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## ***ABOUT US***

WHITE BLACK LEGAL is an open access, peer-reviewed and refereed journal provided dedicated to express views on topical legal issues, thereby generating a cross current of ideas on emerging matters. This platform shall also ignite the initiative and desire of young law students to contribute in the field of law. The erudite response of legal luminaries shall be solicited to enable readers to explore challenges that lie before law makers, lawyers and the society at large, in the event of the ever changing social, economic and technological scenario.

With this thought, we hereby present to you

# **CLIMATE CHANGE: THE DAY AFTER** **TOMORROW**

AUTHORED BY - MAYANK AGNANI

## **ABSTRACT**

*With significant effects on the environment, society, and economy, climate change is a critical worldwide concern. Extended variations in temperature and meteorological patterns are referred to as climate change. These changes may occur naturally as a result of significant volcanic eruptions or variations in the sun's activity. However, human activity has been the primary cause of climate change since the 1800s, mostly as a result of the combustion of fossil fuels like coal, oil, and gas.*

*The study topic focuses on the main causes of climate change, human activities resulting in the same, and other elements that are all introduced at the outset of the paper. The study explores the impact caused by the building of the dams and its effect on the environment. The paper then delves deep into the understanding of the problems created by dams such as the resettlement problem of the displaced people, changing course of water resulting in floods, erosion of soil, landslides etc. that are still unaddressed and are not taken care of by any legislation. The paper also develops a corpus of environmental law that makes use of legal practice that is climate change litigation and worldwide patterns in climate change litigation.*

*Additionally, it draws attention to the lacunas discovered in the environmental jurisprudence in India as well as compared to the global level, non-implementation of such codifications and also provides possible mitigating measures to solve this uprising problem of climate change with the help of green finance, activities in that direction, and different coalitions to support them. Overall, by offering a thorough examination of the social, economic, and legal ramifications of climate change, this research study adds to the continuing conversation about the issue. It emphasizes how urgent it is to address this global issue and urges corporations, Individuals, and policymakers to work together to protect the environment in the future.*



***KEYWORDS:** Climate Change, Causes of Climate Change, Climate Litigation, Environmental Jurisprudence, Mitigation Measures.*

## **INTRODUCTION**

Over the past century, the number and scale of reservoirs globally have grown substantially to meet the increasing demand for water and hydropower driven by population growth, industrialization, and urbanization. It is reported that an average of two dams exceeding 15 meters in height were completed each day during the latter half of the 20th century<sup>1</sup>. To date, more than 50,000 such large dams have been constructed worldwide, contributing to a total storage capacity of over 8,300<sup>2</sup> cubic kilometers. As a result, more than 60% of the world's rivers are currently dammed.

Dams have been an integral part of human civilization for centuries, serving as critical infrastructure for water resource management, flood control, hydroelectric power generation, and navigation. As the global population continues to grow and climate change poses new challenges, the importance of dams in ensuring water security and sustainable development has become increasingly evident, as both the sustainability and the development should go hand in hand<sup>3</sup>.

Dams are multifunctional structures that play a vital role in managing water resources. They are designed to supply water for various purposes, including irrigation, flood prevention, and hydroelectric energy production. By regulating river levels and storing water, dams help mitigate the effects of flooding and provide a reliable source of renewable energy.

The primary purposes of dams include supplying water for domestic, industrial, and agricultural use, ensuring a consistent and reliable water supply. Dams also help control flooding by storing

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<sup>1</sup> Ministry of Jal Shakti Department of Water Resources, River Development & Ganga Rejuvenation NDMA, 'PROCEEDINGS OF ONE-DAY NATIONAL LEVEL WORKSHOP ON "MANAGEMENT OF FLOODS: RESERVOIR MANAGEMENT"', *ONE-DAY NATIONAL LEVEL WORKSHOP ON "MANAGEMENT OF FLOODS: RESERVOIR MANAGEMENT"* (National Disaster Management Authority 2019) <<https://ndma.gov.in/sites/default/files/2020-08/workshop-flood-mgmt.pdf>> accessed 12 June 2024

<sup>2</sup> A. Mehta and D.V. Thareja, 'Flood Management at Kamala Dam'(2021)< <https://www.cbip.org/ISRM-2022/ICOLD2021/Data/Themes/5River%20Basin%20Development%20and%20Management%20including%20Optimization%20of%20Reservoirs%20Operation/5-13%20Pro%202020.html>>accessed 10 July 2024

<sup>3</sup> *Vellore Citizens Welfare Forum vs Union Of India & Ors*, Supreme Court, 28 August 1996, 914 of 1991, scc (India)



water during times of surplus and releasing it during times of low flow, preventing downstream flooding and reducing the risk of damage to properties and ecosystems. Furthermore, dams generate hydroelectric power by converting the potential energy of stored water into electrical energy, which is a clean and renewable source of energy that reduces greenhouse gas emissions. In addition to these purposes, dams help improve water quality by controlling sedimentation and retaining waste from mines, maintaining the ecological balance of the surrounding area and preventing environmental pollution. Dams also facilitate inland navigation by creating deep reservoirs that allow for the movement of water vessels, enhancing economic benefits and providing recreational facilities like fishing and boating. Lastly, dams can be used for fish farming, supporting aquatic ecosystems and providing a sustainable source of food by managing water levels and flows to create suitable conditions for fish to thrive.<sup>4</sup>

According to the National Register of Large Dams, 2019 of the Central Water Commission, India has 5,745 large dams, of which 5,334 are completed and operational, while 411 are under construction. Furthermore, 227 large dams in India are more than 100 years old, and about 18% are between 50 to 100 years old. Globally, India is the third-largest constructor of major dams, with over 1,100 of the more than 5,200 major dams reaching the age of 50, and other's being more than 120 years old. By 2050, it is estimated that 80% of India's major dams will range in age from 50 to more than 150 years. The situation is even more perilous for the hundreds of thousands of small and medium-sized dams, as their lifespan is significantly shorter than that of large dams.

The Central Water Commission (CWC) is the nodal organization responsible for flood forecasting and early flood warnings in India. CWC currently issues flood forecasts for 332 stations, covering 20 major river basins in 23 states and 2 union territories. To provide more lead time for local authorities to plan evacuation and take other remedial measures, CWC has developed basin-wise flood forecasting models based on rainfall-runoff mathematical modeling for 5-day advance flood forecast advisory. In recent years, extreme floods have been witnessed in several states due to excess or large excess rainfall combined with extremely heavy rainfall in short durations.<sup>5</sup>

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<sup>4</sup> Himanshu Thakkar, 'Floods in Indian Rivers: Are Dams and Embankments the Solution or the Problem?' (*Economic and Political Weekly*, 21 February 2021) <[www.epw.in/engage/article/floods-indian-rivers-are-dams-and-embankments](http://www.epw.in/engage/article/floods-indian-rivers-are-dams-and-embankments)> accessed 24 July 2024

<sup>5</sup> MoJS, *Conditions of Dams* (Press Information Bureau Government of India 2022)

While dams can help moderate floods, improper reservoir operations can sometimes lead to downstream flooding. To address this, CWC has issued guidelines for dam operation and maintenance manuals, providing guidance to dam owners on protocols and responsibilities for managing water releases, including during flood seasons. Additionally, under the Disaster Management Act of 2005, state governments and authorities are directed to immediately notify adjacent states after deciding to release water from reservoirs/dams. However, centralized data on flooding caused by faulty reservoir operations is not maintained.

In summary, the growth and importance of dams worldwide have been significant, with dams playing a crucial role in water resource management, flood control, and hydroelectric power generation. However, the effectiveness of dams in flood moderation depends on proper operation and coordination between states. While guidelines have been issued to standardize these practices, more centralized monitoring may be needed to fully assess the flood impacts of reservoir management.

## **PROBLEMS CREATED BY BUILDING OF DAMS**

The construction of large dams fundamentally alters the relationship between water and land and disrupts the delicate balance of ecosystems that often take millennia to develop. Currently, there are approximately 40,000 large dams in the world that have significantly altered the flow of rivers, causing serious environmental impacts.<sup>67</sup>

In recent years, the negative effects of dams have been well documented, so many countries, including India, have largely stopped building new dams and instead focused on mitigating the problems caused by such existing structures.<sup>8</sup>

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<sup>6</sup> Vedantu, 'Disadvantages of Dams - Impact on Environment and People' (VEDANTU, 4 May 2019) <[www.vedantu.com/biology/disadvantages-of-dams](http://www.vedantu.com/biology/disadvantages-of-dams)> accessed 16 July 2024

<sup>7</sup> PK, 'The world's dams: Doing major harm but a manageable problem?' (Mongabay Environmental News) <<https://news.mongabay.com/2022/04/the-worlds-dams-doing-major-harm-but-a-manageable-problem/>> accessed 24 July 2024

<sup>8</sup> Arora A, 'The Environmental Impacts of Dams | Earth.Org' (Earth.Org, 18 January 2024) <<https://earth.org/dams-economic-assets-or-ecological-liabilities/>> accessed 9 July 2024

One of the most important environmental problems of dams is soil erosion. By trapping sediment that would normally be transported downstream, dams deprive downstream areas of these essential nutrients. As a result, the water erodes the river bed and banks and threatens the flora and fauna. Dams are often built to prevent flooding, but many ecosystems have adapted to occasional flooding, and many species depend on flooding for various life stages such as reproduction and hatching. Annual flooding also replenishes wetlands and collects nutrients.<sup>9</sup>

Another major concern is the impact on biodiversity. Dams can disrupt the life cycles of many species of fish and marine mammals, causing population declines and even extinction, as most large dams do not have adequate bypass systems for these animals. In addition, the slow-moving waters of dams in tropical regions provide an ideal breeding ground for disease vectors such as mosquitoes, snails and flies, which can spread malaria, schistosomiasis and river blindness.<sup>10</sup>

Dams can also have far-reaching effects on Earth systems. NASA geophysicist Dr. Benjamin Fong Chao has found evidence that large dams can alter the Earth's circulation by redistributing water mass from oceans to basins. The daily circulation is said to have accelerated by eight parts per million since the 1950s. Sedimentation and siltation are other concerns.

Sedimentation, the process by which sediment accumulates at the upper end of the reservoir, can cause flooding and reduce the usefulness of the dam over time. Siltation, or the accumulation of silt at the bottom of the reservoir, also reduces the dam's effectiveness in power generation, irrigation, and flood control, and shortens its life.<sup>11</sup>

Water and salinization are also important issues. Saltwater irrigation can increase soil salinity, affect the entire ecosystem and disrupt fish reproduction. Large areas along the banks of the river are exposed to increased salinity as a result of the construction of the dam. In the case of the Sardar Sarovar Dam in India, an estimated 40% of the catchment area has been flooded, with more than

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<sup>9</sup> Vedantu, 'Disadvantages of Dams - Impact on Environment and People' (VEDANTU, 4 May 2019) <[www.vedantu.com/biology/disadvantages-of-dams](http://www.vedantu.com/biology/disadvantages-of-dams)> accessed 16 July 2024

<sup>10</sup> Arushi Arora, 'EarthOrg' (Dams: Economic Assets or Ecological Liabilities?, 18 January 2024) <<https://earth.org/dams-economic-assets-or-ecological-liabilities/>> accessed 02 June 2024

<sup>11</sup> Vedantu, 'Disadvantages of Dams - Impact on Environment and People' (VEDANTU, 4 May 2019) <[www.vedantu.com/biology/disadvantages-of-dams](http://www.vedantu.com/biology/disadvantages-of-dams)> accessed 16 July 2024



32,000 hectares of land already under water, including 13,000 hectares of forest and 11,000 hectares of agricultural land.

The construction of large dams also causes some health risks both during construction and after construction. The influx of thousands of workers to build dams can cause the spread of infectious diseases such as AIDS, syphilis, tuberculosis and measles<sup>12</sup>. In addition, reservoirs created by dams can act as breeding grounds for disease vectors, increasing the incidence of malaria, schistosomiasis, and river blindness in surrounding communities.

Dam projects often lead to the displacement and forced displacement of local populations, leading to widespread social disruption and human rights violations. Indigenous peoples whose homelands are flooded by barrier basins have consistently resisted these projects and face various forms of oppression, including physical and legal threats and in some cases even massacres.

Due to the negative effects of dams, local communities increasingly organized and formed coalitions against dam construction at local, national and international levels such as Narmada Bachao Andolan<sup>13</sup>. These resistance efforts have shown that it is possible to stop the construction of large hydroelectric dams, often symbols of economic and political power, at the expense of social and environmental well-being.<sup>14</sup>

Although dams provide benefits such as water storage, flood control and hydropower generation, their construction and operation have significant health and social costs. The spread of infectious diseases, the increase in the prevalence of vector-borne diseases, and the marginalization and oppression of local communities are the main disadvantages of large dam projects. As awareness of these issues grows, grassroots movements have emerged to challenge the construction of dams, emphasizing the need for more sustainable and equitable approaches to water resource management and development.

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<sup>12</sup> 'PROTECTING WATERSHEDS' in Jeff Conant (ed), *A COMMUNITY GUIDE TO ENVIRONMENTAL HEALTH* (Hesperian Foundation 2008)

<sup>13</sup> *Narmada Bachao Andolan vs Union Of India And Others*, Supreme Court, 18 October 2000, 319 of 1994, SCC (India)

<sup>14</sup> 'PROTECTING WATERSHEDS' in Jeff Conant (ed), *A COMMUNITY GUIDE TO ENVIRONMENTAL HEALTH* (Hesperian Foundation 2008)

## THE TEHRI DAM: CASE STUDY

Tehri Dam is a multi-purpose rock and earth-fill embankment dam on the Bhagirathi River near Tehri in Uttarakhand, India. Tehri is located 200 miles north east of Delhi, in the state of Uttaranchal. With a height of 260 meters (855 feet), the dam is the fifth tallest in the world and the tallest dam of India. The Tehri Dam withholds a reservoir for irrigation, municipal water supply and the generation of 1,000 megawatts (1,300,000 hp) of hydroelectricity. The Tehri Dam has been the object of protests by environmental organizations and local people of the region. The construction of the dam has resulted in destruction of houses of thousands of people. The relocation of more than 100,000 people from the area has led to protracted legal battles over resettlement rights, and ultimately resulted in the project's delayed completion. Since 2005, filling of the reservoir has led to the reduced flow of Bhagirathi water from the normal 1,000 cubic feet per second (28 m<sup>3</sup>/s) to a mere 200 cubic feet per second (5.7 m<sup>3</sup>/s). This reduction has been central to local protest against the dam, since the Bhagirathi is considered part of the sacred Ganges whose waters are crucial to Hindu beliefs.

Analyzing the impacts created by the Tehri Dam are;

1. Change in the (i) water chemistry, especially with respect to dissolved oxygen and (ii) turbidity of water.
2. Impact on biodiversity, i.e., flora and fauna of the area.
3. Obstruction of movements of migrating fish species during breeding season.
4. Rivers carry a lot of sediment, which on construction of a dam, will be locked up behind the dam wall. The collected silt in the reservoir eats away the capacity of the reservoir<sup>15</sup>. This impact of reducing the capacity and life of reservoir was studied.
5. Impact of water accumulation on the upstream side of the dam, which causes inundation of land including forest-land.
6. Since 109 villages (full or partial) and Tehri town (full) were affected and the residents were to vacate their ancestral homes and agricultural fields, a scheme was prepared, to

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<sup>15</sup> Soumya Sandipa Shruti Pandey, 'A CASE STUDY ON TEHRI DAM' (masters thesis, Gurunanak college of arts 2023) <[www.studocu.com/in/document/guru-nanak-college-of-arts-science-and-commerce/b-ahistory/a-case-study-on-tehri-dam/33252245](http://www.studocu.com/in/document/guru-nanak-college-of-arts-science-and-commerce/b-ahistory/a-case-study-on-tehri-dam/33252245)> accessed 23 July 2024

resettle these people, with the idea to improve their living standard, keeping their social bonds intact.

7. Problem of water-logging and salinity of the land in the command area.

Despite having such significance and being the tallest dam of India and the 13<sup>th</sup> tallest dam in the world, Tehri dam possess such a threat to the environment and creates problem in the society. These threats and problems are needed to be addressed by the authorities through implementing legislations which includes the aspect of green finance.

## **THE LEGISLATIONS GOVERNING DAMS IN INDIA**

### **THE DAM SAFETY ACT, 2021**

The law is to provide for surveillance, inspection, operation and maintenance of the specified dam for prevention of dam failure related disasters and to provide for institutional mechanism to ensure their safe functioning and for matters connected therewith or incidental thereto. The act provides guidelines for setting up of dam commissions on state and national level, their function and duties. It also contains provision for safety, inspection and data collection of dams.<sup>16</sup>

The act is the sole governing legislation for dams in India which points towards the loopholes of the act. The act does not provide guidelines for the building of the dam, how it needs to be built, by what qualified contractors, material used and area covered. Also it provides for the maintenance of the specified dams which are provided in the circular produced by the government. The different state governments provide different guidelines for construction which are provided in different notifications and are not available to the public at large. This provides a room for creation of an act which provides guidelines about the construction and development of dams to prevent such problems possessed by them.

The management of dams in India faces several significant challenges that undermine their safety and efficiency. A lack of adequate funding and resources has resulted in the aging infrastructure of many dams, which are in dire need of maintenance and repair. This issue is exacerbated by a

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<sup>16</sup> The Dam Safety Act 2021



general lack of transparency in the operation and maintenance of dams, making it difficult for stakeholders to hold the relevant authorities accountable.

The governance and management of dams in India is a complex matter, with numerous stakeholders involved, including state and central government agencies, local communities, and private companies. This complexity often leads to a lack of coordination and conflicting interests among stakeholders, further hindering effective management.

Local communities, who are most affected by the presence of dams, are often excluded from the planning and operation processes. This lack of public participation contributes to a lack of transparency, accountability, and trust in dam management.<sup>17</sup>

Moreover, many of India's dams are not operated efficiently, leading to the wastage of water<sup>18</sup>, a precious resource in the country. Monitoring and surveillance of dams is often inadequate, making it challenging to identify and address potential safety issues in a timely manner. Additionally, Environment and Social Impact Assessments (ESIAs) are not mandatory for all dams, resulting in a lack of understanding of their impact on the environment and local communities.

Limited data availability on the condition of dams makes it difficult to assess the risk of failure and plan for necessary maintenance and repair. The government's resources are often constrained, which can hinder comprehensive and effective efforts to address these concerns<sup>19</sup>.

Despite these challenges, the Indian government has taken steps in recent years to improve dam management, such as:

1. National Dam Safety Policy (NDSP): In 2018, the Government of India created the National Dam Safety Policy (NDSP), which defines standards for dam safety management

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<sup>17</sup> MoJS, *Assessment of The Structure and Condition of Dams* (1987823, Press Information Bureau 2023) <<https://pib.gov.in/PressReleaseDetailm.aspx?PRID=1987823>> accessed 27 June 2024

<sup>18</sup> Economic Times, '3,700 dams in India will lose 26% storage capacity due to sedimentation by 2050: UN study' (*EconomicTimesinindiatimescom*, 9 January 2023) <<https://economictimes.indiatimes.com/news/india/3700-dams-in-india-will-lose-26-storage-capacity-due-to-sedimentation-by-2050-un-study/articleshow/96855411.cms?from=mdr>> accessed 19 July 2024

<sup>19</sup> Economic Times, '3,700 dams in India will lose 26% storage capacity due to sedimentation by 2050: UN study' (*EconomicTimesinindiatimescom*, 9 January 2023) <<https://economictimes.indiatimes.com/news/india/3700-dams-in-india-will-lose-26-storage-capacity-due-to-sedimentation-by-2050-un-study/articleshow/96855411.cms?from=mdr>> accessed 19 July 2024

and monitoring in India. The policy aims to promote the use of innovative technology and best practices in dam safety management by ensuring the safety of all dams, whether under the jurisdiction of federal or state governments.

2. National Dam Safety Organization (NDSO): NDSO was established by the Government of India in 2019 under the Ministry of Jal Shakti to coordinate national policies and programs related to dam safety. NDSO strives to increase dam safety by encouraging the adoption of the latest technologies and state-of-the-art dam safety management techniques and by providing training and capacity building for those responsible for dam safety management.
3. Central Water Commission (CWC): The Central Water Commission (CWC) is the main organization responsible for ensuring the safety of dams in India. It is responsible for the monitoring, inspection and maintenance of all dams in the country, supported by the federal government.
4. State Dam Safety Organizations (SDSOs): Dams controlled by state governments are also subject to their safety obligations. Many state governments have established State Dam Safety Organizations (SDSOs) to ensure the safety of dams within their borders and work with the CWC.
5. Dam Rehabilitation and Improvement Project (DRIP): The Government of India, with the support of the World Bank, started the Dam Rehabilitation and Improvement Project (DRIP) in 2012 to improve the efficiency and safety of several dams in the country.
6. The Water (Prevention and Control of Pollution) Tax Act, 1977 and the Water (Prevention and Control of Pollution) Act, 1974<sup>20</sup> provide guidelines for pollution control and management of water resources, including dams.
7. National Green Tribunal Act, 2010: Allows citizens to file complaints about environmental damage caused by dams. The National Green Tribunal (NGT) is a specialized court that hears environmental issues, including cases related to dams<sup>21</sup>.
8. Forest Conservation Act, 1980<sup>22</sup>: Regulates the use of forest land for non-forest purposes, including construction of dams.

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<sup>20</sup> The water (prevention and control of pollution) act., act No ACT NO. 6 OF 1974, 23 March 2024 (India)

<sup>21</sup> The National Green Tribunal Act, Act No Act No. 19 of 2010, 2 June 2010 (India)

<sup>22</sup> The Forest (Conservation) Act, Act No Act NO. 69 OF 1980, 27 December 1980 (India)

But the implementation of the Dam Safety measures has been ineffective so far. Only 20 states have constituted the State Committee on Dam Safety (SCDS) as required by the Act, and only 16 states have established the State Dam Safety Organization (SDSO). While states have the power to enact dam safety legislation, only Bihar has done so with the Bihar Dam Safety Act, 2006.<sup>23</sup>

At the state level, water resources or irrigation departments are responsible for dam safety, following Central Water Commission (CWC) standards. However, the CWC lacks oversight powers over these state departments.

Dams with irrigation command area less than 10,000 Ha or power generation capacities between 50 to 25 MW require clearance from the state government only and are exempt from environmental clearance<sup>24</sup>. There are no statutory provisions for regular reporting of dam failures, and no single agency keeps track of all dam failures. While the CWC maintains a record of dam failure events, it relies on states to provide the information, which is not regularly updated.

Dam failure analysis is required as part of the Environmental Impact Assessment (EIA) for projects seeking environmental clearance from the Ministry of Environment and Forests (MoEF). However, there is no standardization in how these analyses are conducted and reported. The CWC has developed guidelines, but they are not legally binding. Dam failure analysis is compulsory for constructing new dams or modifying existing ones, but not for dams already in operation without any engineering works<sup>25</sup>.

Many dams in India have structural deficiencies and shortcomings in operation and monitoring<sup>26</sup>. In 2017, the Comptroller and Auditor General of India found that only two out of the 17 states audited conducted pre- and post-monsoon safety audits of their dams.

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<sup>23</sup> 'Dam Safety Act, 2021' (*Drishti IAS*, 9 January 2019) <[www.drishtias.com/to-the-points/Paper2/dam-safety-act-2021](http://www.drishtias.com/to-the-points/Paper2/dam-safety-act-2021)> accessed 19 July 2024

<sup>24</sup> SSB, 'Presentation on The Dam Safety Act,2021' (IIT Roorkee 2023) <[https://iitr.ac.in/Careers/static/ICED/Specialist\\_Lectures/DSA\\_Provisions.pdf](https://iitr.ac.in/Careers/static/ICED/Specialist_Lectures/DSA_Provisions.pdf)> accessed 3 July 2024

<sup>25</sup> *MoJS, MAINTENANCE OF DAMS (1944415, Press Information Bureau 2023)* <<https://pib.gov.in/PressReleaseframePage.aspx?PRID=1944415>> accessed 1 July 2024

<sup>26</sup> *MoJS, Assessment of The Structure and Condition of Dams (1987823, Press Information Bureau 2023)* <<https://pib.gov.in/PressReleaseDetailm.aspx?PRID=1987823>> accessed 27 June 2024



The International Commission on Large Dams (ICOLD) defines dam failure as the collapse or movement of part of a dam or its foundation so that the dam cannot retain water<sup>27</sup>. Such failure may be caused by age, construction deficiencies, inadequate maintenance, extreme weather or seismic events, and faulty operation. Unhealthy dams pose significant threats to human life, crops, houses, buildings, roads, the environment and the economy. Therefore, dam safety is a matter of utmost and universal importance.<sup>28</sup> Ninety-two percent of India's large dams have been built on inter-state rivers. The negative repercussions of a dam's hazard potential may spill over to other States and even other countries.

The new legislation needs to inculcate the laws or the provision provided by the World Commission on Dams in their report, and also the recommendations by the International commission on large dams, and also inculcate suggestions by various dam authorities as per the Indian standards. The new laws need to address the problems created by the building of dams such as environmental effects on building of dams, rehabilitation of the masses, requirements for the construction and maintenance of dams. It also needs to inculcate the aspect of green finance to eradicate the problem of funds and the budget allocated by the Central or State Government, which very often does not reach to the desired target.

The Supreme Court has recognized a much-felt, but less articulated right against the adverse effects of climate change as a distinct fundamental right in the Constitution. Linking the right against climate change to Articles 21 and 14, Chief Justice Chandrachud said the rights to life and equality could not be fully realized without a clean, stable environment<sup>29</sup>.

“The right to health (which is a part of the right to life under Article 21) is impacted due to factors such as air pollution, shifts in vector-borne diseases, rising temperatures, droughts, shortages in food supplies due to crop failure, storms, and flooding. The inability of underserved communities

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<sup>27</sup> — ‘International Commission on Large Dams’ (*International Commission on Large Dams*) <[www.icold-cigb.org/](http://www.icold-cigb.org/)> accessed 19 July 2024

<sup>28</sup> Wallah P, ‘Only IAS’ (*pwnlyias.com*, 9 October 2023) <[<sup>29</sup> \*M K Ranjitsinh & Ors Versus Union of India & Ors.\*, Supreme Court, 21 March 2024, Writ Petition \(Civil\) No. 838 of 2019, \[sci.gov.in\]\(http://sci.gov.in\) \(India\)](https://pwnlyias.com/current-affairs/dam-safety-in-india/#:~:text=And%20State%20Wise-.What%20are%20the%20issues%20associated%20with%20dam%20safety?.Dam%20Safety%20Organisation%20(SDSO)> accessed 27 June 2024</a></p></div><div data-bbox=)

to adapt to climate change or cope with its effects violates the right to life as well as the right to equality. If climate change and environmental degradation lead to acute food and water shortages in a particular area, poorer communities will suffer more than richer ones,” the judgment said.

## CONCLUSION

The adverse impacts of climate change, largely driven by anthropogenic activities including the burning of fossil fuels, have emerged as a pressing global concern. In this context, the construction of dams, while serving vital purposes such as water resource management and hydroelectric power generation, also presents significant environmental and social challenges that warrant careful consideration.

The building of dams can lead to the disruption of natural ecosystems, altering the flow regimes of rivers and impacting the habitats of aquatic species. This can result in the loss of biodiversity and the degradation of sensitive environments, with far-reaching consequences for the overall ecological balance.

The construction of dams often involves the displacement of local communities, leading to the loss of livelihoods, cultural heritage, and social cohesion. Inadequate compensation and resettlement measures can exacerbate the hardships faced by affected populations, contributing to social unrest and inequalities.

In response to the growing concerns surrounding dam safety and sustainability, legislative measures such as the Dam Safety Act in India have been enacted. However, the effective implementation of these laws remains a challenge, with issues such as lack of transparency, aging infrastructure, and insufficient monitoring hindering their impact.

To address the multifaceted challenges posed by dams in the context of climate change, a comprehensive and collaborative approach is necessary. Authorities must prioritize the protection of the environment and the well-being of affected communities while ensuring the efficient and sustainable management of water resources. This requires strengthening regulatory frameworks,

improving transparency and accountability, and investing in the maintenance and upgrade of dam infrastructure.

By acknowledging the complex interplay between dams, climate change, and their socio-environmental consequences, policymakers, researchers, and stakeholders can work together to develop and implement strategies that balance the need for water resource management and hydroelectric power generation with the imperative of environmental and social sustainability.

