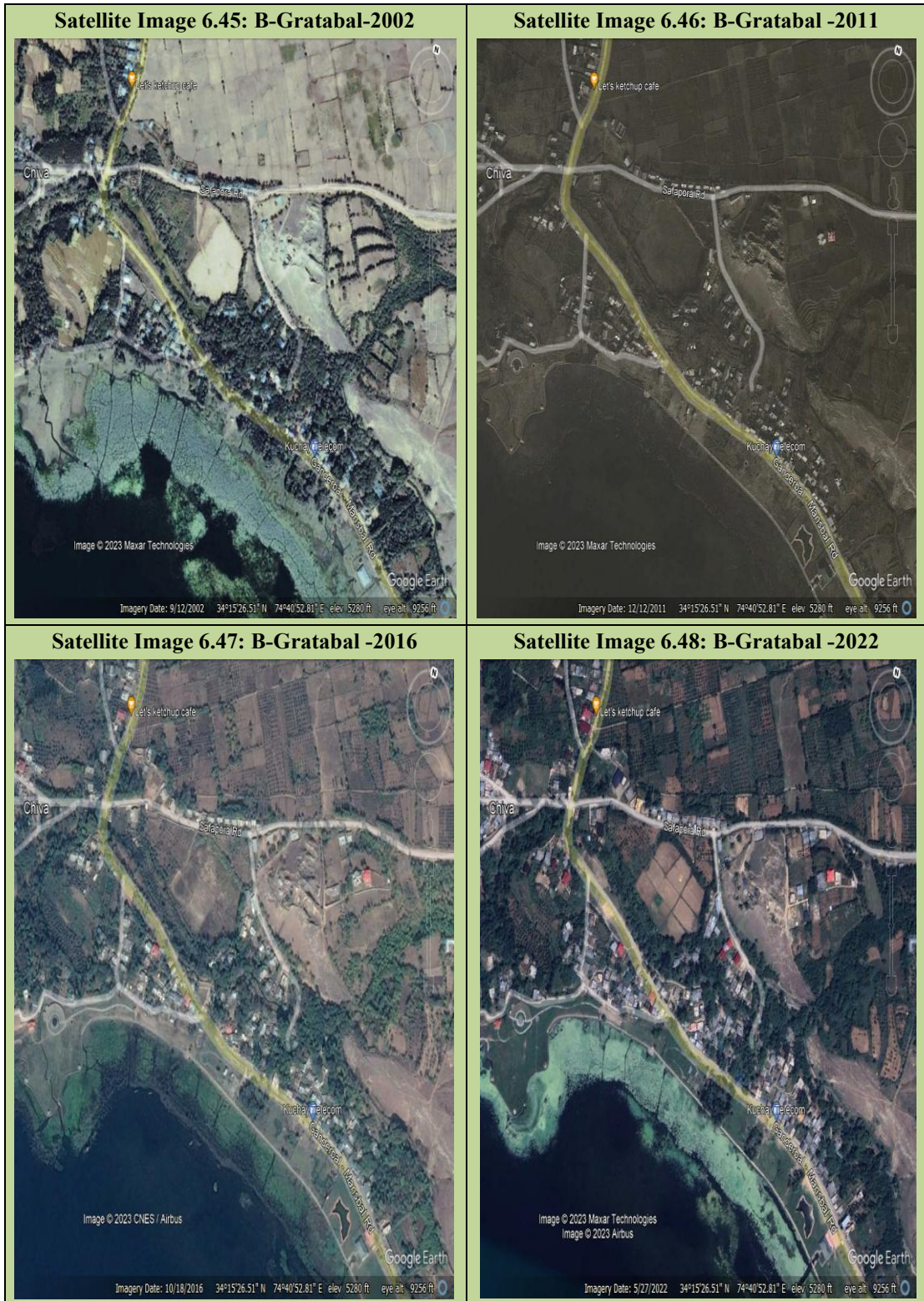
In absence of monitoring of these parameters by WMDA, Audit could also not ascertain whether increase in the surface area of Lakes had actually led to increase in water volume of the Lake or not.

- Analysis of Google Earth Pro images to ascertain spatio-temporal changes in the catchment of Manasbal Lake**

Clear images of Manasbal Lake and its catchment area of Kondabal and Gratabal available on Google Earth Pro for the period 2002-2022 indicate increase in the built-up in these areas which also included Lake fringes. The Google Earth Pro images of the Lake and its catchment depicting spatio-temporal changes in the Lake are shown in the **Satellite Images 6.40 to 6.48:**







6.3.4 Planning

Comprehensive plan for Conservation and Management of Manasbal Lake was not framed but Lake management plans were formulated, financed and implemented on annual basis. Works included in the annual plans were mostly related to tourism development with only marginal Lake-related activities such as sanitation of the area and de-weeding/ dredging of Lake. The annual plans did not address the root causes of degradation such as change in hydrological regimes, pollution or loss of biodiversity of the Lake. WMDA did not have a specific legal framework and clear-cut responsibility for Conservation and Management of the Lake. No meeting was held by WMDA after the year 2017. As such, policy decisions including those in respect of preparation of master plan and finalisation of proposals for Conservation and Management of the Lake, could not be taken.

6.3.4.1 Mandate of the WMDA

As per provisions in the Development Act 1970, WMDA had to prepare a master plan of the area falling under its jurisdiction for carrying out development of the area which also included Manasbal Lake.

Audit noticed that the master plan for the area had not been prepared and as such development activities in the area were carried out without any comprehensive planning. It was also noticed that WMDA did not have a specific legal framework and clear-cut responsibility for Conservation and Management of the Lake.

After being pointed out, WMDA stated (May 2022) that due to non-availability of requisite manpower²³ and laboratory it was not able to carry out Conservation and Management programme in respect of the Lake.

6.3.4.2 Oversight by the Board of Directors

As per Section 4 of the Development, Act 1970, the affairs and policy matters of WMDA were to be run by the Board of Directors with the Chief Minister as Chairman of the Board. Audit observed that only seven meetings were held by the WMDA between January 2006 and December 2017. No meeting was held thereafter. Without existence of the Board, policy decisions including in respect of the preparation of master plan and comprehensive plan for Conservation and Management of the Lake could not be taken.

²³ Environmental and Hydrological engineers, wetland ecologist, limnologists, ecologists, biologists, chemists, remote sensing and GIS specialist, hydrologists, ornithologists, micro biologists etc.

6.3.4.3 Funding for management of Lake

During the period between January 2006 and March 2022, WMDA spent ₹ 48.87 crore²⁴ on various tourist development activities. Out of this amount, only ₹ 3.04 crore²⁵ (six *per cent*) was spent on Lake-related activities such as sanitation of the area and de-weeding/ dredging and revival of springs of the Lake. Audit observed that major Lake generic activities could not be implemented as discussed in **Paragraph 6.3.5**.

6.3.5 Lake Management

Non-demarcation of seven km of length of the Lake had exposed the Lake to encroachments. An expenditure of ₹ 0.51 crore (2015-22) was incurred on de-weeding during the months which were not specified months for de-weeding. WMDA had spent ₹ 0.64 crore (2006-22) on dredging without any bathymetric survey. WMDA had not identified sources of sewage entering the Lake, which were mainly responsible for pollution in the Lake. For over 15 years, no outcome-based action had been taken to either shift the inhabitants of Kondabal village from the Lake area or to get STPs constructed resulting in continuous discharge of untreated sewage into the Lake.

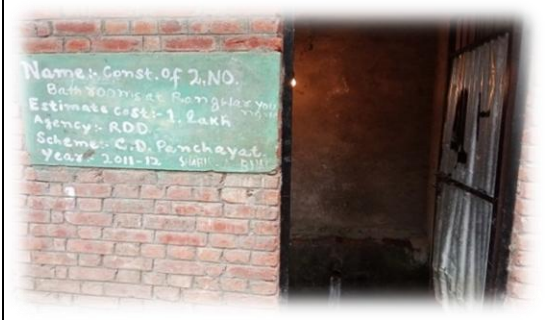

For Conservation and Management of the Lake the activities to be carried out included survey and demarcation of the Lake, identification and treatment of its catchment area, identification and protection of water sources, water budgeting, improving water quality of the Lake by flushing, biodiversity conservation, assessment of life of the Lake, sewage treatment in catchment area and prohibition in diversion of Lake area. Lake management also included de-weeding and dredging of the Lake and generating public awareness.

However, Audit noticed lack of survey, identification and treatment of catchment area, identification and protection of water sources, water budgeting, improving water quality of Lakes by flushing, biodiversity conservation, assessment of life of the Lake, sewage treatment in catchment area and prohibition in diversion of the Lake area and public awareness. Further, there were inadequacies in Lake management viz. demarcation, de-weeding and dredging and STPs as discussed in succeeding Paragraphs.

During joint inspection by the audit party with the members of the audited entity, non-protection of water sources was noticed. Photographic evidence is presented in the following photographs:


²⁴ ₹ 44.59 crore (January 2006 to March 2020) and ₹ 4.28 crore (April 2020 to March 2022)

²⁵ ₹ 2.44 crore (January 2006 to March 2020) and ₹ 0.60 crore (April 2020 to March 2022)

Water sources of the Lake not protected	
Two bathrooms constructed by Rural Development Department on a spring from which water flows to the Lake	Dumping of garbage at the spring/ water source of the Lake at Rangwar Youngore
	

6.3.5.1 Demarcation

Manasbal Lake was demarcated except for a length of seven km (from Kanabal to Naninara) which had not been demarcated due to land dispute and paucity of funds. Non-demarcation of a part of Lake exposed the Lake to encroachments. Photographic evidence is given below.

<p>Due to non-demarcation of a part of the Lake, there were construction of illegal cow-shed and earth filing at fringe of the Lake at Hanji Mohallah</p>	<p>Conversion of land mass into vegetable field by earthfilling at Hanji Mohallah</p>
	

6.3.5.2 De-weeding of Lake

As per National Wetland Conservation Programme, Guidelines for Conservation and Management of Wetlands in India (2009), de-weeding is to be carried out for removing unwanted plants from the Lake. The exercise was to be carried out before flowering/ fruiting and formation of propagules in plants. Weeds were to be removed at a controlled rate of 40 to 50 *per cent* (maximum up to 75 *per cent*) of submerged vegetation. Some selected areas were to be left undisturbed for fish spawning and feeding of waterfowls.

During test check of records, it was observed that ₹ 1.24 crore²⁶ was paid (January 2006 to March 2022) by WMDA to contractors for de-weeding of Lake. The payment

²⁶ ₹ 1.02 crore (January 2006 to March 2020) and ₹ 0.22 crore (April 2020 to March 2022)

included ₹ 0.51 crore spent (2015-22) during the months which were not specified months for de-weeding.

WMDA did not have year/ basin/ area-wise vegetation map of the Lake alongwith data of weed cover. Data regarding areas from which weeds were removed and areas left undisturbed for spawning of fish and feeding of waterfowls was also not maintained. Impact assessment of de-weeding such as decrease/ increase in visibility through water and decrease/ increase in dissolved oxygen, nitrogen and phosphorus in Lake water was also not carried out.

6.3.5.3 Dredging of Lake

As per National Wetland Conservation Programme, Guidelines for Conservation and Management of Wetlands in India (2009), dredging is carried out to improve water flow in the Lake by removing nutrient rich sediments, shoals and solid land mass. Dredging of a Lake has to be based on a bathymetric survey of the Lake, indicating location of blocked channels, area of the Lake to be dredged out, the depth up to which it has to be done, sites where the dredged out material has to be disposed of and cost involved.

WMDA had spent (2006-22) ₹ 0.64 crore²⁷ on dredging without any bathymetric survey. No record was maintained to show locations at which dredging was carried out and places where dredged out material was dumped. No study was conducted to assess the impact of dredging on the Lake.



After being pointed out, WMDA stated (May 2022) that de-weeding and dredging of the Lake were being done as per need and availability of funds.

Photographic evidence of accumulation of silt in the Lake and growth of enormous weed/ red algae in the Lake is given below.

Source of water of Lake at Lar Khul carrying silt and garbage into the Lake. The accumulated silt and garbage not dredged out	Dumped garbage and silt getting carried into the Lake from source of water at Lar khul. The accumulated silt and garbage was not dredged out
	

²⁷

₹ 0.60 crore (January 2006 to March 2020) and ₹ 0.04 crore (April 2020 to March 2022)

<p>Growth of red algae in the Lake due to siltation and garbage entering into the Lake</p>	<p>Growth of weed above 10 feet spread over an area of 1,000 meters in the Lake due to non carrying of de-weeding</p>
	

6.3.5.4 Treatment and disposal of waste/ sludge

WMDA had not identified sources of sewage entering the Lake which were responsible for pollution in the Lake. No system of wetland technology or STPs for treatment of waste generated by inhabitants living next to the Lake was in place.

Although the tendering process for preparation of DPR for setting up of STPs on the banks of Manasbal Lake in Kondabal village was started by WMDA (May 2007), the process was not finalised due to poor response to the tenders. Thereafter, no action was taken by WMDA for over five years up to August 2013.

WMDA decided (September 2013) to shift inhabitants of Kondabal village to Kohistan Colony and submitted (June 2015) request for release of funds to the administrative Department for acquisition of land measuring 149 *kanals* and 13 *marlas* for rehabilitation of 214 families. No further action was taken up to December 2017.

WMDA further decided (December 2017) to explore the possibility of shifting inhabitants of Kondabal village to Kohistan Colony or setting up an STPs for inhabitants of Kondabal. Accordingly, the Tourism Department assigned the preparation of DPR of two STPs at Kondabal to M/s Enco Safe Designs, which prepared the DPR at a cost of ₹ 5.91 crore.

Audit noticed that the population of the area had not been mentioned in the DPR for estimation of capacity of STPs for present and future use and also details were not indicated therein about parameters to be treated by the STPs. Civil works of one of the STPs, to be completed within six months, was allotted (November 2019) to a contractor at a cost of ₹ 0.55 crore. As of March 2020, the contractor was paid ₹ 0.55 crore for civil works executed by him. As of March 2022, the work remained abandoned as allotment of mechanical component of the STPs was not initiated. Funds of ₹ 0.30 crore received (2020-22) were lying unspent with the WMDA.

Thus, for over 15 years no outcome-based action had been taken to either shift the inhabitants of Kondabal village from the Lake area or to get STPs constructed resulting in continuous discharge of untreated sewage into the Lake.

Joint inspection by the audit team alongwith officials from WMDA revealed that drains and sewers were discharging waste directly into the Lake. Cow-dung and garbage were also dumped on the fringes of the Lake and into *nallahs* entering the Lake.

Photographic evidence is given below.

<p>Sewage from drains entering the Lake</p>	<p>Marked in yellow is the stagnation of sewage of houses creating cesspools near the Lake (Kondabal area)</p>
	
<p>Dumping of cow-dung at the fringe of Lake (Hanji Mohallah)</p>	<p>Wash off from garbage and silt at Lake fringe (parking space) entering Lake through one of the water sources of Lake (Lar Khul)</p>
	
<p>Drain water entering the Lake in Kondabal area</p>	<p>Impact of sewage and dumping of garbage turning Lake into cesspool</p>
	

6.3.6 Encroachment of Lake

WMDA did not have details (whether Government or proprietary) of land which formed part of the Lake and its fringes. Due to non-finalisation of Master Plan of the area, unrestricted development/ construction work was going on around the Lake and there were 40 cases of encroachment and unauthorised construction works.

After creation (January 2006) of WMDA, 1,192 *kanals* and six *marlas* of land was transferred to it by the Tourism Department. Audit observed that WMDA did not have details of land which formed part of the Lake and its fringes and details as to whether it was Government or proprietary land.

As per directions of the Hon’ble High Court, no construction can be raised within 500 square yards from the fringe of the Lake and WMDA has to grant permission for any development/ construction work carried out around the Lake in accordance with master plan of the area. Audit observed that due to non-finalisation of the Master Plan of the area by WMDA, unrestricted development/ construction work was going on around the Lake. Records of WMDA showed that there were 40 cases of encroachment and unauthorised construction works. WMDA had not demarcated 500 square yards from the fringes of the Lake area resulting in illegal construction of bathrooms, latrines, cowsheds and in dumping of cow dung on the fringes of the Lake.

Joint inspection of the area by audit alongwith WMDA officials also revealed that huge structures had come up close to the Lake.

<p>Lime stone Kiln on the periphery of the Lake</p>	<p>Illegal construction (new) coming up at the Lake fringe</p>
	
<p>Illegal construction coming up within restricted zone of the Lake</p>	<p>Illegal construction within restricted zone of the Lake</p>
	

6.3.7 Research carried out by scholars of various universities

WMDA had not carried out any research to evaluate water quality of the Lake and to study fish and water bird population in the Lake. Research carried out by scholars of various universities pointed out that stone quarrying was causing land use changes in the catchment area of the Lake, anthropogenic activities were causing discharge of effluents into the Lake and native fish species had become extinct.

WMDA had not carried out any research to evaluate water quality of the Lake and study fish and water bird population in the Lake. Disappearance of native species and invasion of noxious species, if any, due to heavy inflow of silt and sewage flowing into Lake from its catchment areas had also not been assessed. However, research carried out by scholars of various universities on various themes of the Lake indicated that:

- Land use changes were happening in the catchment area of the Lake as stone quarrying was ongoing in the catchment area of Lake, and
- Activities like bathing and washing of clothes by people of adjoining areas of the Lake and discharge of effluents of organic waste into the Lake were going on.

As a result, water quality of the Lake had deteriorated and was not fit for drinking purposes. Further, nutrient and silt load from the catchment area of the Lake had increased resulting in extinction of the abundantly available fish species (*Bortiabirdi*) and aquatic plant (*Eurayleferox*) in the Lake. Besides, dominance of *rotifera brachionus calyciflorus*²⁸ at the littoral zone was causing fast eutrophication of the Lake. Details of research papers are in the *Appendix-6.1*.

6.3.8 Joint Inspection of catchment area of Manasbal Lake

WMDA had not carried out afforestation of mountain ranges of Gratabal and Konbal resulting in huge inflow of sediments into the Lake from these mountain ranges. Sewers from households living on the periphery of the Khul between village Wayul and village Lar enter the Khul and ultimately enter the Manasbal Lake. Heaps of waste/ garbage/ cow dung were being dumped at the fringes of the Khul/ Nallah. Solid waste dumpers/ dust bins and sewer networking system were not available in the Lake vicinity. Huge constructions had come up and WMDA had not carried out a detailed survey to ascertain details of illegal constructions/ encroachments in catchment area of the Lake.

The catchment area of the Manasbal Lake is a mountain range spread over 13 sq. km. The catchment receives precipitation through rainfall and snowfall which contributes water to the Lake through surface flow or from recharged aquifers. Joint inspection

²⁸

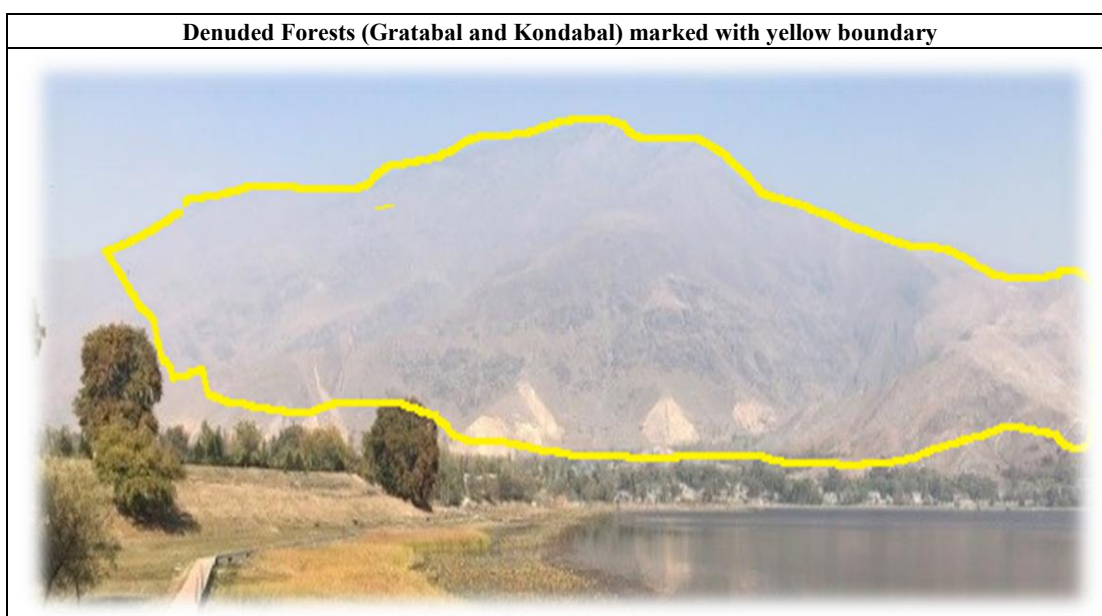
A microscopic or near-microscopic animal species occurring in freshwater.

(April 2022) by the audit team with officials of WMDA carried out in the catchment area²⁹ of the Lake revealed as follows:

6.3.8.1 Afforestation of catchment area

The Manasbal Lake is surrounded by two mountain ranges of Gratabal and Konabal. Gratabal mountains are devoid of forests whereas Konabal mountain range has a 10 *per cent* forest cover. Absence of forests had resulted in huge inflow of sediments into the Lake from these mountain ranges due to run-off during precipitation hastening ageing of the Lake with adverse consequences for the Lake ecosystem.



WMDA had not carried out afforestation of these mountain ranges either through the Forest Department or on their own as mandated by the National Wetland Conservation Programme, Guidelines for Conservation and Management of Wetlands in India (2009).





6.3.8.2 Solid Waste Management/ Sewer networking system in the catchment area

Lar Khul, a major source of water for Manasbal Lake, is an irrigation channel which receives water from Wayul *Nallah*. The surplus water from the Khul is discharged by Irrigation and Flood Control Department into the Lake. The sewers of the households located on the periphery of the Khul between village Wayul and village Lar enter the Khul and ultimately enter the Manasbal Lake. Heaps of waste /garbage/ cow dung were being dumped on the fringes of Khul/ *Nallah* and the Lake as sites had not been designated by the Irrigation Department/ Municipal Council/ WMDA for dumping of waste. Solid waste dumpers/ dust bins and sewer networking system were not available in the Lake vicinity. Photographic evidence is presented in the following photographs:

²⁹ Gratabal, Konabal, Lar Wayul Khul, Dub Khul, Hakeem *Mohalla*, Jaroka Bagh, Kondiangan, Gamdar, Potar *Mohalla*, Gulabbagh, Hanji *Mohalla*, Rather *Mohalla* and Bhagwaan *Mohalla*.

Household sewer discharged in the inlet of the Lake	Household sewer discharged in the inlet of the Lake
	

6.3.8.3 Non-availability of infrastructure to prevent pollutants from entering the Lake

Dumping site near Dub Khul at Hakeem Mohalla near I&FC regulatory gate	Run-off of silt and garbage (near Dub Khul) marked in yellow finding its way into one of the water sources of Lake
	
Run-off from garbage and silt finding its way into the Lake	Garbage and silt causing reclamation of land mass and decrease in open water area
	

Although annual contracts were entered into by WMDA for shifting of waste and de-weeded material away from the Lake, it had not created infrastructure such as trash chambers and artificial wetlands to stop garbage, silt and nutrients from entering the Lake. Joint inspection of audit team with officials of WMDA revealed that solid waste/ de-weeding material were dumped at the fringes of the Lake instead of shifting them away from the Lake resulting into leaching into the Lake. Photographic evidence is given below:photo

<p>Disposal of solid waste and silt removed from the Lake and dumped at the fringes of the Lake near Jaroka Bagh</p>	<p>Dumping of garbage at the main entry gate near open air theater (Lake fringes)</p>
	

6.3.9 Springs

The draft master plan of Wular and Manasbal villages envisaged that there were approximately 1,200 springs which serve as one of the water sources of Manasbal Lake. Audit noticed that WMDA had not carried out any survey to assess the actual number of springs in and around the Lake and ensure their protection.

It was further noticed that water from seven springs³⁰ restored by WMDA was discharging into the Lake. 13 springs³¹ had not been restored/ protected by WMDA. Accumulation of silt around these springs was finding its way into the Lake and was hastening ageing of the Lake. Photographic evidence is given below:

<p>Unprotected spring (marked in yellow) at Hakim Mohallah- Spring water with silt finding way into the Lake</p>	<p>Unprotected spring (marked in yellow)- spring water with silt finding its way into the Lake</p>
	

³⁰ Existing at {(near Temple-Kondbal, parking area, Main Park, one rural museum (Gratbal), Open air theatre and two at kralpora (Jamia-Masjid)}

³¹ Existing at {kondiangan, Gamdar, Khul Mohalla at Kondbal (two), near 2nd Rural museum, Potar Mohalla (two), Gulab bagh (two), Hanji Mohalla (two), Rather Mohalla and Bhagwaan Mohalla}

One of the springs restored by the WMDA



6.3.10 Constructions in the catchment area of Lake without building permission

There was construction in the catchment area of the Lake as substantial structures had come up without building permissions from WMDA. WMDA had not carried out a detailed survey in collaboration with the concerned Departments including Irrigation and Flood Control Department to ascertain details of illegal constructions/encroachments in catchment area of the Lake.

6.3.11 Conclusion

No Comprehensive plan was in place for Conservation and Management of Manasbal Lake. WMDA did not have a specific legal framework and clear-cut responsibility for Conservation and Management of the Lake. Lake management plans were formulated, financed and implemented through annual plans in which only marginal Lake related activities such as sanitation of the area, de-weeding and dredging of the Lake were included. Non-demarcation of seven km of length of the Lake had exposed the Lake to encroachments. The WMDA had not identified sources of sewage entering the Lake, which were mainly responsible for pollution in the Lake. Due to non-finalisation of the Master Plan of the area, unrestricted development and construction work was going on around the Lake and there were 40 cases of encroachment and unauthorised construction works.

6.3.12 Recommendations

- *A comprehensive plan for Conservation and Management of Manasbal Lake needs to be put in place.*
- *The Government should provide a legal framework and clear responsibility for Conservation and Management of the Manasbal Lake.*
- *The Lake area needs to be fully demarcated to avoid encroachments.*
- *Sources from which pollutants enter the Lake needs to be identified and treated.*
- *Construction works going on around the Lake need to be restricted and encroachments of Lake area need to be vacated.*

Srinagar/ Jammu
Dated: 21 October 2025



(K.P. Yadaw)
Principal Accountant General (Audit),
Jammu and Kashmir

Countersigned



New Delhi
Dated: 10 November 2025

(K. Sanjay Murthy)
Comptroller and Auditor General of India

Appendices

Appendix-2.1

(Reference: Paragraph No. 2.2)

Division/ Department-wise changes/ no-changes in the area of Lakes in J&K

Sl. No	District	Name of Lake	Inside/ Outside Forest	Topographic image (Topo) 1967	Satellite image (SI) 2020	Difference (5-6)	Controlling Authority
1	2	3	4	5	6	7	8
Division-wise details of Disappeared Lake						(Area in Hectares)	
Jammu Division							
1	Kathua	Panjuth	Inside Forest	0.66	0.00	0.66	PCCF
2	Kathua	Gura	Inside Forest	0.31	0.00	0.31	PCCF
3	Kathua	Lohar Mela	Inside Forest	0.33	0.00	0.33	PCCF
4	Kishtwar	Tumula Sar	Inside Forest	2.71	0.00	2.71	PCCF
5	Kishtwar	Kannar Sar Bod	Inside Forest	0.78	0.00	0.78	PCCF
6	Kishtwar	Kannar Sar Lokut	Inside Forest	0.83	0.00	0.83	PCCF
7	Kishtwar	Muzim Sar	Inside Forest	2.19	0.00	2.19	PCCF
8	Kishtwar	Moshkhilsar Bod	Inside Forest	0.43	0.00	0.43	PCCF
9	Kishtwar	Moshkhilsar Lokut	Inside Forest	0.54	0.00	0.54	PCCF
10	Kishtwar	Kral Sar	Inside Forest	0.59	0.00	0.59	PCCF
11	Kishtwar	Sarital Sar	Inside Forest	2.43	0.00	2.43	PCCF
12	Kishtwar	Watal Sar	Inside Forest	1.02	0.00	1.02	PCCF
13	Kishtwar	Lu Sar	Inside Forest	2.44	0.00	2.44	PCCF
14	Kishtwar	Shupkanjan Sar	Inside Forest	2.59	0.00	2.59	PCCF
15	Kishtwar	Sunsar Sar	Inside Forest	5.09	0.00	5.09	PCCF
16	Kishtwar	Natishmandu Sar	Inside Forest	1.65	0.00	1.65	PCCF
17	Kishtwar	Selo Nag	Inside Forest	2.01	0.00	2.01	PCCF
18	Kishtwar	Konala Nag	Inside Forest	1.53	0.00	1.53	PCCF
19	Kishtwar	Jammu Gat	Inside Forest	2.07	0.00	2.07	PCCF
20	Kishtwar	Patar Nag	Inside Forest	1.92	0.00	1.92	PCCF
21	Kishtwar	Unnamed Sar	Inside Forest	5.37	0.00	5.37	PCCF
22	Kishtwar	Mandik Sar	Inside Forest	90.96	0.00	90.96	PCCF
23	Kishtwar	Unnamed Sar	Inside Forest	8.21	0.00	8.21	PCCF
24	Poonch	Chandimarg Sar 1	Inside Forest	0.20	0.00	0.20	PCCF
25	Poonch	Chandimarg Sar 2	Inside Forest	0.33	0.00	0.33	PCCF
26	Poonch	Chandimarg Sar 3	Inside Forest	0.15	0.00	0.15	PCCF
27	Poonch	Chandimarg Sar 4	Inside Forest	0.18	0.00	0.18	PCCF
28	Poonch	Dugrian Sar 1	Inside Forest	0.30	0.00	0.30	PCCF
29	Poonch	Dugrian Sar 2	Inside Forest	0.81	0.00	0.81	PCCF
30	Poonch	Dugrian Sar 3	Inside Forest	0.60	0.00	0.60	PCCF
31	Poonch	Gum Sar Lokut	Inside Forest	0.76	0.00	0.76	PCCF
32	Poonch	Delewali Dhanni Sar	Inside Forest	1.66	0.00	1.66	PCCF
33	Poonch	Ding Sar 2	Inside Forest	0.48	0.00	0.48	PCCF
34	Poonch	Neel Sar 2	Inside Forest	1.09	0.00	1.09	PCCF
35	Poonch	Chamber Sar 1	Inside Forest	0.31	0.00	0.31	PCCF
36	Poonch	Chamber Sar 2	Inside Forest	0.14	0.00	0.14	PCCF
37	Poonch	Janjanwali Sar	Inside Forest	4.70	0.00	4.70	PCCF

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Sl. No	District	Name of Lake	Inside/ Outside Forest	Topographic image (Topo) 1967	Satellite image (SI) 2020	Difference (5-6)	Controlling Authority
38	Poonch	Marguri Sar 2	Inside Forest	0.90	0.00	0.90	PCCF
39	Poonch	Marguri Sar 3	Inside Forest	0.61	0.00	0.61	PCCF
40	Poonch	Rupri Sar	Inside Forest	0.84	0.00	0.84	PCCF
41	Rajouri	Thand Sar	Inside Forest	1.15	0.00	1.15	PCCF
42	Rajouri	Marguri Sar	Inside Forest	0.98	0.00	0.98	PCCF
43	Ramban	Sarkanth Gali Sar 1	Inside Forest	0.52	0.00	0.52	PCCF
44	Ramban	Sarkanth Gali Sar 2	Inside Forest	0.29	0.00	0.29	PCCF
45	Ramban	Rahun Sar	Inside Forest	0.66	0.00	0.66	PCCF
46	Ramban	Pathar Sar	Inside Forest	0.64	0.00	0.64	PCCF
47	Ramban	Yemul Talao	Inside Forest	0.34	0.00	0.34	PCCF
48	Reasi	High Alt. Lake	Inside Forest	1.05	0.00	1.05	PCCF
49	Samba	Sanur Talao	Inside Forest	0.94	0.00	0.94	PCCF
50	Samba	Patliwlaidabri Talao	Inside Forest	0.57	0.00	0.57	PCCF
51	Samba	Soram Talao	Inside Forest	0.26	0.00	0.26	PCCF
52	Samba	Leani Andari Talao	Inside Forest	0.50	0.00	0.50	PCCF
53	Samba	Dewan Sar	Inside Forest	1.40	0.00	1.40	PCCF
54	Samba	Muran Talao	Inside Forest	0.47	0.00	0.47	PCCF
55	Doda	Madsu Talao1	Outside Forest	0.32	0.00	0.32	DC
56	Doda	Madsu Talao2	Outside Forest	0.74	0.00	0.74	DC
57	Jammu	Nor Talao	Outside Forest	0.26	0.00	0.26	DC
58	Jammu	Meshiani Talao 1	Outside Forest	0.36	0.00	0.36	DC
59	Jammu	Meshiani Talao 2	Outside Forest	0.64	0.00	0.64	DC
60	Jammu	Pahtu Talao	Outside Forest	0.33	0.00	0.33	DC
61	Jammu	Gaur Talao	Outside Forest	0.38	0.00	0.38	DC
62	Jammu	Jandial Talao	Outside Forest	1.61	0.00	1.61	DC
63	Jammu	Chingaini Talao	Outside Forest	0.71	0.00	0.71	DC
64	Jammu	That Ranjan Talao	Outside Forest	0.83	0.00	0.83	DC
65	Jammu	Ghurota Talao	Outside Forest	1.83	0.00	1.83	DC
66	Jammu	Satowan Talao	Outside Forest	0.85	0.00	0.85	DC
67	Jammu	Barn Talao	Outside Forest	0.42	0.00	0.42	DC
68	Jammu	Sue Choi Talao	Outside Forest	0.82	0.00	0.82	DC
69	Jammu	Unnamed	Outside Forest	0.84	0.00	0.84	DC
70	Jammu	Uparla Bharda Talao	Outside Forest	0.42	0.00	0.42	DC
71	Jammu	Paraurian Talao	Outside Forest	0.43	0.00	0.43	DC
72	Jammu	Khalka Bharda	Outside Forest	0.54	0.00	0.54	DC
73	Jammu	Ghardarwan Sar 2	Outside Forest	0.68	0.00	0.68	DC
74	Jammu	Sungal Talao 2	Outside Forest	2.02	0.00	2.02	DC
75	Jammu	Pangiari Talao 1	Outside Forest	1.06	0.00	1.06	DC
76	Jammu	Pangiari Talao 2	Outside Forest	0.61	0.00	0.61	DC
77	Jammu	Gopala Sar	Outside Forest	0.56	0.00	0.56	DC
78	Jammu	Uparla Badgal Talao	Outside Forest	0.69	0.00	0.69	DC
79	Jammu	Khalka Badgal	Outside Forest	0.57	0.00	0.57	DC

Sl. No	District	Name of Lake	Inside/ Outside Forest	Topographic image (Topo) 1967	Satellite image (SI) 2020	Difference (5-6)	Controlling Authority
		Talao					
80	Jammu	Gopala Talao	Outside Forest	0.87	0.00	0.87	DC
81	Jammu	Dhok Khalsa Talao	Outside Forest	0.75	0.00	0.75	DC
82	Jammu	Lehr Talao	Outside Forest	0.88	0.00	0.88	DC
83	Jammu	Jad Talao 2	Outside Forest	0.70	0.00	0.70	DC
84	Jammu	Bhiri Talao	Outside Forest	0.89	0.00	0.89	DC
85	Jammu	Mangu Di Patian Sar	Outside Forest	0.30	0.00	0.30	DC
86	Jammu	Parsot Talao	Outside Forest	0.57	0.00	0.57	DC
87	Jammu	Toteali Talao 2	Outside Forest	0.72	0.00	0.72	DC
88	Jammu	Thattar Talao 1	Outside Forest	0.76	0.00	0.76	DC
89	Jammu	Thattar Talao 2	Outside Forest	0.51	0.00	0.51	DC
90	Jammu	Mutthi Talao 2	Outside Forest	0.49	0.00	0.49	DC
91	Jammu	Palaura Talao	Outside Forest	1.78	0.00	1.78	DC
92	Jammu	Bhatoli Mangotrian	Outside Forest	1.53	0.00	1.53	DC
93	Jammu	Baukri Talao	Outside Forest	1.73	0.00	1.73	DC
94	Jammu	Baje Chak Talao	Outside Forest	0.75	0.00	0.75	DC
95	Jammu	Laswara Sar	Outside Forest	0.56	0.00	0.56	DC
96	Jammu	Dabbar Lalewala Sar	Outside Forest	0.83	0.00	0.83	DC
97	Jammu	Jhumbiyar Brahmanan Talao	Outside Forest	0.58	0.00	0.58	DC
98	Jammu	Khojipura Talao	Outside Forest	0.82	0.00	0.82	DC
99	Jammu	Chuhe Chak Talao	Outside Forest	0.45	0.00	0.45	DC
100	Jammu	Gajansu Talao	Outside Forest	0.89	0.00	0.89	DC
101	Jammu	Chak Gangu Talao	Outside Forest	0.65	0.00	0.65	DC
102	Jammu	Chatha Talao	Outside Forest	1.06	0.00	1.06	DC
103	Jammu	Sui Simbli Talao	Outside Forest	1.19	0.00	1.19	DC
104	Jammu	Amb Talao	Outside Forest	0.56	0.00	0.56	DC
105	Jammu	Uprala Manda Talao	Outside Forest	0.97	0.00	0.97	DC
106	Jammu	Dhanwal Sar	Outside Forest	1.54	0.00	1.54	DC
107	Jammu	Kata Khu Talao	Outside Forest	0.41	0.00	0.41	DC
108	Jammu	Turgual Talao	Outside Forest	0.37	0.00	0.37	DC
109	Jammu	Janti Talao	Outside Forest	0.48	0.00	0.48	DC
110	Jammu	Kurora Talao	Outside Forest	0.64	0.00	0.64	DC
111	Jammu	Akhnoor Talao	Outside Forest	1.10	0.00	1.10	DC
112	Jammu	Unnamed	Outside Forest	0.58	0.00	0.58	DC
113	Jammu	Ranjan Talao	Outside Forest	0.47	0.00	0.47	DC
114	Kathua	Mandrar1	Outside Forest	0.77	0.00	0.77	DC
115	Kathua	Mandrar2	Outside Forest	0.41	0.00	0.41	DC
116	Kathua	Diol1	Outside Forest	0.37	0.00	0.37	DC
117	Kathua	Diol2	Outside Forest	0.39	0.00	0.39	DC
118	Kathua	Diol3	Outside Forest	0.40	0.00	0.40	DC
119	Kathua	Ter	Outside Forest	0.26	0.00	0.26	DC
120	Kathua	Dharamkot1	Outside Forest	0.35	0.00	0.35	DC

Sl. No	District	Name of Lake	Inside/ Outside Forest	Topographic image (Topo) 1967	Satellite image (SI) 2020	Difference (5-6)	Controlling Authority
121	Kathua	Dharamkot2	Outside Forest	0.29	0.00	0.29	DC
122	Kathua	Phainthar	Outside Forest	0.30	0.00	0.30	DC
123	Kathua	Bhaddu Talao 1	Outside Forest	0.41	0.00	0.41	DC
124	Kathua	Bhaddu Talao2	Outside Forest	0.31	0.00	0.31	DC
125	Kathua	Bhaddu Talao3	Outside Forest	0.43	0.00	0.43	DC
126	Kathua	Kishanpur1	Outside Forest	0.46	0.00	0.46	DC
127	Kathua	Kishanpur2	Outside Forest	0.35	0.00	0.35	DC
128	Kathua	Katli Talao	Outside Forest	0.33	0.00	0.33	DC
129	Kathua	Satura	Outside Forest	0.56	0.00	0.56	DC
130	Kathua	Peiya 1	Outside Forest	0.26	0.00	0.26	DC
131	Kathua	Peiya 2	Outside Forest	0.20	0.00	0.20	DC
132	Kathua	Peiya 3	Outside Forest	0.29	0.00	0.29	DC
133	Kathua	Gurha Mandiyan	Outside Forest	0.42	0.00	0.42	DC
134	Kathua	Mela Wadda 1	Outside Forest	0.34	0.00	0.34	DC
135	Kathua	Mela Wadda2	Outside Forest	0.44	0.00	0.44	DC
136	Kathua	Barwal	Outside Forest	0.84	0.00	0.84	DC
137	Kathua	Karat	Outside Forest	0.66	0.00	0.66	DC
138	Kathua	Kali Ban	Outside Forest	0.32	0.00	0.32	DC
139	Kathua	Mule Da Tala	Outside Forest	0.24	0.00	0.24	DC
140	Kathua	Palghetar	Outside Forest	0.58	0.00	0.58	DC
141	Kathua	Govinda	Outside Forest	0.66	0.00	0.66	DC
142	Kathua	Kanaun	Outside Forest	0.44	0.00	0.44	DC
143	Kathua	Marla	Outside Forest	0.48	0.00	0.48	DC
144	Kathua	Naknal	Outside Forest	1.06	0.00	1.06	DC
145	Kishtwar	Hoksar	Outside Forest	1.21	0.00	1.21	DC
146	Kishtwar	Bimal Nag	Outside Forest	5.28	0.00	5.28	DC
147	Kishtwar	Padar Sar	Outside Forest	1.52	0.00	1.52	DC
148	Kishtwar	Shingdhar Sar	Outside Forest	2.63	0.00	2.63	DC
149	Poonch	Sarian Sar	Outside Forest	0.61	0.00	0.61	DC
150	Poonch	Jamianwali Sar 3	Outside Forest	0.55	0.00	0.55	DC
151	Poonch	Kunalan Sar	Outside Forest	0.65	0.00	0.65	DC
152	Poonch	Chinarmarg Sar 2	Outside Forest	0.80	0.00	0.80	DC
153	Poonch	Chinarmarg Sar 3	Outside Forest	0.39	0.00	0.39	DC
154	Ramban	Jabor Sar Lokut	Outside Forest	0.74	0.00	0.74	DC
155	Ramban	Tangar Sar	Outside Forest	0.81	0.00	0.81	DC
156	Reasi	Kotla Chakkar	Outside Forest	1.61	0.00	1.61	DC
157	Reasi	Bajopur	Outside Forest	0.70	0.00	0.70	DC
158	Reasi	Chakhar Talao	Outside Forest	0.46	0.00	0.46	DC
159	Reasi	Gorra Talao	Outside Forest	0.38	0.00	0.38	DC
160	Reasi	Tung Talao	Outside Forest	0.43	0.00	0.43	DC
161	Reasi	Rauta Talao	Outside Forest	0.24	0.00	0.24	DC
162	Reasi	Orka 1	Outside Forest	0.28	0.00	0.28	DC
163	Reasi	Orka2	Outside Forest	0.27	0.00	0.27	DC
164	Reasi	Galali	Outside Forest	0.39	0.00	0.39	DC
165	Reasi	Kotli Panditan1	Outside Forest	0.39	0.00	0.39	DC
166	Reasi	Kotli Panditan2	Outside Forest	0.49	0.00	0.49	DC
167	Reasi	Sarot1	Outside Forest	0.35	0.00	0.35	DC

Sl. No	District	Name of Lake	Inside/ Outside Forest	Topographic image (Topo) 1967	Satellite image (SI) 2020	Difference (5-6)	Controlling Authority
168	Reasi	Sarot2	Outside Forest	0.33	0.00	0.33	DC
169	Reasi	Ratikhad	Outside Forest	0.47	0.00	0.47	DC
170	Reasi	Kotli Gujran Talao	Outside Forest	0.34	0.00	0.34	DC
171	Reasi	Mathuwar1	Outside Forest	0.24	0.00	0.24	DC
172	Reasi	Mathuwar2	Outside Forest	0.31	0.00	0.31	DC
173	Reasi	Mathuwar3	Outside Forest	0.25	0.00	0.25	DC
174	Reasi	Chirangal1	Outside Forest	0.25	0.00	0.25	DC
175	Reasi	Chirangal2	Outside Forest	0.27	0.00	0.27	DC
176	Reasi	Chirangal3	Outside Forest	0.35	0.00	0.35	DC
177	Reasi	Kalyar Talao	Outside Forest	0.19	0.00	0.19	DC
178	Reasi	Aarli	Outside Forest	0.50	0.00	0.50	DC
179	Reasi	Kun Darorian	Outside Forest	0.40	0.00	0.40	DC
180	Reasi	Karmal Talao	Outside Forest	0.28	0.00	0.28	DC
181	Reasi	Kairi	Outside Forest	0.35	0.00	0.35	DC
182	Reasi	Padmi Talao	Outside Forest	0.58	0.00	0.58	DC
183	Samba	Chhechwal Talao	Outside Forest	0.88	0.00	0.88	DC
184	Samba	Sujani Talao	Outside Forest	0.97	0.00	0.97	DC
185	Samba	Chhaliyari Talao	Outside Forest	1.10	0.00	1.10	DC
186	Samba	Chhaliyari Talao	Outside Forest	0.72	0.00	0.72	DC
187	Samba	Chak Bura Talao	Outside Forest	0.62	0.00	0.62	DC
188	Samba	Ragal Talao	Outside Forest	0.59	0.00	0.59	DC
189	Samba	Madwal Talao	Outside Forest	0.66	0.00	0.66	DC
190	Samba	Sambli Talao	Outside Forest	0.46	0.00	0.46	DC
191	Samba	Thali Sar	Outside Forest	0.42	0.00	0.42	DC
192	Samba	Galar Talao	Outside Forest	0.42	0.00	0.42	DC
193	Samba	Pangdaur Talao	Outside Forest	0.27	0.00	0.27	DC
194	Samba	Khunwal Talao	Outside Forest	0.73	0.00	0.73	DC
195	Samba	Ramblu Talao	Outside Forest	1.00	0.00	1.00	DC
196	Samba	Trindi Sangara Talao	Outside Forest	0.85	0.00	0.85	DC
197	Samba	Mahal Kalandariyan Talao	Outside Forest	0.53	0.00	0.53	DC
198	Samba	Ramgarh Talao	Outside Forest	0.92	0.00	0.92	DC
199	Samba	Chak Shama Talao	Outside Forest	1.47	0.00	1.47	DC
200	Samba	Kothe Manhasan Talao	Outside Forest	0.57	0.00	0.57	DC
201	Samba	Galwal Talao	Outside Forest	1.65	0.00	1.65	DC
202	Samba	Rasana Talao	Outside Forest	0.30	0.00	0.30	DC
203	Samba	Pekhri Talao	Outside Forest	0.52	0.00	0.52	DC
204	Samba	Nargal Talao	Outside Forest	0.36	0.00	0.36	DC
205	Samba	Nagrota Talao	Outside Forest	0.61	0.00	0.61	DC
206	Samba	Mautalian Kalan Talao	Outside Forest	0.24	0.00	0.24	DC
207	Samba	Kuppar Talao	Outside Forest	0.49	0.00	0.49	DC
208	Samba	Chak Largan Talao	Outside Forest	0.40	0.00	0.40	DC
209	Samba	Bajalta Talao	Outside Forest	0.34	0.00	0.34	DC

Sl. No	District	Name of Lake	Inside/ Outside Forest	Topographic image (Topo) 1967	Satellite image (SI) 2020	Difference (5-6)	Controlling Authority
210	Samba	Sungali Talao	Outside Forest	0.45	0.00	0.45	DC
211	Samba	Panali Talao	Outside Forest	0.36	0.00	0.36	DC
212	Samba	Deani Talao	Outside Forest	0.50	0.00	0.50	DC
213	Samba	Barmal Talao	Outside Forest	0.30	0.00	0.30	DC
214	Samba	Mautalian Khurd Talao	Outside Forest	0.38	0.00	0.38	DC
215	Samba	Chat Talao	Outside Forest	0.56	0.00	0.56	DC
216	Samba	Bawali Talao	Outside Forest	0.59	0.00	0.59	DC
217	Samba	Birpur Talao	Outside Forest	0.62	0.00	0.62	DC
218	Samba	Narwal Talao	Outside Forest	0.40	0.00	0.40	DC
219	Samba	Kundanpur Talao	Outside Forest	0.49	0.00	0.49	DC
220	Samba	Ardhani Talao	Outside Forest	0.77	0.00	0.77	DC
221	Samba	Rajpur Kaular Talao	Outside Forest	0.44	0.00	0.44	DC
222	Samba	Basi Kalan Talao	Outside Forest	0.84	0.00	0.84	DC
223	Samba	Basi Khurd Talao	Outside Forest	0.49	0.00	0.49	DC
224	Samba	Palli Talao	Outside Forest	0.61	0.00	0.61	DC
225	Samba	Chhanm Talao	Outside Forest	1.60	0.00	1.60	DC
226	Samba	Dhiansar Rakh Talao	Outside Forest	0.91	0.00	0.91	DC
227	Samba	Kali Bari Talao	Outside Forest	0.37	0.00	0.37	DC
228	Samba	Karalian Kalan Talao	Outside Forest	0.58	0.00	0.58	DC
229	Samba	Sarwa Talao	Outside Forest	1.07	0.00	1.07	DC
230	Samba	Bhudwal Talao	Outside Forest	0.50	0.00	0.50	DC
231	Samba	Gori Khad Talao	Outside Forest	0.69	0.00	0.69	DC
232	Samba	Thalori Brahmanan Talao	Outside Forest	0.42	0.00	0.42	DC
233	Samba	Udh Mandi Talao	Outside Forest	1.07	0.00	1.07	DC
234	Samba	Kamila Talao	Outside Forest	0.72	0.00	0.72	DC
235	Samba	Narwal Lower Talao	Outside Forest	1.15	0.00	1.15	DC
236	Samba	Gangith Talao	Outside Forest	0.24	0.00	0.24	DC
237	Samba	Phatiyar Talao	Outside Forest	0.39	0.00	0.39	DC
238	Samba	Nikki Mutthi Talao	Outside Forest	0.51	0.00	0.51	DC
239	Samba	Badi Mutthi Talao	Outside Forest	0.28	0.00	0.28	DC
240	Samba	Palona Talao	Outside Forest	0.51	0.00	0.51	DC
241	Samba	Malangar Ki Chhan Talao	Outside Forest	0.81	0.00	0.81	DC
242	Samba	Kane Chhan Talao	Outside Forest	0.24	0.00	0.24	DC
243	Samba	Jutwal Talao	Outside Forest	0.31	0.00	0.31	DC
244	Samba	Mudgoli Talao	Outside Forest	0.22	0.00	0.22	DC
245	Udhampur	Trin Talao	Outside Forest	1.97	0.00	1.97	DC
246	Udhampur	Tror Talao 1	Outside Forest	0.35	0.00	0.35	DC
247	Udhampur	Tror Talao 2	Outside Forest	0.14	0.00	0.14	DC
248	Udhampur	Painthal Talao	Outside Forest	0.66	0.00	0.66	DC
249	Udhampur	Chak Talin Talao	Outside Forest	0.29	0.00	0.29	DC

Sl. No	District	Name of Lake	Inside/ Outside Forest	Topographic image (Topo) 1967	Satellite image (SI) 2020	Difference (5-6)	Controlling Authority
250	Udhampur	Khandek Talao	Outside Forest	0.39	0.00	0.39	DC
251	Udhampur	Manun Talao	Outside Forest	0.77	0.00	0.77	DC
252	Udhampur	Chak Baghat Talao	Outside Forest	0.38	0.00	0.38	DC
253	Udhampur	Sira Talao	Outside Forest	1.02	0.00	1.02	DC
254	Udhampur	Serli Sar	Outside Forest	0.84	0.00	0.84	DC
255	Udhampur	Chakhar Talao	Outside Forest	0.43	0.00	0.43	DC
256	Udhampur	Khandra Talao	Outside Forest	0.45	0.00	0.45	DC
257	Udhampur	Barean Talao	Outside Forest	1.30	0.00	1.30	DC
258	Udhampur	Seoj Sar	Outside Forest	2.76	0.00	2.76	DC
259	Udhampur	Karkial Talao	Outside Forest	0.52	0.00	0.52	DC
Total Jammu (259 Lakes)				297.05	0.00	297.05	
Kashmir Division							
1	Anantnag	Kon Nag	Inside Forest	2.07	0.00	2.07	PCCF
2	Anantnag	Nagputan Sar 3	Inside Forest	4.72	0.00	4.72	PCCF
3	Bandipora	Unnamed Lake	Inside Forest	2.18	0.00	2.18	PCCF
4	Bandipora	Unnamed Lake	Inside Forest	0.82	0.00	0.82	PCCF
5	Bandipora	Unnamed Lake	Inside Forest	2.65	0.00	2.65	PCCF
6	Bandipora	Unnamed Lake	Inside Forest	2.65	0.00	2.65	PCCF
7	Bandipora	Chhamar Sar	Inside Forest	7.97	0.00	7.97	PCCF
8	Bandipora	Unnamed Lake	Inside Forest	0.91	0.00	0.91	PCCF
9	Bandipora	Unnamed Lake	Inside Forest	2.79	0.00	2.79	PCCF
10	Bandipora	Unnamed Lake	Inside Forest	2.86	0.00	2.86	PCCF
11	Bandipora	Unnamed Lake	Inside Forest	9.28	0.00	9.28	PCCF
12	Ganderbal	Kaul Sar	Inside Forest	1.05	0.00	1.05	PCCF
13	Ganderbal	Zajibal Sar	Inside Forest	1.02	0.00	1.02	PCCF
14	Ganderbal	Prain Gang Sar	Inside Forest	1.73	0.00	1.73	PCCF
15	Ganderbal	Prain Gang Sar	Inside Forest	0.41	0.00	0.41	PCCF
16	Ganderbal	Prain Gang Sar	Inside Forest	0.71	0.00	0.71	PCCF
17	Ganderbal	Prain Gang Sar	Inside Forest	0.45	0.00	0.45	PCCF
18	Ganderbal	Unnamed Lake	Inside Forest	0.45	0.00	0.45	PCCF
19	Ganderbal	Hoka Sar	Inside Forest	0.45	0.00	0.45	PCCF
20	Ganderbal	Lachnai Sar	Inside Forest	1.28	0.00	1.28	PCCF
21	Kulgam	Unnamed	Inside Forest	1.27	0.00	1.27	PCCF
22	Kulgam	Unnamed	Inside Forest	4.36	0.00	4.36	PCCF
23	Kulgam	Unnamed	Inside Forest	0.32	0.00	0.32	PCCF
24	Kupwara	Bran Khuda Sar	Inside Forest	3.51	0.00	3.51	PCCF
25	Pulwama	Unnamed	Inside Forest	0.72	0.00	0.72	PCCF
26	Pulwama	Unnamed	Inside Forest	0.73	0.00	0.73	PCCF
27	Anantnag	Marhama Wetland	Outside Forest	202.49	0.00	202.49	DC
28	Anantnag	Mahtan Wetland	Outside Forest	103.80	0.00	103.80	DC
29	Bandipora	Batagund Nambal	Outside Forest	15.34	0.00	15.34	DC
30	Bandipora	Bazipura Nambal	Outside Forest	16.96	0.00	16.96	DC
31	Bandipora	Paribal Nambal	Outside Forest	7.45	0.00	7.45	DC
32	Bandipora	Chak Chanadergar	Outside Forest	17.36	0.00	17.36	DC
33	Bandipora	Hakabor Nambal	Outside Forest	10.23	0.00	10.23	DC
34	Bandipora	Pahilpora Nambal	Outside Forest	1.39	0.00	1.39	DC

Sl. No	District	Name of Lake	Inside/ Outside Forest	Topographic image (Topo) 1967	Satellite image (SI) 2020	Difference (5-6)	Controlling Authority
35	Bandipora	Panjinara Nambal	Outside Forest	4.49	0.00	4.49	DC
36	Bandipora	Shalteng Nambal	Outside Forest	13.73	0.00	13.73	DC
37	Budgam	Rakh Arat	Outside Forest	464.05	0.00	464	DC
38	Ganderbal	Malshahibagh Nambal	Outside Forest	3.21	0.00	3.21	DC
39	Ganderbal	Barsu Nambal	Outside Forest	26.95	0.00	26.95	DC
40	Ganderbal	Kurag Nambal	Outside Forest	1.52	0.00	1.52	DC
41	Ganderbal	Kurag Nambal	Outside Forest	7.29	0.00	7.29	DC
42	Ganderbal	Devapura Nambal	Outside Forest	24.76	0.00	24.76	DC
43	Ganderbal	Gogajhigund Nambal	Outside Forest	3.42	0.00	3.42	DC
44	Ganderbal	Sindhbal Nambal	Outside Forest	28.38	0.00	28.38	DC
45	Ganderbal	Pahilpura Nambal	Outside Forest	4.13	0.00	4.13	DC
46	Ganderbal	Pethapura Nambal	Outside Forest	20.89	0.00	20.89	DC
47	Kupwara	Teki Pur Sar	Outside Forest	0.92	0.00	0.92	DC
48	Pulwama	Sethargund Nambal	Outside Forest	18.06	0.00	18.06	DC
49	Pulwama	Parigam Sar	Outside Forest	12.96	0.00	12.96	DC
50	Pulwama	Kisirgam Sar	Outside Forest	6.65	0.00	6.65	DC
51	Pulwama	Begambagh Nambal	Outside Forest	18.93	0.00	18.93	DC
52	Srinagar	Chak Nambal	Outside Forest	55.94	0.00	56	DC
53	Srinagar	Mojagund Nambal	Outside Forest	11.13	0.00	11	DC
54	Srinagar	Gangbugh Nambal	Outside Forest	47.37	0.00	47	DC
55	Srinagar	Gangbugh Nambal-II	Outside Forest	14.04	0.00	14	DC
56	Srinagar	Rakhsutu Mud Nambal	Outside Forest	18.82	0.00	19	DC
Total Kashmir (56 Lakes)				1,240.02	0.00	1,240.02	
Total Jammu and Kashmir (259+56=315 Lakes)				1,537.07	0.00	1,537.07	
Sl. No	District	Name of Lake	Inside/Outside Forest	Topographic image (Topo) 1967	Satellite image (SI) 2020	Difference (5-6)	Controlling Authority
Divison-wise details of Decrease in area of Lakes						(Area in Hectares)	
Jammu Division							
1	Jammu	Chata Sar	Inside Forest	0.52	0.40	0.12	PCCF
2	Jammu	Mawa Sar	Inside Forest	0.42	0.35	0.07	PCCF
3	Kishtwar	Gagar Nai Sar	Inside Forest	1.66	0.55	1.11	PCCF
4	Kishtwar	Handi Mandu Sar	Inside Forest	0.84	0.25	0.59	PCCF
5	Kishtwar	Hok Sar	Inside Forest	2.58	2.27	0.31	PCCF
6	Kishtwar	Kon Nag	Inside Forest	2.41	1.28	1.13	PCCF
7	Kishtwar	Kras Sar	Inside Forest	2.29	0.59	1.70	PCCF
8	Kishtwar	Malgarhu Sar 2	Inside Forest	1.55	0.64	0.91	PCCF
9	Kishtwar	Naginpathar Sar	Inside Forest	2.93	0.76	2.17	PCCF
10	Kishtwar	Naikhoi Nag	Inside Forest	7.52	2.28	5.24	PCCF
11	Kishtwar	Nilgur Sar Lokut	Inside Forest	3.71	0.26	3.45	PCCF
12	Kishtwar	Purmandal Sar	Inside Forest	3.25	2.47	0.78	PCCF
13	Kishtwar	Saras Nag	Inside Forest	7.24	5.44	1.80	PCCF

Sl. No	District	Name of Lake	Inside/ Outside Forest	Topographic image (Topo) 1967	Satellite image (SI) 2020	Difference (5-6)	Controlling Authority
14	Kishtwar	Shil Sar	Inside Forest	3.22	2.63	0.59	PCCF
15	Kishtwar	Shil Sar Lokut	Inside Forest	2.24	1.31	0.93	PCCF
16	Kishtwar	Tulmula Sar	Inside Forest	6.95	6.74	0.21	PCCF
17	Poonch	Barhal Sar	Inside Forest	2.68	2.21	0.47	PCCF
18	Poonch	Bhag Sar	Inside Forest	7.66	7.45	0.21	PCCF
19	Poonch	Bod Gum Sar	Inside Forest	4.00	1.00	3.00	PCCF
20	Poonch	Chambar Sar	Inside Forest	12.53	11.39	1.14	PCCF
21	Poonch	Chhe Sar 1	Inside Forest	3.53	0.73	2.80	PCCF
22	Poonch	Chhe Sar 2	Inside Forest	2.93	1.68	1.25	PCCF
23	Poonch	Ding Sar 1	Inside Forest	2.14	0.84	1.30	PCCF
24	Poonch	Mahra Sar	Inside Forest	0.88	0.67	0.21	PCCF
25	Poonch	Neel Sar 1	Inside Forest	4.00	2.47	1.53	PCCF
26	Poonch	Sannan Sar	Inside Forest	27.51	22.06	5.45	PCCF
27	Rajouri	Panch Gabbar Sar	Inside Forest	6.77	3.46	3.31	PCCF
28	Reasi	Gaga Sar	Inside Forest	4.70	2.37	2.33	PCCF
29	Reasi	Jurya Sar	Inside Forest	2.09	0.09	2.00	PCCF
30	Reasi	Jurya Sar	Inside Forest	2.27	0.76	1.51	PCCF
31	Udhampur	Gharser	Inside Forest	0.87	0.46	0.41	PCCF
32	Doda	Kaplas Sar 1	Outside Forest	8.85	5.33	3.52	DC
33	Doda	Kaplas Sar 4	Outside Forest	1.68	0.58	1.10	DC
34	Jammu	Balowan Sar	Outside Forest	0.64	0.36	0.28	DC
35	Jammu	Barnai Sar	Outside Forest	0.66	0.54	0.12	DC
36	Jammu	Gahi Sar	Outside Forest	0.52	0.37	0.15	DC
37	Jammu	Ghandarwan Sar 1	Outside Forest	0.64	0.53	0.11	DC
38	Jammu	Kalith Sar	Outside Forest	1.79	1.24	0.55	DC
39	Jammu	Kot Sar 2	Outside Forest	0.50	0.41	0.09	DC
40	Jammu	Targoh Sar	Outside Forest	1.04	0.75	0.29	DC
41	Jammu	Tawa Sar	Outside Forest	0.87	0.34	0.53	DC
42	Jammu	Thinda Sar	Outside Forest	0.76	0.29	0.47	DC
43	Jammu	Garh Sar	Outside Forest	0.95	0.35	0.60	WLW
44	Jammu	Ghirana Wetland	Outside Forest	6.78	5.95	0.83	WLW
45	Kathua	Siyagot Sar 1	Outside Forest	0.82	0.08	0.74	DC
46	Kathua	Siyagot Sar 2	Outside Forest	0.91	0.36	0.55	DC
47	Kishtwar	Kali Nag	Outside Forest	15.12	9.88	5.24	DC
48	Poonch	Jamianwali Sar 1	Outside Forest	0.51	0.24	0.27	DC
49	Poonch	Jara Sar 1	Outside Forest	1.32	0.83	0.49	DC
50	Poonch	Jara Sar 2	Outside Forest	1.35	0.54	0.81	DC
51	Ramban	Jabor Sar Bod	Outside Forest	1.95	1.51	0.44	DC
52	Samba	Amwal Sar	Outside Forest	0.87	0.40	0.47	DC
53	Samba	Bari Khad Sar	Outside Forest	0.69	0.67	0.02	DC
54	Samba	Dughor Sar	Outside Forest	1.26	0.75	0.51	DC
55	Samba	Guru Salathian Sar	Outside Forest	1.52	0.35	1.17	DC
56	Samba	Mawa Sar	Outside Forest	1.40	0.86	0.54	DC
57	Samba	Rahiya Sar	Outside Forest	0.83	0.81	0.02	DC
58	Samba	Ranjri Sar	Outside Forest	1.20	0.91	0.29	DC
59	Udhampur	Kotla Sar	Outside Forest	0.73	0.20	0.53	DC
Total Jammu (59 Lakes)				190.05	121.29	68.76	

Sl. No	District	Name of Lake	Inside/ Outside Forest	Topographic image (Topo) 1967	Satellite image (SI) 2020	Difference (5-6)	Controlling Authority
Kashmir Division							
1	Anantnag	Chhumanai Gali Sar	Inside Forest	3.39	3.03	0.36	PCCF
2	Anantnag	Chohar Nag Lokut	Inside Forest	4.59	3.55	1.04	PCCF
3	Anantnag	Dandabari Sar	Inside Forest	1.45	0.88	0.57	PCCF
4	Anantnag	Dod Chhiran Nag 1	Inside Forest	6.31	5.56	0.75	PCCF
5	Anantnag	Dod Chhiran Nag 2	Inside Forest	2.50	0.76	1.74	PCCF
6	Anantnag	Drinyan Sar	Inside Forest	1.20	1.14	0.06	PCCF
7	Anantnag	Girsar Nag	Inside Forest	1.47	0.36	1.11	PCCF
8	Anantnag	Gonhar Sar	Inside Forest	1.58	1.32	0.26	PCCF
9	Anantnag	Gurmisar	Inside Forest	1.46	0.79	0.67	PCCF
10	Anantnag	Kon Nag 1	Inside Forest	10.04	8.63	1.41	PCCF
11	Anantnag	Kon Nag Gali	Inside Forest	8.96	5.05	3.91	PCCF
12	Anantnag	Lakut Nag	Inside Forest	1.00	0.79	0.21	PCCF
13	Anantnag	Mawar Nag	Inside Forest	12.87	5.52	7.35	PCCF
14	Anantnag	Mawar Nag Lakut	Inside Forest	4.68	3.40	1.28	PCCF
15	Anantnag	Nagputan Sar 1	Inside Forest	3.75	3.07	0.68	PCCF
16	Anantnag	Nagputan Sar 2	Inside Forest	3.54	1.51	2.03	PCCF
17	Anantnag	Ruyil Sar	Inside Forest	0.59	0.29	0.30	PCCF
18	Anantnag	Sekiwas Sar	Inside Forest	0.47	0.25	0.22	PCCF
19	Anantnag	Shesh Nag	Inside Forest	64.05	53.72	10.33	PCCF
20	Anantnag	Sona Sar 1	Inside Forest	17.80	16.87	0.93	PCCF
21	Anantnag	Sorus Nag	Inside Forest	21.37	15.68	5.69	PCCF
22	Anantnag	Tuliyar Sar	Inside Forest	9.11	5.01	4.10	PCCF
23	Anantnag	Vimun sar	Inside Forest	1.19	0.79	0.40	PCCF
24	Anantnag	Zissar Nag 1	Inside Forest	5.91	2.04	3.87	PCCF
25	Anantnag	Zissar Nag 2	Inside Forest	4.22	2.24	1.98	PCCF
26	Anantnag	Chanda Sar	Inside Forest	12.34	10.76	1.58	WLW
27	Anantnag	Chhumanai Sar 2	Inside Forest	6.05	3.00	3.05	WLW
28	Anantnag	Doda Sar	Inside Forest	7.58	5.38	2.20	WLW
29	Anantnag	Gandpather Sar	Inside Forest	5.03	1.24	3.79	WLW
30	Anantnag	Munwar Sar	Inside Forest	9.11	8.25	0.86	WLW
31	Anantnag	Sona Sar Lakut / Sar	Inside Forest	0.86	0.52	0.34	WLW
32	Anantnag	Sona Sar 2	Inside Forest	19.31	18.51	0.80	WLW
33	Anantnag	Lakut Sar	Inside Forest	0.38	0.28	0.10	WLW
34	Anantnag	Budru Nag	Inside Forest	1.45	0.66	0.79	WLW
35	Anantnag	Hapat Sar	Inside Forest	0.65	0.47	0.18	WLW
36	Anantnag	Watis Sar	Inside Forest	2.54	1.64	0.90	WLW
37	Bandipora	Bod Hiram Pathri Sar	Inside Forest	7.45	0.66	6.79	PCCF
38	Bandipora	Bod Patalwan Sar	Inside Forest	37.49	31.90	5.59	PCCF
39	Bandipora	Ghulam Sar	Inside Forest	3.06	2.24	0.82	PCCF
40	Bandipora	Handmagar Sar	Inside Forest	3.41	3.01	0.40	PCCF
41	Bandipora	Hiram Pathri Sar	Inside Forest	4.35	3.01	1.34	PCCF
42	Bandipora	Krishan Sar	Inside Forest	34.87	6.44	28.43	PCCF

Sl. No	District	Name of Lake	Inside/ Outside Forest	Topographic image (Topo) 1967	Satellite image (SI) 2020	Difference (5-6)	Controlling Authority
43	Bandipora	Logul Sar	Inside Forest	1.39	1.12	0.27	PCCF
44	Bandipora	Lokut Baib Nar Sar	Inside Forest	1.14	0.61	0.53	PCCF
45	Bandipora	Lokut Chiwti Chhamri Sar	Inside Forest	7.71	7.38	0.33	PCCF
46	Bandipora	Madmatti Sar	Inside Forest	43.61	36.86	6.75	PCCF
47	Bandipora	Nilnai Sar	Inside Forest	1.54	0.97	0.57	PCCF
48	Bandipora	Patalwan Sar	Inside Forest	32.65	31.37	1.28	PCCF
49	Bandipora	Raman Chhish Sar	Inside Forest	2.78	1.67	1.11	PCCF
50	Bandipora	Shira Sar	Inside Forest	2.50	2.21	0.29	PCCF
51	Bandipora	Vishan Sar	Inside Forest	53.19	47.62	5.57	PCCF
52	Bandipora	Watal Sar	Inside Forest	9.28	0.24	9.04	PCCF
53	Bandipora	Zad Sar	Inside Forest	10.31	3.68	6.63	PCCF
54	Bandipora	Kisar Sar	Inside Forest	6.59	5.91	0.68	WLW
55	Baramulla	Mirgund Jhil-I	Outside Forest	272.06	254.36	17.70	WLW
56	Budgam	Hokar Sar	Outside Forest	1,813.08	1,810.07	3.01	WLW
57	Ganderbal	Baribal Sar	Inside Forest	3.90	1.38	2.52	PCCF
58	Ganderbal	Doth Sar	Inside Forest	1.45	1.02	0.43	PCCF
59	Ganderbal	Hoka Sar	Inside Forest	4.21	1.38	2.83	PCCF
60	Ganderbal	Hoka Sar	Inside Forest	3.65	2.32	1.33	PCCF
61	Ganderbal	Nundkol	Inside Forest	38.99	36.63	2.36	PCCF
62	Ganderbal	Prain Gang Sar	Inside Forest	7.11	4.81	2.30	PCCF
63	Ganderbal	Sat Sar	Inside Forest	2.58	2.08	0.50	PCCF
64	Ganderbal	Sona Sar	Inside Forest	3.08	1.08	2.00	PCCF
65	Ganderbal	Shalabugh Nambal	Inside Forest	1,585.82	1,474.63	111.19	WLW
66	Kulgam	Bram Sar	Inside Forest	16.48	15.27	1.21	PCCF
67	Kulgam	Chandan Sar Lakut	Inside Forest	7.06	4.19	2.87	PCCF
68	Kulgam	Chir Sar	Inside Forest	22.04	6.90	15.14	PCCF
69	Kulgam	Dhaklar Sar	Inside Forest	32.90	30.76	2.14	PCCF
70	Kulgam	Hing Sar	Inside Forest	2.57	0.52	2.05	PCCF
71	Kulgam	Indar Sar	Inside Forest	6.01	4.44	1.57	PCCF
72	Kulgam	Makru Sar	Inside Forest	1.94	1.13	0.81	PCCF
73	Kulgam	Nandan Sar	Inside Forest	26.48	25.66	0.82	PCCF
74	Kulgam	Pambasar Sar	Inside Forest	0.43	0.28	0.15	PCCF
75	Kulgam	Ruprigali Sar	Inside Forest	13.55	11.14	2.41	PCCF
76	Kulgam	Unnamed	Inside Forest	0.57	0.14	0.43	PCCF
77	Kulgam	Unnamed	Inside Forest	1.99	1.57	0.42	PCCF
78	Kulgam	Chandan Sar	Inside Forest	16.94	15.38	1.56	WLW
79	Kulgam	Laksukh Sar	Inside Forest	31.42	30.27	1.15	WLW
80	Kupwara	Boban Sar	Inside Forest	0.82	0.81	0.01	PCCF
81	Kupwara	Gang Sar	Inside Forest	0.45	0.28	0.17	PCCF
82	Kupwara	Unnamed	Inside Forest	2.36	0.58	1.78	PCCF
83	Pulwama	Pambach Khod	Inside Forest	1.75	0.87	0.88	PCCF
84	Pulwama	Pambagai Lake	Inside Forest	1.41	0.36	1.05	PCCF
85	Bandipora	Baibnar Sar	Outside Forest	4.46	1.88	2.58	DC

Sl. No	District	Name of Lake	Inside/ Outside Forest	Topographic image (Topo) 1967	Satellite image (SI) 2020	Difference (5-6)	Controlling Authority
86	Bandipora	Chandargar Nambal	Outside Forest	21.21	10.68	10.53	DC
87	Bandipora	Gosia Sar	Outside Forest	0.46	0.18	0.28	DC
88	Bandipora	Gund-I-Khalil Sar (Tsore Teng)	Outside Forest	21.68	3.24	18.44	DC
89	Bandipora	Khanpeth Nambal	Outside Forest	1.45	1.34	0.11	DC
90	Bandipora	Khomina Nambal	Outside Forest	67.85	29.85	38.00	DC
91	Bandipora	Khurwan Sar	Outside Forest	10.76	9.43	1.33	DC
92	Bandipora	Mukhdamyari Nambal	Outside Forest	41.64	24.93	16.71	DC
93	Bandipora	Naidkhai Nambal	Outside Forest	40.67	38.89	1.78	DC
94	Bandipora	Naz Nambal	Outside Forest	11.73	8.69	3.04	DC
95	Bandipora	Poshwari Nambal	Outside Forest	9.14	3.20	5.94	DC
96	Bandipora	Rakh Hajan	Outside Forest	26.04	8.25	17.79	DC
97	Bandipora	Rakhi Dusilpor	Outside Forest	6.81	1.47	5.34	DC
98	Bandipora	Sadunara Hastikhan Nambal	Outside Forest	51.98	36.31	15.67	DC
99	Bandipora	Sarikhan Nambal	Outside Forest	23.41	5.03	18.38	DC
100	Bandipora	Shiekh Sar	Outside Forest	8.32	6.07	2.25	DC
101	Bandipora	Sudarkut Nambal	Outside Forest	172.73	143.81	28.92	DC
102	Bandipora	Tundpura Nambal	Outside Forest	23.54	16.91	6.63	DC
103	Bandipora	Zinipura Nambal	Outside Forest	57.25	40.43	16.82	DC
104	Baramulla	Buna Naugam Nambal	Outside Forest	248.44	200.37	48.07	DC
105	Baramulla	Ferozpur Nambal	Outside Forest	43.57	26.85	16.72	DC
106	Baramulla	Frozen Lake	Outside Forest	3.25	1.03	2.22	DC
107	Baramulla	Kanispora Nambal	Outside Forest	30.46	14.24	16.22	DC
108	Baramulla	Konsar Nar	Outside Forest	1.74	0.15	1.59	DC
109	Baramulla	Panznor Nambal	Outside Forest	25.60	7.86	17.74	DC
110	Ganderbal	Ahan Sar	Outside Forest	27.71	14.18	13.53	DC
111	Ganderbal	Ancher-II	Outside Forest	3.68	1.37	2.31	DC
112	Ganderbal	Gundmumin Nambal	Outside Forest	5.54	0.20	5.34	DC
113	Ganderbal	Hakimgund Nambal	Outside Forest	68.65	27.89	40.76	DC
114	Ganderbal	Khanpur Sar	Outside Forest	39.36	11.89	27.47	DC
115	Ganderbal	Rakh-i-Kujar	Outside Forest	449.73	382.74	66.99	DC
116	Ganderbal	Rakh-i-Rabitar	Outside Forest	698.45	406.03	292.42	DC
117	Ganderbal	Salhar Nag	Outside Forest	12.49	12.30	0.19	DC
118	Ganderbal	Waskur Sar	Outside Forest	72.66	22.18	50.48	DC
119	Kupwara	Awatkul Sar	Outside Forest	2.10	0.14	1.96	DC
120	Kupwara	Badrahar Sar	Outside Forest	3.07	2.99	0.08	DC
121	Kupwara	Bod Sar	Outside Forest	5.54	4.66	0.88	DC
122	Kupwara	Buta Sar	Outside Forest	4.03	3.67	0.36	DC
123	Kupwara	Chak Natnus Sar	Outside Forest	1.50	0.90	0.60	DC
124	Kupwara	Charlie Sar	Outside Forest	2.61	1.72	0.89	DC
125	Kupwara	Dadiwar Sar	Outside Forest	1.27	0.94	0.33	DC
126	Kupwara	Kan Sar	Outside Forest	19.98	14.99	4.99	DC

Sl. No	District	Name of Lake	Inside/ Outside Forest	Topographic image (Topo) 1967	Satellite image (SI) 2020	Difference (5-6)	Controlling Authority
127	Kupwara	Khaipur Sar	Outside Forest	1.96	0.79	1.17	DC
128	Kupwara	Lasipur Sar	Outside Forest	3.06	3.01	0.05	DC
129	Kupwara	Lokut Sar	Outside Forest	1.50	1.42	0.08	DC
130	Kupwara	Maidanpura Sar	Outside Forest	0.92	0.56	0.36	DC
131	Kupwara	Muqam Sar	Outside Forest	2.04	1.61	0.43	DC
132	Kupwara	Nagradnar Sar	Outside Forest	1.91	1.58	0.33	DC
133	Kupwara	Narain Sar	Outside Forest	6.20	5.41	0.79	DC
134	Kupwara	Natnusa Sar	Outside Forest	7.17	6.00	1.17	DC
135	Kupwara	Rakh Shehtal	Outside Forest	2.78	2.48	0.30	DC
136	Kupwara	Rupi Sar	Outside Forest	3.35	3.16	0.19	DC
137	Kupwara	Thundus Sar	Outside Forest	1.70	1.23	0.47	DC
138	Pulwama	Chhatalan Sar	Outside Forest	3.14	0.14	3.00	DC
139	Pulwama	Galandar Sar	Outside Forest	47.75	29.94	17.81	DC
140	Pulwama	Malangpur Nambal	Outside Forest	131.20	124.68	6.52	DC
141	Pulwama	Phashakuri Sar	Outside Forest	11.57	6.10	5.47	WLW
142	Srinagar	Anchar Lake	Outside Forest	1,208.55	1,157.88	50.67	LC&MA
143	Srinagar	Babademb	Outside Forest	33.40	31.00	2.40	DC
144	Srinagar	Khushalsar	Outside Forest	90.52	84.03	6.49	LC&MA
Total Kashmir (144 Lakes)				8,376.50	7,131.07	1,245.43	
Total Jammu and Kashmir (59+144=203 Lakes)				8,566.55	7,252.36	1,314.19	
Division-wise details of Increase in area of Lakes						(Area in Hectares)	
Jammu Division							
1	Jammu	Suruin Sar	Inside Forest	24.23	28.60	4.37	WLW
2	Kishtwar	Nagimandu Sar	Inside Forest	0.40	0.80	0.40	PCCF
3	Kishtwar	Zar Nag	Inside Forest	0.92	10.27	9.35	PCCF
4	Kishtwar	Kutabal Nag	Inside Forest	1.91	2.68	0.77	PCCF
5	Kishtwar	Margan Sar	Inside Forest	2.37	2.63	0.26	PCCF
6	Kishtwar	Drinyan Sar	Inside Forest	2.44	7.91	5.47	PCCF
7	Kishtwar	Khelan Nag	Inside Forest	2.95	7.85	4.90	PCCF
8	Kishtwar	Ditap Nag	Inside Forest	5.62	5.81	0.19	PCCF
9	Kishtwar	Saris Nag	Inside Forest	15.26	25.85	10.59	PCCF
10	Kishtwar	Naganandar Sar	Inside Forest	9.39	11.37	1.98	PCCF
11	Kishtwar	Nilgur Sar Bod	Inside Forest	6.94	7.49	0.55	PCCF
12	Kishtwar	Malgarhu Sar 1	Inside Forest	8.97	9.48	0.51	PCCF
13	Poonch	Gum Sar 2	Inside Forest	2.07	2.15	0.08	PCCF
14	Poonch	Marguri Sar 1	Inside Forest	5.43	5.53	0.10	PCCF
15	Poonch	Katori Sar	Inside Forest	9.85	10.32	0.47	PCCF
16	Rajouri	Bela Sar	Inside Forest	2.45	3.30	0.85	PCCF
17	Rajouri	Katori Sar	Inside Forest	3.21	4.39	1.18	PCCF
18	Rajouri	Simar Sar	Inside Forest	8.82	15.46	6.64	WLW
19	Reasi	Thinamarg	Inside Forest	0.45	1.02	0.57	PCCF
20	Udhampur	Mansar Lake	Inside Forest	57.19	58.61	1.42	WLW
21	Udhampur	Dalsar	Outside Forest	0.83	1.51	0.68	DC
22	Doda	Kaplas Sar 3	Outside Forest	1.09	1.12	0.03	DC
23	Doda	Kaplas Sar 2	Outside Forest	1.28	2.57	1.29	DC
24	Doda	Kaplas Nag	Outside Forest	1.96	2.10	0.14	DC

Sl. No	District	Name of Lake	Inside/ Outside Forest	Topographic image (Topo) 1967	Satellite image (SI) 2020	Difference (5-6)	Controlling Authority
25	Jammu	Tacharwan Sar	Outside Forest	0.27	0.50	0.23	DC
26	Jammu	Barola Sar	Outside Forest	0.30	0.38	0.08	DC
27	Jammu	Mandrean Sar	Outside Forest	0.36	0.41	0.05	DC
28	Jammu	Barui Sar	Outside Forest	0.39	0.59	0.20	DC
29	Jammu	Patoni Sar	Outside Forest	0.40	0.52	0.12	DC
30	Jammu	Jagwal Sar	Outside Forest	0.41	0.68	0.27	DC
31	Jammu	Naugiran Sar	Outside Forest	0.46	0.51	0.05	DC
32	Jammu	Kot Sar 1	Outside Forest	0.54	0.78	0.24	DC
33	Jammu	Mundh Talao	Outside Forest	0.59	0.69	0.10	DC
34	Jammu	Tiriai Sar	Outside Forest	0.73	0.85	0.12	DC
35	Jammu	Gura Sar	Outside Forest	0.83	1.06	0.23	DC
36	Jammu	Akhnoor Sar	Outside Forest	1.09	1.98	0.89	DC
37	Jammu	Sangani Sar	Outside Forest	1.18	1.24	0.06	DC
38	Kishtwar	Kaintal Sar	Outside Forest	0.51	0.97	0.46	DC
39	Kishtwar	Shazun Nag	Outside Forest	1.98	3.48	1.50	DC
40	Kishtwar	Dudhar Sar	Outside Forest	3.39	7.59	4.20	DC
41	Poonch	Handnal Sar	Outside Forest	0.88	2.05	1.17	DC
42	Poonch	Jamianwali Sar 2	Outside Forest	0.90	0.93	0.03	DC
43	Samba	Pati Sar	Outside Forest	0.28	0.41	0.13	DC
44	Samba	Gura Sar	Outside Forest	0.40	0.47	0.07	DC
45	Samba	Kargal Sar	Outside Forest	0.90	1.02	0.12	DC
46	Udhampur	Kali Kund Sar	Outside Forest	3.22	4.86	1.64	DC
Total Jammu (46 Lakes)				196.04	260.79	64.75	
Kashmir Division							
1	Anantnag	Chang Sar	Inside Forest	0.84	1.13	0.29	PCCF
2	Anantnag	Dod Chhiran Nag 3	Inside Forest	3.03	3.20	0.17	PCCF
3	Anantnag	Langinal Nag	Inside Forest	3.60	5.45	1.85	PCCF
4	Anantnag	Charinag	Inside Forest	19.19	19.31	0.12	PCCF
5	Anantnag	Hirubagwan Sar	Inside Forest	16.47	16.84	0.37	PCCF
6	Anantnag	Chhumanai Sar	Inside Forest	7.86	18.01	10.15	WLW
7	Anantnag	Chhumanai Sar 1	Inside Forest	3.19	8.50	5.31	WLW
8	Anantnag	Dudhnag	Inside Forest	11.83	11.94	0.11	WLW
9	Anantnag	Handilsar	Inside Forest	18.80	19.63	0.83	WLW
10	Anantnag	Har Nag	Inside Forest	33.28	33.46	0.18	WLW
11	Anantnag	Hoka Sar	Inside Forest	3.62	4.36	0.74	WLW
12	Anantnag	Katar Nag	Inside Forest	2.90	3.19	0.29	WLW
13	Anantnag	Tarsar	Inside Forest	83.23	84.99	1.76	WLW
14	Anantnag	Tson	Inside Forest	8.87	14.14	5.27	WLW
15	Anantnag	Girwar Nag	Inside Forest	1.68	1.99	0.31	WLW
16	Anantnag	Gumhar/ Gumbar Sar	Inside Forest	1.94	2.39	0.45	WLW
17	Bandipora	Lokut Patalwan Sar	Inside Forest	0.15	1.07	0.92	PCCF
18	Bandipora	Lokut Sar	Inside Forest	0.89	5.53	4.64	PCCF
19	Bandipora	Lokut Chhitrar Nar Sar	Inside Forest	0.96	1.82	0.86	PCCF

Sl. No	District	Name of Lake	Inside/ Outside Forest	Topographic image (Topo) 1967	Satellite image (SI) 2020	Difference (5-6)	Controlling Authority
20	Bandipora	Unnamed Lake	Inside Forest	0.98	1.03	0.05	PCCF
21	Bandipora	Gad Sar Lokut	Inside Forest	1.46	1.50	0.04	PCCF
22	Bandipora	Karunpathar Sar	Inside Forest	1.65	1.68	0.03	PCCF
23	Bandipora	Lokut Karunpathar Sar	Inside Forest	1.97	3.03	1.06	PCCF
24	Bandipora	Nabler Sar	Inside Forest	2.55	3.97	1.42	PCCF
25	Bandipora	Mianmarg Sar	Inside Forest	2.65	4.78	2.13	PCCF
26	Bandipora	Unnamed Lake	Inside Forest	3.20	4.44	1.24	PCCF
27	Bandipora	Gagar Sar	Inside Forest	3.48	4.80	1.32	PCCF
28	Bandipora	Sat Sar	Inside Forest	3.55	5.15	1.60	PCCF
29	Bandipora	Karu Sar	Inside Forest	4.02	7.39	3.37	PCCF
30	Bandipora	Suka Sar	Inside Forest	4.29	6.92	2.63	PCCF
31	Bandipora	Sarbal Sar	Inside Forest	25.28	26.55	1.27	PCCF
32	Bandipora	Kaul Sar	Inside Forest	9.88	10.20	0.32	PCCF
33	Bandipora	Gad Sar	Inside Forest	13.47	40.40	26.93	PCCF
34	Bandipora	Salnai Sar	Inside Forest	32.85	34.26	1.41	PCCF
35	Bandipora	Bod Chitti Chamri Sar	Inside Forest	7.50	10.28	2.78	PCCF
36	Bandipora	Nichnai Sar	Inside Forest	12.71	13.18	0.47	PCCF
37	Ganderbal	Salma Sar	Inside Forest	0.53	2.00	1.47	PCCF
38	Ganderbal	Masthokar Sar	Inside Forest	0.60	3.46	2.86	PCCF
39	Ganderbal	Krim Sar	Inside Forest	0.61	2.73	2.12	PCCF
40	Ganderbal	Nichinai Nag	Inside Forest	0.92	1.96	1.04	PCCF
41	Ganderbal	Kan Sar	Inside Forest	1.11	4.65	3.54	PCCF
42	Ganderbal	Sat Sar	Inside Forest	1.64	1.74	0.10	PCCF
43	Ganderbal	Sat Sar	Inside Forest	1.75	3.15	1.40	PCCF
44	Ganderbal	Gumbur Sar	Inside Forest	2.46	2.98	0.52	PCCF
45	Ganderbal	Gangabal Lake	Inside Forest	155.85	162.79	6.94	PCCF
46	Ganderbal	Yamhar Sar	Inside Forest	8.77	12.03	3.26	PCCF
47	Ganderbal	Kaul Sar	Inside Forest	6.78	11.82	5.04	PCCF
48	Ganderbal	Andurn Sar	Inside Forest	10.72	13.34	2.62	PCCF
49	Ganderbal	Lolgul Sar	Inside Forest	13.23	15.31	2.08	PCCF
50	Ganderbal	Kana Sar	Inside Forest	5.72	6.58	0.86	PCCF
51	Ganderbal	Yamhar Sar	Inside Forest	6.39	8.42	2.03	PCCF
52	Kulgam	Pambasar Sar	Inside Forest	0.49	1.21	0.72	PCCF
53	Kulgam	Rupri Gali Sar	Inside Forest	4.77	6.12	1.35	PCCF
54	Kulgam	Konsar Nag	Inside Forest	131.15	133.31	2.16	PCCF
55	Kulgam	Kotori Sar	Inside Forest	11.71	12.16	0.45	PCCF
56	Kulgam	Barani Sar	Inside Forest	11.52	13.02	1.50	PCCF
57	Kulgam	Golia Sar	Inside Forest	20.85	21.48	0.63	PCCF
58	Kulgam	Barani Sar Lakut	Inside Forest	11.18	11.38	0.20	PCCF
59	Kulgam	Bhag Sar	Inside Forest	66.70	70.11	3.41	WLW
60	Kupwara	Kaindogarnag Sar	Inside Forest	0.55	1.23	0.68	PCCF
61	Kupwara	Buna Wadar Sar	Inside Forest	0.77	1.74	0.97	PCCF
62	Kupwara	Nagradnar Sar	Inside Forest	1.00	3.53	2.53	PCCF
63	Kupwara	Yamrad Sar	Inside Forest	1.62	1.85	0.23	PCCF
64	Kupwara	Chornar Sar	Inside Forest	2.61	3.72	1.11	PCCF

Audit Report on Conservation and Management of Lakes in J&K for the period ended March 2022

Sl. No	District	Name of Lake	Inside/ Outside Forest	Topographic image (Topo) 1967	Satellite image (SI) 2020	Difference (5-6)	Controlling Authority
65	Srinagar	Marsar Lake	Inside Forest	39.33	43.71	4.38	WLW
66	Bandipora	Malapura Sar	Outside Forest	1.87	25.97	24.10	DC
67	Bandipora	Rakh-I Malgom	Outside Forest	209.36	211.48	2.12	DC
68	Bandipora	Chanpaz Mahal Nambal	Outside Forest	11.43	14.42	2.99	DC
69	Bandipora	Chak Sudarkut Bala	Outside Forest	10.94	19.01	8.07	DC
70	Bandipora	Wudin Sar	Outside Forest	8.00	8.12	0.12	DC
71	Bandipora	Chirangpura Nambal	Outside Forest	7.32	21.12	13.80	DC
72	Bandipora	Malikpur Sar	Outside Forest	6.77	7.39	0.62	DC
73	Baramulla	Tungban Sar	Outside Forest	0.58	1.12	0.54	DC
74	Baramulla	Kantar Nag Sar	Outside Forest	1.62	2.50	0.88	DC
75	Baramulla	Gathgopal	Outside Forest	130.48	237.90	107.42	DC
76	Baramulla	Bod Nambal/Gad Sar	Outside Forest	57.33	57.49	0.16	DC
77	Baramulla	Mirgund Jhil-II	Outside Forest	47.16	49.88	2.72	WLW
78	Budgam	Narkura Nambal	Outside Forest	349.40	359.35	9.95	DC
79	Kupwara	Lalpura Sar	Outside Forest	0.73	1.19	0.46	DC
80	Kupwara	Mukam Shareif Sar	Outside Forest	0.91	1.09	0.18	DC
81	Kupwara	Sar	Outside Forest	0.92	0.96	0.04	DC
82	Kupwara	Redanag Sar	Outside Forest	1.00	1.68	0.68	DC
83	Kupwara	Chandigam Sar	Outside Forest	1.18	1.29	0.11	DC
84	Kupwara	Pal Nar Sar	Outside Forest	1.34	1.43	0.09	DC
85	Kupwara	Pir Sar	Outside Forest	1.50	2.23	0.73	DC
86	Kupwara	Doruswain Sar	Outside Forest	1.52	1.67	0.15	DC
87	Kupwara	Redanag	Outside Forest	1.59	1.73	0.14	DC
88	Kupwara	Manchher Sar	Outside Forest	1.65	1.83	0.18	DC
89	Kupwara	Bakihakar	Outside Forest	1.67	1.76	0.09	DC
90	Kupwara	Gujar Pattisar	Outside Forest	1.73	3.09	1.36	DC
91	Kupwara	Gund Manchar Sar	Outside Forest	1.75	2.42	0.67	DC
92	Kupwara	Natnus Sar	Outside Forest	1.91	2.95	1.04	DC
93	Kupwara	Sar	Outside Forest	1.96	2.03	0.07	DC
94	Kupwara	Kandi Sar	Outside Forest	2.14	2.46	0.32	DC
95	Kupwara	Bhagatpura Sar	Outside Forest	2.16	2.92	0.76	DC
96	Kupwara	Nuridin Khan Chak Sar	Outside Forest	2.27	3.23	0.96	DC
97	Kupwara	Sogam Sar	Outside Forest	2.62	4.72	2.10	DC
98	Kupwara	Nag Reddi	Outside Forest	2.72	3.72	1.00	DC
99	Kupwara	Sar	Outside Forest	2.87	3.42	0.55	DC
100	Pulwama	Drangbal Nambal	Outside Forest	11.91	15.55	3.64	DC
101	Pulwama	Ech Nambal	Outside Forest	5.86	10.11	4.25	DC
102	Pulwama	Bodsar/Chatlam	Outside Forest	53.11	56.57	3.46	WLW
103	Srinagar	Dal Lake	Outside Forest	2324.75	2460.55	135.80	LC&MA
104	Srinagar	Gilsar	Outside Forest	5.25	7.51	2.26	LC&MA
Total Kashmir (104 Lakes)				4,154.43	4,627.90	473.47	
Total Jammu and Kashmir (46+104=150 Lakes)				4,350.47	4,888.69	538.22	

Sl. No	District	Name of Lake	Inside/ Outside Forest	Topographic image (Topo) 1967	Satellite image (SI) 2020	Difference (5-6)	Controlling Authority
Division-wise details of area of Lakes remaining static						(Area in Hectares)	
Jammu Division							
1	Kishtwar	Kain Nag	Inside Forest	0.68	0.68	0.00	PCCF
2	Poonch	Chinarmarg Sar 1	Outside Forest	0.31	0.31	0.00	DC
3	Samba	Dansal Sar	Outside Forest	0.63	0.63	0.00	DC
Total Jammu (03 Lakes)				1.62	1.62	0.00	
Kashmir Division							
1	Anantnag	Chohar Nag	Inside Forest	10.67	10.67	0.00	PCCF
2	Budgam	Kharmarg Sar	Inside Forest	2.70	2.70	0.00	PCCF
3	Budgam	Sainmarg Sar	Inside Forest	3.60	3.60	0.00	PCCF
4	Budgam	Nil Nag	Inside Forest	7.46	7.46	0.00	PCCF
5	Budgam	Magrusar	Inside Forest	7.01	7.01	0.00	PCCF
6	Budgam	Ainpat Sar	Inside Forest	5.47	5.47	0.00	PCCF
7	Budgam	Ainpat Sar Bod	Inside Forest	10.33	10.33	0.00	PCCF
8	Shopian	Gumsar	Inside Forest	1.96	1.96	0.00	PCCF
9	Bandipora	Wular Lake	Outside Forest	13,325.35	13,325.35	0.00	DC
10	Baramulla	Haigam Jhil	Outside Forest	754.21	754.21	0.00	WLW
11	Budgam	Gurwan Sar Lokut	Outside Forest	1.53	1.53	0.00	DC
12	Budgam	Wogur Sar	Outside Forest	1.85	1.85	0.00	DC
13	Budgam	Chinamarg Sar	Outside Forest	2.17	2.17	0.00	DC
14	Budgam	Gurwan Sar	Outside Forest	2.56	2.56	0.00	DC
15	Budgam	Shiv Nag	Outside Forest	3.33	3.33	0.00	DC
16	Budgam	Gurwan Sar Bod	Outside Forest	4.66	4.66	0.00	DC
17	Budgam	Lokut Sar	Outside Forest	4.98	4.98	0.00	DC
18	Budgam	Bodh Sar	Outside Forest	43.87	43.87	0.00	DC
19	Budgam	Pam Sar	Outside Forest	23.95	23.95	0.00	DC
20	Budgam	Daman Sar	Outside Forest	14.32	14.32	0.00	DC
21	Budgam	Navkan Sar	Outside Forest	13.79	13.79	0.00	DC
22	Budgam	Pathri Sar	Outside Forest	11.00	11.00	0.00	DC
23	Budgam	Navkan Sar Lakut	Outside Forest	8.85	8.85	0.00	DC
24	Budgam	Khara Sar	Outside Forest	8.12	8.12	0.00	DC
25	Ganderbal	Manasbal Lake	Outside Forest	260.00	260.00	0.00	DC
26	Shopian	Thal Sar	Outside Forest	0.40	0.40	0.00	DC
Total Kashmir (26 Lakes)				14,534.14	14,534.14	0.00	
Total Jammu and Kashmir (03+26=29 Lakes)				14,535.76	14,535.76	0.00	

Province	Total Division – wise of J&K	Disappeared Lakes		Decrease in area of Lakes			Increase in area of Lakes			No change in area of Lakes			
		No. of Lakes	Total Area	No. of Lakes	Area in 1967	Area in 2014 / 2020	Total	No. of Lakes	Area in 1967	Area in 2014 / 2020	Total	No. of Lakes	Area in 1967
Jammu	367	259	297.05	59	190.05	121.29	68.76	46	196.04	260.79	64.75	3	1.62
Kashmir	330	56	1,240.02	144	8,376.50	7,131.07	1,245.43	104	4,154.43	4,627.9	473.47	26	14,534.14
Total	697	315	1,537.07	203	8,566.55	7,252.36	1,314.19	150	4,350.47	4,888.69	538.22	29	14,535.76

Appendix-2.2

(Reference: Paragraphs No. 2.2.1 and 2.5)

Department/ Jurisdiction/ Lake-wise details of change in area of Lakes

Sl. No.	District	Name of Lake	Inside/Outside Forest	Topo 1967	SI 2020	Difference (5-6)	Department
Details of Decreased area of Lakes falling under Jurisdiction of PCCF						(Area In Hectares)	
1	Jammu	Chata Sar	Inside Forest	0.52	0.40	0.12	PCCF
2	Jammu	Mawa Sar	Inside Forest	0.42	0.35	0.07	PCCF
3	Kishtwar	Gagar Nai Sar	Inside Forest	1.66	0.55	1.11	PCCF
4	Kishtwar	Handi Mandu Sar	Inside Forest	0.84	0.25	0.59	PCCF
5	Kishtwar	Hok Sar	Inside Forest	2.58	2.27	0.31	PCCF
6	Kishtwar	Kon Nag	Inside Forest	2.41	1.28	1.13	PCCF
7	Kishtwar	Kras Sar	Inside Forest	2.29	0.59	1.70	PCCF
8	Kishtwar	Malgarhu Sar 2	Inside Forest	1.55	0.64	0.91	PCCF
9	Kishtwar	Naginpathar Sar	Inside Forest	2.93	0.76	2.17	PCCF
10	Kishtwar	Naikhoi Nag	Inside Forest	7.52	2.28	5.24	PCCF
11	Kishtwar	Nilgur Sar Lokut	Inside Forest	3.71	0.26	3.45	PCCF
12	Kishtwar	Purmandal Sar	Inside Forest	3.25	2.47	0.78	PCCF
13	Kishtwar	Saras Nag	Inside Forest	7.24	5.44	1.80	PCCF
14	Kishtwar	Shil Sar	Inside Forest	3.22	2.63	0.59	PCCF
15	Kishtwar	Shil Sar Lokut	Inside Forest	2.24	1.31	0.93	PCCF
16	Kishtwar	Tulmula Sar	Inside Forest	6.95	6.74	0.21	PCCF
17	Poonch	Barhal Sar	Inside Forest	2.68	2.21	0.47	PCCF
18	Poonch	Bhag Sar	Inside Forest	7.66	7.45	0.21	PCCF
19	Poonch	Bod Gum Sar	Inside Forest	4.00	1.00	3.00	PCCF
20	Poonch	Chambar Sar	Inside Forest	12.53	11.39	1.14	PCCF
21	Poonch	Chhe Sar 1	Inside Forest	3.53	0.73	2.80	PCCF
22	Poonch	Chhe Sar 2	Inside Forest	2.93	1.68	1.25	PCCF
23	Poonch	Ding Sar 1	Inside Forest	2.14	0.84	1.30	PCCF
24	Poonch	Mahra Sar	Inside Forest	0.88	0.67	0.21	PCCF
25	Poonch	Neel Sar 1	Inside Forest	4.00	2.47	1.53	PCCF
26	Poonch	Sannan Sar	Inside Forest	27.51	22.06	5.45	PCCF
27	Rajouri	Panch Gabbar Sar	Inside Forest	6.77	3.46	3.31	PCCF
28	Reasi	Gaga Sar	Inside Forest	4.70	2.37	2.33	PCCF
29	Reasi	Jurya Sar	Inside Forest	2.09	0.09	2.00	PCCF
30	Reasi	Jurya Sar	Inside Forest	2.27	0.76	1.51	PCCF
31	Udhampur	Gharser	Inside Forest	0.87	0.46	0.41	PCCF
32	Anantnag	Chhumanai Gali Sar	Inside Forest	3.39	3.03	0.36	PCCF
33	Anantnag	Chohar Nag Lokut	Inside Forest	4.59	3.55	1.04	PCCF
34	Anantnag	Dandabari Sar	Inside Forest	1.45	0.88	0.57	PCCF
35	Anantnag	Dod Chhiran Nag 1	Inside Forest	6.31	5.56	0.75	PCCF
36	Anantnag	Dod Chhiran Nag 2	Inside Forest	2.50	0.76	1.74	PCCF
37	Anantnag	Drinyan Sar	Inside Forest	1.20	1.14	0.06	PCCF
38	Anantnag	Girsar Nag	Inside Forest	1.47	0.36	1.11	PCCF
39	Anantnag	Gonhar Sar	Inside Forest	1.58	1.32	0.26	PCCF
40	Anantnag	Gurmisar	Inside Forest	1.46	0.79	0.67	PCCF
41	Anantnag	Kon Nag 1	Inside Forest	10.04	8.63	1.41	PCCF
42	Anantnag	Kon Nag Gali	Inside Forest	8.96	5.05	3.91	PCCF
43	Anantnag	Lakut Nag	Inside Forest	1.00	0.79	0.21	PCCF
44	Anantnag	Mawar Nag	Inside Forest	12.87	5.52	7.35	PCCF
45	Anantnag	Mawar Nag Lakut	Inside Forest	4.68	3.40	1.28	PCCF
46	Anantnag	Nagputan Sar 1	Inside Forest	3.75	3.07	0.68	PCCF
47	Anantnag	Nagputan Sar 2	Inside Forest	3.54	1.51	2.03	PCCF
48	Anantnag	Ruyil Sar	Inside Forest	0.59	0.29	0.30	PCCF
49	Anantnag	Sekiwas Sar	Inside Forest	0.47	0.25	0.22	PCCF
50	Anantnag	Shesh Nag	Inside Forest	64.05	53.72	10.33	PCCF
51	Anantnag	Sona Sar 1	Inside Forest	17.80	16.87	0.93	PCCF
52	Anantnag	Sorus Nag	Inside Forest	21.37	15.68	5.69	PCCF
53	Anantnag	Tuliyar Sar	Inside Forest	9.11	5.01	4.10	PCCF
54	Anantnag	Vimun sar	Inside Forest	1.19	0.79	0.40	PCCF

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Sl. No.	District	Name of Lake	Inside/Outside Forest	Topo 1967	SI 2020	Difference (5-6)	Department
55	Anantnag	Zissar Nag 1	Inside Forest	5.91	2.04	3.87	PCCF
56	Anantnag	Zissar Nag 2	Inside Forest	4.22	2.24	1.98	PCCF
57	Bandipora	Bod Hiram Pathri Sar	Inside Forest	7.45	0.66	6.79	PCCF
58	Bandipora	Bod Patalwan Sar	Inside Forest	37.49	31.90	5.59	PCCF
59	Bandipora	Ghulam Sar	Inside Forest	3.06	2.24	0.82	PCCF
60	Bandipora	Handmagar Sar	Inside Forest	3.41	3.01	0.40	PCCF
61	Bandipora	Hiram Pathri Sar	Inside Forest	4.35	3.01	1.34	PCCF
62	Bandipora	Krishan Sar	Inside Forest	34.87	6.44	28.43	PCCF
63	Bandipora	Logul Sar	Inside Forest	1.39	1.12	0.27	PCCF
64	Bandipora	Lokut Baib Nar Sar	Inside Forest	1.14	0.61	0.53	PCCF
65	Bandipora	Lokut Chiwiti Chhamri Sar	Inside Forest	7.71	7.38	0.33	PCCF
66	Bandipora	Madmatti Sar	Inside Forest	43.61	36.86	6.75	PCCF
67	Bandipora	Nilnai Sar	Inside Forest	1.54	0.97	0.57	PCCF
68	Bandipora	Patalwan Sar	Inside Forest	32.65	31.37	1.28	PCCF
69	Bandipora	Raman Chhish Sar	Inside Forest	2.78	1.67	1.11	PCCF
70	Bandipora	Shira Sar	Inside Forest	2.50	2.21	0.29	PCCF
71	Bandipora	Vishan Sar	Inside Forest	53.19	47.62	5.57	PCCF
72	Bandipora	Watal Sar	Inside Forest	9.28	0.24	9.04	PCCF
73	Bandipora	Zad Sar	Inside Forest	10.31	3.68	6.63	PCCF
74	Ganderbal	Baribal Sar	Inside Forest	3.90	1.38	2.52	PCCF
75	Ganderbal	Doth Sar	Inside Forest	1.45	1.02	0.43	PCCF
76	Ganderbal	Hoka Sar	Inside Forest	4.21	1.38	2.83	PCCF
77	Ganderbal	Hoka Sar	Inside Forest	3.65	2.32	1.33	PCCF
78	Ganderbal	Nundkol	Inside Forest	38.99	36.63	2.36	PCCF
79	Ganderbal	Prain Gang Sar	Inside Forest	7.11	4.81	2.30	PCCF
80	Ganderbal	Sat Sar	Inside Forest	2.58	2.08	0.50	PCCF
81	Ganderbal	Sona Sar	Inside Forest	3.08	1.08	2.00	PCCF
82	Kulgam	Bram Sar	Inside Forest	16.48	15.27	1.21	PCCF
83	Kulgam	Chandan Sar Lakut	Inside Forest	7.06	4.19	2.87	PCCF
84	Kulgam	Chir Sar	Inside Forest	22.04	6.90	15.14	PCCF
85	Kulgam	Dhaklar Sar	Inside Forest	32.90	30.76	2.14	PCCF
86	Kulgam	Hing Sar	Inside Forest	2.57	0.52	2.05	PCCF
87	Kulgam	Indar Sar	Inside Forest	6.01	4.44	1.57	PCCF
88	Kulgam	Makru Sar	Inside Forest	1.94	1.13	0.81	PCCF
89	Kulgam	Nandan Sar	Inside Forest	26.48	25.66	0.82	PCCF
90	Kulgam	Pambasar Sar	Inside Forest	0.43	0.28	0.15	PCCF
91	Kulgam	Ruprigali Sar	Inside Forest	13.55	11.14	2.41	PCCF
92	Kulgam	Unnamed	Inside Forest	0.57	0.14	0.43	PCCF
93	Kulgam	Unnamed	Inside Forest	1.99	1.57	0.42	PCCF
94	Kupwara	Boban Sar	Inside Forest	0.82	0.81	0.01	PCCF
95	Kupwara	Gang Sar	Inside Forest	0.45	0.28	0.17	PCCF
96	Kupwara	Unnamed	Inside Forest	2.36	0.58	1.78	PCCF
97	Pulwama	Pambach Khod	Inside Forest	1.75	0.87	0.88	PCCF
98	Pulwama	Pambagai Lake	Inside Forest	1.42	0.36	1.06	PCCF
Total Decreased Lakes of PCCF (98 Lakes)				787.91	564.70	223.20	
Details of Decreased area of Lake falling under Jurisdiction of District Administration						(Area In Hectares)	
1	Doda	Kaplas Sar 1	Outside Forest	8.85	5.33	3.52	DC
2	Doda	Kaplas Sar 4	Outside Forest	1.68	0.58	1.10	DC
3	Jammu	Balowan Sar	Outside Forest	0.64	0.36	0.28	DC
4	Jammu	Barnai Sar	Outside Forest	0.66	0.54	0.12	DC
5	Jammu	Gahi Sar	Outside Forest	0.52	0.37	0.15	DC
6	Jammu	Ghandarwan Sar 1	Outside Forest	0.64	0.53	0.11	DC
7	Jammu	Kalith Sar	Outside Forest	1.79	1.24	0.55	DC
8	Jammu	Kot Sar 2	Outside Forest	0.50	0.41	0.09	DC
9	Jammu	Targoh Sar	Outside Forest	1.04	0.75	0.29	DC
10	Jammu	Tawa Sar	Outside Forest	0.87	0.34	0.53	DC
11	Jammu	Thinda Sar	Outside Forest	0.76	0.29	0.47	DC
12	Kathua	Siyagot Sar 1	Outside Forest	0.82	0.08	0.74	DC
13	Kathua	Siyagot Sar 2	Outside Forest	0.91	0.36	0.55	DC
14	Kishtwar	Kali Nag	Outside Forest	15.12	9.88	5.24	DC
15	Poonch	Jamianwali Sar 1	Outside Forest	0.51	0.24	0.27	DC
16	Poonch	Jara Sar 1	Outside Forest	1.32	0.83	0.49	DC

Sl. No.	District	Name of Lake	Inside/Outside Forest	Topo 1967	SI 2020	Difference (5-6)	Department
17	Poonch	Jara Sar 2	Outside Forest	1.35	0.54	0.81	DC
18	Ramban	Jabor Sar Bod	Outside Forest	1.95	1.51	0.44	DC
19	Samba	Amwal Sar	Outside Forest	0.87	0.40	0.47	DC
20	Samba	Bari Khad Sar	Outside Forest	0.69	0.67	0.02	DC
21	Samba	Dughor Sar	Outside Forest	1.26	0.75	0.51	DC
22	Samba	Guru Salathian Sar	Outside Forest	1.52	0.35	1.17	DC
23	Samba	Mawa Sar	Outside Forest	1.40	0.86	0.54	DC
24	Samba	Rahiya Sar	Outside Forest	0.83	0.81	0.02	DC
25	Samba	Ranjri Sar	Outside Forest	1.20	0.91	0.29	DC
26	Udhampur	Kotla Sar	Outside Forest	0.73	0.20	0.53	DC
27	Bandipora	Baibnar Sar	Outside Forest	4.46	1.88	2.58	DC
28	Bandipora	Chandargar Nambal	Outside Forest	21.21	10.68	10.53	DC
29	Bandipora	Gosia Sar	Outside Forest	0.46	0.18	0.28	DC
30	Bandipora	Gund-I-Khalil Sar(Tsore Teng)	Outside Forest	21.68	3.24	18.44	DC
31	Bandipora	Khanpeth Nambal	Outside Forest	1.45	1.34	0.11	DC
32	Bandipora	Khomina Nambal	Outside Forest	67.85	29.85	38.00	DC
33	Bandipora	Khurwan Sar	Outside Forest	10.76	9.43	1.33	DC
34	Bandipora	Mukhdamyari Nambal	Outside Forest	41.64	24.93	16.71	DC
35	Bandipora	Naidkhai Nambal	Outside Forest	40.67	38.89	1.78	DC
36	Bandipora	Naz Nambal	Outside Forest	11.73	8.69	3.04	DC
37	Bandipora	Poshwari Nambal	Outside Forest	9.14	3.20	5.94	DC
38	Bandipora	Rakh Hajan	Outside Forest	26.04	8.25	17.79	DC
39	Bandipora	Rakhi Dusilpor	Outside Forest	6.81	1.47	5.34	DC
40	Bandipora	Sadunara Hastikhan Nambal	Outside Forest	51.98	36.31	15.67	DC
41	Bandipora	Sarikhan Nambal	Outside Forest	23.41	5.03	18.38	DC
42	Bandipora	Shiekh Sar	Outside Forest	8.32	6.07	2.25	DC
43	Bandipora	Sudarkut Nambal	Outside Forest	172.73	143.81	28.92	DC
44	Bandipora	Tundpura Nambal	Outside Forest	23.54	16.91	6.63	DC
45	Bandipora	Zinipura Nambal	Outside Forest	57.25	40.43	16.82	DC
46	Baramulla	Buna Naugam Nambal	Outside Forest	248.44	200.37	48.07	DC
47	Baramulla	Ferozpur Nambal	Outside Forest	43.57	26.85	16.72	DC
48	Baramulla	Frozen Lake	Outside Forest	3.25	1.03	2.22	DC
49	Baramulla	Kanispora Nambal	Outside Forest	30.46	14.24	16.22	DC
50	Baramulla	Konsar Nar	Outside Forest	1.74	0.15	1.59	DC
51	Baramulla	Panznor Nambal	Outside Forest	25.60	7.86	17.74	DC
52	Ganderbal	Ahan Sar	Outside Forest	27.71	14.18	13.53	DC
53	Ganderbal	Ancher-II	Outside Forest	3.68	1.37	2.31	DC
54	Ganderbal	Gundmumin Nambal	Outside Forest	5.54	0.20	5.34	DC
55	Ganderbal	Hakimgund Nambal	Outside Forest	68.65	27.89	40.76	DC
56	Ganderbal	Khanpur Sar	Outside Forest	39.36	11.89	27.47	DC
57	Ganderbal	Rakh-i-Kujar	Outside Forest	449.73	382.74	66.99	DC
58	Ganderbal	Rakh-i-Rabitar	Outside Forest	698.45	406.03	292.42	DC
59	Ganderbal	Salhar Nag	Outside Forest	12.49	12.30	0.19	DC
60	Ganderbal	Waskur Sar	Outside Forest	72.66	22.18	50.48	DC
61	Kupwara	Awatkul Sar	Outside Forest	2.10	0.14	1.96	DC
62	Kupwara	Badrahar Sar	Outside Forest	3.07	2.99	0.08	DC
63	Kupwara	Bod Sar	Outside Forest	5.54	4.66	0.88	DC
64	Kupwara	Buta Sar	Outside Forest	4.03	3.67	0.36	DC
65	Kupwara	Chak Natnus Sar	Outside Forest	1.50	0.90	0.60	DC
66	Kupwara	Charlie Sar	Outside Forest	2.61	1.72	0.89	DC
67	Kupwara	Dadiwar Sar	Outside Forest	1.27	0.94	0.33	DC
68	Kupwara	Kan Sar	Outside Forest	19.98	14.99	4.99	DC
69	Kupwara	Khaipur Sar	Outside Forest	1.96	0.79	1.17	DC
70	Kupwara	Lasipur Sar	Outside Forest	3.06	3.01	0.05	DC
71	Kupwara	Lokut Sar	Outside Forest	1.50	1.42	0.08	DC
72	Kupwara	Maidanpura Sar	Outside Forest	0.92	0.56	0.36	DC
73	Kupwara	Muqam Sar	Outside Forest	2.04	1.61	0.43	DC
74	Kupwara	Nagradnar Sar	Outside Forest	1.91	1.58	0.33	DC
75	Kupwara	Narain Sar	Outside Forest	6.20	5.41	0.79	DC
76	Kupwara	Natnusa Sar	Outside Forest	7.17	6.00	1.17	DC
77	Kupwara	Rakh Shehtal	Outside Forest	2.78	2.48	0.30	DC
78	Kupwara	Rupi Sar	Outside Forest	3.35	3.16	0.19	DC

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Sl. No.	District	Name of Lake	Inside/Outside Forest	Topo 1967	SI 2020	Difference (5-6)	Department
79	Kupwara	Thundus Sar	Outside Forest	1.70	1.23	0.47	DC
80	Pulwama	Chhatalan Sar	Outside Forest	3.14	0.14	3.00	DC
81	Pulwama	Galandar Sar	Outside Forest	47.75	29.94	17.81	DC
82	Pulwama	Malangpur Nambal	Outside Forest	131.20	124.68	6.52	DC
83	Srinagar	Babademb	Outside Forest	33.40	31.00	2.40	DC
Total Decreased Lakes of DC (83 Lakes)				2,669.07	1,792.02	877.05	
Details of Decreased Lake falling under Jurisdiction of Wildlife Warden						(Area In Hectares)	
1	Anantnag	Chanda Sar	Inside Forest	12.34	10.76	1.58	WLW
2	Anantnag	Chhumanai Sar 2	Inside Forest	6.05	3.00	3.05	WLW
3	Anantnag	Doda Sar	Inside Forest	7.58	5.38	2.20	WLW
4	Anantnag	Gandpathar Sar	Inside Forest	5.03	1.24	3.79	WLW
5	Anantnag	Munwar Sar	Inside Forest	9.11	8.25	0.86	WLW
6	Anantnag	Sona Sar Lakut / Sar	Inside Forest	0.86	0.52	0.34	WLW
7	Anantnag	Sona Sar 2	Inside Forest	19.31	18.51	0.80	WLW
8	Anantnag	Lakut Sar	Inside Forest	0.38	0.28	0.10	WLW
9	Anantnag	Budru Nag	Inside Forest	1.45	0.66	0.79	WLW
10	Anantnag	Hapat Sar	Inside Forest	0.65	0.47	0.18	WLW
11	Anantnag	Watis Sar	Inside Forest	2.54	1.64	0.90	WLW
12	Bandipora	Kisar Sar	Inside Forest	6.59	5.91	0.68	WLW
13	Baramulla	Mirgund Jhil-I	Outside Forest	272.06	254.36	17.70	WLW
14	Budgam	Hokar Sar	Outside Forest	1813.08	1810.07	3.01	WLW
15	Ganderbal	Shalabugh Nambal	Inside Forest	1585.82	1474.63	111.19	WLW
16	Kulgam	Chandan Sar	Inside Forest	16.94	15.38	1.56	WLW
17	Kulgam	Laksukh Sar	Inside Forest	31.42	30.27	1.15	WLW
18	Jammu	Garh Sar	Outside Forest	0.95	0.35	0.60	WLW
19	Jammu	Ghirana Wetland	Outside Forest	6.78	5.95	0.83	WLW
20	Pulwama	Phashakuri Sar	Outside Forest	11.57	6.10	5.47	WLW
Total Decreased Lakes of WLW (20 Lakes)				3,810.51	3,653.73	156.78	
Details of Decreased Lake falling under Jurisdiction of Lake Conservation & Management Authority						(Area In Hectares)	
1	Srinagar	Anchar Lake	Outside Forest	1208.55	1157.88	50.67	LC&MA
2	Srinagar	Khushalsar	Outside Forest	90.52	84.03	6.49	LC&MA
Total Decreased Lakes of LC&MA (2 Lakes)				1,299.07	1,241.91	57.16	
Total Decreased (98+83+20+2=203 Lakes)				8,566.56	7,252.36	1,314.20	

Statement showing details of Lakes where in decrease in Lake area was equal to or more than 50 per cent to total area

Sl. No.	District	Name of Lake	Inside/ Outside Forest	Topo 1967	SI 2020	Difference	Department	Decrease in Lake area equal to or more than 50 per cent
Statement showing details of Lakes where decrease in Lake area was equal to or more than 50 per cent to total area								
1	Kishtwar	Gagar Nai Sar	Inside Forest	1.66	0.55	1.11	PCCF	67
2	Kishtwar	Handi Mandu Sar	Inside Forest	0.84	0.25	0.59	PCCF	70
3	Kishtwar	Kras Sar	Inside Forest	2.29	0.59	1.70	PCCF	74
4	Kishtwar	Malgarhu Sar 2	Inside Forest	1.55	0.64	0.91	PCCF	59
5	Kishtwar	Naginpathar Sar	Inside Forest	2.93	0.76	2.17	PCCF	74
6	Kishtwar	Naikhoi Nag	Inside Forest	7.52	2.28	5.24	PCCF	70
7	Kishtwar	Nilgur Sar Lokut	Inside Forest	3.71	0.26	3.45	PCCF	93
8	Poonch	Bod Gum Sar	Inside Forest	4.00	1.00	3.00	PCCF	75
9	Poonch	Chhe Sar 1	Inside Forest	3.53	0.73	2.80	PCCF	79
10	Poonch	Ding Sar 1	Inside Forest	2.14	0.84	1.30	PCCF	61
11	Reasi	Gaga Sar	Inside Forest	4.70	2.37	2.33	PCCF	50
12	Reasi	Jurya Sar	Inside Forest	2.09	0.09	2.00	PCCF	96
13	Reasi	Jurya Sar	Inside Forest	2.27	0.76	1.51	PCCF	67
14	Anantnag	Dod Chhiran Nag 2	Inside Forest	2.50	0.76	1.74	PCCF	70
15	Anantnag	Girsar Nag	Inside Forest	1.47	0.36	1.11	PCCF	76
16	Anantnag	Mawar Nag	Inside Forest	12.87	5.52	7.35	PCCF	57
17	Anantnag	Nagputan Sar 2	Inside Forest	3.54	1.51	2.03	PCCF	57
18	Anantnag	Ruyil Sar	Inside Forest	0.59	0.29	0.30	PCCF	51
19	Anantnag	Zissar Nag 1	Inside Forest	5.91	2.04	3.87	PCCF	65
20	Bandipora	Bod Hiram Pathri Sar	Inside Forest	7.45	0.66	6.79	PCCF	91
21	Bandipora	Krishan Sar	Inside Forest	34.87	6.44	28.43	PCCF	82
22	Bandipora	Watal Sar	Inside Forest	9.28	0.24	9.04	PCCF	97
23	Bandipora	Zad Sar	Inside Forest	10.31	3.68	6.63	PCCF	64
24	Ganderbal	Baribal Sar	Inside Forest	3.90	1.38	2.52	PCCF	65
25	Ganderbal	Hoka Sar	Inside Forest	4.21	1.38	2.83	PCCF	67
26	Ganderbal	Sona Sar	Inside Forest	3.08	1.08	2.00	PCCF	65
27	Kulgam	Chir Sar	Inside Forest	22.04	6.90	15.14	PCCF	69
28	Kulgam	Hing Sar	Inside Forest	2.57	0.52	2.05	PCCF	80
29	Kulgam	Unnamed	Inside Forest	0.57	0.14	0.43	PCCF	75
30	Kupwara	Unnamed	Inside Forest	2.36	0.58	1.78	PCCF	75
31	Pulwama	Pambach Khod	Inside Forest	1.75	0.87	0.88	PCCF	50
32	Pulwama	Pambagai Lake	Inside Forest	1.42	0.36	1.06	PCCF	75
Total Decreased Lakes of PCCF (32 Lakes)				169.92	45.83	124.09		
Details of Decreased Lake falling under Jurisdiction of District Administration						(Area In Hectares)		
1	Doda	Kaplas Sar 4	Outside Forest	1.68	0.58	1.10	DC	65
2	Jammu	Tawa Sar	Outside Forest	0.87	0.34	0.53	DC	61
3	Jammu	Thinda Sar	Outside Forest	0.76	0.29	0.47	DC	62
4	Kathua	Siyagot Sar 1	Outside Forest	0.82	0.08	0.74	DC	90
5	Kathua	Siyagot Sar 2	Outside Forest	0.91	0.36	0.55	DC	60
6	Poonch	Jamianwali Sar 1	Outside Forest	0.51	0.24	0.27	DC	53
7	Poonch	Jara Sar 2	Outside Forest	1.35	0.54	0.81	DC	60
8	Samba	Amwal Sar	Outside Forest	0.87	0.40	0.47	DC	54
9	Samba	Guru Salathian Sar	Outside Forest	1.52	0.35	1.17	DC	77
10	Udhampur	Kotla Sar	Outside Forest	0.73	0.20	0.53	DC	73
11	Bandipora	Baibnar Sar	Outside Forest	4.46	1.88	2.58	DC	58
12	Bandipora	Chandargar Nambal	Outside Forest	21.21	10.68	10.53	DC	50
13	Bandipora	Gosia Sar	Outside Forest	0.46	0.18	0.28	DC	61
14	Bandipora	Gund-I-Khalil Sar (Tsore Teng)	Outside Forest	21.68	3.24	18.44	DC	85
15	Bandipora	Khomina Nambal	Outside Forest	67.85	29.85	38.00	DC	56
16	Bandipora	Poshwari Nambal	Outside Forest	9.14	3.20	5.94	DC	65
17	Bandipora	Rakh Hajan	Outside Forest	26.04	8.25	17.79	DC	68
18	Bandipora	Rakhi Dusilpor	Outside Forest	6.81	1.47	5.34	DC	78
19	Bandipora	Sarikhan Nambal	Outside Forest	23.41	5.03	18.38	DC	79
20	Baramulla	Frozen Lake	Outside Forest	3.25	1.03	2.22	DC	68

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Sl. No.	District	Name of Lake	Inside/ Outside Forest	Topo 1967	SI 2020	Difference	Department	Decrease in Lake area equal to or more than 50 per cent
21	Baramulla	Kanispora Nambal	Outside Forest	30.46	14.24	16.22	DC	53
22	Baramulla	Konsar Nar	Outside Forest	1.74	0.15	1.59	DC	91
23	Baramulla	Panznor Nambal	Outside Forest	25.60	7.86	17.74	DC	69
24	Ganderbal	Ancher-II	Outside Forest	3.68	1.37	2.31	DC	63
25	Ganderbal	Gundmumin Nambal	Outside Forest	5.54	0.20	5.34	DC	96
26	Ganderbal	Hakingund Nambal	Outside Forest	68.65	27.89	40.76	DC	59
27	Ganderbal	Khanpur Sar	Outside Forest	39.36	11.89	27.47	DC	70
28	Ganderbal	Waskur Sar	Outside Forest	72.66	22.18	50.48	DC	69
29	Kupwara	Awatkul Sar	Outside Forest	2.10	0.14	1.96	DC	93
30	Kupwara	Khaipur Sar	Outside Forest	1.96	0.79	1.17	DC	60
31	Pulwama	Chhatalan Sar	Outside Forest	3.14	0.14	3.00	DC	96
Total Decreased Lakes of DC (31 Lakes)				449.22	155.04	294.18		

Details of Disappeared Lake jurisdiction-wise

Sl. No.	District	Name of Lake	Inside/Outside Forest	Topo 1967	SI 2020	Difference (5-6)	Department
1	2	3	4	5	6	7	8
Details of Disappeared Lake falling under Jurisdiction of PCCF						(Area In Hectares)	
1	Kathua	Panjuth	Inside Forest	0.66	0	0.66	PCCF
2	Kathua	Gura	Inside Forest	0.31	0	0.31	PCCF
3	Kathua	Lohar Mela	Inside Forest	0.33	0	0.33	PCCF
4	Kishtwar	Tumula Sar	Inside Forest	2.71	0	2.71	PCCF
5	Kishtwar	Kannar Sar Bod	Inside Forest	0.78	0	0.78	PCCF
6	Kishtwar	Kannar Sar Lokut	Inside Forest	0.83	0	0.83	PCCF
7	Kishtwar	Muzim Sar	Inside Forest	2.19	0	2.19	PCCF
8	Kishtwar	Moshkhilsar Bod	Inside Forest	0.43	0	0.43	PCCF
9	Kishtwar	Moshkhilsar Lokut	Inside Forest	0.54	0	0.54	PCCF
10	Kishtwar	Kral Sar	Inside Forest	0.59	0	0.59	PCCF
11	Kishtwar	Sarital Sar	Inside Forest	2.43	0	2.43	PCCF
12	Kishtwar	Watal Sar	Inside Forest	1.02	0	1.02	PCCF
13	Kishtwar	Lu Sar	Inside Forest	2.44	0	2.44	PCCF
14	Kishtwar	Shupkanjan Sar	Inside Forest	2.59	0	2.59	PCCF
15	Kishtwar	Sunsar Sar	Inside Forest	5.09	0	5.09	PCCF
16	Kishtwar	Natismandu Sar	Inside Forest	1.65	0	1.65	PCCF
17	Kishtwar	Selo Nag	Inside Forest	2.01	0	2.01	PCCF
18	Kishtwar	Konala Nag	Inside Forest	1.53	0	1.53	PCCF
19	Kishtwar	Jammu Gat	Inside Forest	2.07	0	2.07	PCCF
20	Kishtwar	Patar Nag	Inside Forest	1.92	0	1.92	PCCF
21	Kishtwar	Unnamed Sar	Inside Forest	5.37	0	5.37	PCCF
22	Kishtwar	Mandik Sar	Inside Forest	90.96	0	90.96	PCCF
23	Kishtwar	Unnamed Sar	Inside Forest	8.21	0	8.21	PCCF
24	Poonch	Chandimarg Sar 1	Inside Forest	0.2	0	0.2	PCCF
25	Poonch	Chandimarg Sar 2	Inside Forest	0.33	0	0.33	PCCF
26	Poonch	Chandimarg Sar 3	Inside Forest	0.15	0	0.15	PCCF
27	Poonch	Chandimarg Sar 4	Inside Forest	0.18	0	0.18	PCCF
28	Poonch	Dugrian Sar 1	Inside Forest	0.3	0	0.3	PCCF
29	Poonch	Dugrian Sar 2	Inside Forest	0.81	0	0.81	PCCF
30	Poonch	Dugrian Sar 3	Inside Forest	0.6	0	0.6	PCCF
31	Poonch	Gum Sar Lokut	Inside Forest	0.76	0	0.76	PCCF
32	Poonch	Delewali Dhanni Sar	Inside Forest	1.66	0	1.66	PCCF
33	Poonch	Ding Sar 2	Inside Forest	0.48	0	0.48	PCCF
34	Poonch	Neel Sar 2	Inside Forest	1.09	0	1.09	PCCF
35	Poonch	Chamber Sar 1	Inside Forest	0.31	0	0.31	PCCF
36	Poonch	Chamber Sar 2	Inside Forest	0.14	0	0.14	PCCF
37	Poonch	Janjanwali Sar	Inside Forest	4.7	0	4.7	PCCF
38	Poonch	Marguri Sar 2	Inside Forest	0.9	0	0.9	PCCF
39	Poonch	Marguri Sar 3	Inside Forest	0.61	0	0.61	PCCF
40	Poonch	Rupri Sar	Inside Forest	0.84	0	0.84	PCCF
41	Rajouri	Thand Sar	Inside Forest	1.15	0	1.15	PCCF
42	Rajouri	Marguri Sar	Inside Forest	0.98	0	0.98	PCCF
43	Ramban	Sarkanth Gali Sar 1	Inside Forest	0.52	0	0.52	PCCF
44	Ramban	Sarkanth Gali Sar 2	Inside Forest	0.29	0	0.29	PCCF
45	Ramban	Rahun Sar	Inside Forest	0.66	0	0.66	PCCF
46	Ramban	Pathar Sar	Inside Forest	0.64	0	0.64	PCCF
47	Ramban	Yemul Talao	Inside Forest	0.34	0	0.34	PCCF
48	Reasi	High Alt. Lake	Inside Forest	1.05	0	1.05	PCCF
49	Samba	Sanur Talao	Inside Forest	0.94	0	0.94	PCCF
50	Samba	Patliwladabri Talao	Inside Forest	0.57	0	0.57	PCCF
51	Samba	Soram Talao	Inside Forest	0.26	0	0.26	PCCF
52	Samba	Leani Andari Talao	Inside Forest	0.5	0	0.5	PCCF
53	Samba	Dewan Sar	Inside Forest	1.4	0	1.4	PCCF
54	Samba	Muran Talao	Inside Forest	0.47	0	0.47	PCCF
55	Anantnag	Kon Nag	Inside Forest	2.07	0	2.07	PCCF
56	Anantnag	Nagputan Sar 3	Inside Forest	4.72	0	4.72	PCCF
57	Bandipora	Unnamed Lake	Inside Forest	2.18	0	2.18	PCCF

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Sl. No.	District	Name of Lake	Inside/Outside Forest	Topo 1967	SI 2020	Difference (5-6)	Department
58	Bandipora	Unnamed Lake	Inside Forest	0.82	0	0.82	PCCF
59	Bandipora	Unnamed Lake	Inside Forest	2.65	0	2.65	PCCF
60	Bandipora	Unnamed Lake	Inside Forest	2.65	0	2.65	PCCF
61	Bandipora	Chhamar Sar	Inside Forest	7.97	0	7.97	PCCF
62	Bandipora	Unnamed Lake	Inside Forest	0.91	0	0.91	PCCF
63	Bandipora	Unnamed Lake	Inside Forest	2.79	0	2.79	PCCF
64	Bandipora	Unnamed Lake	Inside Forest	2.86	0	2.86	PCCF
65	Bandipora	Unnamed Lake	Inside Forest	9.28	0	9.28	PCCF
66	Ganderbal	Kaul Sar	Inside Forest	1.05	0	1.05	PCCF
67	Ganderbal	Zajibal Sar	Inside Forest	1.02	0	1.02	PCCF
68	Ganderbal	Prain Gang Sar	Inside Forest	1.73	0	1.73	PCCF
69	Ganderbal	Prain Gang Sar	Inside Forest	0.41	0	0.41	PCCF
70	Ganderbal	Prain Gang Sar	Inside Forest	0.71	0	0.71	PCCF
71	Ganderbal	Prain Gang Sar	Inside Forest	0.45	0	0.45	PCCF
72	Ganderbal	Unnamed Lake	Inside Forest	0.45	0	0.45	PCCF
73	Ganderbal	Hoka Sar	Inside Forest	0.45	0	0.45	PCCF
74	Ganderbal	Lachnai Sar	Inside Forest	1.28	0	1.28	PCCF
75	Kulgam	Unnamed	Inside Forest	1.27	0	1.27	PCCF
76	Kulgam	Unnamed	Inside Forest	4.36	0	4.36	PCCF
77	Kulgam	Unnamed	Inside Forest	0.32	0	0.32	PCCF
78	Kupwara	Bran Khuda Sar	Inside Forest	3.51	0	3.51	PCCF
79	Pulwama	Unnamed	Inside Forest	0.72	0	0.72	PCCF
80	Pulwama	Unnamed	Inside Forest	0.73	0	0.73	PCCF
Total Disappeared Lakes of PCCF (80 Lakes)				217.85	0	217.85	
Details of Disappeared Lake falling under Jurisdiction of District Administration						(Area In Hectares)	
1	Doda	Madsu Talao1	Outside Forest	0.32	0	0.32	DC
2	Doda	Madsu Talao2	Outside Forest	0.74	0	0.74	DC
3	Jammu	Nor Talao	Outside Forest	0.26	0	0.26	DC
4	Jammu	Meshiani Talao 1	Outside Forest	0.36	0	0.36	DC
5	Jammu	Meshiani Talao 2	Outside Forest	0.64	0	0.64	DC
6	Jammu	Pahtu Talao	Outside Forest	0.33	0	0.33	DC
7	Jammu	Gaur Talao	Outside Forest	0.38	0	0.38	DC
8	Jammu	Jandial Talao	Outside Forest	1.61	0	1.61	DC
9	Jammu	Chingaini Talao	Outside Forest	0.71	0	0.71	DC
10	Jammu	That Ranjan Talao	Outside Forest	0.83	0	0.83	DC
11	Jammu	Ghurota Talao	Outside Forest	1.83	0	1.83	DC
12	Jammu	Satowan Talao	Outside Forest	0.85	0	0.85	DC
13	Jammu	Barn Talao	Outside Forest	0.42	0	0.42	DC
14	Jammu	Sue Choi Talao	Outside Forest	0.82	0	0.82	DC
15	Jammu	Unnamed	Outside Forest	0.84	0	0.84	DC
16	Jammu	Uparla Bharda Talao	Outside Forest	0.42	0	0.42	DC
17	Jammu	Paraurian Talao	Outside Forest	0.43	0	0.43	DC
18	Jammu	Khalka Bharda	Outside Forest	0.54	0	0.54	DC
19	Jammu	Ghardarwan Sar 2	Outside Forest	0.68	0	0.68	DC
20	Jammu	Sungal Talao 2	Outside Forest	2.02	0	2.02	DC
21	Jammu	Pangiari Talao 1	Outside Forest	1.06	0	1.06	DC
22	Jammu	Pangiari Talao 2	Outside Forest	0.61	0	0.61	DC
23	Jammu	Gopala Sar	Outside Forest	0.56	0	0.56	DC
24	Jammu	Uparla Badgal Talao	Outside Forest	0.69	0	0.69	DC
25	Jammu	Khalka Badgal Talao	Outside Forest	0.57	0	0.57	DC
26	Jammu	Gopala Talao	Outside Forest	0.87	0	0.87	DC
27	Jammu	Dhok Khalsa Talao	Outside Forest	0.75	0	0.75	DC
28	Jammu	Lehr Talao	Outside Forest	0.88	0	0.88	DC
29	Jammu	Jad Talao 2	Outside Forest	0.7	0	0.7	DC
30	Jammu	Bhiri Talao	Outside Forest	0.89	0	0.89	DC
31	Jammu	Mangu Di Patian Sar	Outside Forest	0.3	0	0.3	DC
32	Jammu	Parsot Talao	Outside Forest	0.57	0	0.57	DC
33	Jammu	Toteali Talao 2	Outside Forest	0.72	0	0.72	DC
34	Jammu	Thattar Talao 1	Outside Forest	0.76	0	0.76	DC
35	Jammu	Thattar Talao 2	Outside Forest	0.51	0	0.51	DC
36	Jammu	Mutthi Talao 2	Outside Forest	0.49	0	0.49	DC
37	Jammu	Palaura Talao	Outside Forest	1.78	0	1.78	DC

Sl. No.	District	Name of Lake	Inside/Outside Forest	Topo 1967	SI 2020	Difference (5-6)	Department
38	Jammu	Bhatoli Mangotrian	Outside Forest	1.53	0	1.53	DC
39	Jammu	Baukri Talao	Outside Forest	1.73	0	1.73	DC
40	Jammu	Baje Chak Talao	Outside Forest	0.75	0	0.75	DC
41	Jammu	Laswara Sar	Outside Forest	0.56	0	0.56	DC
42	Jammu	Dabbar Lalewala Sar	Outside Forest	0.83	0	0.83	DC
43	Jammu	Jhumbiyar Brahmanan Talao	Outside Forest	0.58	0	0.58	DC
44	Jammu	Khojipura Talao	Outside Forest	0.82	0	0.82	DC
45	Jammu	Chuhe Chak Talao	Outside Forest	0.45	0	0.45	DC
46	Jammu	Gajansu Talao	Outside Forest	0.89	0	0.89	DC
47	Jammu	Chak Gangu Talao	Outside Forest	0.65	0	0.65	DC
48	Jammu	Chatha Talao	Outside Forest	1.06	0	1.06	DC
49	Jammu	Sui Simbli Talao	Outside Forest	1.19	0	1.19	DC
50	Jammu	Amb Talao	Outside Forest	0.56	0	0.56	DC
51	Jammu	Uprala Manda Talao	Outside Forest	0.97	0	0.97	DC
52	Jammu	Dhanwal Sar	Outside Forest	1.54	0	1.54	DC
53	Jammu	Kata Khu Talao	Outside Forest	0.41	0	0.41	DC
54	Jammu	Turgual Talao	Outside Forest	0.37	0	0.37	DC
55	Jammu	Janti Talao	Outside Forest	0.48	0	0.48	DC
56	Jammu	Kurora Talao	Outside Forest	0.64	0	0.64	DC
57	Jammu	Akhnoor Talao	Outside Forest	1.1	0	1.1	DC
58	Jammu	Unnamed	Outside Forest	0.58	0	0.58	DC
59	Jammu	Ranjan Talao	Outside Forest	0.47	0	0.47	DC
60	Kathua	Mandrar1	Outside Forest	0.77	0	0.77	DC
61	Kathua	Mandrar2	Outside Forest	0.41	0	0.41	DC
62	Kathua	Diol1	Outside Forest	0.37	0	0.37	DC
63	Kathua	Diol2	Outside Forest	0.39	0	0.39	DC
64	Kathua	Diol3	Outside Forest	0.4	0	0.4	DC
65	Kathua	Ter	Outside Forest	0.26	0	0.26	DC
66	Kathua	Dharamkot1	Outside Forest	0.35	0	0.35	DC
67	Kathua	Dharamkot2	Outside Forest	0.29	0	0.29	DC
68	Kathua	Phainthar	Outside Forest	0.3	0	0.3	DC
69	Kathua	Bhaddu Talao1	Outside Forest	0.41	0	0.41	DC
70	Kathua	Bhaddu Talao2	Outside Forest	0.31	0	0.31	DC
71	Kathua	Bhaddu Talao3	Outside Forest	0.43	0	0.43	DC
72	Kathua	Kishanpur1	Outside Forest	0.46	0	0.46	DC
73	Kathua	Kishanpur2	Outside Forest	0.35	0	0.35	DC
74	Kathua	Katli Talao	Outside Forest	0.33	0	0.33	DC
75	Kathua	Satura	Outside Forest	0.56	0	0.56	DC
76	Kathua	Peiya1	Outside Forest	0.26	0	0.26	DC
77	Kathua	Peiya2	Outside Forest	0.2	0	0.2	DC
78	Kathua	Peiya3	Outside Forest	0.29	0	0.29	DC
79	Kathua	Gurha Mandiyan	Outside Forest	0.42	0	0.42	DC
80	Kathua	Mela Wadda1	Outside Forest	0.34	0	0.34	DC
81	Kathua	Mela Wadda2	Outside Forest	0.44	0	0.44	DC
82	Kathua	Barwal	Outside Forest	0.84	0	0.84	DC
83	Kathua	Karat	Outside Forest	0.66	0	0.66	DC
84	Kathua	Kali Ban	Outside Forest	0.32	0	0.32	DC
85	Kathua	Mule Da Tala	Outside Forest	0.24	0	0.24	DC
86	Kathua	Palghetar	Outside Forest	0.58	0	0.58	DC
87	Kathua	Govinda	Outside Forest	0.66	0	0.66	DC
88	Kathua	Kanaun	Outside Forest	0.44	0	0.44	DC
89	Kathua	Marla	Outside Forest	0.48	0	0.48	DC
90	Kathua	Naknal	Outside Forest	1.06	0	1.06	DC
91	Kishtwar	Hoksar	Outside Forest	1.21	0	1.21	DC
92	Kishtwar	Bimal Nag	Outside Forest	5.28	0	5.28	DC
93	Kishtwar	Padar Sar	Outside Forest	1.52	0	1.52	DC
94	Kishtwar	Shingdhar Sar	Outside Forest	2.63	0	2.63	DC
95	Poonch	Sarian Sar	Outside Forest	0.61	0	0.61	DC
96	Poonch	Jamianwali Sar 3	Outside Forest	0.55	0	0.55	DC
97	Poonch	Kunalan Sar	Outside Forest	0.65	0	0.65	DC
98	Poonch	Chinarmarg Sar 2	Outside Forest	0.8	0	0.8	DC
99	Poonch	Chinarmarg Sar 3	Outside Forest	0.39	0	0.39	DC

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Sl. No.	District	Name of Lake	Inside/Outside Forest	Topo 1967	SI 2020	Difference (5-6)	Department
100	Ramban	Jabor Sar Lokut	Outside Forest	0.74	0	0.74	DC
101	Ramban	Tangar Sar	Outside Forest	0.81	0	0.81	DC
102	Reasi	Kotla Chakkar	Outside Forest	1.61	0	1.61	DC
103	Reasi	Bajopur	Outside Forest	0.7	0	0.7	DC
104	Reasi	Chakhar Talao	Outside Forest	0.46	0	0.46	DC
105	Reasi	Gorra Talao	Outside Forest	0.38	0	0.38	DC
106	Reasi	Tung Talao	Outside Forest	0.43	0	0.43	DC
107	Reasi	Rauta Talao	Outside Forest	0.24	0	0.24	DC
108	Reasi	Orka1	Outside Forest	0.28	0	0.28	DC
109	Reasi	Orka2	Outside Forest	0.27	0	0.27	DC
110	Reasi	Galali	Outside Forest	0.39	0	0.39	DC
111	Reasi	Kotli Panditan1	Outside Forest	0.39	0	0.39	DC
112	Reasi	Kotli Panditan2	Outside Forest	0.49	0	0.49	DC
113	Reasi	Sarot1	Outside Forest	0.35	0	0.35	DC
114	Reasi	Sarot2	Outside Forest	0.33	0	0.33	DC
115	Reasi	Ratikhad	Outside Forest	0.47	0	0.47	DC
116	Reasi	Kotli Gujran Talao	Outside Forest	0.34	0	0.34	DC
117	Reasi	Mathuwar1	Outside Forest	0.24	0	0.24	DC
118	Reasi	Mathuwar2	Outside Forest	0.31	0	0.31	DC
119	Reasi	Mathuwar3	Outside Forest	0.25	0	0.25	DC
120	Reasi	Chirangal1	Outside Forest	0.25	0	0.25	DC
121	Reasi	Chirangal2	Outside Forest	0.27	0	0.27	DC
122	Reasi	Chirangal3	Outside Forest	0.35	0	0.35	DC
123	Reasi	Kalyar Talao	Outside Forest	0.19	0	0.19	DC
124	Reasi	Arli	Outside Forest	0.5	0	0.5	DC
125	Reasi	Kun Darorian	Outside Forest	0.4	0	0.4	DC
126	Reasi	Karmal Talao	Outside Forest	0.28	0	0.28	DC
127	Reasi	Kairi	Outside Forest	0.35	0	0.35	DC
128	Reasi	Padmi Talao	Outside Forest	0.58	0	0.58	DC
129	Samba	Chhechwal Talao	Outside Forest	0.88	0	0.88	DC
130	Samba	Sujani Talao	Outside Forest	0.97	0	0.97	DC
131	Samba	Chhaliyari Talao	Outside Forest	1.1	0	1.1	DC
132	Samba	Chhaliyari Talao	Outside Forest	0.72	0	0.72	DC
133	Samba	Chak Bura Talao	Outside Forest	0.62	0	0.62	DC
134	Samba	Ragal Talao	Outside Forest	0.59	0	0.59	DC
135	Samba	Madwal Talao	Outside Forest	0.66	0	0.66	DC
136	Samba	Sambli Talao	Outside Forest	0.46	0	0.46	DC
137	Samba	Thali Sar	Outside Forest	0.42	0	0.42	DC
138	Samba	Galar Talao	Outside Forest	0.42	0	0.42	DC
139	Samba	Pangdaur Talao	Outside Forest	0.27	0	0.27	DC
140	Samba	Khunwal Talao	Outside Forest	0.73	0	0.73	DC
141	Samba	Ramblu Talao	Outside Forest	1	0	1	DC
142	Samba	Trindi Sangara Talao	Outside Forest	0.85	0	0.85	DC
143	Samba	Mahal Kalandariyan Talao	Outside Forest	0.53	0	0.53	DC
144	Samba	Ramgarh Talao	Outside Forest	0.92	0	0.92	DC
145	Samba	Chak Shama Talao	Outside Forest	1.47	0	1.47	DC
146	Samba	Kothe Manhasan Talao	Outside Forest	0.57	0	0.57	DC
147	Samba	Galwal Talao	Outside Forest	1.65	0	1.65	DC
148	Samba	Rasana Talao	Outside Forest	0.3	0	0.3	DC
149	Samba	Pekhri Talao	Outside Forest	0.52	0	0.52	DC
150	Samba	Nargal Talao	Outside Forest	0.36	0	0.36	DC
151	Samba	Nagrota Talao	Outside Forest	0.61	0	0.61	DC
152	Samba	Mautalian Kalan Talao	Outside Forest	0.24	0	0.24	DC
153	Samba	Kuppar Talao	Outside Forest	0.49	0	0.49	DC
154	Samba	Chak Largan Talao	Outside Forest	0.4	0	0.4	DC
155	Samba	Bajalta Talao	Outside Forest	0.34	0	0.34	DC
156	Samba	Sungali Talao	Outside Forest	0.45	0	0.45	DC
157	Samba	Panali Talao	Outside Forest	0.36	0	0.36	DC
158	Samba	Deani Talao	Outside Forest	0.5	0	0.5	DC
159	Samba	Barmal Talao	Outside Forest	0.3	0	0.3	DC
160	Samba	Mautalian Khurd Talao	Outside Forest	0.38	0	0.38	DC
161	Samba	Chat Talao	Outside Forest	0.56	0	0.56	DC

Sl. No.	District	Name of Lake	Inside/Outside Forest	Topo 1967	SI 2020	Difference (5-6)	Department
162	Samba	Bawali Talao	Outside Forest	0.59	0	0.59	DC
163	Samba	Birpur Talao	Outside Forest	0.62	0	0.62	DC
164	Samba	Narwal Talao	Outside Forest	0.4	0	0.4	DC
165	Samba	Kundanpur Talao	Outside Forest	0.49	0	0.49	DC
166	Samba	Ardhani Talao	Outside Forest	0.77	0	0.77	DC
167	Samba	Rajpur Kaular Talao	Outside Forest	0.44	0	0.44	DC
168	Samba	Basi Kalan Talao	Outside Forest	0.84	0	0.84	DC
169	Samba	Basi Khurd Talao	Outside Forest	0.49	0	0.49	DC
170	Samba	Palli Talao	Outside Forest	0.61	0	0.61	DC
171	Samba	Chhanm Talao	Outside Forest	1.6	0	1.6	DC
172	Samba	Dhiansar Rakh Talao	Outside Forest	0.91	0	0.91	DC
173	Samba	Kali Bari Talao	Outside Forest	0.37	0	0.37	DC
174	Samba	Karalian Kalan Talao	Outside Forest	0.58	0	0.58	DC
175	Samba	Sarwa Talao	Outside Forest	1.07	0	1.07	DC
176	Samba	Bhudwal Talao	Outside Forest	0.5	0	0.5	DC
177	Samba	Gori Khad Talao	Outside Forest	0.69	0	0.69	DC
178	Samba	Thalori Brahmanan Talao	Outside Forest	0.42	0	0.42	DC
179	Samba	Udh Mandi Talao	Outside Forest	1.07	0	1.07	DC
180	Samba	Kamila Talao	Outside Forest	0.72	0	0.72	DC
181	Samba	Narwal Lower Talao	Outside Forest	1.15	0	1.15	DC
182	Samba	Gangith Talao	Outside Forest	0.24	0	0.24	DC
183	Samba	Phatiyar Talao	Outside Forest	0.39	0	0.39	DC
184	Samba	Nikki Mutthi Talao	Outside Forest	0.51	0	0.51	DC
185	Samba	Badi Mutthi Talao	Outside Forest	0.28	0	0.28	DC
186	Samba	Palona Talao	Outside Forest	0.51	0	0.51	DC
187	Samba	Malangar Ki Chhan Talao	Outside Forest	0.81	0	0.81	DC
188	Samba	Kane Chhan Talao	Outside Forest	0.24	0	0.24	DC
189	Samba	Jutwal Talao	Outside Forest	0.31	0	0.31	DC
190	Samba	Mudgoli Talao	Outside Forest	0.22	0	0.22	DC
191	Udhampur	Trin Talao	Outside Forest	1.97	0	1.97	DC
192	Udhampur	Tror Talao 1	Outside Forest	0.35	0	0.35	DC
193	Udhampur	Tror Talao 2	Outside Forest	0.14	0	0.14	DC
194	Udhampur	Painthal Talao	Outside Forest	0.66	0	0.66	DC
195	Udhampur	Chak Talin Talao	Outside Forest	0.29	0	0.29	DC
196	Udhampur	Khandek Talao	Outside Forest	0.39	0	0.39	DC
197	Udhampur	Manun Talao	Outside Forest	0.77	0	0.77	DC
198	Udhampur	Chak Baghat Talao	Outside Forest	0.38	0	0.38	DC
199	Udhampur	Sira Talao	Outside Forest	1.02	0	1.02	DC
200	Udhampur	Serli Sar	Outside Forest	0.84	0	0.84	DC
201	Udhampur	Chakhar Talao	Outside Forest	0.43	0	0.43	DC
202	Udhampur	Khandra Talao	Outside Forest	0.45	0	0.45	DC
203	Udhampur	Barean Talao	Outside Forest	1.3	0	1.3	DC
204	Udhampur	Seoj Sar	Outside Forest	2.76	0	2.76	DC
205	Udhampur	Karkial Talao	Outside Forest	0.52	0	0.52	DC
206	Anantnag	Marhama Wetland	Outside Forest	202.49	0	202.49	DC
207	Anantnag	Mahtan Wetland	Outside Forest	103.8	0	103.8	DC
208	Bandipora	Batagund Nambal	Outside Forest	15.34	0	15.34	DC
209	Bandipora	Bazipura Nambal	Outside Forest	16.96	0	16.96	DC
210	Bandipora	Paribal Nambal	Outside Forest	7.45	0	7.45	DC
211	Bandipora	Chak Chanadergar	Outside Forest	17.36	0	17.36	DC
212	Bandipora	Hakabor Nambal	Outside Forest	10.23	0	10.23	DC
213	Bandipora	Pahilpora Nambal	Outside Forest	1.39	0	1.39	DC
214	Bandipora	Panjnara Nambal	Outside Forest	4.49	0	4.49	DC
215	Bandipora	Shalteng Nambal	Outside Forest	13.73	0	13.73	DC
216	Budgam	Rakh Arat	Outside Forest	464.05	0	464.05	DC
217	Ganderbal	Malshahibagh Nambal	Outside Forest	3.21	0	3.21	DC
218	Ganderbal	Barsu Nambal	Outside Forest	26.95	0	26.95	DC
219	Ganderbal	Kurag Nambal	Outside Forest	1.52	0	1.52	DC
220	Ganderbal	Kurag Nambal	Outside Forest	7.29	0	7.29	DC
221	Ganderbal	Devapura Nambal	Outside Forest	24.76	0	24.76	DC
222	Ganderbal	Gogajihgund Nambal	Outside Forest	3.42	0	3.42	DC
223	Ganderbal	Sindhbal Nambal	Outside Forest	28.38	0	28.38	DC

Sl. No.	District	Name of Lake	Inside/Outside Forest	Topo 1967	SI 2020	Difference (5-6)	Department
224	Ganderbal	Pahilpura Nambal	Outside Forest	4.13	0	4.13	DC
225	Ganderbal	Pethapura Nambal	Outside Forest	20.89	0	20.89	DC
226	Kupwara	Teki Pur Sar	Outside Forest	0.92	0	0.92	DC
227	Pulwama	Sethargund Nambal	Outside Forest	18.06	0	18.06	DC
228	Pulwama	Parigam Sar	Outside Forest	12.96	0	12.96	DC
229	Pulwama	Kisirgam Sar	Outside Forest	6.65	0	6.65	DC
230	Pulwama	Begambagh Nambal	Outside Forest	18.93	0	18.93	DC
231	Srinagar	Chak Nambal	Outside Forest	55.94	0	55.94	DC
232	Srinagar	Mojagund Nambal	Outside Forest	11.13	0	11.13	DC
233	Srinagar	Gangbugh Nambal	Outside Forest	47.37	0	47.37	DC
234	Srinagar	Gangbugh Nambal-II	Outside Forest	14.04	0	14.04	DC
235	Srinagar	Rakhsutu Mud Nambal	Outside Forest	18.82	0	18.82	DC
Total DC (235 Lakes)				1,319.22	0	1,319.22	
Total PCCF & DC (80+235=315 Lakes)				1,537.07	0	1,537.07	

Details of Increased area of Lakes jurisdiction-wise

Sl. No.	District	Name of Lake	Inside/Outside Forest	Topo 1967	SI 2020	Difference (5-6)	Department
1	2	3	4	5	6	7	8
Details of Increased area of Lake falling under Jurisdiction of PCCF						(Area In Hectares)	
1	Kishtwar	Nagimandu Sar	Inside Forest	0.4	0.8	0.4	PCCF
2	Kishtwar	Zar Nag	Inside Forest	0.92	10.27	9.35	PCCF
3	Kishtwar	Kutabal Nag	Inside Forest	1.91	2.68	0.77	PCCF
4	Kishtwar	Margan Sar	Inside Forest	2.37	2.63	0.26	PCCF
5	Kishtwar	Drinyan Sar	Inside Forest	2.44	7.91	5.47	PCCF
6	Kishtwar	Khelan Nag	Inside Forest	2.95	7.85	4.9	PCCF
7	Kishtwar	Ditap Nag	Inside Forest	5.62	5.81	0.19	PCCF
8	Kishtwar	Saris Nag	Inside Forest	15.26	25.85	10.59	PCCF
9	Kishtwar	Naganandar Sar	Inside Forest	9.39	11.37	1.98	PCCF
10	Kishtwar	Nilgur Sar Bod	Inside Forest	6.94	7.49	0.55	PCCF
11	Kishtwar	Malgarhu Sar 1	Inside Forest	8.97	9.48	0.51	PCCF
12	Poonch	Gum Sar 2	Inside Forest	2.07	2.15	0.08	PCCF
13	Poonch	Marguri Sar 1	Inside Forest	5.43	5.53	0.1	PCCF
14	Poonch	Katori Sar	Inside Forest	9.85	10.32	0.47	PCCF
15	Rajouri	Bela Sar	Inside Forest	2.45	3.3	0.85	PCCF
16	Rajouri	Katori Sar	Inside Forest	3.21	4.39	1.18	PCCF
17	Reasi	Thinamarg	Inside Forest	0.45	1.02	0.57	PCCF
18	Anantnag	Chang Sar	Inside Forest	0.84	1.13	0.29	PCCF
19	Anantnag	Dod Chhiran Nag 3	Inside Forest	3.03	3.2	0.17	PCCF
20	Anantnag	Langinal Nag	Inside Forest	3.6	5.45	1.85	PCCF
21	Anantnag	Charinag	Inside Forest	19.19	19.31	0.12	PCCF
22	Anantnag	Hirubagwan Sar	Inside Forest	16.47	16.84	0.37	PCCF
23	Bandipora	Lokut Patalwan Sar	Inside Forest	0.15	1.07	0.92	PCCF
24	Bandipora	Lokut Sar	Inside Forest	0.89	5.53	4.64	PCCF
25	Bandipora	Lokut Chhitrar Nar Sar	Inside Forest	0.96	1.82	0.86	PCCF
26	Bandipora	Unnamed Lake	Inside Forest	0.98	1.03	0.05	PCCF
27	Bandipora	Gad Sar Lokut	Inside Forest	1.46	1.5	0.04	PCCF
28	Bandipora	Karunpathar Sar	Inside Forest	1.65	1.68	0.03	PCCF
29	Bandipora	Lokut Karunpathar Sar	Inside Forest	1.97	3.03	1.06	PCCF
30	Bandipora	Nabler Sar	Inside Forest	2.55	3.97	1.42	PCCF
31	Bandipora	Mianmarg Sar	Inside Forest	2.65	4.78	2.13	PCCF
32	Bandipora	Unnamed Lake	Inside Forest	3.2	4.44	1.24	PCCF
33	Bandipora	Gagar Sar	Inside Forest	3.48	4.8	1.32	PCCF
34	Bandipora	Sat Sar	Inside Forest	3.55	5.15	1.6	PCCF
35	Bandipora	Karu Sar	Inside Forest	4.02	7.39	3.37	PCCF
36	Bandipora	Suka Sar	Inside Forest	4.29	6.92	2.63	PCCF
37	Bandipora	Sarbal Sar	Inside Forest	25.28	26.55	1.27	PCCF
38	Bandipora	Kaul Sar	Inside Forest	9.88	10.2	0.32	PCCF
39	Bandipora	Gad Sar	Inside Forest	13.47	40.4	26.93	PCCF
40	Bandipora	Salnai Sar	Inside Forest	32.85	34.26	1.41	PCCF
41	Bandipora	Bod Chitti Chamri Sar	Inside Forest	7.5	10.28	2.78	PCCF
42	Bandipora	Nichnai Sar	Inside Forest	12.71	13.18	0.47	PCCF
43	Ganderbal	Salma Sar	Inside Forest	0.53	2	1.47	PCCF
44	Ganderbal	Masthokar Sar	Inside Forest	0.6	3.46	2.86	PCCF
45	Ganderbal	Krim Sar	Inside Forest	0.61	2.73	2.12	PCCF
46	Ganderbal	Nichinai Nag	Inside Forest	0.92	1.96	1.04	PCCF
47	Ganderbal	Kan Sar	Inside Forest	1.11	4.65	3.54	PCCF
48	Ganderbal	Sat Sar	Inside Forest	1.64	1.74	0.1	PCCF
49	Ganderbal	Sat Sar	Inside Forest	1.75	3.15	1.4	PCCF
50	Ganderbal	Gumbur Sar	Inside Forest	2.46	2.98	0.52	PCCF
51	Ganderbal	Gangabal Lake	Inside Forest	155.85	162.79	6.94	PCCF
52	Ganderbal	Yamhar Sar	Inside Forest	8.77	12.03	3.26	PCCF
53	Ganderbal	Kaul Sar	Inside Forest	6.78	11.82	5.04	PCCF
54	Ganderbal	Andurn Sar	Inside Forest	10.72	13.34	2.62	PCCF
55	Ganderbal	Lolgul Sar	Inside Forest	13.23	15.31	2.08	PCCF
56	Ganderbal	Kana Sar	Inside Forest	5.72	6.58	0.86	PCCF
57	Ganderbal	Yamhar Sar	Inside Forest	6.39	8.42	2.03	PCCF
58	Kulgam	Pambasar Sar	Inside Forest	0.49	1.21	0.72	PCCF

Audit Report on Conservation and Management of Lakes in J&K for the period ended March 2022

Sl. No.	District	Name of Lake	Inside/Outside Forest	Topo 1967	SI 2020	Difference (5-6)	Department
59	Kulgam	Rupri Gali Sar	Inside Forest	4.77	6.12	1.35	PCCF
60	Kulgam	Konsar Nag	Inside Forest	131.15	133.31	2.16	PCCF
61	Kulgam	Kotori Sar	Inside Forest	11.71	12.16	0.45	PCCF
62	Kulgam	Barani Sar	Inside Forest	11.52	13.02	1.5	PCCF
63	Kulgam	Golia Sar	Inside Forest	20.85	21.48	0.63	PCCF
64	Kulgam	Barani Sar Lakut	Inside Forest	11.18	11.38	0.2	PCCF
65	Kupwara	Kaindogarnag Sar	Inside Forest	0.55	1.23	0.68	PCCF
66	Kupwara	Buna Wadar Sar	Inside Forest	0.77	1.74	0.97	PCCF
67	Kupwara	Nagradnar Sar	Inside Forest	1	3.53	2.53	PCCF
68	Kupwara	Yamrad Sar	Inside Forest	1.62	1.85	0.23	PCCF
69	Kupwara	Chornar Sar	Inside Forest	2.61	3.72	1.11	PCCF
Total Increased area - PCCF (69 Lakes)				672.55	816.47	143.92	
Details of Increased area of Lake falling under Jurisdiction of DC						(Area In Hectares)	
1	Udhampur	Dalsar	Outside Forest	0.83	1.51	0.68	DC
2	Doda	Kaplas Sar 3	Outside Forest	1.09	1.12	0.03	DC
3	Doda	Kaplas Sar 2	Outside Forest	1.28	2.57	1.29	DC
4	Doda	Kaplas Nag	Outside Forest	1.96	2.1	0.14	DC
5	Jammu	Tacharwan Sar	Outside Forest	0.27	0.5	0.23	DC
6	Jammu	Barola Sar	Outside Forest	0.3	0.38	0.08	DC
7	Jammu	Mandran Sar	Outside Forest	0.36	0.41	0.05	DC
8	Jammu	Barui Sar	Outside Forest	0.39	0.59	0.2	DC
9	Jammu	Patoni Sar	Outside Forest	0.4	0.52	0.12	DC
10	Jammu	Jagwal Sar	Outside Forest	0.41	0.68	0.27	DC
11	Jammu	Naugiran Sar	Outside Forest	0.46	0.51	0.05	DC
12	Jammu	Kot Sar 1	Outside Forest	0.54	0.78	0.24	DC
13	Jammu	Mundh Talao	Outside Forest	0.59	0.69	0.1	DC
14	Jammu	Tiriai Sar	Outside Forest	0.73	0.85	0.12	DC
15	Jammu	Gura Sar	Outside Forest	0.83	1.06	0.23	DC
16	Jammu	Akhnoor Sar	Outside Forest	1.09	1.98	0.89	DC
17	Jammu	Sangani Sar	Outside Forest	1.18	1.24	0.06	DC
18	Kishtwar	Kaintal Sar	Outside Forest	0.51	0.97	0.46	DC
19	Kishtwar	Shazun Nag	Outside Forest	1.98	3.48	1.5	DC
20	Kishtwar	Dudhar Sar	Outside Forest	3.39	7.59	4.2	DC
21	Poonch	Handnal Sar	Outside Forest	0.88	2.05	1.17	DC
22	Poonch	Jamianwali Sar 2	Outside Forest	0.9	0.93	0.03	DC
23	Samba	Pati Sar	Outside Forest	0.28	0.41	0.13	DC
24	Samba	Gura Sar	Outside Forest	0.4	0.47	0.07	DC
25	Samba	Kargal Sar	Outside Forest	0.9	1.02	0.12	DC
26	Udhampur	Kali Kund Sar	Outside Forest	3.22	4.86	1.64	DC
27	Bandipora	Malapura Sar	Outside Forest	1.87	25.97	24.1	DC
28	Bandipora	Rakh-I Malgom	Outside Forest	209.36	211.48	2.12	DC
29	Bandipora	Chanpaz Mahal Nambal	Outside Forest	11.43	14.42	2.99	DC
30	Bandipora	Chak Sudarkut Bala	Outside Forest	10.94	19.01	8.07	DC
31	Bandipora	Wudin Sar	Outside Forest	8	8.12	0.12	DC
32	Bandipora	Chirangpura Nambal	Outside Forest	7.32	21.12	13.8	DC
33	Bandipora	Malikpur Sar	Outside Forest	6.77	7.39	0.62	DC
34	Baramulla	Tungban Sar	Outside Forest	0.58	1.12	0.54	DC
35	Baramulla	Kantar Nag Sar	Outside Forest	1.62	2.5	0.88	DC
36	Baramulla	Gathgopal	Outside Forest	130.48	237.9	107.42	DC
37	Baramulla	Bod Nambal/Gad Sar	Outside Forest	57.33	57.49	0.16	DC
38	Budgam	Narkura Nambal	Outside Forest	349.4	359.35	9.95	DC
39	Kupwara	Lalpura Sar	Outside Forest	0.73	1.19	0.46	DC
40	Kupwara	Mukam Shareif Sar	Outside Forest	0.91	1.09	0.18	DC
41	Kupwara	Sar	Outside Forest	0.92	0.96	0.04	DC
42	Kupwara	Redanag Sar	Outside Forest	1	1.68	0.68	DC
43	Kupwara	Chandigam Sar	Outside Forest	1.18	1.29	0.11	DC
44	Kupwara	Pal Nar Sar	Outside Forest	1.34	1.43	0.09	DC
45	Kupwara	Pir Sar	Outside Forest	1.5	2.23	0.73	DC
46	Kupwara	Doruswain Sar	Outside Forest	1.52	1.67	0.15	DC
47	Kupwara	Redanag	Outside Forest	1.59	1.73	0.14	DC
48	Kupwara	Manchher Sar	Outside Forest	1.65	1.83	0.18	DC
49	Kupwara	Bakihakar	Outside Forest	1.67	1.76	0.09	DC

Sl. No.	District	Name of Lake	Inside/Outside Forest	Topo 1967	SI 2020	Difference (5-6)	Department
50	Kupwara	Gujar Pattisar	Outside Forest	1.73	3.09	1.36	DC
51	Kupwara	Gund Manchar Sar	Outside Forest	1.75	2.42	0.67	DC
52	Kupwara	Natnus Sar	Outside Forest	1.91	2.95	1.04	DC
53	Kupwara	Sar	Outside Forest	1.96	2.03	0.07	DC
54	Kupwara	Kandi Sar	Outside Forest	2.14	2.46	0.32	DC
55	Kupwara	Bhagatpura Sar	Outside Forest	2.16	2.92	0.76	DC
56	Kupwara	Nurdin Khan Chak Sar	Outside Forest	2.27	3.23	0.96	DC
57	Kupwara	Sogam Sar	Outside Forest	2.62	4.72	2.1	DC
58	Kupwara	Nag Reddi	Outside Forest	2.72	3.72	1	DC
59	Kupwara	Sar	Outside Forest	2.87	3.42	0.55	DC
60	Pulwama	Drangbal Nambal	Outside Forest	11.91	15.55	3.64	DC
61	Pulwama	Ech Nambal	Outside Forest	5.86	10.11	4.25	DC
Total Increased area - DC (61 Lakes)				874.18	1,078.62	204.44	
Details of Increased area of Lake falling under Jurisdiction of WLW							(Area In Hectares)
1	Jammu	Suruin Sar	Inside Forest	24.23	28.6	4.37	WLW
2	Rajouri	Simar Sar	Inside Forest	8.82	15.46	6.64	WLW
3	Udhampur	Mansar Lake	Inside Forest	57.19	58.61	1.42	WLW
4	Anantnag	Chhumanai Sar	Inside Forest	7.86	18.01	10.15	WLW
5	Anantnag	Chhumanai Sar 1	Inside Forest	3.19	8.5	5.31	WLW
6	Anantnag	Dudhnag	Inside Forest	11.83	11.94	0.11	WLW
7	Anantnag	Handilsar	Inside Forest	18.8	19.63	0.83	WLW
8	Anantnag	Har Nag	Inside Forest	33.28	33.46	0.18	WLW
9	Anantnag	Hoka Sar	Inside Forest	3.62	4.36	0.74	WLW
10	Anantnag	Katar Nag	Inside Forest	2.9	3.19	0.29	WLW
11	Anantnag	Tarsar	Inside Forest	83.23	84.99	1.76	WLW
12	Anantnag	Tson	Inside Forest	8.87	14.14	5.27	WLW
13	Anantnag	Girwar Nag	Inside Forest	1.68	1.99	0.31	WLW
14	Anantnag	Gumhar/ Gumbar Sar	Inside Forest	1.94	2.39	0.45	WLW
15	Kulgam	Bhag Sar	Inside Forest	66.7	70.11	3.41	WLW
16	Srinagar	Marsar Lake	Inside Forest	39.33	43.71	4.38	WLW
17	Baramulla	Mirgund Jhil-II	Outside Forest	47.16	49.88	2.72	WLW
18	Pulwama	Bodsar/Chatlam	Outside Forest	53.11	56.57	3.46	WLW
Total Increased area - WLW (18 Lakes)				473.74	525.54	51.80	
Details of Increased area of Lake falling under Jurisdiction of LC&MA							(Area In Hectares)
1	Srinagar	Dal Lake	Outside Forest	2,324.75	2,460.55	135.8	LC&MA
2	Srinagar	Gilsar	Outside Forest	5.25	7.51	2.26	LC&MA
Total Increased area - LC&MA (02 Lakes)				2,330.00	2,468.06	138.06	
Total (69+61+18+02=150 Lakes)				4,350.47	4,888.69	538.22	

Details of Unchanged area of Lakes jurisdiction-wise

Sl. No.	District	Name of Lake	Inside/Outside Forest	Topo 1967	SI 2020	Difference (5-6)	Department
1	2	3	4	5	6	7	8
Details of Unchanged area of Lake falling under Jurisdiction of PCCF						(Area In Hectares)	
1	Kishtwar	Kain Nag	Inside Forest	0.68	0.68	0	PCCF
2	Anantnag	Chohar Nag	Inside Forest	10.67	10.67	0	PCCF
3	Budgam	Kharmarg Sar	Inside Forest	2.7	2.7	0	PCCF
4	Budgam	Sainmarg Sar	Inside Forest	3.6	3.6	0	PCCF
5	Budgam	Nil Nag	Inside Forest	7.46	7.46	0	PCCF
6	Budgam	Magrusar	Inside Forest	7.01	7.01	0	PCCF
7	Budgam	Ainpat Sar	Inside Forest	5.47	5.47	0	PCCF
8	Budgam	Ainpat Sar Bod	Inside Forest	10.33	10.33	0	PCCF
9	Shopian	Gumsar	Inside Forest	1.96	1.96	0	PCCF
Total PCCF (09 Lakes)				49.88	49.88	0	
Details of Unchanged area of Lake falling under Jurisdiction of WUCMA						(Area In Hectares)	
1	Bandipora	Wular Lake	Outside Forest	13,325.35	13,325.35	0	WUCMA
Total WUCMA (01 Lake)				13,325.35	13,325.35	0	
Details of Unchanged area of Lake falling under Jurisdiction of DC						(Area In Hectares)	
1	Poonch	Chinarmarg Sar 1	Outside Forest	0.31	0.31	0	DC
2	Samba	Dansal Sar	Outside Forest	0.63	0.63	0	DC
3	Budgam	Gurwan Sar Lokut	Outside Forest	1.53	1.53	0	DC
4	Budgam	Wogur Sar	Outside Forest	1.85	1.85	0	DC
5	Budgam	Chinamarg Sar	Outside Forest	2.17	2.17	0	DC
6	Budgam	Gurwan Sar	Outside Forest	2.56	2.56	0	DC
7	Budgam	Shiv Nag	Outside Forest	3.33	3.33	0	DC
8	Budgam	Gurwan Sar Bod	Outside Forest	4.66	4.66	0	DC
9	Budgam	Lokut Sar	Outside Forest	4.98	4.98	0	DC
10	Budgam	Bodh Sar	Outside Forest	43.87	43.87	0	DC
11	Budgam	Pam Sar	Outside Forest	23.95	23.95	0	DC
12	Budgam	Daman Sar	Outside Forest	14.32	14.32	0	DC
13	Budgam	Navkan Sar	Outside Forest	13.79	13.79	0	DC
14	Budgam	Pathri Sar	Outside Forest	11	11	0	DC
15	Budgam	Navkan Sar Lakut	Outside Forest	8.85	8.85	0	DC
16	Budgam	Khara Sar	Outside Forest	8.12	8.12	0	DC
17	Shopian	Thal Sar	Outside Forest	0.4	0.4	0	DC
Total DC (17 Lakes)				146.32	146.32	0	
Details of Unchanged area of Lake falling under Jurisdiction of DC						(Area In Hectares)	
1	Baramulla	Haigam Jhil	Outside Forest	754.21	754.21	0	WLW
Total WLW (01 Lake)				754.21	754.21	0	
Details of Unchanged area of Lake falling under Jurisdiction of Wular-Manasbal Development Authority						(Area In Hectares)	
1	Ganderbal	Manasbal Lake	Outside Forest	260	260	0	WMDA
Total WMDA (01 Lake)				260	260	0	
Total Unchanged (09+01+17+01+01=29 Lakes)				14,535.76	14,535.76	0	

Appendix- 2.3

(Reference: Paragraph No. 2.2.2 and 2.5)

Department/ Authority-wise details of Spatio-temporal changes in sampled Lakes

Sl. No.	District	Name of Lake	Area In Hectares 1967	SI-2020	Decrease/ Disappear/ Increase (-) / Unchange
Department:- PCCF (Area in hectares)					
1	Anantnag	Shesh Nag	64.05	53.72	10.33
2	Ganderbal	Nundkol	38.99	36.63	2.36
3	Kulgam	Chir Sar ¹	22.04	6.90	15.14
4	Reasi	Gaga Sar	4.70	2.37	2.33
Total decreased area (4 Lakes) PCCF			129.78	99.62	30.16
1	Kishtwar	Mandik Sar	90.96	0	90.96
Total disappeared area (1 Lake) PCCF			90.96	0	90.96
1	Bandipora	Sarbal Sar	25.28	26.55	-1.27
2	Ganderbal	Gangabal Lake	155.85	162.79	-6.94
3	Kulgam	Konsar Nag	131.15	133.31	-2.16
Total increased area (3 Lakes) PCCF			312.28	322.65	10.37
1	Budgam	Nil Nag	7.46	7.46	0.00
Total unchanged area (1 Lake) PCCF			7.46	7.46	
Total area of 9 Lakes			540.48	429.73	
Authority:- Wular Conservation & Management Authority					
1	Bandipora	Wular Lake	13,325.35	13,325.35	0.00
Total unchanged area (1 Lake) WUCMA			13,325.35	13,325.35	0.00
Department:- Wild Life Protection Department					
1	Anantnag	Munwar Sar	9.11	8.25	0.86
2	Ganderbal	Shalabugh Nambal	1,585.82	1,474.63	111.19
3	Baramulla	Mirgund Jhil-I	272.06	254.36	17.70
4	Budgam	Hokar Sar	1,813.08	1,810.07	3.01
Total decreased area (4 Lakes) WPD			3,680.07	3,547.31	132.76
1	Anantnag	Tson	8.87	14.14	-5.27
2	Jammu	Surinsar	24.23	28.60	-4.37
3	Rajouri	Simar Sar	8.82	15.46	-6.64
4	Udhampur	Mansar Lake	57.19	58.61	-1.42
5	Baramulla	Mirgund Jhil-II	47.16	49.88	-2.72
6	Pulwama	Bodsar/Chatlam	53.11	56.57	-3.46
Total increased area (6 Lakes) WPD			199.38	223.26	23.88
1	Baramulla	Haigam Jhil	754.21	754.21	0
Total unchanged area (1 Lake) WPD			754.21	754.21	
Total area of 11 Lakes			4,633.66	4,524.78	
Department:- District Administration					
1	Baramulla	Buna Naugam Nambal	248.44	200.37	48.07
2	Baramulla	Ferozpur Nambal	43.57	26.85	16.72
3	Bandipora	Sudarkut Nambal	172.73	143.81	28.92
4	Bandipora	Khomina Nambal	67.85	29.85	38.00
5	Bandipora	Zinipura Nambal	57.25	40.43	16.82
6	Bandipora	Sadunara Hastikhan Nambal	51.98	36.31	15.67
7	Bandipora	Mukhdamyari Nambal	41.64	24.93	16.71

¹ Lakes where area decreased more than 50 per cent

Sl. No.	District	Name of Lake	Area In Hectares 1967	SI-2020	Decrease/ Disappear/ Increase (-) / Unchange
8	Bandipora	Naidkhai Nambal	40.67	38.89	1.78
9	Bandipora	Chandargar Nambal	21.21	10.68	10.53
10	Bandipora	Naz Nambal	11.73	8.69	3.04
11	Ganderbal	Rakh-i-Rabitar	698.45	406.03	292.42
12	Ganderbal	Rakh-i-Kujar	449.73	382.74	66.99
13	Ganderbal	Waskur Sar	72.66	22.18	50.48
14	Ganderbal	Hakimgund Nambal	68.65	27.89	40.76
15	Ganderbal	Ahan Sar	27.71	14.18	13.53
16	Kupwara	Narain Sar	6.20	5.41	0.79
17	Pulwama	Malangpur Nambal	131.20	124.68	6.52
18	Pulwama	Galandar Sar	47.75	29.94	17.81
19	Doda	Kaplas Sar 1	8.85	5.33	3.52
20	Ramban	Jabor Sar Bod	1.95	1.51	0.44
Total decreased area (20 Lakes) Distt. Admn			2,270.22	1,580.70	689.52
1	Anantnag	Marhama Wetland	202.49	0	202.49
2	Anantnag	Mahtan Wetland	103.80	0	103.80
3	Budgam	Rakh-i-Arth	464.05	0	464.05
4	Ganderbal	Devapura Nambal	24.76	0	24.76
5	Pulwama	Sethargund Nambal	18.06	0	18.06
6	Srinagar	Chak Nambal	55.94	0	55.94
7	Srinagar	Gangbugh Nambal	47.37	0	47.37
8	Srinagar	Gangbugh Nambal-II	14.04	0	14.04
9	Kathua	Naknal	1.06	0	1.06
10	Samba	Galwal Talao	1.65	0	1.65
Total disappeared area (10 Lakes) Distt. Admn.			933.22	0.00	933.22
1	Baramulla	Gathgopal	130.48	237.90	-107.42
2	Baramulla	Bod Nambal/Gad Sar	57.33	57.49	-0.16
3	Bandipora	Rakh-I Malgom	209.36	211.48	-2.12
4	Bandipora	Chak Sudarkut Bala	10.94	19.01	-8.07
5	Bandipora	Chirangpura Nambal	7.32	21.12	-13.80
6	Budgam	Narkura Nambal	349.40	359.35	-9.95
Total increased area (06 Lakes) Distt. Admn			764.83	906.35	141.52
1	Budgam	Bodh Sar	43.87	43.87	0.00
2	Budgam	Navkan Sar Lakut	8.85	8.85	0.00
Total unchanged area (02 Lakes) Distt. Admn			52.72	52.72	0
Total area of 38 Lakes			4,020.99	2,539.77	
Authority:- Lake Conservation and Management Authority					
1	Srinagar	Anchar Lake	1,208.55	1,157.88	-50.67
2	Srinagar	Khushalsar	90.52	84.03	-6.49
Total decreased area (02 Lakes) LCMA			1,299.07	1,241.91	-57.16
1	Srinagar	Dal Lake	2,324.75	2,460.55	135.80
Total increased area (01Lake) LCMA			2,324.75	2,460.55	135.80
Total area of 3 Lakes			3,623.82	3,702.46	78.64
Authority:- Wular-Manasbal Development Authority					
1	Ganderbal	Manasbal Lake	260.00	260.00	0.00
Total unchanged area (1 Lake) WMDA			260.00	260.00	0

S. No	Name of lakes without open water area & decrease in Aquatic Plantation	Open Water		Aquatic Vegetation / Marshy		Cropland		Silted Area		Built Up		Plantation		Vacant / Fallowland		Agriculture		Horticulture		Total		
		2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020
1	Gathgopal			28.40	34.05							209.50	203.85								237.90	237.90
2	Hatgam Jhil			450.60	455.07			38.01	33.54	1.37	1.37	159.22	159.22			105.01	105.01				754.21	754.21
3	Malangpora			110.22	112.11					0.53	0.53	11.09	9.32	2.84	2.72						124.68	124.68
4	Naaz Nambal			2.57	7.24	5.58	0.91														8.15	8.15
5	Rakh-i-Malgom			173.57	179.82	35.89	26.96					2.02	4.70								211.48	211.48
6	Zinipura Nambal			33.35	34.21	7.08	6.22														40.43	40.43
7	Buna Nowgam Nambal			178.68	179.46			21.69	20.91												200.37	200.37
8	Mehafan				103.80					103.80											103.80	103.80
9	Merhama				202.49											202.49					202.49	202.49
10	Sethergund Nambal				18.06											18.06					18.06	18.06
11	Rakh-i-Arth			31.40	31.71					0.72	0.57	97.86	86.25	0.61	0.70	317.13	328.57	16.34	16.26		464.06	464.06
12	Devpora Nambal									0.16	0.16	3.92	3.25	2.38	2.38	10.14	11.18	8.18	7.81		24.78	24.78
13	Chak Nambal			33.15	36.66					0.85	0.64			21.28	16.82	0.66	1.82				55.94	55.94
	Total	0.00	0.00	1041.94	1394.68	48.55	34.09	59.70	54.45	107.43	3.27	483.61	466.59	27.11	22.62	653.49	446.58	24.52	24.07	0.00	2446.35	2446.35

S.N	Name of lakes without open water area & increase in Acqaatic Vegetation	Open Water		Aquatic Vegetation / Marshy		Cropland		Floating Garden		Silted Area		Built Up		Plantation		Vacant / Fallowland		Agriculture		Scrub		Pasture		Marshy		Vegetation		Horticulture		Not mentioned		River		Total	
		2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	
1	Mirgund Jhi-I			110.76	109.17	79.50	49.29							64.10	95.90																		254.36	254.36	
2	Mirgund Jhi-II			22.84	20.20	6.22	7.84							20.82	21.84																		49.88	49.88	
3	Sudarkut Nambal			136.20	132.34	1.07	1.35							6.54	10.12																		143.81	143.81	
4	Rakh-i-Kujar			376.69	375.64									6.05	7.10																		382.74	382.74	
5	Hakim Gund Nambal			26.24	25.55									1.65	2.34																		27.89	27.89	
6	Gangbugh Nambal-II			9.31	9.28								0.08	0.12																			14.05	14.05	
7	Gangbugh Nambal			36.67	35.11					0.46	0.06	2.94	2.07	1.57	0.76																		47.37	47.37	
8	Narkara Nambal			242.74	239.44					0.35	0.23	16.49	19.89	15.17	15.19	1.90	1.90																276.65	276.65	
	Total	0.00	0.00	961.45	946.73	86.79	58.48	0.00	0.00	0.81	0.29	118.67	159.38	16.74	15.95	12.29	15.92	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	1196.75	1196.75		

Overall change in classification of land use	Open Water		Aquatic Vegetation / Marshy		Cropland		Floating Garden		Silted Area		Built Up		Plantation		Vacant / Fallowland		Agriculture		Scrub		Pasture		Marshy		Vegetation		Horticulture		Not mentioned		River		Total		
	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020		
63 Lakes	6082.90	8086.42	10849.03	9861.66	433.08	433.08	342.17	752.92	712.08	721.32	745.12	244.16	113.05	2047.89	2139.17	113.70	86.42	1305.01	698.88	12.95	1.03	85.33	51.00	0.00	0.00	2046.72	1945.00	497.55	404.73	91.52	106.34	23.61	11.62	25302.69	25302.69

S. No	Name of lakes with increase in Open Water	Open Water		Aquatic Vegetation / Marshy		Cropland		Floating Garden		Silted Area	Built Up	Plantation	Vacant / Fallow land	Agriculture		Scrub	Pasture	Marshy	Vegetation	Horticulture	Not mentioned	River	Total		
		2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014
1	Khominia Nambal	0.65	0.18	25.48	26.07	3.64	3.52					0.08	0.08											29.85	29.85
2	Sudhara Hastikham Nambal	4.69	1.23	31.55	35.01	0.08	0.08																	36.32	36.32
3	Anchar lake	86.44	65.00	53.72	48.63			8.61	7.05	571.25	599.04	12.70	16.03	37.61	41.47					387.55	380.66			1157.88	1157.88
	Total	91.78	66.41	110.75	109.71	3.72	3.60	0.00	0.00	0.00	8.61	7.05	12.70	16.03	37.61	41.47	0.00	0.00	0.00	387.55	380.66	0.00	0.00	1224.05	1224.05

S. No	Name of lakes without open water area & decrease in Aquatic Plantation	Open Water		Aquatic Vegetation / Marshy		Cropland		Floating Garden		Silted Area	Built Up	Plantation	Vacant / Fallow land	Agriculture		Scrub	Pasture	Marshy	Vegetation	Horticulture	Not mentioned	River	Total		
		2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014
1	Gathgopal			28.40	34.05							209.50	203.85											237.90	237.90
2	Hingam Jhil			450.60	455.07					38.01	33.54	1.37	1.37	159.22	159.22	105.01	105.01							754.21	754.21
3	Malangpora			110.22	112.11							0.53	11.09	9.32	2.84	2.72								124.68	124.68
4	Naaz Nambal			2.57	7.24	5.58	0.91																	8.15	8.15
5	Rakhi-i-Malgom			173.57	179.82	35.89	26.96					2.02	4.70											211.48	211.48
6	Zhinjura Nambal			33.35	34.21	7.08	6.22																	40.43	40.43
7	Buna Nowgam Nambal			178.68	179.46			21.69	20.91															200.37	200.37
8	Mebatan			103.80	103.80						103.80													202.49	202.49
9	Merhama			202.49	18.06																			18.06	18.06
10	Sethergund Nambal				18.06																			464.06	464.06
11	Rakhi-i-Arth			31.40	31.71					0.72	0.57	97.86	86.25	0.61	0.70	317.13	328.57			16.34	16.26			464.06	464.06
12	Despora Nambal									0.16	0.16	3.92	2.38	10.14	11.18					8.18	7.81			55.94	55.94
13	Chak Nambal			35.15	36.66						0.85	0.64			21.28	16.82	0.66	1.82						55.94	55.94
	Total	0.00	0.00	1041.94	1394.68	48.55	34.09	0.00	0.00	59.70	54.45	107.43	3.27	483.61	466.59	27.11	22.62	653.49	446.58	0.00	24.07	0.00	0.00	2446.35	2446.35

S.N	Name of lakes without open water area & increase in Aquatic Vegetation	Open Water		Aquatic Vegetation / Marshy		Cropland		Floating Garden		Silted Area	Built Up	Plantation	Vacant / Fallow land	Agriculture		Scrub	Pasture	Marshy	Vegetation	Horticulture	Not mentioned	River	Total		
		2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014
1	Mirgund Jhil-I			110.76	109.17	79.50	49.29					64.10	95.90											254.36	254.36
2	Mirgund Jhil-II			22.84	20.20	6.22	7.84					20.82	21.84											49.88	49.88
3	Sudarkut Nambal			136.20	132.34	1.07	1.35					6.54	10.12											143.81	143.81
4	Rakhi-i-Kujjar			376.69	375.64							6.05	7.10											382.74	382.74
5	Hakim Gand Numbal			26.24	25.55							1.65	2.34											27.89	27.89
6	Gangbogh Nambal-II			9.31	9.28							0.08	0.12			4.66	4.65							14.05	14.05
7	Gangbogh Nambal			36.67	35.11			0.46	0.06	2.94	2.07	1.57	0.76	5.73	9.37									47.37	47.37
8	Narkara Nambal			242.74	239.44			0.35	0.23	16.49	19.89	15.17	15.19	1.90	1.90									276.65	276.65
	Total	0.00	0.00	961.45	946.73	86.79	58.48	0.00	0.00	0.81	0.29	118.67	167.4	159.95	12.29	15.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1196.75	1196.75

No of Lakes having anthropogenic pressure	Open Water		Aquatic Vegetation / Marshy		Cropland		Floating Garden		Silted Area	Built Up	Plantation	Vacant / Fallow land	Agriculture		Scrub	Pasture	Marshy	Vegetation	Horticulture	Not mentioned	River	Total										
	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014								
44 Lakes	5219.32	7282.19	10780.85	9782.32	480.21	337.42	752.92	712.08	721.32	745.12	244.16	113.05	2015.46	2075.81	113.70	86.42	1303.01	698.88	12.95	1.03	85.33	51.00	2046.72	1943.00	492.55	404.73	91.52	90.96	23.61	11.62	24335.63	24335.63

Appendix-2.6

(Reference: Paragraph No. 2.3.1)

Lake-wise absence of open water, decrease/ increase in aquatic vegetation

(Area in hectares)

S. No	Name of Lakes without open water area & decrease in Aquatic Plantation	Open Water		Aquatic Vegetation / Marshy		Cropland		Silted Area		Built Up		Plantation		Vacant / Fallow land		Agriculture		Horticulture		Total		
		2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020
1	Gathgopal			28.40	34.05							209.50	203.85								237.90	237.90
2	Haigam Jhil			450.60	455.07			38.01	33.54	1.37	1.37	159.22	159.22			105.01	105.01				754.21	754.21
3	Malangpora			110.22	112.11					0.53	0.53	11.09	9.32	2.84	2.72						124.68	124.68
4	Naaz Nambal			2.57	7.24	5.58	0.91														8.15	8.15
5	Rahh-i-Malgom			173.57	179.82	35.89	26.96					2.02	4.70								211.48	211.48
6	Zinipura Nambal			33.35	34.21	7.08	6.22														40.43	40.43
7	Buna Nowgam Nambal			178.68	179.46			21.69	20.91												200.37	200.37
8	Mehatan				103.80					103.80											103.80	103.80
9	Merhama				202.49											202.49					202.49	202.49
10	Sethergund Nambal				18.06											18.06					18.06	18.06
11	Rakh-i-Arth			31.40	31.71					0.72	0.57	97.86	86.25	0.61	0.70	317.13	328.57	16.34	16.26		464.06	464.06
12	Devpora Nambal									0.16	0.16	3.92	3.25	2.38	2.38	10.14	11.18	8.18	7.81		24.78	24.78
13	Chak Nambal			33.15	36.66					0.85	0.64			21.28	16.82	0.66	1.82				55.94	55.94
	Total	0.00	0.00	1041.94	1394.68	48.55	34.09	59.70	54.45	107.43	3.27	483.61	466.59	27.11	22.62	653.49	446.58	24.52	24.07		2446.35	2446.35
S.No	Name of Lakes without open water area & increase in Aquatic Vegetation	Open Water		Aquatic Vegetation / Marshy		Cropland		Silted Area		Built Up		Plantation		Vacant / Fallow land		Agriculture		Horticulture		Total		
		2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020
14	Mirgund Jhil-I			110.76	109.17	79.50	49.29					64.10	95.90								254.36	254.36
15	Mirgund Jhil-II			22.84	20.20	6.22	7.84					20.82	21.84								49.88	49.88
16	S udarkut Nambal			136.20	132.34	1.07	1.35					6.54	10.12								143.81	143.81
17	Rakh-i-Kujar			376.69	375.64							6.05	7.10								382.74	382.74
18	Hakim Gund Nambal			26.24	25.55							1.65	2.34								27.89	27.89
19	Gangbugh Nambal-II			9.31	9.28							0.08	0.12			4.66	4.65				14.05	14.05
20	Gangbugh Nambal			36.67	35.11					0.46	0.06	2.94	2.07	1.57	0.76	5.73	9.37				47.37	47.37
21	Narkara Nambal			242.74	239.44					0.35	0.23	16.49	19.89	15.17	15.19	1.90	1.90				276.65	276.65
	Total	0.00	0.00	961.45	946.73	86.79	58.48	0.00	0.00	0.81	0.29	118.67	159.38	16.74	15.95	12.29	15.92	0.00	0.00		1196.75	1196.75
S. No	No of Lakes having Loss of open water & change in other land use/Classification use	Open Water		Aquatic Vegetation / Marshy		Cropland		Silted Area		Built Up		Plantation		Vacant / Fallow land		Agriculture		Horticulture		Total		
		2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020
	21 Lakes	0.00	0.00	2003.39	2341.41	135.34	92.57	59.70	54.45	108.24	3.56	602.28	625.97	43.85	38.57	665.78	462.50	24.52	24.07		3643.10	3643.10

Appendix- 2.8

(Reference: Paragraph No. 2.3.1)

Lake-wise increase in open water & change in other Land use

(Area in hectares)

S. No	Name of lakes with increase in Open Water	Open Water		Aquatic Vegetation / Marshy		Cropland		Built Up		Plantation		Vacant/ Fallowland		Agriculture		Horticulture		Not mentioned		Total	
		2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014
1	Chirangpura Nambal	2.63	1.05	15.62	15.32	2.87	4.75													21.12	21.12
2	Bodsar/Chatlam	15.31	9.42	32.78	39.15					8.48	8.00									56.57	56.57
3	Khomina Nambal	0.65	0.18	25.48	26.07	3.64	3.52			0.08	0.08									29.85	29.85
4	Waskur Nambal	21.82	19.86	0.36	2.32															22.18	22.18
5	Sudhara Hastikhan Nambal	4.69	1.23	31.55	35.01	0.08	0.08													36.32	36.32
6	Ahan sar	14.00	10.98	0.18	3.20															14.18	14.18
7	Shesh Nag	58.72	53.72																5.00	58.72	58.72
8	Tson	14.15	14.14																0.01	14.15	14.15
9	Sarbal Sar	26.80	26.55																0.25	26.80	26.80
10	Nundkhul	37.66	36.63																1.03	37.66	37.66
11	Nil Nag	9.81	7.46																2.35	9.81	9.81
12	Bodh Sar	47.06	43.87																3.19	47.06	47.06
13	Navkan Sar Lakut	9.82	8.85																0.97	9.82	9.82
14	Gangbal	163.02	162.79																0.23	163.02	163.02
15	Konsar Nag	134.87	133.31																1.56	134.87	134.87
16	Narain Sar	5.79	5.41																0.38	5.79	5.79
17	Mansar Lake	59.00	58.61																0.39	59.00	59.00
18	Simar Sar	15.48	15.46																0.02	15.48	15.48
19	Manasbal Lake	216.81	185.29	19.24	19.35					23.95	55.36									260.00	260.00
20	Anchar lake	86.44	65.00	53.72	48.63				8.61	7.05	599.04	12.70	16.03	37.61	41.47	387.55	380.66			1157.88	1157.88
21	Kaplas sar	8.46	8.46																	8.46	8.46
22	Gaga Sar	2.37	2.37																	2.37	2.37
	Total	955.36	870.64	178.93	189.05	6.59	8.35	8.61	7.05	603.76	662.48	12.70	16.03	37.61	41.47	387.55	380.66	0.00	15.38	2191.11	2191.11

Appendix- 2.9

(Reference: Paragraph No. 2.3.2)

Year / Location-wise clear images available on Google Earth Pro

Lake	Encroached Area within Lake	Catchment Area of the Lake	Year of Image {Clear Image Available (CIA)}															
			2002	2004	2005	2006	2007	2008	2010	2011	2012	2013	2014	2015	2016	2018	2022	
Dal Lake	Mir-Behri, Lati Mohalla, inside Lake etc	-	-	-	-	CIA	-	CIA	-	-	-	-	CIA	-	-	-	CIA	
	-	Takiya Sangreshi, Danthama, Shalimar, Koshpora, Banigam etc	-	-	CIA	-	-	-	-	-	-	-	-	-	-	-	-	CIA
	-	Nishat	-	CIA	-	-	-	-	CIA	-	-	-	-	-	-	-	-	CIA
	-	Hazratbal/ Habak	-	-	-	-	CIA	-	-	CIA	-	-	-	-	-	-	-	CIA
	-	Rainawari	-	CIA	-	-	-	-	-	-	CIA	-	-	-	-	-	-	CIA
Wular	Sher Colony	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	CIA
	Kanyari	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	CIA
Hokersar	-	Bandipora	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	CIA
	-	Haji Bagh	-	-	-	CIA	-	-	-	-	-	-	-	-	-	-	-	CIA
	-	Soithubgh	-	-	CIA	-	-	-	-	-	-	-	-	-	-	-	-	CIA
	-	HMT	-	-	CIA	-	-	-	-	-	-	-	-	-	-	-	-	CIA
Mansar	-	Jassor Mohalla	CIA	-	-	-	-	-	-	-	CIA	-	-	-	-	-	-	CIA
	-	Ladili Mohalla	CIA	-	-	-	-	-	-	-	CIA	-	-	-	-	-	-	CIA
	-	Moriyan	CIA	-	-	-	-	-	-	-	CIA	-	-	-	-	-	-	CIA
Surinsar	-	Lake Fringes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	CIA
	-	Lower Padder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	CIA
	-	Upper Padder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	CIA
Manasbal	-	Kondabal	CIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	CIA
	-	Gratabal	CIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	CIA

Appendix-2.10

(Reference: Paragraph No. 2.5)

Statement showing functions of the Departments/ Authorities/ Boards related to environmental issues which includes preparation of development plans for Lakes

1. J&K, Ecology, Environment and Remote Sensing Department (EE&RSD)

J&K Government had assigned (October 1989) survey and monitoring of Lakes of J&K and preparation of Development Plans for Lakes to EE & RSD. The department had to conduct detailed survey Lakes of the J&K and study their physical, chemical and biological dynamics and prepare detailed plans for development and management of Lakes.

2. Principal Chief Conservator of Forest (PCCF), J&K

PCCF controls all the forest area of J&K through its various divisions. The divisions prepare Annual Plan of Operations (APOs) for execution of various forest management activities such as plantation of degraded forests, fencing/ demarcation of forest areas, establishment of nurseries etc. Besides, J&K Forest Policy (2010) includes strategy for protection & conservation of Lakes and conservation of biodiversity in forests.

3. Wildlife Protection Department (WPD)

WPD controls wild area of J&K through its various divisions. The WPD prepares APOs for management and habitat improvement of wild life in protected areas which included some Lake specific activities viz. survey, demarcation, de-silting, de-weeding, plugging of breaches etc.

4. Union Territory Wetland Authority

National Wetland Conservation Program Guidelines for Conservation and Management of Lakes advised (June 2009) States to constitute Wetland Authority and subsequently Wetland Rules²-also envisaged establishment of Wetland Authority in each States / Union Territories. Further, Wetland Rules laid planning / strategies as detailed below:-

- demarcation of Lake boundary supported by accurate digital maps with coordinates and validated by ground-truthing;
- ecological character description of Lakes;
- comprehensive list of activities to be regulated & permitted within the notified Lakes & their zone of influence and mechanisms for maintenance of ecological character through promotional activities in cases wherein lands within boundary of notified Lakes or Lakes complex have private tenancy rights;

² 2010 superseded in 2017

- comprehensive digital inventory of all Lakes and its uploading on a web portal to be developed by the Central Government;
- measures for enhancing awareness within stakeholders and local communities;
- strategies for conservation and wise use of Lakes were to be defined; wise use being a principle for managing these ecosystems which incorporates capture of fisheries at subsistence level or harvest of aquatic plants and functions of water storage, groundwater recharging, flood buffering, values of recreation and cultural are maintained or enhanced;
- For notification of Lakes through Central Government, Brief Document comprising broad geographic delineation of Lakes, demarcation of Lake Boundary supported by accurate digital maps with coordinates and validated by ground-truthing, list of activities to be regulated & permitted within the Lakes, etc. was to be prepared.

5. Biodiversity Board, J&K

The Biological Diversity Act, 2002 envisaged conservation of biological diversity and sustainable use of its components. The Lake ecosystem includes wide range of biodiversity so role of BDB for conservation of biological diversity and sustainable use of its components relating to Lakes is very vital. The Act provided for establishment of Biodiversity Board (BDB), appointment of its members to exercise functions of BDB and constitution of Biodiversity Fund (BDF) to be used for conservation and promotion of biological resources.

6. Jammu and Kashmir Pollution Control Board (JK-PCB)

JK-PCB was established (1987) for restoration & maintaining natural water bodies, planning and programs for prevention and control of water pollution and regular monitoring of water quality of water bodies (including Lakes).

7. Development Authorities

There were four Development Authorities established under the Development, Act 1970, for development of the areas falling under their jurisdiction which included Lake areas also.

8. Rakhs and Farms Department (R&FD)

Activities of the Department includes receipts of one fourth of agriculture produce from cultivators who cultivate land pertaining to the Department. The cultivable land includes land of eight Lakes³ (falling in six districts) which sometimes become dry during lean periods.

9. Water Resource Regularity Authority (WRRRA)

Water Resources (Regulation and Management) Act 2010 included protection of physical integrity of Lakes & springs (including its source water protection) and their improvement for which WRRRA was to be established. The Act envisaged establishment of Water Resource

³ Sadurkut, Narkara, Chirangpura, Rakh-i-Rabtar, Gungbug, Rak-i-Kujar, Nowgam Jhil and Rakh-i-Arth

Regularity Authority to exercise the functions laid in Water Resources (Regulation and Management) Act 2010.

Further, Act laid preparation of Water Policy and Plan (WP&P) for development, management, planning, utilization & monitoring of water resources, preparation of plans for prevention of encroachment on existing water bodies. Also, Act laid constitution of Committee to discuss policy matters relating to functions of WRRRA.

Appendix-3.1

(Reference: Paragraph No. 3.2)

Division/ District-wise details of Lakes in which sewage enters without any treatment

Sl. No.	Province	District	Name of The Water body	Inside / Outside	Remarks
1	Jammu	Jammu	Surinsar	Inside Forest	Lake having population around it though inside forest.
2		Udhampur	Mansar Lake	Inside Forest	
3		Doda	Kaplas Sar 1	Outside Forest	
4		Kathua	Naknal	Outside Forest	
5		Ramban	Jabor Sar Bod	Outside Forest	
6		Samba	Galwal Talao	Outside Forest	
Total		6		6	
1	Kashmir	Anantnag	Marhama Wetland	Outside Forest	
2		Anantnag	Mahtan Wetland	Outside Forest	
3		Baramulla	Haigam Jhil	Outside Forest	
4		Baramulla	Mirgund Jhil-I	Outside Forest	
5		Baramulla	Buna Naugam Nambal	Outside Forest	
6		Baramulla	Gathgopal	Outside Forest	
7		Baramulla	Bod Nambal/Gad Sar	Outside Forest	
8		Baramulla	Mirgund Jhil-II	Outside Forest	
9		Baramulla	Ferozpur Nambal	Outside Forest	
10		Bandipora	Wular Lake	Outside Forest	
11		Bandipora	Rakh-I Malgom	Outside Forest	
12		Bandipora	Sudarkut Nambal	Outside Forest	
13		Bandipora	Khomina Nambal	Outside Forest	
14		Bandipora	Zinipura Nambal	Outside Forest	
15		Bandipora	Sadunara Hastikhan Nambal	Outside Forest	
16		Bandipora	Mukhdamyari Nambal	Outside Forest	
17		Bandipora	Naidkhai Nambal	Outside Forest	
18		Bandipora	Chandargar Nambal	Outside Forest	
19		Bandipora	Naz Nambal	Outside Forest	
20		Bandipora	Chak Sudarkut Bala	Outside Forest	
21		Bandipora	Chirangpura Nambal	Outside Forest	
22		Budgam	Hokar Sar	Outside Forest	
23		Budgam	Rakh Arat	Outside Forest	
24		Budgam	Narkura Nambal	Outside Forest	
25		Budgam	Bodh Sar	Outside Forest	
26		Budgam	Navkan Sar Lakut	Outside Forest	
27		Ganderbal	Shalabugh Nambal	Inside Forest	Lake having population around it though inside forest.
28		Ganderbal	Rakh-i-Rabitar	Outside Forest	
29		Ganderbal	Rakh-i-Kujar	Outside Forest	
30		Ganderbal	Manasbal Lake	Outside Forest	
31		Ganderbal	Waskur Sar	Outside Forest	

Sl. No.	Province	District	Name of The Water body	Inside / Outside	Remarks
32		Ganderbal	Hakimgund Nambal	Outside Forest	
33		Ganderbal	Ahan Sar	Outside Forest	
34		Ganderbal	Devapura Nambal	Outside Forest	
35		Kupwara	Narain Sar	Outside Forest	
36		Pulwama	Malangpur Nambal	Outside Forest	
37		Pulwama	Bodsar/Chatlam	Outside Forest	
38		Pulwama	Galandar Sar	Outside Forest	
39		Pulwama	Sethargund Nambal	Outside Forest	
40		Srinagar	Anchar Lake	Outside Forest	
41		Srinagar	Khushalsar	Outside Forest	
42		Srinagar	Chak Nambal	Outside Forest	
43		Srinagar	Gangbugh Nambal	Outside Forest	
44		Srinagar	Gangbugh Nambal-II	Outside Forest	
Total		44		44	
Grand Total				50	

Appendix-3.2

(Reference: Paragraph No. 3.2)

Details of Lakes, alongwith the number of households, human population and animal population, where sewage was discharged either directly into these Lakes or at the fringes of these Lakes

Sl. No.	Name of the water body	No of House Holds	Human Population	Animal Population	Sewer / Sewerage point	Total No. of sewer entry points
1	Marhama	1,000	5,000	3,000	Sather& Panjpora	2
2	Chandargar Nambal	1,000	5,000	3,000	Chandergeer near school & Panchayat ghar	2
3	Check Sader koot Bala	1,400	7,000	3,000	Not Assessed	0
4	Chirangpura Nambal	260	1,300	700	Bakshibal Chiranpora, ladipora	3
5	Khomina Nambal	800	4,000	1,000	Vijpara	1
6	Mukhdamyari Nambal	250	1,500	600	Shreeharikaran gundl	1
7	Naidkhai Nambal	3,000	15,000	8,000	Not Assessed	0
8	Naz Nambal	3,600	18,000	5,000	Ajas, Gund Saderkoot	2
9	Rakh-i- Malgom	1,100	5,500	2,100	Chandergeer & sudarkoot	2
10	Sadunara, Hastikhan Nambal	1,400	7,000	5,000	Ghulam yari, Sadunara, Banyari & sharki	4
11	Sudarkut Nambal	800	4000	500	Saderkoot payeen	1
12	Zinipura Numbal	140	700	900	Zoonipora, ashma , nabadi pora, safapora	4
13	Buna Nowgam Nambal	800	4000	2000	Rakhi Sultan pora	1
14	ferozpore Nambal	2,000	10,000	15,000	Pathanmohalla HanjiWeera, trikolbal	3
15	Gathgopal	1,200	5,000	13,000	Chakjamaal Mir channel	1
16	Haigam Jhil	525	2,595	1,500	Akhoon pora, Radigam and wandakh pora	3
17	Mirgund Jhil -I	6,000	30,000	60,000	Chaki-Kawoosa	1
18	Mirgund Jhil -ii	1,250	5,000	1,200	Allambal, wandakpora etc	2
19	Hokar sar	20,000	1,00,000	25,000	Soibugh, Gotpora , Lawaypora , Sozieth, Narbal	5
20	Narkara Nambal	15,000	75,000	2,000	Humhama , nadirgund, Sheikhpura	3
21	Rakhi -i- arith	12,000	60,000	15,000	khomeni chowk, Hamdiania Colony, Rakhi-i- arith	3
22	Ahan sar	300	1,500	1,000	Not Assessed	0
23	Devapur	1,200	6,000	10,000	Not Assessed	0
24	Hakeem gund Nambal	800	4,000	7,000	Hakeem gund	1
25	Rakh-i-Kujar	2,000	10,000	30,000	Nagbal, Beehama, Khujar fatepure	3
26	Rakh-i-Rabitar	4,200	21,000	28,000	zarigund, khurihama, Barsoo	3
27	Shalabugh	2,000	10,000	15,000	Takanwari , Kreshibal,Sangam & SKIMS	4
28	Bodsar/ Chattlan	150	750	600	Lolipora & konnibal	2
29	Galander sar	180	800	100	Kroncho and chandhar	2
30	Malangpora Nambal	500	2,500	3,000	Malangpora& Padgampora	2
31	Sathergund	195	975	8,000	Sathergund	1
32	Anchar Lake	5,000	25,000	1,500	SKIMS, Anchar, Daghpora Gadurah shalabugh	5
33	Khushalsar Lake	1,000	5,000	500	Zanimar, zadibal	2
34	Waskur sar	400	2,000	3,000	Not Assessed	0
Total		91,450	4,55,120	2,75,200		69

Appendix-3.3

(Reference: Paragraph No. 3.2)

Name of 23 Lakes where there was increase in aquatic vegetation, siltation, agriculture, built-up etc

S. No	Name of lakes with decrease in Open Water	Aquatic Vegetation / Marshy		Open Water		Cropland		Floating Garden		Silted Area		Built Up		Plantation		Vacant / Fallow land		Agriculture		Scrub		Pasture		Vegetation		Horticulture		River		Total		
		2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2020	2014	2020	2014	2020	2020	2014	2020	2014	2020	2020	2014		
1	Boti Nambal /Gad-sar	49.54	48.85	7.95	8.64																									57.49	57.49	
2	Chandargur Nambal	8.27	8.14	0.21	0.34	0.36	0.36						1.01	1.01	0.83	0.83														10.68	10.68	
3	Check Sadurkut Bala	13.77	10.93	0.77	3.61	3.37	3.37								1.10	1.10														19.01	19.01	
4	Ferozpur Nambal	25.56	6.35	1.14	20.37								0.15	0.13																26.85	26.85	
5	Galandar sar	28.71	28.63	0.59	0.71								0.35	0.18	0.07	0.11	0.18													29.94	29.94	
6	Khushalsar	30.70	29.97	7.38	15.40				23.52	19.88			0.16	0.18	18.42	16.97	3.65	1.63												84.03	84.03	
7	NaidKhai Nambal	37.03	36.59	1.00	1.54	0.86	0.76						0.32	0.21	44.26	46.53	1.79	1.83												38.89	38.89	
8	Rakch-i-Rabitar	358.43	340.19	0.08	16.12	1.15	1.15						0.79	0.82	696.31	698.87														406.03	406.03	
9	Shallabugh Nambal	744.03	569.75	20.46	204.06	0.51	0.51						12.53	0.62	19.79	18.00														1474.63	1474.63	
10	Wullar Lake	7216.60	6134.00	2785.70	4440.00								644.90	688.00	19.79	18.00														13350.00	13350.00	
11	Jabor Sar	1.01	0.87	0.50	0.64																									1.51	1.51	
12	Naknal	0.75	0.29	0.00	0.46																									0.75	0.75	
13	Hokersar	131.76	92.99	950.35	1017.98								4.19	2.05	3.40	1.68	8.44	13.96	131.14	118.91	12.95	1.03								1347.33	1347.33	
14	Chirangpura Nambal	15.62	15.32	2.63	1.05	2.87	4.75																								21.12	21.12
15	Anchar lake	53.72	48.63	86.44	65.00								8.61	7.05	571.25	599.04	12.70	16.03	37.61	41.47										387.55	380.66	
16	Mirgund Jhil-I	110.76	109.17			79.50	49.29								64.10	95.90															254.36	254.36
17	Mirgund Jhil-II	22.84	20.20			6.22	7.84								20.82	21.84															49.88	49.88
18	Sudarkut Nambal	136.20	132.34			1.07	1.35								6.54	10.12														143.81	143.81	
19	Rakch-i-Kujar	376.69	375.64										6.05	7.10																382.74	382.74	
20	Hakim Gund Nambal	26.24	25.55										1.65	2.34																27.89	27.89	
21	Gangbugh Nambal-II	9.31	9.28										0.46	0.06	2.94	2.07	1.57	0.76	4.66	4.65										14.05	14.05	
22	Gangbugh Nambal	36.67	35.11										0.35	0.23	16.49	19.89	15.17	15.19	5.73	9.37										47.37	47.37	
23	Narkara Nambal	242.74	239.44										34.23	28.58	153.74	1609.11	45.36	51.51	651.52	252.30	12.95	1.03								276.65	276.65	
	Total	9676.95	8318.23	3865.40	5795.92	95.91	69.38	23.52	19.88	661.62	690.67	34.23	28.58	153.74	1609.11	45.36	51.51	651.52	252.30	12.95	1.03	85.33	51.00	2046.72	1943.00	468.03	380.66	23.61	11.62	19222.89	19222.89	

Land Use/ Classification Use	Increase in aquatic vegetation in respect of 23 Lakes					
	2020	2014	Decrease	Increase	Decrease Percentage	Increase Percentage
Aquatic Vegetation / Marshy	9,676.95	8,318.23		1,358.72	0	16
Open Water	3,865.40	5,795.92	1,930.52		33	0
Cropland	95.91	69.38		26.53	0	38
Floating Garden	23.52	19.88		3.64	0	18
Silted Area	661.62	690.67	29.05		4	0
Built-up	34.23	28.58		5.65	0	20
Plantation	1,531.74	1,609.11	77.37		5	0
Vacant / Fallow land	45.36	51.51	6.15		12	0
Agriculture	651.52	252.30		399.22	0	158
Scrub	12.95	1.03		11.92	0	1,157
Pasture	85.33	51.00		34.33	0	67
Vegetation	2,046.72	1,943.00		103.72	0	5
Horticulture	468.03	380.66		87.37	0	23
River	23.61	11.62		11.99	0	103
Total	19,222.89	19,222.89	2,043.09	2,043.09		

Appendix-3.4

(Reference: Paragraph No. 3.2)

Name of 40 Lakes where non-dredging resulted in increase in aquatic vegetation and consequent increase in other land use changes

S. No	Name of lakes with decrease in Open Water	Open Water		Aquatic Vegetation / Marshy		Cropland		Floating Garden		Silted Area		Built Up		Plantation		Vacant / Fallow land		Agriculture		Pasture		Vegetation		Horticulture		Total		
		2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020	2014	2020
1	Chandargar Nambal	0.21	0.34	8.27	8.14	0.36	0.36							1.01	1.01	0.83	0.83										10.68	10.68
2	Check Sadurkut Bala	0.77	3.61	13.77	10.93	3.37	3.37									1.10	1.10										19.01	19.01
3	Ferozpur Nambal	1.14	20.37	25.56	6.35									0.15	0.13												26.85	26.85
4	Galandar sar	0.59	0.71	28.71	28.63								0.35	0.35	0.18	0.11	0.18									29.94	29.94	
5	Khushalsar	7.58	15.40	30.70	29.97				23.52	19.88			0.16	0.18	18.42	16.97	3.65	1.63								84.03	84.03	
6	Mukhidumyari Nambal	0.05	0.84	20.55	23.65											4.33	0.44										24.93	24.93
7	Nadkhat Nambal	1.00	1.54	37.03	36.59	0.86	0.76																				38.89	38.89
8	Rakh-i-Rabitar	0.08	16.12	358.43	340.19	1.15	1.15					0.32	0.21	44.26	46.53	1.79	1.83									406.03	406.03	
9	Shallibagh Nambal	20.46	204.06	744.03	569.75	0.51	0.51				12.53	0.62	0.79	698.87													1474.63	1474.63
10	Wullar Lake	2785.70	4440.00	7216.60	6134.00						644.90	688.00	19.79	18.00					470.48	76.00	85.33	51.00	2046.72	1943.00	80.48	0.00	13350.00	13350.00
11	Galwal Taloa	0.27	0.32											0.03	0.03	0.90	0.85										1.20	1.20
12	Chirangpura Nambal	2.63	1.05	15.62	15.32	2.87	4.75																				21.12	21.12
13	Bodisar/Chadlam	15.31	9.42	32.78	39.15									8.48	8.00												56.57	56.57
14	Khooina Nambal	0.65	0.18	25.48	26.07	3.64	3.52							0.08	0.08												29.85	29.85
15	Waskur Nambal	21.82	19.86	0.36	2.32																						22.18	22.18
16	Sudnara Hasdkhan Nambal	4.69	1.23	31.55	35.01	0.08	0.08																				36.32	36.32
17	Ahan sar	14.00	10.98	0.18	3.20																						14.18	14.18
18	Manasbal Lake	21.681	185.29	19.24	19.35																						260.00	260.00
19	Anchar lake	86.44	65.00	53.72	48.63								8.61	7.05	571.25	599.04	12.70	16.03	37.61	41.47					387.55	380.66	1157.88	1157.88
20	Gadgopal			28.40	34.05									209.50	203.85												237.90	237.90
21	Haigam Jhil			450.60	455.07						38.01	33.54	1.37	1.37	159.22	159.22			105.01	105.01						754.21	754.21	
22	Malangpora			110.22	112.11								0.53	0.53	11.09	9.32	2.84	2.72									124.68	124.68
23	Naaz Nambal			2.57	7.24	5.58	0.91																				8.15	8.15
24	Rakh-i-Malgom			173.57	179.82	35.89	26.96							2.02	4.70												211.48	211.48
25	Zinipura Nambal			33.35	34.21	7.08	6.22																				40.43	40.43
26	Buna Nowgan Nambal			178.68	179.46						21.69	20.91															200.37	200.37
27	Mchattan			103.80	103.80								103.80														103.80	103.80
28	Merhana			202.49	202.49																						202.49	202.49
29	Sethergund Nambal			18.06	18.06																						18.06	18.06
30	Rakh-i-Arth			31.40	31.71								0.72	0.57	97.86	86.25	0.61	0.70	317.13	328.57					16.34	16.26	464.06	464.06
31	Devpora Nambal												0.16	0.16	3.92	3.25	2.38	2.38	10.14	11.18					8.18	7.81	24.78	24.78
32	Chak Nambal			33.15	36.66								0.85	0.64					21.28	16.82	0.66	1.82					55.94	55.94
33	Mirgund Jhil-I			110.76	109.17	79.50	49.29							64.10	95.90												254.36	254.36
34	Mirgund Jhil-II			22.84	20.20	6.22	7.84							20.82	21.84												49.88	49.88
35	S udarkut Nambal			136.20	132.34	1.07	1.35							6.54	10.12												143.81	143.81
36	Rakh-i-Kujjar			376.69	375.64									6.05	7.10												382.74	382.74
37	Hakim Gund Nambal			26.24	25.55																						27.89	27.89
38	Gangbugh Nambal-I			9.31	9.28									0.08	0.12												4.66	4.65
39	Gangbugh Nambal			36.67	35.11								0.46	0.06	2.94	2.07	1.57	0.76	5.73	9.37						47.37	47.37	
40	Narkara Nambal			242.74	239.44								0.35	0.23	16.49	19.89	15.17	15.19	1.90	1.90							276.65	276.65
	Total	3180.20	4996.32	10665.97	9718.66	148.18	107.07	23.52	19.88	717.13	743.07	138.26	30.17	1966.40	2052.06	69.26	61.46	1173.87	579.97	85.33	51.00	2046.72	1943.00	492.55	404.73	20707.39	20707.39	

Non-dredging resulted increase in aquatic vegetation and consequent increase in other land use changes in respect of 40 Lakes							
Land Use/ Classification Use	2020	2014	Decrease	Increase	Decrease Percentage	Increase Percentage	
Open Water	3,180.20	4,996.32	1,816.12		36		
Aquatic Vegetation / Marshy	10,665.97	9,718.66		947.31		10	
Cropland	148.18	107.07		41.11		38	
Floating Garden	23.52	19.88		3.64		18	
Silted Area	717.13	743.07	25.94		3		
Built-up	138.26	30.17		108.09		358	
Plantation	1,966.40	2,052.06	85.66		4		
Vacant / Fallow land	69.26	61.46		7.80		13	
Agriculture	1,173.87	579.97		593.90		102	
Pasture	85.33	51.00		34.33		67	
Vegetation	2,046.72	1,943.00		103.72		5	
Horticulture	492.55	404.73		87.82		22	
Total	20,707.39	20,707.39	1,927.72	1,927.72			

Appendix- 3.5

(Reference: Paragraph No. 3.2)

Lake-wise details of fishing and extraction of vegetation species

Sl. No.	Name of the Lake	Items of livelihood extracted/ utilised from the Lakes
1.	Marhama Wet Land	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
2.	Chandargar Nambal	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
3.	Check Sader koot Bala	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
4.	Chirangpura Nambal	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
5.	Khomina Nambal	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
6.	Mukhdamyari Nambal	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
7.	Naidkhai Nambal	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
8.	Naz Nambal	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
9.	Rakh-i- Malgom	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
10.	Sadunara, Hastikhan Nambal	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
11.	Sudarkut Nambal	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
12.	Zinipura Numbal	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
13.	Buna Nowgam Nambal	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
14.	Ferozpore Nambal	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
15.	Gathgopal	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
16.	Haigam Jhil	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
17.	Mirgund Jhil -I	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
18.	Mirgund Jhil -ii	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
19.	Hokar sar	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
20.	Narkara Nambal	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
21.	Rakh-i- arth	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
22.	Ahan sar	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
23.	Devapora	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
24.	Hakeem gund Nambal	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
25.	Manasbal	fishing, extraction of Nadroo, Bumb, Foder & weed
26.	Rakh-i-Kujar	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
27.	Rakh-i-Rabitar	fishing, extraction of Nadroo, Bumb, Foder & weed
28.	Shalabugh	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
29.	Waskur sar	fishing, extraction of vegetable , trapa, Foder & weed
30.	Bodsar/ Chattlan	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
31.	Galander sar	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
32.	Malangpora Nambal	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
33.	Sathergund	fishing, extraction of Kalrun, typha, Bumb, Foder & weed
34.	Anchar	fishing, extraction of Nadroo, Kalrun, typha, Bumb, Foder & weed
35.	Khushal sar	fishing, extraction of Kalrun, typha, Bumb, Foder & weed

Appendix- 3.6

(Reference: Paragraph No. 3.2)

Ongoing transfer of Lake areas by the Government for construction purpose as on March 2022

Sl. No	Name of the Lake	To whom transferred	Nomenclature of constructions	Land transferred (in hectares)
1.	Naz numbal	Medical Deptt. Education Deptt. Industries Deptt. Police etc.	Construction of - Govt. Hospital, Degree College, Industrial Estates, quarters for Police Deptt. etc.	22.95
2.	Rakh-i-Arth,	Lake Conservation and Management Authority	Construction of Rehabilitation Colony	376.30
3.	Narkara	Agricultural University- Kashmir, Railway Deptt.	Construction of Bldgs. for KVK, Railways etc.	127.30
4.	Rakh-i-Rabitar	Central University & Education Deptt	Construction of Central University, Higher Secondary School, playground etc.	35.00
5.	Rakh-i-Khujar	Srinagar Development Authority (SDA) & CRPF	Construction of Quarters	4.25
6.	Waskursar	Industries Deptt & CRPF	Construction of Industrial Estates & quarters	6.00
7.	Hakimgund	Industries Deptt., SDA etc.	Construction of Skill Institute, Housing quarters etc.	1.00
8.	Bodsar/ Chatlam	Fisheries Deptt.	Construction of office, hut and fishponds.	1.00
9.	Sethargund	Flood Irrigation Deptt, Sericulture, Railway etc.	Construction of office buildings	4.50
10.	Gungbugh	SDA, Board of School Education, JVC-Hospital, Police	SDA, Board of School Education, JVC-Hospital, Police Headquarters etc.	187.00
Total				765.30

Appendix- 3.7

(Reference: Paragraph No. 3.2)

Transfer of Lake areas by the Government for construction uses

Sl. No.	Name of the Lake	Government of Government or other agencies / Body	Nomenclature of constructions & quantum of land transferred	Land transferred (in hectares)
1.	Hakimgund	Industries Deptt. SDA & Floriculture Deptt.	Construction of Skill Institute, Housing Colony & Office	7.50
2.	Gungbugh-I	JVC, SDA etc.	Hospital and Housing Colony	210.00
Total				217.50

Appendix-3.8

(Reference: Paragraph No. 3.2)

Details of five Lakes in which encroachments were reported by the Tehsildars

(Area in hectares)

Sl. No.	Name of Lake	District in which Lake fall	Encroachment by way of	Quantum of Illegal Encroachment
1.	Haigam Jhil	Baramulla	Structures and school etc.	573.50
2.	Mirgund Jhuil-II	Baramulla	Plantation and reclamation of land Masses etc.	3.00
3.	Hokar Sar	Budgam	Plantation and reclamation of land Masses etc.	126.05
4.	Anchar Lake	Srinagar	Plantation and reclamation of land Masses , roads & structures etc.	7.00
5.	Khushalsar	Srinagar	Plantation and reclamation of land Masses siltation weed, roads and structures etc.	3.00
Total				712.55

Appendix-3.9

(Reference: Paragraph No. 3.3)

Funds allocated by the Government of Jammu and Kashmir for conservation and management Plans/ activities for six detailed-checked Lakes

Year	Overall disbursement of State/ UT under capex funds	State / UT releases to Lakes under capex					Total disbursement of capex funds to Lakes
		Dal	Wular	Manasbal	Hokersar	Surinsar / Mansar	
2017-18	10,352.88	53.00	-	1.45	0.02	0.86	55.33
2018-19	8,413.58	32.25	-	1.35	0.05	0.90	34.55
2019-20	9,944.23	36.56	-	2.13	0.05	0.51	39.25
2020-21	10,470.38	100.51	95.85	0.79	0.00	0.00	197.15
2021-22	11,047.04	179.02	54.02	1.33	0.00	0.00	234.37
Total	50,228.11	401.34	149.87	7.05	0.12	2.27	560.65

Appendix-4.1
(Reference: Paragraph No. 4.4)

Approved activities and sub-components with sanctioned cost to be covered under the National Lake Conservation Plan

(₹ in crore)			
Sl. No	Name of the Activity	Sub-components of the activities	Sanctioned cost
1.	Sewage Treatment	Sewerage works; Sewage pumping stations; Sewage Treatment Plants and Treatment of waste within the Lake hamlet, house boats and peripheral villages.	96.92
2.	Solid Waste Management Works	Provisions for community bins, Garbage gabblers, Payments for NGOs for collection of solid wastes etc.	0.76
3.	Hydraulic Works	Diversion works on Tailbal <i>Nallah</i> , remaining works for outlet of <i>Nallah</i> Amir Khan & Brari-Numbal cut and extension of Padshahi Channel	12.83
4.	Restoration and Development Works	Dredging of blocked channels, De-weeding, Reed belt creation including dredging, Shoreline Development, works for carrying fresh water from springs/ streams to Lake, additional dredging/ De-weeding works, and Aerators.	49.62
5.	Catchment Management	Structural measures, Stone walls, Plantation, Vegetative measures, Improvement to livelihood strategies etc.	25.84
6.	Infrastructure Development	Research & Development, water quality, monitoring, laboratory etc. Building for labs and J&K, LWDA, Captive power plant, and Bathymetric survey/ equipment/ works	15.93
7.	Public Awareness	Creation of website; establishment of Donga boat; Education/ cultural activities relating to Lake etc.	5.41
8.	Unforeseen/ Miscellaneous items	-	4.36
9.	Provision for land acquisition	Compensation for acquisition of land within the Lake	87.10
Total			298.77

Appendix-4.2
(Reference: Paragraph No. 4.5.1)

Underutilisation of overall funds received by Lakes Conservation and Management Authority

(₹ in crore)								
Period	Opening Balance	Capex	Revenue	NLC P (GoI)	Total	Expenditure	Closing Balance	Percentage underutilisation
	(1)	(2)	(3)	(4)	(5) =(1)+(2)+(3)+(4)	(6)	(7) =(5)-(6)	(8) =[(7)/(5)]*100
2017-18	67.83	53	15.97	22	158.8	79.16	79.64	50.15
2018-19	79.64	32.25	25.49	-	137.38	87.31	50.07	36.45
2019-20	50.07	36.56	23.08	-	109.71	61.08	48.63	44.00
2020-21	48.63	100.51	32.07	-	181.21	46.29	134.92	74.45
2021-22	134.92	179.02	32.50		346.44	65.76	280.68	81.02

Appendix-4.3
(Reference: Paragraph No. 4.5.1)

Underutilisation of funds under National Lake Conservation Plan

(₹ in crore)						
Year	Opening Balance	Receipts	Total availability	Expenditure	Closing Balance	Percentage underutilisation
	(1)	(2)	(3)	(4)	(5) =(3)-(4)	(6)=[(5)/(3)]*100
2017-18	9.34	22.00	31.34	8.08	23.26	74.22
2018-19	23.26	-	23.26	10.42	12.84	55.20
2019-20	12.84	-	12.84	2.21	10.63	82.79
2020-21	10.63	--	10.63	1.29	9.34	88.00
2021-22	9.34	--	9.34	0.34	9.00	96.00

Appendix-4.4
(Reference: Paragraph No. 4.5.1)

Statement showing unspent balances lying with implementing agencies

(₹ in crore)

Division	Lake Division-I	Lake Division-II	Mechanical	Total
	(1)	(2)	(3)	(4)=(1)+(2)+(3)
31.03.2015	0.52	0.40	0.16	1.08
31.03.2016	0.45	0.59	0.23	1.27
31.03.2017	1.25	0.52	0.39	2.16
31.03.2018	0.66	0.41	0.54	1.61
31.03.2019	0.61	0.63	0.47	1.71

Appendix-4.5
(Reference: Paragraph No. 4.6.1)

Treatment of sewage inflow by Sewage Treatment Plants

Sl. No	Sewage Treatment Plants At	Capacity / treatment design (mld)	Design years since installation	Areas to be serviced
1.	Habak	3.2	15	Zukra, Habak and Habak Homheir
2.	REC / Hazratbal	7.5		Kashmir University, Nasim Bagh, Hazratbal, REC, Nagin Bagh, Mirza Bagh and Nagin Lake periphery including Kantar, Suderbal, Mahirwar Suderbal, and upto Ashai Bagh Bridge.
3.	Nala Amir Khan	5.4		Western side of Nagin Lake periphery including Gulwanpura <i>Mohalla</i> , Alamdar colony (A and B), Botashah <i>Mohalla</i> , Mugal <i>Mohalla</i> , Ashraf <i>Mohalla</i> , Lal Bazar, Bhagwanpura, Nawab Bagh, and Lepar Hospital
4.	Brari Numbal ⁴	9.5		Moma Khan, Khajiarbal, Hathi Khan, Rainawari, Jogilankar & Miskeen Bagh etc.
5.	Hotel welcome	6.6		Buchwara, Gagribal & Durgjan
6.	Lam	4.5		Nishat, Lam, Brein Kralasangri, Guptganga, Karapura
Total		36.7		

⁴ STP at Welcome Hotel was amalgamated with STP Brari Numbal

Appendix-4.6
(Reference: Paragraphs No. 4.6.10 and 4.13)

Themes of research papers and its authors, conclusions and suggestions relating to Dal Lake

Sl. No	Research Reports of Dal Lake	Conclusions	Suggestions
1.	Forecasting Past and Future Trend of Physio-chemical Parameters In Dal Lake, Srinagar Kashmir, India using Statistical Analysis and Modelling of December, 2019 by Ishtiyah Ahmad Rather and Abdul Qayoom Dar	Increase in the nutrients from the catchment due to uncontrolled use of fertilizers and pesticides, unplanned urbanization, encroachment, in & around and tourist influx had resulted in the deterioration of the water quality of Dal Lake and consequently ecology of the Lake is changing. There is drop in the dissolved oxygen of the Lake. The considerable increase in the eutrophication cause hyper eutrophication of the Lake.	For future planning and management of the Lake, planning and implementation of Lake management strategies needed to refine and adapt to improve and preserve the present-day Lake water quality. Artificial Lake aeration should be installed to increase the dissolved oxygen levels in the Lake.
2.	Impact of sewage treatment plant effluent on water quality of Dal Lake, Kashmir, India of 01-2020 by Hafsa Farooq Chashoo, Adnan Abubakr, MH Balkhi & others	Sewage treatment plants installed to treat and improve wastewaters around Dal Lake is improper. STPs are not only malfunctioning but are exacerbating the problem of Lake pollution by bringing a catastrophic consequence as non-point sources of pollution are being made the point source of pollution. This has also manifested by an increase in the oxygen consumption in the hypolimnion, rise in the BOD, COD and the concentration of chlorides, sulphides, phosphorus and nitrogen. The same has also reported by Abu-Bakr & Kundangar (2009).	There is an urgent need to upgrade STPs so to reduce N & P concentrations more efficiently. The long term solution in our opinion is the adoption of proven Root Zone technology/ artificial wetland technology for waste water treatment. The same has been emphasized by Abu-Bakr and Kundangar (2004) and Abu-Bakr and Kundangar (2009)
3.	Environmental impact Assessment Studies on Dal Lake Kashmir of May 2018 by Shabeena Masoodi, M.R.D. Kundangar	Conservation measures to retrieve the Dal Lake are going on for last more than three decades yet there is no appreciable change in the ecological status of the Lake, the Lake continues under ecological stresses and the water quality does not show any significant improvement. The half-hearted approach and faulty proposal by the consultants have overshadowed the earlier achievements. The malfunctioning of STPs have made them point source pollutants. The incomplete sewerage system around Nigeen basin of Dal Lake has further aggravated the problems for the management practices. The houseboat sanitation had remained an unaccomplished job.	There is an urgent need to upgrade STPs to reduce N & P concentrations more efficiently. The long term solution in our opinion is the adoption of proven Root Zone technology/ artificial wetland technology for waste water treatment.
4.	Land use/cover mapping and assessing	There is rapid transformation of various landforms such as agricultural lands to residential class, water bodies into marshy	Land use and water quality are inseparable. Regulation of a proper land use plan in the Dal Lake

Sl. No	Research Reports of Dal Lake	Conclusions	Suggestions
	<p>the impact of solid waste on water quality of Dal Lake catchment using remote sensing and GIS (Srinagar, India) of August 2018 by Junaid Qadir and Perminder Singh</p>	<p>and marshy into either residential or agriculture in the catchment of the Lake. The major land use in the Lake catchment is built-up-area. During the last 3 decades, the area under built-up had increased from 46.94 (ha) in 1981 to 79.54 (ha) in 2011, whereas area under aquatic vegetation had also increased from 54.26 (ha) in 1981 to 90.15(ha) in 2011. Increase in the human settlement within and around the Lake and house boats are adding rich solid waste and direct sewer discharge in the Lake. As a result, there are drastic changes in the water quality of the Lake. This had led to eutrophication of the Lake and its ecosystem is deteriorating fast.</p>	<p>catchment is vital for preventing the further nutrient enrichment and sedimentation of the Lake waters.</p>
5.	<p>Assessing the impact of land use and land cover dynamics on water quality of Dal Lake, NW Himalaya, India of April 2020 by Shri Ishtiyaq Ahmad Dar & Shri Abdul Qayoom</p>	<p>The changing land-use practices in the Dal catchment have severe repercussions on its ecology and the long term socioeconomics of the whole Kashmir valley. The main reason for the deterioration of the water quality of Dal Lake is due to increased nutrient and silt loads from its catchment as a result of unprecedented LULC changes. There is decrease in the forest cover from 135.72 km² in 1980 to 118 Km² in 2018 during four decades. An aquatic vegetation within the Lake had increased 180.65 <i>per cent</i>, with only 2.03 km² of area in 1980 to 5.70 km² in 2018. The amount of nitrogen and phosphorus in the Lake is tremendous, thereby deteriorating its water quality. The ecology of the Lake got severely damaged, resulted in adversely affecting its flora and fauna. The sewage discharge from the urban catchment had amplified the eutrophication of the Lake as well.</p>	<p>A broad framework of policies for sustainable management of sewage of the urban Dal Lake catchment, and a concrete action plan for the conservation and restoration of Lake. Provided essential inputs to Policy makers in understanding the role of land use and land cover changes impacting the water quality of the Lake so there is need to frame an effective and eco-friendly land-use policy for its catchment.</p>

Appendix-5.1
(Reference: Paragraph No. 5.5.3.2)

Details of funds releases, expenditure incurred and unspent fund in respect of Wular Lake

(₹ in crore)					
13 th FC					
Period	Opening balance	Funds received	Expenditure	Closing Balance	Underutilisation of funds (per cent)
2011-12	00	30.00	3.50	26.50	88
2012-13	26.50	00	12.66	13.84	52
2013-14	13.84	00	5.31	8.53	62
2014-15	8.53	30.00	10.18	28.35	74
Total		60.00	31.65		
2015-16	28.35	00	13.74	14.61	52
2016-17	14.61	00	0.44	14.17	97
2017-18	14.17	00	0.11	14.06	99
2018-19	14.06	00	3.86	10.20	73
2019-20	10.20	00	8.43	1.77	17
Capex funds					
Period	Fund Approved	Allocation	Expenditure		Remarks
2020-21	196.15	95.85	95.85	-	Funds of ₹ 46.28 crore were not released
2021-22		54.02	54.02	-	
Total	196.15	149.87	149.87		

Appendix-5.2
(Reference: Paragraph No. 5.6.2)

Activity-wise approved tentative cost, expenditure incurred under CAPEX vis-à-vis proposed revised activity-wise cost estimates to be implemented for Comprehensive Conservation and Management Plan
(₹ in crore)

Sl. No	Activity	Cost approved under Action plan	Expenditure	Revised/cost overrun proposed
1.	Survey & Demarcation	4.00	0.17	13.00
2.	Catchment Conservation	14.20	3.83	95.18
3.	Water Management	171.76	144.73	1,554.67
4.	Bio-diversity Conservation	1.80	0.00	17.25
5.	Eco-Tourism Development	1.87	0.02	282.26
6.	Sustainable Resource Development & Livelihood Improvement	00	0.00	18.64
7.	Institutional Development	2.52	1.12	19.00
Total		196.15	149.87	2,000.00

Appendix-5.3
(Reference: Paragraph No. 5.8.1)

Themes of research papers and its authors, conclusion and suggestions relating to Wular Lake

Sl. No	Research Reports	Conclusions	Suggestions
Themes of research papers & its authors, conclusions and suggestions in respect of Wular Lake			
1	Dying Wular: A Progeny to Preserve dated September-2020 by Zubair Ahmad Naik & Rahul Dabra	<p>Lake has been the victim of the ill planning practices within, around the as well as within the catchment of the Lake. Once known for the quality water and the aquatic life, has become reservoir of the pollution which comes in different forms through the water coming into it. The Lake is shrinking at an alarming rate besides the water quality is getting deteriorated on daily basis. The Lake had deteriorated or vanished in terms of size, ecology, productivity, water-quality, beauty, hydrography etc. At present it is undergoing degradation at a very fast pace.</p> <p>Much of its area has been brought under vegetation, agriculture, human settlement, government departments, tourist hotels etc.</p> <p>The problem of the Lake has not been well recognized until recently. A number of reports and active plans have appeared in recent years but the results are zero.</p> <p>Measures and steps have not been taken as yet to save Lake from becoming a cesspool.</p>	<p>The following remedial measures were laid:</p> <ul style="list-style-type: none"> - ➤The government should take active role in conservation and maintenance of Lake. ➤People must be educated about modern scientific methods of sanitation, sewage, disposal and processing of the waste matter to avoid sewer pollution in the Lake. ➤Deforestation must be stopped and the process of afforestation be vitalised. ➤There should be only a regulated and controlled township at urban and local levels. ➤Encroachment upon parks, Lakes, rivers and streams must be stopped. ➤There is a need to improve Lakes hydrological connectivity with existing marshes. It will help in water absorption capacity of the wetland system to control flooding and increase retention capacity of Lake. ➤Government should decide to get the boundaries of the Lake identified and proposals formulated for its protection and preservation.
2	On the fish diversity, conservational management and rehabilitation aspects of Wular Lake, Kashmir India Dated 21 Nov, 2016 by Rumysa.K, Sharique A Ali & others	<p>The population of Schizothracine fishes in Lake had considerably decreased over the years particularly after the introduction of common carp in 1956. The fish species like Schizothorax richardsonii and Bangana diplostoma once abundant and even caught in commercial quantities, which has now disappeared. The factors responsible for decline in indigenous fishes is the encroachment of the shallow areas of the Lake for agricultural activities as use of artificial fertilizers, pesticides and herbicides in apple orchards and paddy fields from nearby areas had effected the indigenous fishes. Besides, direct discharge of untreated sewage coming from highly populated villages, catchment runoff, tourist pressure etc. Combinations of these threat factors</p>	<ul style="list-style-type: none"> ➤ Master plan should be developed for the treatment of all point source of pollution entering into the Lake, especially for the sewage coming from the residential area of the Lake which otherwise will affect the water quality and will deteriorate over all ecosystem health. ➤Watershed management plan should be implemented along the catchment area of Lake and construction and human habitation should be prohibited ➤Deforestation and overgrazing should be properly controlled in order to prevent soil erosion and loss of biodiversity. ➤ Indiscriminate mining of sand should be restricted or minimized as this practice destroys the breeding grounds and dwelling place of Lake Fauna. ➤Sustainable fisheries development to maintain/ restore fish diversity and yield. ➤Control of invasive species and enhancing biodiversity. ➤To protect the Lake from silt problem brought in through main feeding channel-and other small streams, settling basins need to

Sl. No	Research Reports	Conclusions	Suggestions
		<p>affect not only fishes but also puts freshwater biodiversity uniquely at risk.</p>	<p>construct near their points into the Lake.</p> <ul style="list-style-type: none"> ➤ Large areas of the Lake have been illegally encroached and converted into paddy fields and vegetables gardens. The further encroachment in the Lake must be stopped. ➤ Continuous deposition and pouring of domestic wastes, garbage and dead animals into the channels which ends at Lake be stopped under strict orders.
3	<p>Analyzing Vegetation Change Processes at Watershed Level: A Multi-temporal Study of the Wular Catchment dated September 2017 by Zahoor-ul-Hassan, M Imran Malik & T.A. Kanth</p>	<p>Catchment of the Lake is facing drastic changes in vegetation patterns mainly by unplanned utilization and management of natural resources due to influence of increased human activities. The major changes include the growth of hydrophytic vegetation due to increased nutrient levels and also the cultivation of water nuts, fodder etc. on the associated marshes. The change in the land use from paddy to the horticultural land is another important change that had occurred in the catchment. The degradation of forests and their conversion to the grasslands and wastelands is also an important anthropogenic impact on the Catchment.</p>	<p>Watershed is considered to be the ideal unit for analysis and management of natural resources for planning. The soil, vegetation and water are the basic resources, which interact and establish in a watershed. Hence, all these three resources have to be managed collectively and in an integrated way. The continuous monitoring of the land cover changes provides a better understanding of the interactions between human and natural phenomena to manage and use resources. Contain increasing encroachment and deterioration of water quality of Lake.</p>

Appendix-6.1
(Reference: Paragraph No. 6.3.7)

Themes of research papers and its authors, conclusion and suggestions relating to Manasbal Lake

Sl. No	Research Report	Conclusions	Suggestions
1.	Coliform bacterial estimation: A tool for assessing water quality of Manasbal Lake of Kashmir, Himalaya by Sana Shafi, Azra N. Kamili, Manzoor A. Shah and Suhaib A. Bandh from the Department of Environmental Science/Botany/ Centre of Research for Development/ University of Kashmir	High density of total coliform bacteria in the Lake water indicated that the water quality had deteriorated and was not fit for drinking purposes. This was due to poor land use pattern in the immediate catchment and discharge of waste water into the Lake.	Control must be implemented to minimize bacterial transport to such natural systems.
2.	Assessing the Impact of Anthropogenic Activities on Manasbal Lake in Kashmir Himalayas by Irfan Rashid, Majid Farooq, Mohammad Muslim, Shakil Ahmad Romshoo from the Department of Earth Sciences, University of Kashmir, Srinagar	Stone quarrying and subsequent land system changes in the catchment were the main causes responsible for the deteriorating health of the Lake by adversely influencing the erosion and other land surface processes in its catchment area. As a result, there was increase in the nutrient and silt load and their discharge into the Lake. High sediment and nutrient loads have a direct bearing on the distribution of flora and fauna. This had caused extinction of a fish species (<i>Bortia birdi</i>) and an aquatic plant (<i>Eurayle ferox</i>) from the Lake.	Afforestation of barren areas with local coniferous forest species like <i>Pinus wallichiana</i> to reduce the silt load on the Lake body. Continuous monitoring of the Lake, its immediate surrounding and the catchment for land system changes, hydrochemistry, biodiversity and Lake hydrology to develop a robust strategy and action plan for the conservation and restoration of the Lake
3.	Rotifer community in Manasbal Lake of Kashmir of 2014 by Irfan Jamila, A. R. Yousuf, Muni Parveen, Khalida Hassan, Musharaf Rehman and Bashir A. Sheikh from the Center of Research for Development and Department of Zoology, University of Kashmir, Srinagar	Dominance of rotifera- <i>Brachionus calyciflorus</i> at littoral zone of the Lake indicating that Lake is tending fast towards eutrophication due to site being used for many activities like washing, bathing; effluents of organic wastes are discharged into the Lake.	

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