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**DAM SAFETY ACT, 2021:
A Critical Appraisal**

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Contents

| | | |
|----------|-----------------|-------------------------|
| Volume V | ISSN: 2582-1903 | April 2022 - March 2023 |
|----------|-----------------|-------------------------|

Excerpts from the V. R. Krishna Iyer Annual Law Lecture Series *Page*

1. HINDU PHILOSOPHY AND MODERN JURISPRUDENCE
Justice V. Ramasubramanian 1

Special Article

2. THE UNIFORM CIVIL CODE DEBATE IN INDIA: Conceptual Predicaments, Historical Legitimacy, and Challenges to Pluralism
Chanchal Kumar Singh & Mritunjay Kumar 12

Articles

3. THE UNDERSTANDING OF ANIMAL RIGHTS: Advancing a New Approach
Sanchit Sharma 63
4. GIG WORKERS AND EMPLOYMENT LAWS: An Indian Perspective
Anand Pawar & Ankit Srivastava 88
5. INSIDER TRADING: Contours of Liability and Judicial Approach
Girjesh Shukla & Adity Dehal 103
6. A TRYST WITH SUCCESSION RIGHTS: An Impact Assessment of the Hindu Succession Amendment Act 2005 on Women Landholders
Pranay Agarwal 123
7. CENSORSHIP: A Moral Dilemma or an Immoral Siege on Freedom of Speech?
Dhawal Shankar Srivastava & Zubair Ahmed Khan 144
8. THE LEGAL IMPLICATIONS OF THE CRIMINAL PROCEDURE (IDENTIFICATION) ACT, 2022: A Comprehensive Analysis of Constitutional, Criminal, and Forensic Dimensions
Shaifali Dixit & Chandrika 166

Notes and Comments

9. DISSENT IN THE AADHAAR JUDGEMENT: Exploring Dimensions of the future of Privacy Jurisprudence in India
Varin Sharma 190
10. HARMONIZING DIVERSITY: Challenges in Unifying Marriage and Divorce Laws in India
Alok Kumar & Namita Vashishtha 213
11. DIVIDING EQUALITY DESTROYING AFFIRMATIVE JUSTICE: Assessing Economically Weaker Sections (EWS) Reservation in India
Mohammad Hussian, Showkat Ahmad Wani & Dhriti Bole 236
12. HUMAN RIGHTS PROTECTION AT STATE LEVEL: A Critique of the Functioning of SHRCs in India
Nehru & Hitesh Manglani 253
13. *SUBHASH DESAI v. PRINCIPAL SECRETARY*: Interpreting the Issues of the Role of the Speaker Under the Tenth Schedule, and the Symbols Order
Abhinav Yadav 272
14. LEGAL CHALLENGES POSED BY ARTIFICIAL INTELLIGENCE IN CONSUMER ONLINE DISPUTE RESOLUTION
Vibhuti Jaswal & Shiekhar Panwar 289
15. DAM SAFETY ACT, 2021: A Critical Appraisal
Narayan Chandra Sarangi 300

DAM SAFETY ACT, 2021: A Critical Appraisal

*Narayan Chandra Sarangi**

[Abstract: The enactment of the Dam Safety Act 2021 indicates a significant step forward in India's ongoing attempts to develop a legal structure for comprehensive management of dam safety and issues related thereto. Even though the Act includes several provisions which are in sync with international standards, but there are also several aspects in which it needs to be improved to avoid potential political slugfest and achieve its objectives. Some of these topics include the participation of various stakeholders, the regulatory process, the proclamation of liberty, the security of minor dams, and the safety of dams located in environmentally sensitive regions. As a consequence of these deficiencies, there is a risk that the Act will have a more challenging time achieving the objectives it set out to do.

This article suggests an inter-disciplinary risk-based approach, a greater emphasis on small dams, improved protections for dams in ecologically sensitive regions, increased stakeholder participation, and expanded measures for the capacity development of regulators as potential options that might be taken to make the Act more effective. These recommendations will result in safer dams across the country and will also enhance the Act's efficacy which would ultimately impact human health, property, and the environment.]

I

Introduction

Dams perform a variety of functions, serving as critical components of water resource management, flood control, hydropower generation, and water supply systems, which underscores the vital role they play in modern societies, and it is imperative that every precaution be taken to ensure their safety because their structural integrity has a substantial impact on human life, the environment, infrastructure, and general well-being. This necessitates the creation of a culture of long-term dam safety that tackles both technical and non-technical concerns. Tensile

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stress¹ effects, the structural suitability of the dam and its auxiliary structures, dam auscultation, and other technical considerations fall under this category. Technical experts are best suited to make these decisions. The 'non-technical' issues cover things like how the effects of dam safety on the environment and society are to be handled.² While the majority of these depend on the decision-maker's discretion, a regulatory framework is required to ensure accountability, openness, and stakeholder involvement. Decision-makers must be able to decide on both the technical and non-technical aspects of dam safety based on the broad criteria contained in the framework, which must offer a suitable environment for the development of a dam safety culture.

The Indian government recently enacted the Dam Safety Act 2021 to enhance the safety of dams throughout the country. It replaces the Dam Safety Act of 1978 and aims to improve dam safety by imposing higher testing, maintenance, and surveillance standards. In an attempt to enhance dam safety, both of these laws were passed. The Act applied to four categories of dam first is dams which are higher than 15 metre, second dams which are between ten and fifteen metres, third the dam which has a reservoir with a capacity of over ten million cubic meters and fourth the dams deemed to threaten life or property further downstream to dams higher than 15 meters, or between ten and fifteen metres, if the dam has a reservoir with a capacity of over ten million cubic meters and dams deemed to threaten life or property further downstream.³ The Act mandates the formation of a National Dam Safety Committee, State Committee on Dam Safety, State Dam Safety Organisation, National Dam Safety Authority and establishment of Establishment of National Dam Safety Authority along with the State Dam Safety Committees, the hiring of a Dam Security Officer by the dam proprietor, and the construction of a National Dam Safety Authority.⁴ The Act intends to protect human beings and the natural environment from any potential harm caused by dam failures. This article assesses the likelihood that the Dam Safety Act of 2021 will effectively attain its stated goals. This article seeks to improve dam security in India by analysing the Act's provisions, identifying its flaws, exploring its potential effectiveness, comparing it to

¹ **Tensile strength**, maximum load that a material can support without fracture when being stretched, divided by the original cross-sectional area of the material. Accessed on <https://www.britannica.com/science/tensile-strength>

² International Atomic Energy Agency, 'Non-technical factors impacting on the decision-making processes in environmental remediation: Influences on the decision-making process such as cost, planned land use and public perception' (2002).

³ Adamo, N., Al-Ansari, N., Sissakian, V., Laue, J., & Knutsson, S. (2021). Geophysical methods and their applications in dam safety monitoring. *Journal of Earth Sciences and Geotechnical Engineering*, 11(1), 291-345.

⁴ S. Awasthi, *Why India needs A central dam Safety Act*, 64(12) WATER AND ENERGY INTERNATIONAL 29 (2022).

international best practices, and proposing viable solutions to achieve this objective.⁵

The following are a few of the most important ideas discussed in this article.

- This article separates the purpose, objectives, and provisions of the Dam Safety Act of 2021 into the categories they belong to.⁶
- A review of the deficiencies of the Act, including how it addresses the involvement of participants, the autonomy of lawmakers, the preservation of small dams, and the health and safety of dams in ecologically fragile regions.⁷
- An examination of the possible efficacy of the Act in attaining its objectives, as well as an analysis of the obstacles and constraints that could reduce that potential effectiveness.
- Examination of the Dam Safety Act of 2021 through the lens of the most effective regulatory and oversight frameworks for dams worldwide.
- The purpose of these suggested modifications to the Dam Safety and Expansion Act is to make dams across the nation safer.

II

Overview of the Dam Safety Act, 2021

The Dam Safety Act of 2021 represents a significant milestone in the efforts of the Indian government to enhance the safety and reliability of dams throughout the nation. This legislative development reflects a proactive approach to address the critical importance of dam safety, given their multifaceted functions and the potential impact on human life, the environment, and infrastructure. Dam Safety Act 2021 was only just passed into law by the Indian government to improve dam safety across the whole nation. The recently passed legislation introduces new requirements for dam maintenance and monitoring to enhance dam safety over the long term.⁸

The Act applies to dams that are more than fifteen meters, as well as between ten and fifteen meters if the dam has a body of water with a capacity that is greater than ten million cubic meters, and it also applies to dams that provide a threat to life or

⁵ Damle, D. (2021). *Dam Safety in India*. National Institute of Public Finance and Policy.

⁶ Dam Safety Act, 2021, Summary of Legislative Changes.

⁷ A. Drechsler, Federal Actors in Dam Removal Policy (2021).

⁸ R. Ram, et al. *A review of Victoria's dam safety regulatory framework* in PROCEEDINGS OF ANCOLD 2021 ONLINE CONFERENCE ON DAMS: PERCEPTIONS & REALITIES OF RISK (November, 2021).

property farther downstream.⁹ The Act requires the establishment of State Dam Safety Committees in addition to the National Dam Safety Committee, the National Dam Safety Authority, and the dam owner's recruitment of a Dam Safety Officer. Additionally, the Act necessitates the establishment of State Dam Safety Committees.¹⁰ In addition, the Act stipulates that a Dam Safety Manager must do an annual inspection of each and every dam.

The Dam Safety Act of 2021 incorporates the provisions listed below as some of its most important requirements.¹¹

- Establishment of National Committee and State Committees on Dam Safety
- Dam Safety Officer Appointment
- Establishment of the National Dam Safety Authority
- Safety guidelines and emergency action plans

The Dam Safety Act of 2021 aims to protect downstream residents and the environment from the consequences of dam failure. It is anticipated that the Act will improve oversight and Administration of dam safety in India, resulting in safer dams throughout the country.

III

Critical Appraisal of the Dam Safety Act, 2021

Therefore, if we are concerned about the protection of dams in India, we should support the Dam Protection Act of 2021. This framework addresses the nationwide shortcoming in dam safety regulation and Administration that existed prior to its implementation. Beginning with the planning phase and continuing through activities, maintenance, and decommissioning, the Act addresses dam safety.¹² The Dam Safety Act of 2021 is a powerful piece of legislation because it outlines the responsibilities of the numerous parties involved in dam safety. The Act establishes a National Committee on Dam Safety, State Committees on Dam Safety, and a National Dam Safety Authority to ensure that dams across the nation are

⁹ *Supra* note 8.

¹⁰ J. Suwatthikul, *et. al. Development of Dam Safety Remote Monitoring and Evaluation System* 16(4) JOURNAL OF DISASTER RESEARCH 607 (2021).

¹¹ R. Walsh, A.S. Ward, *An overview of the evolving jurisdictional scope of the US Clean Water Act for hydrologists*. 9(5) WILEY INTERDISCIPLINARY REVIEWS: WATER (2022).

¹² S. Awasthi, *Why India needs A central dam Safety Act*. 64(12) WATER AND ENERGY INTERNATIONAL 29 (2022).

constructed without jeopardising public safety.¹³ In addition, the Act stipulates that each dam must be assigned a Dam Safety Officer in order to monitor its safety.¹⁴

The Dam Safety Act of 2021 requires dam owners to devise safety standards and emergency response plans, another positive aspect of the legislation. This is essential because it guarantees that dam administrators will be prepared for disasters and able to take the necessary precautions to prevent or mitigate the severity of any potential disasters. In addition, the Act mandates regular dam inspections and requires dam owners to disclose the current state of their dams to the State Committees on Dam Safety and the National Dam Safety Authority.¹⁵ Despite this, the Dam Safety Act of 2021 has some defects that must be addressed before it can be fully implemented. There need to be mechanisms for community involvement in dam safety. Since dams can significantly affect the surrounding environment, particularly those residing downstream, their participation in dam safety is essential. It is necessary that communities nearby have an interest in dam safety decisions made pursuant to the Act.

A further shortcoming of the Dam Safety Act of 2021 is the absence of a system to ensure accountability. The Act does not hold dam owners or other stakeholders accountable for noncompliance or negligence in adhering to dam safety regulations. This can result in poor decision-making and a failure to prioritize dam safety as a top concern. The Dam Safety Act of 2021 should also include provisions to address the issue of transparency. The Act does not mandate the disclosure of information regarding the safety of dams. There is a legal obligation for the public to be informed about the safety of dams, especially when dams pose threats to people's livelihoods or their means of survival. Access to information about dam safety by the public should be legally mandated. If we are concerned about the security of dams in India, we should support the Dam Safety Act of 2021. The Act establishes a comprehensive framework for administering dam safety regulations. However, the Act contains gaps that must be addressed. This includes requirements for local community engagement, accountability, and transparency. For the Dam Safety Act of 2021 to fulfil its promise of making dams in India secure, certain restrictions must be eliminated.

¹³ D. Damle, *Dam Safety in India*. National Institute of Public Finance and Policy (2021).

¹⁴ K.S. Richards, & K.R. Reddy, *Critical appraisal of piping phenomena in earth dams* 66 BULLETIN OF ENGINEERING GEOLOGY AND THE ENVIRONMENT 381 (2007).

¹⁵ J. Yumnam, *An assessment of dams in India's north east seeking carbon credits from clean development mechanism of the United Nations Framework Convention on Climate Change*, CITIZENS' CONCERN FOR DAMS AND DEVELOPMENT, MANIPUR (2012).

IV

The challenges and limitations that may hinder the effectiveness of the Act

The Dam Safety Act of 2021 is confronted with a great deal of opposition and limitations, all of which have a chance to reduce the Act's level of effectiveness. Insufficient precautions are taken to ensure the safety of installations with a lower priority: The Act places a primary emphasis on the security of large dams, although the fact that dams of even a moderate size might, under certain conditions, constitute a substantial risk to the safety of human life as well as property. It might be challenging to ascertain whether or not lower dams comply with safety rules due to the fact that a large number of them are owned and controlled by private entities or by the public sector.

Insufficient provisions for dams in ecologically sensitive areas

Dams that are built in ecologically fragile regions, such as national parks and sanctuaries, are not afforded the kind of protection that is required by this Act. The building of dams in such sites has been connected to severe environmental impacts, such as the uprooting of animal populations and the destruction of their natural habitats. One such case is moving wild animals from one location to another. The building and operation of dams are subject to more stringent environmental laws, which are necessary to ensure that the physical quality of the region around it is not compromised¹⁶.

Limited enforcement capacity

It may be challenging to carry out the provisions of the Act in geographically dispersed or rural locations since the relevant regulatory authorities may have a lesser presence there or fewer resources available. Because of this, it might be more challenging to put the provisions of the Act into practice. The regulatory agencies' skills will need to be improved, and their funding will need to be increased for them to be able to carry out the provisions of the Act in an effective manner.

Limited public participation

The Act does not allow for sufficient public input in the decision-making process on dam safety. Consequently, local communities may need to be made aware of the safety of dams located in their immediate area¹⁷. As a consequence of this, the Act's

¹⁶ A. Shukla, & N.K. Goel, *Understanding risks associated with dams and in context to dams in Damodar Valley* (2021).

¹⁷ L. Montrone, *et al. The political economy of coal in India—Evidence from expert interviews* 61 ENERGY FOR SUSTAINABLE DEVELOPMENT 230-240 (2021).

obligations regarding plans for emergencies and public disclosure may have less of an impact than was intended. In spite of the reality that the Dam Safety Act of 2021 can boost dam safety in India, there are a number of challenges and limits that could limit the law's usefulness and prevent it from fully realising its promise¹⁸. In order to overcome these challenges, it will be necessary to implement a more robust system for ensuring public engagement and environmental safeguards, in addition to having a stronger political will.

Stakeholder engagement

However, the Act does not contain any requirements for the involvement of stakeholders, which is an essential component for guaranteeing the safety and longevity of dams. According to the recommendations of worldwide best practices, the participation of stakeholders is necessary during every stage of the lifecycle of a dam. This includes the phases of design and planning, construction, operation, and decommissioning.

Independent regulators

Dam safety regulation could be undermined because the Act does not give regulatory bodies sufficient autonomy from political involvement. This is a risk since the Act does not guarantee significant independence from political interference¹⁹. Independent regulatory entities being provided with the required expertise and resources, in accordance with standard procedures that are followed globally, is the most effective approach to guarantee that safety standards will be successfully implemented²⁰.

Risk-based approach

The Act fails to put an emphasis on the adoption of a risk-based strategy to dam safety, despite the fact that such an approach is widely accepted as a standard. An evaluation of the security of a dam, taking into account the likely repercussions of its collapse and the distribution of resources in accordance with this evaluation, is an illustration of a risk-based approach.

Emergency action plans

In respect of the provisions for emergency action plans, the Act is not up to par with what is generally accepted to be standard practice on a global scale. In order for

¹⁸ R. Pereira, Public participation, indigenous peoples' land rights and major infrastructure projects in the Amazon: The case for a human rights assessment framework 30(2) REVIEW OF EUROPEAN, COMPARATIVE & INTERNATIONAL ENVIRONMENTAL LAW 184 (2021).

¹⁹ P. Cullet, *Water Laws, Policies and Reforms—Where are these leading?* in CENTRE FOR FINANCIAL ACCOUNTABILITY, STATE OF FINANCE IN INDIA REPORT 2021-2022.

²⁰ *Id.*

plans for emergencies to be effective, they need to be tested and updated on a regular basis. Additionally, open communication lines need to be maintained with towns further downstream, disaster relief agencies, and local authorities.

Dam safety culture

The Act does not include any measures for establishing an environment of dam safety, which is a vital part of globally recognised best practices; nevertheless, the Act does have provisions for encouraging a culture of dam construction. Essential aspects of a safety culture include the dissemination of information to individuals regarding the import of dam safety and the promotion of a proactive attitude to the identification and management of hazards. It is a move in the right direction and ought to be supported, despite the fact that there is potential for enhancements in aligning the Dam Safety Act of 2021 with worldwide standards. It will be necessary to make significant expenditures in capacity training, the strengthening of regulatory frameworks, and the growth of a culture that prioritises dam safety in order to close these gaps.

V

Conclusion & Recommendation

Many dams have been constructed and more are planned as crucial components of India's water management policy, playing pivotal roles in supporting rapid and sustained agricultural expansion and development. Large sums of money and other resources have been utilized to build this infrastructure over time, making it imperative to maximize their utility.

Until recently, discussions in India regarding dams primarily focused on issues such as land acquisition, relocation, rehabilitation, environmental evaluations, permissions, and conflicting apportionment claims for impounded water, with little debate on dam safety. However, the majority of dams in India date back to an earlier era and are approaching the end of their useful life, requiring ongoing repairs. As they age, the costs of maintenance and repairs continue to rise, presenting a significant challenge to India's sustainable growth.

Many dams in India do not meet current quality, quantity, hydrological, and engineering standards and have severe structural and other faults. Additionally, uncertainties associated with climate change further exacerbate dam safety concerns.

The several states that control the majority of dams lack the administrative and technological resources to address security issues, often allocating insufficient funds

for upkeep and repairs. States have displayed apathy towards dam safety, particularly when left to their own devices. Furthermore, the lack of a comprehensive legal framework, supporting institutions, and distribution of responsibilities increases the risk of accidents, resulting in missed opportunities and close calls.

A dam failure resulting from natural disasters, poor engineering, or human error can lead to fatalities, environmental damage, and property destruction, highlighting the need for strict adherence to safety regulations. Despite advancements in dam engineering, gaps remain in our understanding of uncertainties related to environmental and anthropogenic factors, materials behavior, construction methods, and meteorological aspects.

To ensure standardized and institutionalized safety practices, dam safety legislation with a comprehensive, preventative, and adaptive approach that establishes uniform standards is necessary.

The essay also identifies potential obstacles and limitations, including inadequate budgets, insufficient capacity-building mechanisms for regulators, and a lack of political will to implement the Act. Additionally, it analyzes the Dam Safety Act 2021 in comparison to international laws and regulations concerning dam safety.

The enactment of the Dam Safety Act of 2021 signifies a significant step towards establishing a legal framework for managing dam safety in India. However, the Act has several shortcomings, such as a lack of stakeholder participation and an inability to ensure the security of smaller dams and those located in environmentally fragile regions. The Act's effectiveness will depend on political will, enforcement of provisions, and availability of funds and capacity-building tools for regulators.

While the Dam Safety Act 2021 is a positive development for dam management and safety in India, more can be done to improve the law and ensure secure and environmentally friendly dam management across the nation."

Recommendations

The following guidelines should be considered in order to enhance the efficacy of the Dam Safety Act of 2021 and increase dam safety across the nation.

Improve stakeholder engagement

It is essential that the Act be modified to include provisions mandating the active involvement of local communities and organisations serving civil society in the process of determining dam safety. This increases the probability that they will consider themselves heard and establishes the groundwork for fostering greater trust.

Strengthen the National Dam Safety Authority

To make sure that the National Dam Safety Authority has the capacity to carry out its responsibilities, the organisation must be allocated additional funds and personnel. This will aid in the procedure of creating a government agency with jurisdiction over dam safety across the nation.

Adopt a risk-based approach

The Act should include a risk-based approach to dam safety in which the likelihood of failure for each dam is assessed, and operations are prioritised based on this evaluation. This can aid in prioritising dams which present the most significant hazard and effectively distributing scarce resources.

Increase focus on small dams

Protections for minor dams, which are frequently neglected in dam security management regardless of the fact that they should be included in the Act, should be included. To achieve this, it is necessary to establish specific standards for dams of lesser significance and to conduct routine safety inspections of these dams.

The Act should protect dams in ecologically sensitive areas, for instance, by mandating the fulfilment of adverse environmental assessments prior to their construction. Dams in areas of environmental risk should be subject to stricter regulations. The Act should provide some form of protection for dams in ecologically sensitive locations.

Increase capacity-building measures

Regulators must have access to training and other capacity-building resources if they are capable of fulfilling their duties effectively. This improves the likelihood that the Act will be implemented in a consistent and efficient manner. If the report's recommendations are implemented, dam safety throughout the nation will improve.