

INTERNATIONAL JOURNAL FOR LEGAL RESEARCH AND ANALYSIS



Open Access, Refereed Journal Multi-Disciplinary
Peer Reviewed

www.ijlra.com

DISCLAIMER

No part of this publication may be reproduced, stored, transmitted, or distributed in any form or by any means, whether electronic, mechanical, photocopying, recording, or otherwise, without prior written permission of the Managing Editor of the *International Journal for Legal Research & Analysis (IJLRA)*.

The views, opinions, interpretations, and conclusions expressed in the articles published in this journal are solely those of the respective authors. They do not necessarily reflect the views of the Editorial Board, Editors, Reviewers, Advisors, or the Publisher of IJLRA.

Although every reasonable effort has been made to ensure the accuracy, authenticity, and proper citation of the content published in this journal, neither the Editorial Board nor IJLRA shall be held liable or responsible, in any manner whatsoever, for any loss, damage, or consequence arising from the use, reliance upon, or interpretation of the information contained in this publication.

The content published herein is intended solely for academic and informational purposes and shall not be construed as legal advice or professional opinion.

**Copyright © International Journal for Legal Research & Analysis.
All rights reserved.**

ABOUT US

The *International Journal for Legal Research & Analysis (IJLRA)* (ISSN: 2582-6433) is a peer-reviewed, academic, online journal published on a monthly basis. The journal aims to provide a comprehensive and interactive platform for the publication of original and high-quality legal research.

IJLRA publishes Short Articles, Long Articles, Research Papers, Case Comments, Book Reviews, Essays, and interdisciplinary studies in the field of law and allied disciplines. The journal seeks to promote critical analysis and informed discourse on contemporary legal, social, and policy issues.

The primary objective of IJLRA is to enhance academic engagement and scholarly dialogue among law students, researchers, academicians, legal professionals, and members of the Bar and Bench. The journal endeavours to establish itself as a credible and widely cited academic publication through the publication of original, well-researched, and analytically sound contributions.

IJLRA welcomes submissions from all branches of law, provided the work is original, unpublished, and submitted in accordance with the prescribed submission guidelines. All manuscripts are subject to a rigorous peer-review process to ensure academic quality, originality, and relevance.

Through its publications, the *International Journal for Legal Research & Analysis* aspires to contribute meaningfully to legal scholarship and the development of law as an instrument of justice and social progress.

PUBLICATION ETHICS, COPYRIGHT & AUTHOR RESPONSIBILITY STATEMENT

The *International Journal for Legal Research and Analysis (IJLRA)* is committed to upholding the highest standards of publication ethics and academic integrity. All manuscripts submitted to the journal must be original, unpublished, and free from plagiarism, data fabrication, falsification, or any form of unethical research or publication practice. Authors are solely responsible for the accuracy, originality, legality, and ethical compliance of their work and must ensure that all sources are properly cited and that necessary permissions for any third-party copyrighted material have been duly obtained prior to submission. Copyright in all published articles vests with IJLRA, unless otherwise expressly stated, and authors grant the journal the irrevocable right to publish, reproduce, distribute, and archive their work in print and electronic formats. The views and opinions expressed in the articles are those of the authors alone and do not reflect the views of the Editors, Editorial Board, Reviewers, or Publisher. IJLRA shall not be liable for any loss, damage, claim, or legal consequence arising from the use, reliance upon, or interpretation of the content published. By submitting a manuscript, the author(s) agree to fully indemnify and hold harmless the journal, its Editor-in-Chief, Editors, Editorial Board, Reviewers, Advisors, Publisher, and Management against any claims, liabilities, or legal proceedings arising out of plagiarism, copyright infringement, defamation, breach of confidentiality, or violation of third-party rights. The journal reserves the absolute right to reject, withdraw, retract, or remove any manuscript or published article in case of ethical or legal violations, without incurring any liability.

SOCIO-POLITICAL AND LEGAL ANALYSIS OF STRUCTURAL DECAY AND SAFETY CONCERNS AT THE MULLAPERIYAR DAM

AUTHORED BY - ALPHONSA AMSTRONG¹ & ANAGHA AMSTRONG²
BA LLB,
KES' Shri Jayantilal H. Patel Law College

Abstract

This paper analyzes the uncertain socio-political, legal, and structural status of the Mullaperiyar Dam, placing it as a crucial case study under the scope of the global crisis of geriatric dam infrastructure. The study examines the potential risks of a 130-year-old dam made up of a lime-surkhi mortar and makes a comparative analysis with catastrophic historical failures, for example, the 1979 Machu Dam disaster, to highlight imminent danger posed by structural outdatedness present in the regions of high seismic activity. The main intent of this research is to examine the judicial shift from a “maintenance-based” approach of the Supreme Court's 2014 judgment to the preventive statutory requirements of the Dam Safety Act, 2021. Eventually, this paper recommends the urgent decommissioning of the current structure of the dam and the construction of a contemporary replacement dam. It argues that the central and state governments should overcome the interstate dispute between Kerala and Tamil Nadu to fulfill their binding constitutional duty under Article 21 by emphasizing the “Right to Life” through a lasting engineering solution.

Keywords: Mullaperiyar Dam, Kerala, Tamil Nadu, Dam Safety Act 2021, Article 21, Geriatric Dams.

Introduction

Water is one of the most essential elements for human survival, but still historically, it has been one of the greatest sources of friction and conflict between civilizations. While a river obeys the laws of nature by adhering to gravity and terrain, human laws try to trap, redirect, and own the flow of these water bodies through engineering and legal contracts. This creates a fundamental tension between nature, which is dynamic and changing, and legal agreements

like the 1886 Periyar Lease Deed, which are rigid and static more often. The Mullaperiyar Dam is a physical embodiment of this conflict, where a 130-year-old structure of lime-surkhi stands as a boundary between the water security of one state and as a terror to the physical safety of the other.

For over a century, the Periyar River was viewed as a shared resource, but as the Mullaperiyar Dam's aging process is accelerating, that resource has transformed itself into a source of intense anxiety and terror. In the humid, seismically active landscape of the Western Ghats, the physical reality of the dam, which is marked by internal leaching and cracks, has started to surpass the legal protections once thought to be permanent. This has forced a shift in the public consciousness to see water not only as a life-giver but also as a potential force of destruction if the containment fails.

Historical Foundations and the Socio-Political Landscape of the Periyar

Dispute

The Mullaperiyar dam issue originates from a lease deed famously known as the Periyar Lease Deed of 1886, which is a treaty that was signed between the Maharaja of Travancore and the British Secretary of State for India. The Periyar Lease Deed was a 999-year lease that granted the Madras Presidency (now Tamil Nadu) 8,000 acres of land and the right to divert the west-flowing Periyar River eastward for a period of 999 years. This created a colonial relic, as there was no termination clause for this deed, wherein Kerala, as the owner, had no right over the dam operation, thus creating a legal deadlock. While Tamil Nadu, being the beneficiary, enjoys the absolute rights to the water. Kerala challenged the validity of this agreement after independence, but the renewal of the agreement in the year 1970 by the government of Kerala gave it a fresh legal standing, which the Supreme Court later upheld. This dam is a gravity dam that is constructed using rubble masonry and lime-surkhi mortar, a technology that is considered dated in the present times for structures of this scale. The structural safety of the Mullaperiyar dam has exceeded regional discourse and gained global attention. Through the 2021 global assessment, the United Nations University (UNU-INWEH), in its report 'Ageing Water Infrastructure: An Emerging Global Risk', classified Mullaperiyar as a key example of a high-risk 19th-century structure that has significantly outlasted its intended lifespan.

The Socio-Political Conflict:

- **Right to Life for Kerala:** Kerala argues that the 130 year old structure that is built with “surkhi” (an age-old masonry using a lime and burnt brick powder mix) poses a catastrophic risk to 3.5 million to 10 million people living downstream. This disaster that can arguably happen violates Article 21 of the Constitution when we consider the lives of people of Kerala. And the “Risk Society” perspective here is that this dam has outlasted its 50 year design life.
- **Water for Tamil Nadu:** The lifeline of five dry districts (Theni, Madurai, Dindigul, Sivagangai, and Ramanathapuram) of Tamil Nadu is water. Any decrease in the levels of water is considered as a serious threat to food security and the means of survival for thousands of farmers. Tamil Nadu claims that the dam has been strengthened to an adequate level and believes that fears of Kerala's safety are politically motivated to prevent their water rights.
- **Federalism and Adjudication:** The dispute between Kerala and Tamil Nadu emphasizes the drawback of the Inter-State River Water Disputes Act, 1956. The Supreme Court has frequently intervened in this matter, particularly in 2006 and 2014, allowing Tamil Nadu to increase the water level to 142 ft, against Kerala's opposition.

A Critical Review Of Judicial Proceedings (1886–2026)

A. *Mullaperiyar Environmental Protection Forum v. Union of India* (2006)¹

This case was the first case to place water levels as the central issue in the judicial proceedings.

- **Legal Detail:** The Supreme Court granted Tamil Nadu permission to increase the water level from 136 feet to 142 feet after analyzing the dam's structural safety at that level. Kerala straight away countered it by passing the Kerala Irrigation and Water Conservation (Amendment) Act, 2006, which allowed the legislative power to overcome the court ruling by placing the water level back at 136 feet.

B. *State of Tamil Nadu v. State of Kerala & Anr.* (2014)²

A Constitutional Bench comprising of 5-judges passed the judgment centring on Article

¹ *Mullaperiyar Env't Prot. Forum v. Union of India*, (2006) 3 S.C.C. 643.

² *State of Tamil Nadu v. State of Kerala*, (2014) 12 S.C.C. 696.

131 (interstate disputes) and the separation of powers.

- Legal Detail:

The court struck down the Kerala Irrigation and Water Conservation (Amendment) Act, 2006, as ultra vires, which aimed to limit the water level to 136 ft and was declared unconstitutional. The Court held that a State Legislature cannot repeal a judicial order by amending the law to annul a court's particular finding on the dam's safety, and the doctrine of Res Judicata was applied by the Court, asserting that once the court had determined and declared that the dam is safe for 146 feet in 2006, the state cannot amend the legislation on the issue. Thus, the Court enabled Tamil Nadu to increase the water level to 142 ft and established a three-member committee to monitor safety and implementation.

C. *Dr. Joe Joseph & Ors. v. State of Tamil Nadu & Ors. (2022)*³

This case was started in the midst of intensified anxiety after a devastating floods of 2018 and 2021, led by the Dr. Joe Joseph and local residents petitioned the Supreme Court requesting immediate intervention relating to structural stability of the Mullaperiyar Dam and the implementation of a scientific "Rule Curve" in order to control release of water and prevent upcoming disasters.

- Legal Issues:

Shift to Statutory Law: When the Dam Safety Act, 2021 came into force the central issue was how to integrate prevailing Court appointed Supervisory Committee with the newly implemented Dam Safety Act, 2021.

Resolving issues between Judicial and Technical Oversight: Determining whether the Court should manage technical safety of dam or delegate them to specialized statutory bodies.

- The Judgment and Instructions by the Court:

The Judgment of this case was pronounced by a Bench comprising of Justice A.M. Khanwilkar, Justice Abhay S. Oka, and Justice C.T. Ravikumar on April 8, 2022. The court used its plenary powers provided under Article 142 of the Constitution to pass following directions:

a. Reconstitution of Committee: the court added two technical experts in the Supervisory

³ *Joe Joseph v. State of Tamil Nadu*, (2022) 15 S.C.C. 380.

Committee, one from Kerala and one from Tamil Nadu, who have expertise in the field of dam safety and hydrology.

b. The "Surrogate" Authority: The Supervisory Committee was made as a statutory surrogate and was implemented and made effective until the regular NDSA was fully operational to perform all the functions of the NDSA as specified in section 9 of the 2021 Act.

c. Operational Directives:

The committee was particularly assigned with the following:

i. Monitoring all the safety issues of the dam including instrumentation and maintenance.

ii. Executing a scientific Rule Curve and an Emergency Action Plan (EAP)

iii. To ensure transparency by Real-time data sharing between states.

d. State Accountability: The Chief Secretaries of both the states were made individually accountable for confirming that the Committee's direction were followed without any further delay.

• Legal Outcomes:

The ruling enforced that the dam safety is a technical and statutory matter and not solely a judicial matter. It revealed that future disputes of the dam would be resolved through the conditions set by the Dam Safety Act, 2021 instead of constant adversarial litigation.

D. *Save Kerala Brigade v. Union of India & Ors* (2025)⁴

The case of *Save Brigade v. Union of India* signifies a transition in the legal conflict between the two states regarding the Mullaperiyar Dam. Earlier, the main focus of the dam is to repair or strengthen the existing structure but now it has shifted the focus towards the need for complete decommissioning and building a new one in its place.

The Supreme Court of India heard a Public Interest Litigation (PIL) filed by the NGO *Save Kerala Brigade* (SKB), On October 13, 2025. The case was handled by a bench including Chief Justice B.R. Gavai and Justice K. Vinod Chandran. The petition aims for issuing a Writ of Mandamus to order the Union government and State governments of Kerala and Tamil Nadu to decommission the 130-year-old dam and replace it with a new one.

• Petitioner's Arguments:

The petitioner argued that 130 year old aging Mullaperiyar Dam is unsafe as it has undergone material fatigue. Roughly around 62% of the dam's inner core consists of lime-

⁴ *Save Kerala Brigade v. Union of India*, W.P.(C) No. 964/2025 (India Oct. 13, 2025), https://api.sci.gov.in/jonew/cl/2025-10-13/M_J_2.pdf.

surkhi mortar, an outdated 19th century hydraulic mix which is classified as M5 strength. This material is six times weaker than the M30 concrete which is used in modern dams like the Idukki Arch Dam. The petitioner further cited that the core samples from 2012 indicates that the lime-surkhi mortar had disintegrated, causing large internal voids within the dam which weakens the bonding of the material and makes the structure vulnerable to internal erosion. The petition stated that the dam is located in Seismic Zone III and with increased seismic activity in the region, the masonry of the dam can no longer be considered as earthquake proof. The most serious safety argument by petitioner is that there can be a probable cascade effect. If Mullaperiyar Dam collapses, the resulting hydraulic force from the dam would strike all the idukki project dams (idukki, cheruthoni and kulamavu) and the weakest link which is the kulamavu dam would probably fail, causing a deluge that could ruin five districts in kerala and take millions of lives. The Senior Advocate Giri stated that the life of about 10 million people is at risk of loss while arguing about the strengthening measures of the past have failed to address the fundamental deterioration of the lime-surkhi core of the dam. Thus the petitioner requested for a Writ of Mandamus in order to decommission the dam, stating that only supreme court has the authority to bypass this interstate deadlock and order for the construction of a new dam in its place, invoking the right to life under Article 21.

- Court's Response and Directions :

The Court did not order for the construction of a new dam immediately but instead passed a Notice Order that reopened the decommissioning debate again. The Supreme Court issued notices to the Union of India, State of Tamil Nadu, State of Kerala, and the National Disaster Management Authority (NDMA) concerning this matter.

By including NDMA the Court treated the issue of the Mullaperiyar dam as potential a disaster management concern and the Supreme Court also directed the respondents to submit detailed affidavits on whether a new dam is feasible and to provide safety assessments under the Dam Safety Act, 2021.

E. The Current Landscape (2026)

Today, this interstate dispute has moved beyond courtroom to a structured regulatory era. As the Dam Safety Act 2021 is now fully operative, the National Dam Safety Authority assumes the lead supervisory role of effectively taking over the functions which were previously held by the Supervisory Committee appointed by the Supreme Court. This

notable shift is marked by the NDSA's recent formation of a specialized technical committee known as the Comprehensive Dam Safety Evaluation Committee (CDSEC). In early 2026, it was tasked with performing a comprehensive, fresh safety audit of the dam structure. This transition, in fact, moves the resolution of this century old conflict into a regulatory landscape, where the key challenge remains reconciling of a 19th century colonial lease with the 21st century requirement for technical safety and the fundamental right to life.

Downstream Catastrophe: Assessing the Hydraulic and Socio-Economic Impact on Kerala

The possible failure of Mullaperiyar Dam is categorized as a "High-Risk, High-Consequence" incident of the Cascade Failure, it would trigger. When this 130 year old structure fails, the potential danger is not solely determined by the volume of its own reservoir, but following destruction of downstream of the Idukki Reservoir system.

Based on updated demographic data and more advanced hydraulic models, the shift in risk estimates from 3.5 million (2011) to 10 million (2025–2026) that will contribute to total system collapse.

A. The IIT Roorkee Study on Seismic Vulnerability (2008–2012)

A "Seismic Stability Analysis" study was conducted by IIT Roorkee to determine whether the dam could withstand an earthquake in the Periyar region. The study recognized 22 geological fault lines within a 300 km radius. It concluded that the dam is under-designed as it is made up of lime –surkhi masonry for the modern seismic forces. This study also analysed that a magnitude 6.5 earthquake would cause a total structural break down as the lime-surkhi binder has washed away over 130 years, resulting in internal cavity that could not bear highest ground acceleration.

B. The IIT Delhi Study on Hydrological Safety (2010–2012)

A "Hydrological Safety" study was conducted by IIT Delhi to determine the capacity of the dam to withstand excessive rainfall and Probable Maximum Flood" (PMF) events. The study identified that the dam is Hydrologically unsafe. It determined that the current spill channels are not sufficient enough to release the water during the devastating monsoon occurrence.

A possible danger is also determined through the study of the dam that, if the water level increases upto 158 ft, the dam would be overtopped. In that case a gravity dam like Mullaperiyar Dam, will not withstand overtopping of water and will cause an immediate failure of the main structure.

C. Save Kerala Brigade v. Union of India

The most current danger assessment was presented by Senior Advocate V.Giri in a Supreme Court hearing occurred in 13th October, 2025 to the Bench of CJI B.R. Gavai. Advocate Giri stated that, according to the modern satellite data and 2025 census projections the Cascade Effect caused by the failure of Mullaperiyar dam followed by the Idukki and Cheruthoni dams would release a rush of water that is extremely powerful enough to submerge the whole industrial region of Ernakulam (Kochi) and the flood-prone area of Alappuzha district. The 10 Million figure denoting the loss of lives of the people if the dam fails was first officially stated through this case. The kinetic energy of Mullaperiyar's water would surpass the height of Idukki Arch Dam, discharging almost 2,000 million tonnes of water towards coastal regions, that would result in the death of 10 million people.

D. Prof. Shivaji Rao's 2014 report (DAM BREAK REPORT CONFIRMS 35 LAKHS DEATHS DUE TO COLLAPSE OF MULLAPERIYAR)

The report determines the seismic vulnerability of the dam, pointing out critical engineering concerns because of its old construction materials. The report states that the dam is "under-designed" with respect to the modern safety standards, mainly because the dam lies in a seismically active region (Seismic Zone III). Based on the technical simulations in the report, Prof. Rao argues that a moderate earthquake (approximately magnitude 6.5) would probably cause a catastrophic structural failure. This is because the age old masonry lacks tensile strength and bonding strength, which are needed to withstand peak ground acceleration of a modern seismic event. Thus, the dam is described as a "disaster waiting in the wings" which means there is a high risk of collapse of the dam in near future.

Another major concern that is discussed in this report is regarding the cascade effect, which is quantified by Prof. Rao using the NWS-DAMBRK Model. This model simulates the movement of a high-velocity flood wave through the Periyar River basin. As per the report, if a breach in

the Mullaperiyar Dam occurs, it could release an unpredictable wall of water (estimated at over 80,000 cusecs) that can eventually reach the Idukki reservoir approximately 36 to 40 kilometers downstream, in a span of less than two hours. This sudden surge depicted in the model, can create a “domino effect” where the substantial volume and velocity of the water can surpass or in turn cause the structural failure of the Idukki arch dam and successive downstream barriers. This cascading failure would result in a disastrous submergence across the Idukki, ernakulam, and Kottayam districts, arguably endangering the lives of 3.5 million people which could cause irreversible socio- economic destruction to the central belt of the state.

Analysis on arid reversion and its effects on agriculture and water insecurity in Tamil Nadu

In case Mullaperiyar Dam bursts, the crisis perspective commonly focuses on the imminent danger to life and property in Kerala because of the unpredictable flooding. On the other hand, for the people of Tamil Nadu, the disaster will bring a complete collapse of agriculture, economy and humanitarian systems. The Mullaperiyar Dam is located on the west-flowing Periyar River in Kerala but is controlled and operated by Tamil Nadu, which redirects the water toward the east into the Vaigai River basin. If the dam bursts and the reservoir gets empty, then Tamil Nadu will immediately lose its primary water lifeline, resulting in tremendous hardships across its southern districts. The situation of Tamil Nadu can be seen in the following articles:

1) The approaching failure of Agricultural Economy in Southern Tamil Nadu

In the article “Mulla Periyar dam: Safety aspects to save farmers of Tamil Nadu and Kerala” published as an analysis by the India Water Portal highlights the dual disaster of a potential dam burst. While, people of Kerala will face a direct threat to life due to potential catastrophic flood, Tamil Nadu, on the other hand, will also face unprecedented economic and agricultural failure. This dam is the lifeline of dry rain-shadow area of Southern Tamil Nadu. If the dam undergoes a structural collapse without a mutually consented replacement of the dam, there will be a collapse of agricultural productions and economy of lakhs of people in the Southern Tamil Nadu districts. Without an active storage and usable water from the dam, the earlier fertile and Intensively cultivated lands of these districts will undergo rapid land degradation, forcing farming families into sudden poverty.

2) Impact of Drought on Vulnerable Districts and Decline in Hydel Power Production

The article, “Inter-State Dispute over Water and Safety in India: The Mullaperiyar Dam, a Historical Perspective”, examines the multidimensional dependency of Tamil Nadu on the diverted waters. The water from the Mullaperiyar dam is explicitly used to irrigate intensely drought prone districts in Tamil Nadu. A structural collapse of dam will not only cause a huge agricultural water scarcity but also the complete shutdown of the Periyar Power Station, which is dependent on hydel pipelines from the reservoir to produce electricity upto 180 MW capacity. This unexpected loss of both irrigation capacities and hydel power generation would bring agriculture and industrial production in Southern Tamil Nadu to an abrupt stop compounding into extreme economic instability throughout the state.

3) Problems affecting 2.5 lakh acres of farmland and drinking water

In the view of farmer’s associations, the dam is the essential lifeline for more than 2.5 lakh acres agricultural land covering five primary districts of Theni, Madurai, Sivaganga, Ramanathapuram, and Dindigul. In case the dam bursts, the immediate shutdown of water will suddenly destroy the Growing crops over these 2.5 lakh acres. Moreover, municipal drinking water supply programs over these five districts deeply Count on the Vaigai dam, which is fed by Mullaperiyar Dam. Thus an unexpected humanitarian disaster will happen if the Mullaperiyar Dam bursts, which will ultimately result in deprivation of drinking water for the millions of citizens. These five districts are prone to famine if this unfortunate fate happens in real life.

A Comparative Analysis of Global Dam Failures and the Mullaperiyar

Dam Issue

To comprehend probable outcome of Mullaperiyar Dam whether or not decommissioned or sufficiently replaced, we can examine the critical collapse of other geriatric dams internationally.

A. The Machchhu II Dam

- A devastating structural collapse was faced by Machchhu II Dam on August 11, 1979, which is located on the Machchhu River in Morbi, Gujarat. The unusual heavy monsoon rains caused a water surge that was almost triple the size of the dam’s constructed outlet

spillway capacity. The dam broke due to the crest overflow over the earthen embankments surrounding the masonry spillway. A death toll of 1,800 to 25000 people was estimated because of the huge surge of water that flooded the industrial town of Morbi within 20 minutes.

- When comparing Machchhu II dam and Mullaperiyar dam, the underlying vulnerability of both the dams is identical i.e., outdated hydrological system. While Machchhu II was a newer, earthfill dam which was constructed in 1972 and Mullaperiyar Dam is a 19th-century gravity dam built with lime and surkhi. Both the dam was constructed on the basis of historical rainfall data, that is not suitable for severe weather conditions of the present times. There are serious concerns regarding severe rainfall that can overwhelm Mullaperiyar Dam's outmoded spillway capability due to the climate change that is escalating monsoons in the Western Ghats. Similar mechanism of overflowing is seen in the destruction of Machchhu II Dam.

B. Derna Dams

- Thousands of people were killed and the entire neighborhoods of Derna was washed into the sea on September 2023, when the Abu Mansour and Derna dams in Libya collapsed sequentially. There was years of neglect in maintainance of these dams which were built in the 1970s. The Storm Daniel was the sudden trigger which brought unexpected rainfall on the region. The outlet channels of Derna Dams were outdated and they could not cope up with the extreme modern climate change which resulted in Overtopping and systemic failure.
- When comparing Derna Dams and Mullaperiyar Dam, the infrastructure of these dams do not count for modern meteorological extremes. The rainfall patterns in Kerala have been drastically changed which can be proved through the torrential Kerala flood of 2018. Through these dams it is clear that operating an aging dam under these unstable climate condition is a great risk.

C. Toddbrook Reservoir

- The Toddbrook Dam constructed in 1838, is genuinely a geraitric dam from the same construction period as that of Mullaperiyar Dam. The intense flood happened in August 2019, pushed the dam into the verge of collapse. The surge of water overflowed the emergency spillways, breaking down the concrete and threatened to sweep away the 180 year old clay core underneath the dam. An immediate emergency evacuation of

people and intervention barely prevented a total disaster.

- While comparing the Toddbrook Dam and Mullaperiyar Dam, it becomes arguable that 19th-century materials degrade over a century, creating hidden internal weaknesses. In case Mullaperiyar Dam face an immediate rush of kinetic energy from modern floodwaters, its outdated mortar core could quickly break apart, similar to the danger faced by Toddbrook.

D. St. Francis Dam

- The St. Francis Dam was collapsed disastrously soon after the completion, releasing a huge surge of water in a California valley and thereby killing over 425 people. It is considered as the second deadliest dam failure in American history after the South Fork Dam failure. Geologically unstable foundation was the main reason for the failure of the dam. The dam was firmly fixed into a fault line and constructed over a weak soil conglomerates, resulting in the breaking down of the structure when the water pressure became extremely high.
- While comparing St Francis Dam and Mullaperiyar Dam, Mullaperiyar Dam is located in a high-risk seismic region in the western Ghats and has faced small tremors in the past like Idukki tremors. The St Francis Dam collapse acts as a clear warning from history that even the largest and strongest gravity dams are totally reliant on the tectonic and geological stability of their foundations. Thus even a moderate earthquake can easily destroy Mullaperiyar Dam's aged masonry structure.

Practical approaches for the Union and State governments to resolve the Mullaperiyar Dam issue

Addressing the Mullaperiyar Dam issue demands shifting from pure political discourse and prioritizing on practical, hydro political legal techniques. The central point of the dispute is the lack of trust that is, Kerala is concerned about the safety of millions of people because of the outdated structure of the dam whereas Tamil Nadu is concerned about losing its right over the main water supply, when a new dam is built.

In order to create solutions for the issue of the dam that will benefit both the states, the Union and State governments should work together on legal systems, structural designs, and modern water management.

Following are the well planned, logically sound steps backed by credible policy and legal analysis:

A. Utilizing the National Dam Safety Authority (NDSA) for Statutory Mediation

The most important step that the Union government can take is enforcing and fully implementing the Dam Safety Act, 2021. Previously the dam disputes were mainly controlled through Supreme Court cases. However with the introduction of a new Act, the responsibility of dams and disputes related to the dams shifts from ad-hoc judicial jurisdiction to a permanent, neutral regulatory body called National Dam Safety Authority (NDSA). With the help of NDSA the Union government can enforce scientific safety standards, regular independent inspections, and coordination between Kerala and Tamil Nadu's State Dam Safety Organisations, ensuring the issue is managed technically rather than politically or legally.

B. Converting the Mullaperiyar Dam from a storage dam into a diversion dam

On the basis of the water dispute between the states, experts argue that there is a need for a major change in the hydrological strategy. At present Tamil Nadu demands to maintain a high water level up to 142 ft for storage, which creates immense fear in Kerala concerning the structural failure of the dam. A solution for the dam issue is to redefine the dam's function from a storage structure to a diversion structure. Through this strategy, the water will be stored and maintained at a lower and safe level (e.g., 120 ft), but the water would be immediately and continuously diverted to Tamil Nadu. This method ensures that Tamil Nadu's water needs are met while considerably reducing hydrostatic pressure and safety risk for Kerala.

C. Constructing a New Dam with a Joint Management Board

Kerala's primary concern is to decommission the ageing dam and build a new one in its place. Tamil Nadu challenges this due to the fear of losing control over the dam and that Kerala will make use of the new dam to prevent the water supply to Tamil Nadu. To resolve this problem, a legal compromise can be introduced where Kerala can take the responsibility of funding and building a new dam, ensuring its citizens' safety. On the other hand, the day-to-day operation of the dam will be controlled by the joint body involving Kerala, Tamil Nadu, and the union government, a tripartite joint management board, similar to the Bhakra-Beas model. This legally strong treaty will ensure that

Tamil Nadu's water needs are met and Kerala gets a structurally sound dam.

D. Improving urban water systems with ecosystem based basin planning

A massive volume of water diverted from Mullaperiyar Dam is being wasted because of evaporation, seepage, and illegal tapping while travelling over places like Madurai through its open canals. To resolve this issue, Tamil Nadu must invest in modernising the water transport system with the help of closed-pipe lift irrigation to carry water more efficiently to treatment plants and promote micro-irrigation methods among farmers to reduce water wastage. Therefore, by improving internal water efficiency, the dependency on the Periyar River will decrease, and this will ultimately reduce the tensions between the states, promoting eventual ecosystem-based river basin planning.

Conclusion

The 1886 lease deed, which is one of the colonial engineering successes, has now become a serious modern-day crisis on safety and livelihood for Kerala and Tamil Nadu, respectively. For Kerala, the aging dam is an unending fear because of its location in a seismic region. Whereas, for Tamil Nadu, the dam acts as a critical lifeline that is non-negotiable for their agriculture and food security. Therefore, this situation is leading to a severe interstate dispute that is backed by fear and mistrust that prevents all the solutions for it. To resolve this issue, there must be a unified approach where the union government should serve as a neutral, scientific arbiter via the National Dam Safety Authority, providing clear and transparent data to build trust between the states. And the state governments must move beyond legal battles. Kerala must provide well-defined technical plans for a new dam, and Tamil Nadu must be willing to accept modern engineering alternatives that ensure the lives of the people are not at risk while maintaining the water supply. The responsibility for this interstate dispute also lies with the people of both states. The citizens residing in these states must reject water chauvinism and shall also be careful about the spread of misinformation on this issue on social media. The true dispute resolution happens when there is interstate empathy by recognizing the farmer's need for water and the residents' need for safety are equally valid fundamental rights. In conclusion, the Mullaperiyar Dam issue is a test for India's ability to manage federal relations with maturity, where the solution lies in diplomacy, cooperation, modern engineering, and mutual understanding. Let the water flow as a bond of brotherhood, not as a reservoir of fear.

References

1. Ministry of Jal Shakti, *Mulla Periyar Dam Issue* (2024), <https://www.jalshakti-dowr.gov.in/static/uploads/2024/05/MULLA-PERİYAR-DAM-ISSUE.pdf>.
2. Duminda Perera et al., *Ageing Water Storage Infrastructure: An Emerging Global Risk* (UNU-INWEH Report Series No. 11, 2021)
3. *Mullaperiyar Environmental Protection Forum v. Union of India*, (2006) 3 SCC 643. Available at: <https://indiankanoon.org/doc/1649309/>
4. *State of Tamil Nadu v. State of Kerala & Anr.*, (2014) 12 SCC 696. Available at: <https://indiankanoon.org/doc/41744252/>
5. *Dr. Joe Joseph & Ors. v. State of Tamil Nadu & Ors.*, (2022) 15 SCC 380. Available at: <https://indiankanoon.org/doc/139874329/>
6. *Save Kerala Brigade v. Union of India & Ors.*, W.P.(C) No. 964/2025 (Supreme Court of India, Oct. 13, 2025)
 - Case analysis and factual background available at:
 - a. PTL, *Mullaperiyar Dam: Supreme Court Issues Notice for Decommission*, Deccan Herald (Oct. 13, 2025), <https://www.deccanherald.com/india/notice-to-centre-tamil-nadu-kerala-on-plea-to-decommission-mullaperiyar-dam-3762320>
 - b. Mohanty, Suchitra Kalyan, *Supreme Court Issues Notices to Centre, TN and Kerala to Examine Safety of Mullaperiyar Dam*, New Indian Express (Oct. 13, 2025), <https://www.newindianexpress.com/states/kerala/2025/Oct/13/supreme-court-issues-notices-to-centre-tn-and-kerala-to-examine-safety-of-mullaperiyar-dam>
7. Express News Service, *Five-Member Committee Formed to Study Safety Aspects of Mullaiperiyar Dam*, New Indian Express (Jan. 13, 2026), <https://www.newindianexpress.com/states/tamil-nadu/2026/Jan/13/five-member-committee-formed-to-study-safety-aspects-of-mullaiperiyar-dam>.
8. Prameela K., *IIT Roorkee Finds 22 Faults Around Mullaperiyar*, New Indian Express (Aug. 14, 2010), <https://www.newindianexpress.com/states/kerala/2010/Aug/14/iit-roorkee-finds-22-faults-around-mullaperiyar-178139.html>
9. T. Shivaji Rao, *Mulla Periyar Dam: Safety Aspects to Save Farmers of Tamil Nadu and Kerala*, India Water Portal (Jan. 9, 2010), <https://www.indiawaterportal.org/articles/mulla-periyar-dam-safety-aspects-save-farmers-tamil-nadu-and-kerala>
10. T. Shivaji Rao, *Dam Break Report Confirms 35 Lakh Deaths Due to Collapse of*

- Mullaperiyar* (2014), https://prod-qt-images.s3.amazonaws.com/indiawaterportal/import/sites/default/files/iwp/dam_break_analysis_of_mullaperiyar_dam_prof._shivaji_rao_2014.pdf.
11. A.J. Thatheyus, Delphin Prema Dhanaseeli & P. Vanitha, *Inter-state Dispute Over Water and Safety in India: The Mullaperiyar Dam, a Historical Perspective*, 1 Am. J. Water Res. (Jan. 23, 2013), <https://pubs.sciepub.com/ajwr/1/2/2/>
 12. *Farmers Hail Verdict on Mullaperiyar Dam*, The Hindu (May 8, 2014), as compiled in Tamil Nadu Agricultural University Daily Events, https://agritech.tnau.ac.in/daily_events/2014/english/may/08_may_14_eng.pdf
 13. U.S. Army Corps of Engineers Risk Mgmt. Ctr. et al., *Machhu Dam II (Gujarat, India, 1979)*, ASDSO Dam Failures & Lessons Learned, <https://damfailures.org/case-study/machhu-dam-ii-gujarat-india-1979/>
 14. Ayman Mokhtar Nemnem et al., *How Extreme Rainfall and Failing Dams Unleashed the Derna Flood Disaster*, 16 Nat. Commc'ns 4191 (2025), <https://pmc.ncbi.nlm.nih.gov/articles/PMC12056002/>.
 15. David Balmforth, *Toddbrook Reservoir Independent Review Report by Professor David Balmforth* (Feb. 10, 2020), <https://assets.publishing.service.gov.uk/media/5e6f3f56d3bf7f2690785d52/toddbrook-reservoir-independent-review-reporta.pdf>.
 16. I.A. Alvi et al., *St. Francis Dam (California, 1928)*, ASDSO Dam Failures & Lessons Learned, <https://damfailures.org/case-study/st-francis-dam-california-1928/>
 17. *Conflict Resolution*, Forum for Pol'y Dialogues on Water Conflicts in India, <https://waterconflictforum.org/conflict-resol>
 18. *Water Supply Source Augmentation*, Corp. of Madurai, <https://maduraicorporation.co.in/water-supply-source-augmentation/>