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RESEARCH ARTICLE

A STUDY ON ENCROACHMENT AND RESTORATION OF WATER BODIES IN INDIA

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ABSTRACT

India accounts for 18% of the world's population but has mere 4% of its fresh water resources. More than 80% of the water in the country is used for agriculture while the remaining is allocated for domestic and industrial purposes. India is gradually progressing from being a water-abundant country to one facing water scarcity owing to simmering pressure of population explosion and alarming rate of urbanisation and industrialisation. Population explosion, haphazard urbanisation and industrial expansion have led to the depletion of water bodies and thus paved the way for encroachment of water bodies. The enumeration, preservation, conservation and renovation of bodies are becoming increasingly important for economic, social and environmental sustainability. During the first census of water bodies (2017-18), 24,24,540 water bodies have been enumerated in the country, out of which 14,42,993 are ponds (59.5%), 3,81,805 are tanks (15.7%) and 2,92,280 are reservoirs (12.1%), whereas the remaining 3,07,462 are water conservation schemes (12.7%), check dams, percolation tanks, lakes and other water bodies. The present paper appraises the encroachment of water bodies, causes and impact of it. The central assistance released and water bodies restored and also the status of water conservation and water harvesting works in India are also appraised.

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INTRODUCTION

Increasing industrialisation, haphazard urbanisation and a market-driven economy drive for unlawfully encroaching large tracts of public land and water bodies mainly for real estate and cultivation purposes.[1] Encroachment on water bodies is the advancement of structures and utilities into natural areas like rivers, lakes and ponds, often leading to their degradation and loss of biodiversity. This widespread issue has prompted government initiatives, including water body censuses and campaigns like Amrit Sarovars, to identify, protect and restore these crucial resources, though responsibility for action also lies with the state governments. The Ministry of Jal Shakti conducted the first-ever census of water bodies of India in 2018-19 and provided a comprehensive inventory of India's water resources, including natural and man-made water bodies such as ponds, tanks, lakes and more. Moreover, it identified the encroachment of water bodies and highlighted disparities between rural and urban areas, varying levels of encroachment and revealed even crucial insights into the country's water resources. The Ministry of Jal Shakti conducts the census to identify water stress areas, plan for water conservation, prevents encroachments and designs policies on judicious water use and conservation. All natural or man-made units bounded on all sides with some or no masonry work used for storing water for irrigation or other purposes (e.g. industrial, pisciculture, domestic/drinking, recreation, religious, ground water recharge etc.) were treated as water bodies in the first census of water bodies.

ENCROACHMENT ON WATER BODIES: Encroachment is defined as the illegal occupation of water body boundaries and their buffer zones for activities such as construction and agriculture. Moreover, it is the physical intrusion of buildings, roads and other constructions into natural water bodies and their buffer zones. This includes the filling of ponds, the reduction of river corridors and the building on floodplains and wetlands. India, despite having multiple freshwater sources, is under subterranean water stress now due to the growing demand on account of increasing population, negligence, pollution and exploitation. Water bodies are encroached for human activities. This increases impervious cover adjacent to these water bodies like rivers, lakes and wetlands. The functions of the water bodies are significantly affected resulting in a decline in water quality, disturbance in equilibrium conditions and loss of terrestrial and aquatic habitat.

Illegal Encroachments of Water Bodies and River Beds

Regulating, preservation and conservation of water bodies including river beds, lakes, etc., and to check illegal encroachments, are under the purview of the State Government concerned. However, in order to supplement the efforts of the State Governments, some of the initiatives taken by Government of India in this regard are as below:

- Government of India is providing financial assistance to the identified schemes under Repair, Renovation and Restoration of Water Bodies (RRR of WBs) component of Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)-Har Khet Ko Pani (HKKP).[2]
- Rejuvenation of water bodies is also a component under Water Supply sector of Atal Mission for Rejuvenation and Urban Transformation (AMRUT) scheme under Ministry of Housing & Urban Affairs. Further, AMRUT 2.0 launched in October, 2021, includes rejuvenation of water bodies and water conservation.[3]

- Jal Shakti Abhiyan was launched by the Government in 2019 and continued as an annual "Jal Shakti Abhiyan: Catch The Rain" (JSA:CTR) campaigns**,** covering all districts (rural as well as urban) of India. The Government of India and the State Governments focus on renovation of traditional and other water bodies/ tanks, enumeration, geo-tagging and making inventory of all water bodies, and removal of encroachments of tanks/ lakes and de-silting of tanks, and protection of water catchment area.[4]
- To commemorate Azadi ka Amrit Mahotsav (AKAM), marking 75 years of independence from British rule, Government of India has also launched a campaign to take up creation/ rejuvenation of 75 water bodies, to be called Amrit Sarovars, in every district of India.[5]
- Government of India launched the first census of water bodies in convergence with the Sixth Round of Minor Irrigation Census (reference year 2017-18), under the centrally sponsored scheme- "Irrigation Census". The objective of the exercise is to develop a national database of all water bodies in the country. The work is now in its last leg, with provisional information having been compiled.[6]
- Mahatma Gandhi National Rural Employment Guarantee Scheme (MNREGS) has provisions for public works relating to water resource management conservation and water harvesting structures to improve groundwater like underground dykes, earthen dams, stop dams, check dams and roof-top rain water harvesting structures.[7]

As per the 1st Census of water bodies in convergence with the sixth minor irrigation census (reference year 2017-18), under the centrally sponsored scheme – "Irrigation Census" conducted by this Ministry, 36,717 number of water bodies are reported to be encroached. It is for the State Government to take corrective actions in this regard.

CAUSES AND CONSEQUENCES OF ENCROACHMENT ON WATER BODIES

Encroachment of water bodies is the unauthorized advancement of human structures and activities into rivers, lakes, ponds, and wetlands, leading to reduced natural water retention and increased flood risks. The urban development and a lack of effective enforcement of land-use regulations are the prime factors of water bodies' encroachment.

Causes of Encroachment

Lack of Enforcement: High Court judgments indicate that authorities have been willing to follow the legal process but face political hurdles and inaction, allowing violations on water bodies to persist. Weak legal frameworks and inadequate enforcement can allow encroachment of water bodies.

Urbanization and Development: Rapid urban growth often leads to the conversion of natural landscapes, including water bodies into built-up areas.

Land-Grabbers and Nexus: In some cases, powerful local elites, bureaucrats and politicians may be involved in land-grabbing schemes which facilitate flexible encroachment.

Consequences of Encroachment

Environmental Degradation: There is loss of natural ecosystems and the associated flora and fauna. Encroachments destroy flora and fauna and damage human settlements, contributing to environmental crises.

Loss of biodiversity: Encroachment destroys habitats, leading to the loss of local flora and fauna and reduces the rich variety of life found in and around water bodies.

Reduced water availability: It can hinder the natural functions of water bodies, impacting water supply for communities and ecosystems.

Increased pollution: Encroachment can disrupt natural filtration and flow, contributing to water quality issues.

Flood risks: Structures built in floodplains reduce natural flood absorption, increasing the risk of flooding in surrounding areas. Depriving areas of their natural water storage capacity leads to increased flooding during heavy rainfall. Illegal constructions, especially in water channels, are directly linked to increased flood occurrences

Water Scarcity: The natural replenishment of aquifers through wetlands and other water bodies is disrupted.

STATUS OF WATER BODIES AND THEIR ENCROACHMENT

The encroachment on water bodies is rampant and many encroachers are resorting to violence to silence those who oppose them. Recurrent droughts in the state necessitate that these water bodies be restored and protected, and encroachments are removed. The Ministry of Jal Shakti launched the first census of water bodies in convergence with the sixth minor irrigation census (reference year 2017-18), under the centrally sponsored scheme – "Irrigation Census". The objective of the census of water bodies is to develop a national database for all water bodies by collecting information on all important aspects of the subject including their size, condition, status of encroachments, use, storage capacity etc. As per usual practice, the census was conducted by the State/UT Governments through nodal department identified in each State /UT for this purpose. State-wise information on number of water bodies in rural and urban area as available from the first census of water bodies is given in the Table 1**.**

The table portrays that 24,24,540 water bodies have been enumerated for the Census, out of which 97.1% (23.5 lakh water bodies) are in rural areas and only 2.9% (69,485) are in urban areas. Out of the 23.5 lakh water bodies in rural areas, 36,736 water bodies are encroached while in urban areas, 1,760 water bodies are encroached. The lesser proportion of water bodies in the urban areas is quite obvious since the urban areas have undergone expansions and infrastructural development which might have caused depletion of water bodies as 1.6% of the water bodies enumerated in rural areas were encroached as compared to 2.5% in urban areas. State-wise data reveals that Uttar Pradesh had the greatest number of water bodies encroached, with 15,301 followed by Tamil Nadu with 8,366. Andhra Pradesh and Telangana have also recorded more than 3,000 encroached water bodies each. Together, these 4 states account for almost 80% of the total water bodies encroached in India. The share of water bodies encroached across states gives a clearer picture since the number of water bodies enumerated in each state varies. For instance, in Andhra Pradesh, 3,920 water bodies are encroached out of the total 1.9 lakh water bodies enumerated in the state. This number is much larger than the total number of water bodies enumerated in the northeastern states. In terms of the percentage of water bodies encroached as against the total number of water bodies enumerated in the respective states, it is seen that the variation across states is huge. It ranges from less than 1% in states like Odisha, Kerala, Jharkhand, and Maharashtra to more than 24% in Delhi. After Delhi, Punjab has the highest share of water bodies encroached with nearly 10% followed by Tamil Nadu with nearly 8% and Uttar Pradesh with 6.2%. This disparity is also evident across states. Nearly 39% of the water bodies in urban areas of Delhi are encroached as against 23.4% in rural areas. Similarly, in Tamil Nadu, the share of encroached water bodies in urban areas is more than 13% while in rural areas it is less than 8%. Likewise, 11.3% of the water bodies in urban Telangana are encroached compared to 4.6% in rural parts of the state. Such disparity in rural and urban figures is visible in states like Andhra Pradesh, Bihar, Puducherry, and Gujarat. It is also observed that the number of encroached water bodies in urban parts of Maharashtra,

Table 1. State-wise number of water bodies reported in the first Census of Water bodies

Sl.No.	States/UTs	No. of Water Bodies			No. of Encroached Water Bodies		
		Rural	**Urban**	**Total**	**Rural**	**Urban**	**Total**
1	Andaman & Nicobar Islands	3497	31	3528	59	0	59
2	Andhra Pradesh	190263	514	190777	3871	49	3920
3	Arunachal Pradesh	893	100	993	0	0	0
4	Assam	170112	2380	172492	6	7	13
5	Bihar	43831	1962	45793	779	92	871
6	Chandigarh	23	165	188	0	0	0
7	Chhattisgarh	33519	481	34000	111	0	111
8	Delhi	849	44	893	199	17	216
9	Goa	1406	57	1463	8	0	8
10	Gujarat	53156	913	54069	3	19	22
11	Haryana	14898	0	14898	50	0	50
12	Himachal Pradesh	87364	653	88017	42	0	42
13	Jammu & Kashmir	9687	78	9765	102	1	103
14	Jharkhand	106176	1422	107598	559	1	560
15	Karnataka	26224	789	27013	948	0	948
16	Kerala	49725	6009	55734	103	8	111
17	Madhya Pradesh	81012	1631	82643	1750	29	1779
18	Maharashtra	96343	719	97062	251	0	251
19	Manipur	1369	289	1658	0	6	6
20	Meghalaya	12798	534	13332	6	0	6
21	Mizoram	1436	749	2185	4	3	7
22	Nagaland	1287	145	1432	1	0	1
23	Odisha	178054	3783	181837	1028	20	1048
24	Puducherry	1050	121	1171	26	8	34
25	Punjab	15831	181	16012	1577	1	1578
26	Rajasthan	16750	189	16939	45	2	47
27	Sikkim	122	12	134	0	0	0
28	Tamil Nadu	99414	7543	106957	7360	1006	8366
29	Telangana	63063	992	64055	2920	112	3032
30	Tripura	32140	4099	36239	1	0	1
31	Uttarakhand	2970	126	3096	4	1	5
32	Uttar Pradesh	240139	4948	245087	14923	378	15301
33	West Bengal	719654	27826	747480	0	0	0
TOTAL		**2355055**	**69485**	**2424540**	**36736**	**1760**	**38496**

Source:First Census of Water Bodies 2017-18 but released in 2023[8]

Table 2. Levels of Encroachment of Water Bodies in India

Sl. No.	Percentage of Area Under Encroachment of Water Bodies	Percentage of number of Water Bodies under Encroachment	Cumulative Percentage of number of Water Bodies under Encroachment
1	< 25	62.80	62.80
2	25 - 50	17.80	80.60
3	50 – 75	7.60	88.20
4	.> 75	11.80	100.00
Total		100.00	

Source: Census of Water Bodies, Report of Government of India, 2023[9]

Table 3. Key Findings from the First Census

Sl. No.	Type of Water Body	Area Encroached	Percentage
	Rural	2,355,055	97.10
	Urban	69,485	2.90
	Total	2,424,540	100.00
1	Ponds	1,442,993	59.50
2	Tanks	381,805	15.70
3	Reservoirs	292,280	12.10
4	Water Conservation Schemes/ percolation tanks/check dams	226,217	9.30
5	Lakes	22,361	0.90
6	Others	58,884	2.50

Source: First Water Bodies Census, Report 2017-18 released in 2023) [11]

Table 4. Central Assistance Released and Water Bodies Restored

Sl. No.	State	Central assistance released till March 2021(Rs. in crore)	Water Bodies completed till March 2021
1	Andhra Pradesh	2.70	0
2	Bihar	18.08	6
3	Gujarat	8.81	3
4	Madhya Pradesh	37.70	124
5	Manipur	34.63	0
6	Meghalaya	5.18	8
7	Odisha	145.18	810
8	Rajasthan	62.18	66
9	Tamil Nadu	34.25	153
10	Telangana	104.56	371
11	Uttar Pradesh	16.41	8
Total		**469.69**	**1549**

Table 5. Status of Water Conservation and Water Harvesting Works in India on 13.07.2023

Sl. No.	Name of the State / UT	Status of Water Bodies	
		Completed	Ongoing
1	Andhra Pradesh	333247	27470
2	Arunachal Pradesh	1236	386
3	Assam	29481	18173
4	Bihar	125996	56215
5	Chattisgarh	195933	35095
6	Goa	157	83
7	Gujarat	157744	25120
8	Haryana	15234	2138
9	Himachal Pradesh	99884	9522
10	Jammu & Kashmir	43591	26923
11	Jharkhand	399528	14774
12	Karnataka	398729	118897
13	Kerala	441775	65902
14	Ladakh	718	25
15	Madhya Pradesh	736820	126572
16	Maharashtra	211233	14323
17	Manipur	10634	3273
18	Meghalaya	20460	10111
19	Mizoram	8682	337
20	Nagaland	5059	826
21	Odisha	138620	83393
22	Punjab	4161	2282
23	Rajasthan	183831	92357
24	Sikkim	4268	768
25	Tamil Nadu	434021	70622
26	Telangana	522817	83634
27	Tripura	141838	3051
28	Uttar Pradesh	493083	113963
29	Uttarkhand	80478	13117
30	West Bengal	379338	66048
31	Andaman & Nicobar Islands	397	101
32	Dadra, Nagar Haveli and Daman & Diu	1	3
33	Lakshadweep	50	34
34	Puducherry	354	56
Total		5619488	1085826

Source: Census of Water Bodies, GOI, 2023[13]

Karnataka, and West Bengal where some of the major Indian cities are located, is reported as zero. The top 5 states in terms of the number of water bodies are West Bengal, Uttar Pradesh, Andhra Pradesh, Odisha and Assam, which constitute around 63% of the total water bodies in the country. The top 5 states in terms of the number of water bodies in urban areas are West Bengal, Tamil Nadu, Kerala, Uttar Pradesh and Tripura, whereas in rural areas, the top 5 states are West Bengal, Uttar Pradesh, Andhra Pradesh, Odisha and Assam.

Levels of Encroachment: The area encroached for 24,516 out of the total 38,496 water bodies, was assessed. Based on the area encroached, the report categorises the water bodies reeling under encroachment of 4 different levels (Table 2 and Fig.1), i.e. less than 25% of the area encroached, those with 25 to 50% encroached, those with 50 to 75% encroached and those with more than 75% area under encroachment. The table portrays that 62.8% of these water bodies have less than 25% area under encroachment while 11.8% have more than 75% of area under encroachment. About 17.8% had 25 to 50% area under encroachment and the remaining 7.6% had 50 to 75% area under encroachment. In other words, about one in every five encroached water bodies had more than 50% of their area encroached.

Encroachment of Ponds: Water being a State subject, it is for the State Governments concerned to take cognizance of encroachment on different ponds in the State, and to take up programmes and schemes for protection and restoration of its water bodies against encroachment. However, for supplementing the efforts of the State Governments, Government of India has taken a number of important initiatives for enumeration, conservation and development of water bodies. In 2019, Jal Shakti Abhiyan was launched by the Government. This was followed in 2021 by "Jal Shakti Abhiyan: Catch The Rain" (JSA:CTR)[10] campaign. Focused interventions under these annual campaigns taken up by the Government of India and the State Governments, inter-alia, include renovation of traditional and other water bodies/tanks, enumeration, geo-tagging and making inventory of all water bodies and removal of encroachments of tanks/lakes and de-silting of tanks.

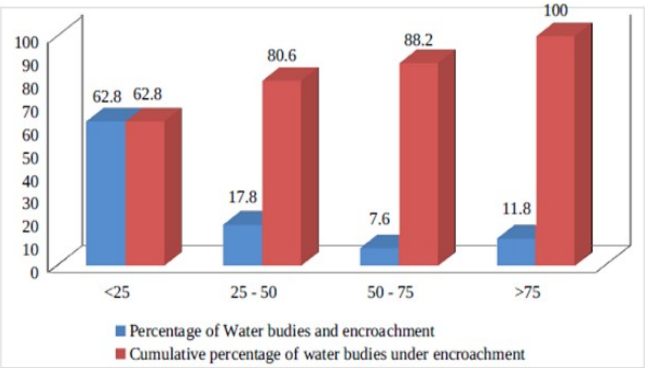

Fig.1. Levels of Encroachment of Water Bodies in India

Census Findings (2023): The first water bodies' census collected data across 33 states and union territories and the key findings from the Census are presented in the Table 3. India's First Census of Water Bodies (reference year 2017-18, released 2023) found 2,424,540 water bodies, with 97.1% in rural areas and 2.9% in urban areas. Among them 59.5% of water bodies are ponds, followed by tanks (15.7%), reservoirs (12.1%), water conservation schemes/percolation tanks/check dams (9.3%), lakes (0.9%) and others (2.5%). Majority of the encroached water bodies are Ponds. The report also reveals that more than two-thirds of all encroached water bodies are ponds.

RESTORATION OF WATER BODIES: Initiatives like India's Amrit Sarovar and Jal Shakti Abhiyan aim to protect and restore these vital resources. Ministry undertakes census of minor irrigation schemes from time to time, which also captures information

pertaining to certain specific water bodies in the country. Works related to water resources development & management are planned, funded, executed and maintained by the State Governments as per their own resources and priorities. State-wise details of central assistance released and water bodies restored are presented in the Table 4. Central assistance for restoration of water bodies is provided by this Ministry under the scheme "Repair, Renovation and Restoration (RRR) of Water Bodies", which is a component of Pradhan Mantri Krishi Sinchayee Yojana – Har Khet KO Pani (PMKSY- HKKP**).** The scheme aims at restoring the lost irrigation potential by improvement and restoration of existing water bodies. Under the RRR of Water Bodies scheme, XII Plan onwards a total of 2,228 water bodies with an estimated cost of Rs.1,914.86 crore, have been taken up for restoration in various States. Up to March, 2021, central assistance of Rs.469.69 crore has been released to the States under the scheme, and in this period RRR of 1,549 water bodies has been completed. [12]

Status of Water Conservation and Water Harvesting Works: Mahatma Gandhi National Rural Employment Guarantee Scheme (MNREGS) has provisions for public works relating to natural resource management, water conservation and water harvesting structures to augment and improve ground water like underground dykes, earthen dams, stop dams, check dams and roof-top rain water harvesting structures in public buildings. The State/UT wise details of water conservation and water harvesting works completed as on 13.07.2023 since inception of the scheme are presented in the Table 5. The table 4 portrays that 6705314 works relating to water bodies have been considered for conservation and harvesting. Nevertheless, 5619488 works have been completed and 1085826 works have been ongoing. If the ongoing works are completed immediately, there can be reduction in the encroachment of water bodies.

RECOMMENDATIONS

The following suggestions have been forwarded to protect water bodies and control further encroachment of water bodies

- Petitions must be filed against the unauthorized construction on water bodies and their buffer zones, leading to orders for the removal of encroachments.
- The State government should take necessary steps immediately to protect water bodies from illegal occupation and encroachments.
- The government to take immediate steps to protect water bodies by appointing committees to monitor and conserve village tanks.
- Encroachments of water bodies can be reduced by imposing penalties on the culprits to curb encroachments and maintain water bodies.
- All structures, including those constructed decades ago, on encroached lands must be demolished.

CONCLUSION

The water bodies play a pivotal role in the ecosystem and human life as they are water retaining structures. There are 24,24,540 water bodies in India, of which 23,55,055 (97.1%) are in rural areas and only 69,485 (2.9%) are in urban areas. India conducted its First Census of Water Bodies, completed in 2023, enumerating 2.42 million water bodies. Owing to population explosion, urbanisation and industrial expansion, the water bodies have become stooges for encroachment. Moreover, due to poor rainfall for many years, the village tank did not fill fully and became an easy target for local villagers to encroach upon to grow banana, coconut, oilseeds, pulses, and flowers. It is the need of the hour now to protect them and their further encroachment. If these are not protected, water scarcity will loom large further as both surface and ground water levels declined drastically and by now there is an alarmingly increasing rate of water scarcity in India. There is a strong push for stringent laws to penalize not only the public involved in encroachments but also the government officials who fail to act.

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