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WATER LEGISLATION IN INDIA AS PRIORITY ASPECT OF WATER RESOURCES MANAGEMENT

Effective water resource management is contingent on sound water legislation, which plays a crucial role in shaping worldwide water management strategies. The objective of this review is to analyze water policies and legislation in India, and pinpoint issues in water policy implementation and management. Additionally, the review includes an examination of the European Water Framework Directive (WFD) to explore the differences between European water legislation assumptions and water management, which can aid in adapting certain EU assumptions to Indian legislation. India faces urgent water-related problems due to inadequate water resource management in individual states and nationwide, which can be mitigated by implementing coherence in water policies and collaborating with policymakers, practitioners, and stakeholders from various economic sectors to enhance water governance strategies. Comparative analysis revealed that the European Water Framework Directive adopts a more specific and integrated approach, supported by precise legal regulation, wide-ranging stakeholder involvement, and investments in technology and infrastructure to achieve its set water management goals. In contrast, the Indian water legislation framework lacks a systemic approach, and the main gap lies in the inconsistency between national and state water legislation and the lack of proper coordination between the state and central governments. Unifying legal regulations at the national and state levels in cooperation with responsible legislative and executive institutions at appropriate governmental levels can help solve water management problems and achieve set goals.

Keywords: water management, water policy, European water directives

1. Introduction

The world's population of seven billion is supported by an adequate amount of freshwater; however, its distribution is not equal, and a significant amount is misused, contaminated, and not properly managed. Water usage is projected to rise globally owing to various factors including altered consumption patterns, economic growth, and population expansion [11]. In terms of continental freshwater resources, America accounts for 45%, followed by Asia at 28%, Europe at 15.5%, and Africa at 9%.

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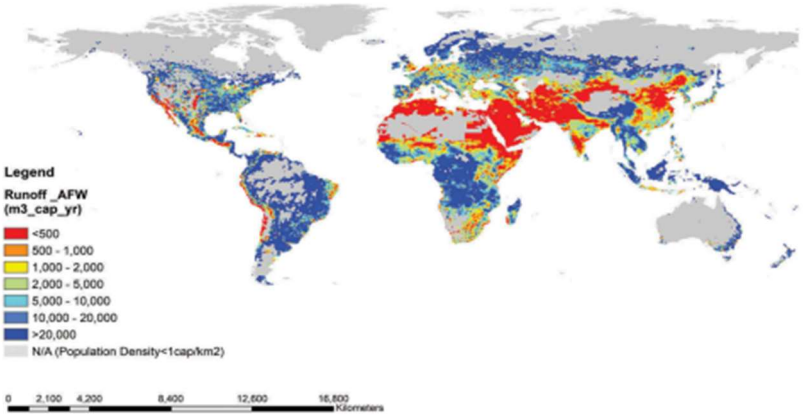

Fig. 1. Spatial Distribution of available freshwater (m^3/capita/year) [34]

As illustrated in the world freshwater map in Fig. 1, the distribution of available freshwater is highly uneven and varies considerably at continental, national, and local levels.

Global water demand is increasing owing to ongoing population growth, economic development, and changes in consumption patterns. Global water demand has increased by 600% over the last 100 years, corresponding to an annual growth rate of 1.8%. The demand for all water consumption is approximately 4,600 km^3 per year and is expected to increase by 20% to 30% by 2050 and up to 5500 to 6000 km per year 2. The rise in water consumption by 2025 is shown in the figure below; 2025 is shown in figure below global water consumption 1900–2025 [7].

However, from a micro-perspective, changes in hydrologic balances, overexploitation, and rising pollution of freshwater reserves have caused freshwater supplies in many areas and communities to diminish. Significant water shortages are a problem in many third-world nations. Growing freshwater shortages are becoming a significant obstacle to feeding the world's expanding population, protecting ecosystems, and preserving social, economic, and health security as well as international peace [18]. Water management includes irregular rainfall patterns and ensuing floods and droughts, wasteful water usage, uncontrolled groundwater extraction, pollution, and low water quality due to open defecation, lax waste management regulations, and interstate river conflicts. Regional diversity in the endowment of water resources and inadequate management have led to an increasing number of disputes between home, industrial, and agricultural users, as well as a serious water crisis in certain towns [11].

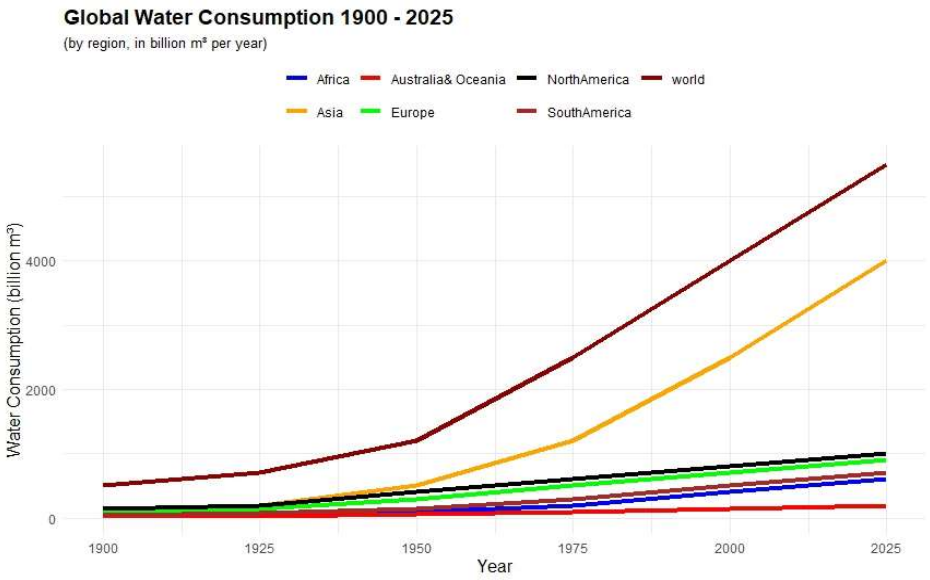

Fig. 2. Global water consumption 1900–2025 [3]

India is the largest democracy in the world. Only 4% of the world's renewable water resources are found in India, which is home to nearly a billion people or 18% of the world's population [20]. According to data from the World Bank, India is the world's second most populous nation, yet its seventh largest by land area. The fundamental population, land area, and per capita water availability statistics for India are shown in Table 1 [28]. Water originates from different sources such as precipitation, surface water, and groundwater, which play essential roles in water supply in India [1]. India is a water-stressed nation with an estimated annual per capita water availability of 1,588 cubic meters (India-WRIS, 2012), substantially exceeding the 1000 cubic meters required to qualify as a water-scarce nation. Although India is home to 18% of the world's population, it accounts for only 4% of the world's renewable water resources. Approximately half of all the accessible water resources can be used [24]. However, from a micro-perspective, changes in hydrologic balances, overexploitation, and rising pollution of freshwater reserves have caused freshwater supplies in many areas and communities to diminish. Significant water shortages are a problem in many third-world nations. Growing freshwater shortages are becoming a significant obstacle to feeding the world's expanding population, protecting ecosystems, and preserving social, economic, and health security as well as international peace [18].

Table 1. Basic population, land area, and water data for India [28]

Population	Land Area	Population Density	Renewable Internal Fresh Water Resources Per Capita
1.38 billion	2,973,190 km^2	464 people per km^2	1080 m^3

2. **Current water issues: Indian scenario**

India is facing serious water problems that are becoming more severe because of the changing climate. A significant amount of water evaporates due to droughts caused by climate change. There has also been a considerable increase in the need for drinking water during hot weather. The occurrence of severe floods in certain areas and droughts in other regions exacerbate the problem of water contamination. India's primary ecosystems are experiencing unprecedented changes due to climate change, including negative effects on the country's water balance in various regions due to variations in evapotranspiration and precipitation [8]. According to the National Institution for Transforming India (NITI Aayog), a government-affiliated think tank, 600 million Indians experience extreme to high water stress, and a persistent absence of successful measures may result in an endless water catastrophe. The growing urban population is primarily responsible for the increase in water consumption and pollution caused by the discharge of household and industrial wastewater, with decadal growth of 17. Increasing urbanization, changing agriculture and livelihoods, expanding industries and power demands, privatization, interstate conflicts that result in overextraction and degradation of the current resource base, and a growing population are just a few challenges facing the Indian water sector is facing [19]. The uneven distribution of rainfall, ensuing floods and droughts, inefficient water use, uncontrolled groundwater extraction, water pollution, poor water quality due to open defecation, lax waste management regulations, and interstate river disputes are among the problems in the field of water management. These factors, in addition to regional variations in the endowment of water resources and inadequate management, have caused a significant scarcity of water in certain areas and increased the frequency of disputes between home and industrial users as well as between farmers [11]. There are three main problems related to variability in India's water resources.

(i) There is considerable temporal variation in water availability in India, which contributes to various problems including floods and droughts.
(ii) There is a significant geographical discrepancy between the supply and demand for water; although availability is constant, the demand for different applications is rising quickly.
(iii) It is becoming increasingly unsustainable to remove water from surface and subterranean water bodies to fulfill escalating needs [17].

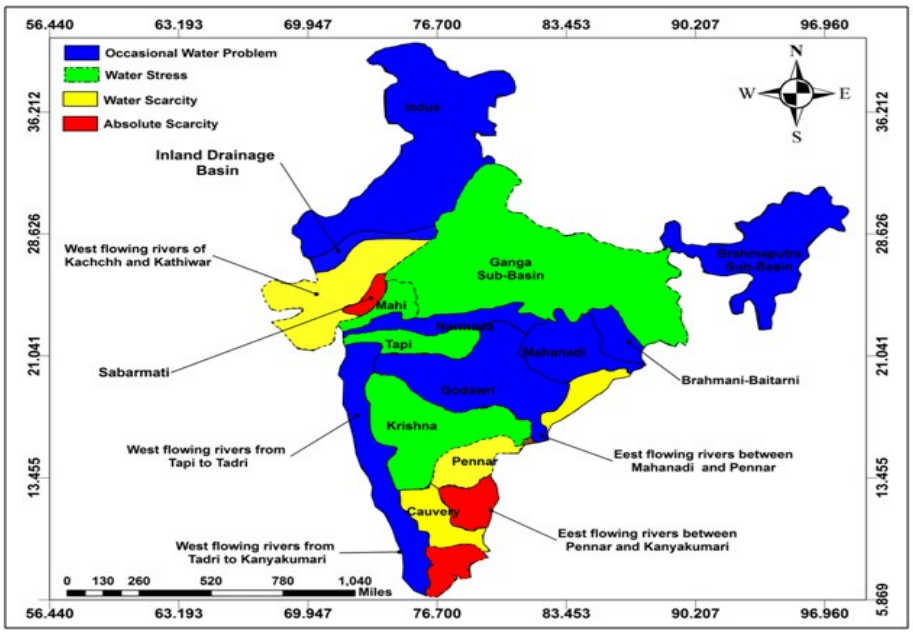

Fig. 3. Map of Indian major river basins in context of water availability [27]

In India, the Himalayan range is an abundant source of water resources, which is a form of snow that melts and finds its way in the form of river networks that are 45000 km long. There are 13 large river basins (Fig. 3) that account for approximately 83% of the country's drainage basin area, 85% of its surface runoff, and nearly 80% of its population. The greatest strength of India's freshwater resources is that it has 20 major rivers and several fewer rivers that meet the country's water needs for domestic, industrial, and agricultural use. Recent research has shown a link between rising temperatures, destabilization of hydrological processes leading to changes in ecosystems in the Ganges Basin, and water availability and quality [27]. However, this manifests itself as an increase in freshwater pollution. After gaining independence in 1951, the per capita water availability in India dropped from 5177 cubic meters (m^3) per year to 1463 m^3 /year by 2014. This reverse relationship between population growth and the relative decrease in water availability annually has been seen as a serious contribution to the current water crisis in India. Moreover, the quantity of water required for irrigation, urban consumption, and industry has increased significantly since the 1950s. The current usage indicated in Table 2 is probably than twice as much water as needed for industrial and residential use, which subsequently results in a 12–17% decrease in the amount of water available for agriculture [22].

Table 2. Comparative annual water consumption in India (%, 2013) [22]

Sector	World	Europe	Africa	India	Expected usage in India by 2050
Agriculture	69	33	88	83	59
Industry	23	54	5	12	24
Domestic	8	13	7	5	10

Research has shown that climate change has had an unprecedented impact on nearly all of India's major ecosystems. These impacts include negative effects on the country's water balance in various regions due to variations in evapotranspiration and precipitation and increased saltwater intrusion into coastal and island aquifers because of rising sea levels [11]. Water stress, deficits or shortages, and crises are aspects of water scarcity. Both nature and people may have been blamed for this. To solve this problem and adapt to climate change, systems of integrated water resource management must be based on appropriate legislative tools and financial support from governmental and local sources [18].

3. Main problems with water management in India

3.1. Water scarcity and water pollution

Water pollution is the result of both natural and anthropogenic factors. Urbanization processes lead to a significant increase in water demand, which leads to the excessive exploitation of surface and underground water sources. Accordingly, the amount of sewage discharged into water bodies has increased, often without treatment. Additionally, climate change has a negative impact on the hydrological cycle and water availability. These problems are exacerbated by climate change, which also influences the hydrologic cycle [9].

Hazardous pollutants (organic, inorganic, and biological) contaminate over 70% of surface water and a growing portion of groundwater. Both point and non-point sources, such as domestic and industrial effluents, surface runoff from urban and agricultural lands, and solid waste, are the main sources of this contamination. Poor water quality has serious health effects; in India, illnesses linked to water and sanitation account for 60% of the environmental health burden [11]. Given that millions of lives and livelihoods are at risk due to the water crisis, India is facing an especially challenging situation. Over 600 million Indians, or over half of the population, live in areas of high to severe water shortages, and each year, approximately 200,000 of them pass away from a lack of access to clean water. By 2030, a nation's water needs will likely exceed its supply. The demand for water is significantly higher than the supply owing to uneven distribution, fast expansion, and population growth. Among

the 1.3 billion people living in India, approximately 163 million do not have access to safe water near their homes [8]. Nearly 600 million people deal with high to extreme water stress, as stated by NITI Aayog, the government's body. However, more than 40%of the available surface water is consumed annually. A decrease in water availability due to unequal surface water distribution, population growth, urbanization, and shortage of water availability occurs in many regions of India (fig.4) [28].

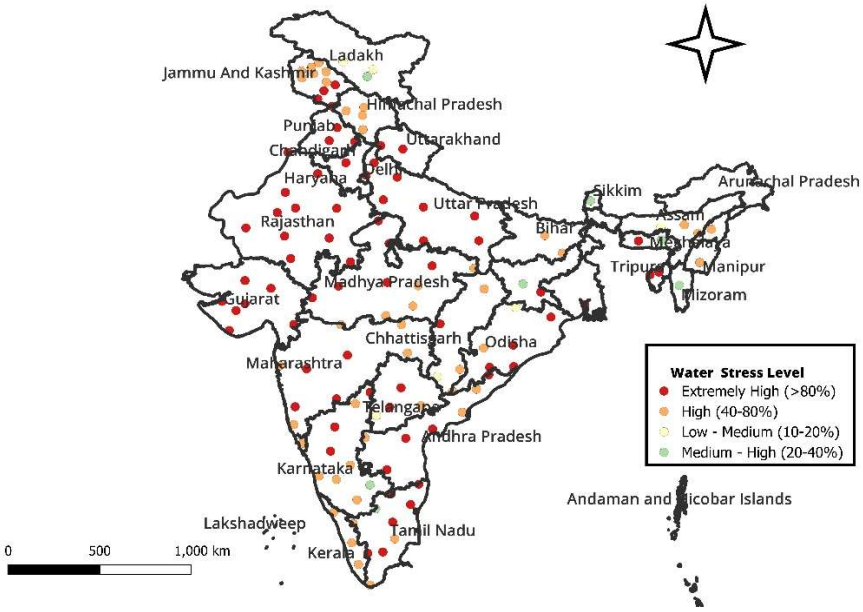

Fig. 4. State wise water distribution of water stress in India

Water shortages have been a major issue in discussions on India's socioeconomic future, particularly in the last ten years. According to many official sources of information, a large part of India is predicted to be among the third of the world that will experience complete water scarcity by 2025 [21]. The prior factors that determine water scarcity are water quality, population growth, widening disparity between water supply and water, lack of appropriate infrastructure, climatic conditions, social aspects, political and institutional activities, legislative aspects, and ecological education [10]. These symptoms, which are already evident in a few areas of India, will spread throughout the nation and may eventually become a permanent problem for the water sector if adequate measures are not taken swiftly in the sphere of water management and protection [25].

Point and nonpoint sources of contamination pose danger to surface and groundwater resources. The pressures of economic development have caused a shift in water resource allocation patterns in India. India is predicted to experience water stress by 2020 owing to its increasing population and

progressively declining average water supply. India has been rapidly urbanizing; from 10.84 percent in 1901 to 28.5 percent in 2001 and 31.16 percent in 2002, this rate has grown. Most cities lack adequate plans for gathering, moving, handling, and removing liquid and solid wastes. In addition, a growing issue is the growth of peri-urban regions without sufficient infrastructure (Dinar et al., n.d.) According to official surveys, more than one-third of India's rural groundwater sources are polluted by geogenic pollutants (fluoride and arsenic), anthropogenic pollutants, and pathogenic microorganisms [11].

3.2. Climate change influence on water resources

Climate change can worsen water resource degradation. They affect natural and anthropogenic systems by making them more vulnerable to different dimensions and intensities. Climate change can exacerbate the impact of natural disasters, such as hurricanes and floods, on both natural and human-made structures, resulting in increased economic and human losses. It has been recognized as one of the key global issues of the twenty-first century [19]. The potential for exploitable surface water resources may be further diminished by the anticipated increase in the frequency of climate extremes caused by human intervention [24]. The hydrologic cycle and, consequently, water supply, are significantly affected by the rising climate [19]. A significant challenge to the sustainable supply of water is the ever-growing demand for water and the effects of global climate change, which are increasing human influences on water resources [20]. Climate change puts more constraints on India, which is expected to soon result in significant water stress, particularly along the east coast, west, and peninsula. Additional pressure on the current resource usage pattern may result from India's worldwide commitment to mitigate the effects of climate change. To fulfill its commitment to mitigating the effects of climate change, India must develop and implement sustainable resource usage strategies that reduce the strain on its current resources. This will require a concerted effort from all sectors of society as well as a shift in the country's priorities towards more environmentally friendly practices. By doing so, India can not only meet its commitments but also set an example for other nations to follow in their own efforts to combat climate change [19].

4. Water legislation aspects

Water resources are the basis of the development and prosperity of every country. It is one of the most valuable natural resources, the availability of which is determined not only by the climatic conditions and hydrological situation of the country, but also by their rational use and protection. Often, a water crisis is caused not by a physical lack of water resources, but by a lack of proper water management. Water legislation is the basis for effective water resources management and plays an essential role in shaping water management strategies

4.1. National Law Framework

Currently, India is facing the problem of water legal framework implementation, as the existing water law framework in India lacks proper implementation tools.

In the current scenario, India faces a problem in the regulation of the water framework because the existing water law framework lacks proper framework management. The current framework of India has been formulated over the decades and constitutes several different principles, rules, and acts. The framework includes the local law principles and irrigation acts that were formulated in the colonial period as well as the recent water regulation that is also followed by the judicial recognition of a human right to water. The lack of a proper water framework at the national level reveals that different state and central government legal acts and other principles are not coherent and thus are contradictory in some cases [13]. The increasing demand for water requires the appropriate management and allocation of water for different purposes. It relates to the immediate need to develop appropriate water policies and strategies based on a holistic and integrated approach, considering prior national perspectives. The state governments were to develop state-level policies, incorporating them into legislation acts, management plans, and programs. Although the central government provides financial support to state governments for developing these programs and projects, it was not effective and did not lead to improvement in the situation [23]. The national water policies encompass a wide variety of topic measures necessary for the efficient management of water resources, and their implementation is rather extensive. Approximately 15 jurisdictions have developed water policies based on these national policies throughout a range of periods. These include the following states: Madhya Pradesh, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Odisha, Puducherry, Punjab, Rajasthan, Uttar Pradesh, and Andhra Pradesh, West Bengal.

Fig. 5. State wise map of India

The National Water Policies (NWP) of 1987 and 2002 were largely followed by state-level policies. Nonetheless, the 2012 NWP draft is still in its early stages, and states have not updated or revised their water policies accordingly. The Indian government began negotiations with states in 2012 [6]. According to the NWP assumption, water is managed in different ways in urban and rural areas, according to the state water law. Water management is done through *panchayat raj* (the oldest system of local government in rural areas), which also varies from state to state based on the duties and implementation of water policies. However, in urban areas, there is a different water management approach, and water is managed by political and executive authorities in districts and municipalities. These organizations at the district and municipality levels oversee formulating policies, carrying them out, and providing services. Water distribution, infrastructure construction and upkeep, and other associated duties are included in service offering [6]. In general, the water law in India is state based. This is because of the constitutional scheme implemented by the Government of India Act, the principle under the 1935 Legislation Act given to the states to legislate the principle in their area. In this way, states have their own exclusive authority to regulate water supplies, irrigation, canals, drainage, embankments, water storage, hydropower, etc. related to water [12].

4.2. Development of National and State water Policies

4.2.1. Colonial times

The historical context of the water flourished from the time of the Indus Valley civilization around 2500 BCE. During that period, water was an essential resource for civilization and was used primarily for personal and irrigation purposes. However, the scenario of water utilization changed in post-colonial times, and water law constitutes constitutional, federal developments, specific acts on surface and groundwater irrigation, human rights, and social and environmental issues [13]. In the 1866, British government formulated water policies that focused more on the commercial rather than the social, and under the policy, they decided that states are responsible for the construction of future projects by their own organizations and financial support would be through public loans [26]. Legislation based on the colonial government also introduced the division of duties between the central government and the states regarding water. The provinces were given the authority to make decisions regarding water supply, irrigation, canals, drainage, embankments, water storage, and hydropower by the Government of India Act (1935) [13]. The idea of government sovereignty over surface waters has existed since the colonial era. Common law rules, which emphasized landowners' rights to water, were introduced during British rule to manage control over and rights to water. A landowner with riparian rights can use surface water on their property while still having unrestricted access to groundwater [1].

4.2.2. National and state water policies (1987)

State water policies were added to the national framework. The foundations of both federal and state policies are the same: water is a natural or economic resource that can be used to increase the economy's capacity for production, whether for hydropower or irrigation water for agricultural production; additionally, the allocation of water uses should prioritize drinking water, irrigation, hydropower, ecology, agro-industries and non-agricultural industries, navigation, and other uses [26]. The constitution of India consists of both state and union lists, in which water is mentioned. States play an important role in the governance of water resources and the formulation of water policies, while the central government watches the distribution of water resources within all states. The first national water policy was formulated in 1987 and established a thorough framework for the management of India's water resources. Water was identified as a basic human need and precious national asset [30]. The 1987 policy emphasized the need for an integrated strategy and brought attention to issues facing the Indian water sector. Most of these elements were maintained during the 2002 NWP period. The policy recommends that all individual projects and plans be developed within the framework of a hydrological unit, such as a drainage basin or subbasin, for resource planning purposes [23]. The policy also addresses the necessity of utilizing groundwater, controlling floods, minimizing the impacts of droughts, controlling water pollution, and developing a standardized national information system that will introduce the scientific planning and management of water resources [1].

4.2.3. National water policy

The National Policy on Water 1987 gave rise to the 2002 National Water Policy. The policy was changed because of the new concept that integrated water resource management principles were added to the policy. The new policy came into existence because of new problems that have arisen over time since the formulation of the policy in 1897 after proper investigational checks [26]. The guiding concepts of the First National Water Policy were further emphasized in the 2002 National Water Policy. This brought attention to the socio-economic factors that contribute to the development and execution of water resource projects, including public concerns about water impoundment, suitable settlement and rehabilitation for project-affected people and animals, and environmental sustainability. It also suggests that information and statistics about water should be produced to be utilized for future planning [30]. The coordination method of national water policy implementation is discussed in this policy. The policy also discusses the integration of land and water use policies, given the extensive use of water in agriculture and the tenuous relationship between water and land rights in India. Preventing the harmful

overuse of water resources is a shared responsibility between federal and state governments. This Policy considers industries that release waste into rivers, streams, and other bodies of water. It states that effluents must be treated to acceptable levels of pollutants prior to release into the main streams, and that a minimum flow must be maintained to maintain the ecology while taking social considerations into account [26].

However, in addition to all water laws, there are other principles and regulatory acts that make up water laws. At the local level, there are regulatory bodies with additional rules and principles at the local level. These regulatory principles are agreements formulated by local legislation for the regulation of water use for domestic purposes and irrigation [12]. India's states have their own policies. These regulations are copies of the National Water Policy, which frequently transforms into a state-specific plan. Water policies in states like Tamil Nadu and Himachal Pradesh are more oriented toward the equity principle and take into consideration community-based control over water resources or the participation role of people's organizations [26]. Even the 2002 policy highly recommended the passage of "Dam Safety Legislation," an amendment to the Inter-State Water Disputes Act, 1956 that would provide a time limit for resolving disputes, and legislation that would protect the bodies of water already in existence by preventing encroachment and deteriorating water quality. However, none of these measures have been implemented [1].

4.2.4. National policy (2012)

The National Water Policy of 2012 put forward a general framework for the anticipated future development of water resources and reforms to the water sector. This clearly highlights the main issues that must be resolved and outlines the guiding ideas that must be followed to achieve this [22]. The National Water Policy, 2012, aims to evaluate the current situation and suggest a framework for a planned national approach to action, and various recommendations have been developed under this policy to achieve the objective of the policy and suggestions for the conservation, development, and proper management of water resources within the country [2]. The policy consists of the following salient features.

- Focus on the necessity of comprehensive legislation and national framework laws for the best possible development of inter-state rivers and river valleys.
- The ecological status of rivers and river flows is analyzed by low or no flows in small floods, huge floods, and variations in the flow.
- Projects and services involving water resources should be implemented through community involvement. In public-private partnerships, the private sector can be encouraged to provide services in accordance with agreed-upon terms of service delivery, including penalties for noncompliance, wherever state governments or local governing bodies are determined [2].

Numerous federal and state laws pertain to water. Despite this, many legal and administrative problems have arisen because water, a topic covered by the Constitution, is mainly listed on the State List, with only matters pertaining to interstate conflicts and international agreements. In addition, the principles of integrated water resource management have already been mentioned in the 2012 national water policy. Furthermore, in the NWP 2012, encroachments and diversions of water bodies (such as rivers, tanks, ponds, etc.) and drainage channels (irrigated also consider drainage of urban area) must not be permitted, and if it has occurred, it needs to be appropriately maintained and restored as much as possible. In addition, the environmental requirements of Himalayan areas, aquatic ecosystems, wetlands, and embanked floodplains must be acknowledged and considered [22].

5. Analysis of the State water legislation

Based on a recent evaluation of current policies, it seems that NWP 1987, NWP 2002, and NWP 2012 lack the "Water Law" component, which results in weak legal strength. Furthermore, there is a significant loss of "Water Administration" in the "Water Policy." After reviewing some of the components, current water policies have been reevaluated. Two crucial elements that need immediate attention are the integration of multi-sectoral policy and legal responsibility. Table 3 provides an explanation of the policy analyses based on the discovered components [16]. Table 3 presents the outcomes of the policy analyses based on the chosen components.

Table 3: National water policies evaluated based on the identified elements [16]

Components	National Water Policy 1987	National Water Policy 2002	National Water Policy 2012
Legal	**Distinction of water sources, accountability of sector officials, scope for private and user participation. Framework for integrated use of water sources**. • No intervention based on legal distinction of sources. • Surface water property rights or accountability of water sector officials discussed.	**Water Law** • Proposed need for 'Water Framework Law' to govern legislative or executive powers by the Centre, States, and local governing bodies. • Proposed modifications for regulation of groundwater.	**Water law** • Water Framework Law needed to govern legislative/executive powers. • Acts modification for groundwater regulation. • Comprehensive legislation proposed for inter-state rivers and river valleys.

	• No legal definition for private-user participation. • No framework for integrated use of water sources.	• Proposed comprehensive legislation for optimum development of interstate rivers and river valleys to facilitate interstate coordination.	
Project selection criteria, Linkages within Law, and Policy and with other policies	**Economy: Pricing, funds, private sector and user participation, poverty, and water** • Project criteria based on Environment Impact Assessment (EIA), Social Impact Assessment (SIA), and rehabilitation of disadvantaged groups encouraged. • No direct link between law and policy and other policies. • Close integration of water uses, and land use policies suggested.	**Water Policy** • Water rates to promote economic use. • Participation of farmers and voluntary agencies in management of distribution and collection of water rates in irrigation. • No direct subsidies on water rates for the poor, but provisions for disadvantaged groups and weaker sections included. • Equity and social justice promoted in water allocation in an irrigation system, but not explained for domestic water distribution and allocation. • Transparency and subsidy on water rates for poorer sections recommended.	**Water Policy** • Provisions from NWP 1987 and 2002 included. • Pricing of water to ensure efficient use and reward conservation. • Equitable access to water for all and fair pricing for drinking and other uses (sanitation, agricultural, industrial) through independent statutory bodies. • Allocation and pricing on economic principles for gainful use. • Statutory powers for Water Users Associations to collect and retain water charges, manage quantum, and maintain distribution in their jurisdiction
Organizational functional balance, Accountability, Water pricing body, Data validity, Science and Technology	**Water Administration** • No policy on regulation of organizations and functional balance. • No regulation for accountability and no separate water pricing body allocated. • Data sharing, coding, classification, processing, and free exchange of data at national and state levels promoted for reliable future projections.	**Institutional arrangements promoted at the national level to deliberate on water issues and evolve consensus.** • Use of modern techniques such as construction materials, tunneling technologies, seismic design of structures, risk and disaster management, use of remote sensing,	**Water Administration** • Water framework law. • Adaptation to climate change. • Demand management and water use efficiency. • Conservation of river corridors, water bodies, and infrastructure.

	• Effective and economic use of water resources via promoting research in areas such as hydrometeorology, surface and groundwater hydrology, river morphology and hydraulics, harvesting and groundwater recharge, recycling, and reuse, cropping system, and other conservation techniques.	environmental impact, prevention of logging and soil salinity, etc.	• Trans-boundary Rivers: International agreements with neighboring countries for exchange of hydrological data. • Database and information system. • Research and training needs.

As water is a state subject of India, every state has its own responsibility to implement strategies based on the functions required within their state boundaries. Many states have implemented their own policies, which are formulated in accordance with national water policy, and every state in India uses national policy as a strategy [1].

Table 4. State-wise water policies in India [1]

Nr	State water policies	Date of Implementation
1	Maharashtra State Water Policy	2019
2	Gujarat State Water Policy	2015
3	Rajasthan State Water Policy	2010
4	Uttar Pradesh State Water Policy	2020
6	Himachal Pradesh State Water Policy	2013
7	Tamil Nadu State Water Policy	1994
8	Andhra Pradesh State Water Policy	2009
9	Kerala State Water Policy	2008
10	State Water Policy Karnataka	2022
11	Madhya Pradesh State Water Policy	2003
12	Water Policy Delhi	2016
13	Jammu and Kashmir State Water Policy	2017
14	Assam State Water Policy	2007
15	Bihar State Water Policy	2010
16	Chhattisgarh State Water Policy	2012
17	Goa State Water Policy	2021
18	Haryana State Rural Water policy	2012
19	Haryana State Urban Water Policy	2012
20	Jharkhand State Water Policy	2011
21	Kerala State Water Policy	2008
22	Meghalaya State Water Policy	2019
23	Nagaland Water Policy,	2016
24	Odisha State Water Policy	2007
25	Punjab State Water Policy	2008

6. Comparison of basic water law assumptions in India and the EU

India and Europe have formulated legal frameworks for water management and protection, with the European approach being more comprehensive and integrated. The European Water Framework Directive (WFD) emphasizes river basin management, stakeholder involvement, and the integration of water policy with other sectors, providing a holistic approach to water resource management [14]. However, India's water legislation is more fragmented and faces challenges in implementation and management. Given the critical role of legal regulations in water resource management and ecosystem protection, a comprehensive system of regulations and standards should be further developed, taking into consideration all aspects of sustainable water management. The EU legislative framework, which applies to 27 member countries with diverse climatic and economic conditions, provides a developed framework that is adapted to the specificity of individual countries. India also faces challenges in implementing the national legislative framework at the state level. To improve India's water law, it would be beneficial to take advantage of the experiences of other countries and consider the possibility of introducing good practices while considering national specificities. Therefore, a comparison of EU water legislation and the National Water Policy (NWP) in India is interesting. Table 5 presents a comparative analysis of the general aspects of EU and Indian water legislation.

Table 5. Comparison of main issues of EU and Indian water legislation

	European Union	**India**
Parent Framework	Water Framework Directive (WFD), 2020	Indian National Water Policy (NWP), 2013
Binding territorial scope	27 European member countries	Republic of India
Mandatory performance	Obligates all countries	States have primary domain over water allocation and water. use within their territories [29].
Objective	'Good status' for all ground and surface waters (rivers, lakes, transitional waters, and coastal waters) in the EU	Supply the clean and safe surface and groundwater to the domestic water uses of urban and rural inhabitant and the drinking water of livestock and fishes at the overall river basin, to eradicate the hydrous diseases
Complementary regulations	Directives on: Environmental Quality Standards Marine Strategy Framework Floods Groundwater Bathing Water Drinking Water Urban Wastewater Nitrates Directive	Laws on: Embankments, Drinking water supply, Irrigation, Floods, Water conservation, River water pollution, Rehabilitation of evacuees and displaced persons, Fisheries and Ferries

Implementation effectiveness	90% of the analyzed river basins in 11 European Union countries will still not be in good condition by 2027 [15]	About 70% of India's surface water resources are polluted due to the discharge of untreated wastewater [5]
Enforcement of law	Comprehensive legislative framework aimed at governing water management and protection across the European union member states	Enforcement is primarily the responsibility of both central and state authorities
Integrated management approach	Water management is guided by integrated approach that emphasizes coordination between various sectors and stakeholders [32]	Water management strategies are influenced by a combination of national policies and state level initiatives
Public Involvement	Required mandatory	Water management is the prerogative of the state and partly state governments
Monitoring and Report	Requires comprehensive monitoring and report of surface water and groundwater bodies [32]	Water quality monitoring is fragmented across different policies at the central and state levels [32]

7. Conclusion

After conducting a comprehensive comparative study of water policies in India and Europe, it became evident that India faces significant challenges in managing its water resources effectively. This has led to issues such as water scarcity, pollution, and inadequate infrastructure. In contrast, European nations have a more comprehensive water directive framework that integrates social and economic aspects. The formulation of Indian water policies faces numerous challenges due to the country's growing population, increasing industrialization, and poor policy management. Despite the enactment of legislation and the establishment of policies to improve water management, significant gaps remain between formulation and enforcement. Additionally, I found that India has diverse state and central legislations and policies that differ from one another, while European member states have a unified perspective in their framework directive, aiming to achieve good status in all water bodies and groundwater while protecting water quality. Indian water policy lacks the coherency within their policies, even poor management of these policies that could be seen in all states of the country individually. There is need for sustainable practices and innovative initiatives, especially in the climate change impacts exacerbating water stress across the country. Moreover, I can also conclude with this European water directive framework explains more specific and Integrated approach that is characterized by better regulation of legislations, stakeholder involvement in wide range, and investments in the technology and infrastructure that help in achieving the goals in water management practice.

However, issues related to the water persists in both India and Europe as well. But India must specifically prioritize access to clean water, infrastructure developments, and improve government mechanisms to implement policies that will be effective. There is need for collaboration from all sectors like agriculture, Industry, Urban development, and environmental conservation bodies to achieve progress in the management of the water. India can learn from the experience of the WFD of Europe and can strengthen its own water legislation and management practices. I will also conclude that there is not proper coordination between the State Water Government and central government. This problem can be solved by the collaboration of the state governments with the center government with the other sectors for the effective implementation of the water legislation in achieving the water management objectives. For India's economic, environmental, and social prosperity, water laws need to change. The current legal system, which is largely left over from the colonial era, requires significant reform and democratization, and suitable alternatives are urgently needed. Therefore, future research in the field of water law should develop alternative socio-legal discourse and practice in which relevant authorities take seriously both scientific and organizational knowledge about water resources management considering the legal aspects of water resources management. To effectively implement this alternative socio-legal discourse, it is crucial to engage stakeholders from different sectors, such as agriculture, industry, and government, to ensure that their perspectives and interests are considered in water resources management.

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