



Original Article

Legal Dimensions of Water Footprint Assessment in Industrial & Agricultural Sectors

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Abstract

Water scarcity along with environmental degradation due to rampant industrialization, agriculture, climate change and increasing populations is a matter of great concern globally. Water Footprint assessment is a significant tool to evaluate the impact of freshwater consumption and pollution on industrial and agricultural activities. The research discusses legal dimensions of Water Footprint Assessment (WFA) in relation to environmental justice, water governance, corporate social responsibility and sustainability. The paper reviews international and national laws and judgments, ISO 14046 standards, Environmental Impact Assessment, ESG compliance, etc. related to WFA and advocates incorporating WFA in legal provisions for conserving freshwater resources.

Keywords: Water Footprint Assessment, Environmental Law, Sustainable Development, Agriculture, Industrial Regulations, Water Governance, ESG compliance and ISO 14046.

Introduction

Water is a necessity for life, apart from being a requirement for agriculture, industries as well as to maintain ecological balance. However, water scarcity, water pollution and inequitable distribution of freshwater is a matter of great concern as it affects the environment as well as the entire society. Agriculture and industry are the two areas that consume a major portion of freshwater as well as contribute significantly to water pollution and unsustainable use of water. Water Footprint Assessment (WFA) is a significant tool that helps analyze water consumption and pollution in relation to commodities produced. International Organization for Standardization has developed ISO 14046 as a standard for water footprint assessment based on Life Cycle Assessment for freshwater footprint management. The research focuses on legal aspects of WFA in relation to industrial and agricultural water use with an objective to review various legal, regulatory and judicial initiatives undertaken globally as well as nationally for sustainable freshwater management and environmental conservation.

Concept of Water Footprint Assessment (WFA)

Water Footprint Assessment refers to analyzing freshwater consumption and pollution footprints that include the impact on the environment, water quality as well as quantity. Water Footprint has three aspects namely blue, green and grey water footprints.

Blue Water Footprint refers to the consumption of freshwater available in lakes, rivers and groundwater including its evaporation and transfer during various industrial processes.

Green Water Footprint refers to the consumption of freshwater in the form of rainwater stored as moisture in the soil before being evaporated or transpired mainly in agricultural production.

Grey Water Footprint refers to the volume of water required for diluting water pollutants in order to achieve water quality standards. ISO 14046 defines water footprint as a life-cycle based environmental assessment centered on potential environmental consequences of water consumption and water degradation. Water Footprint Assessment follows similar framework as any other Life Cycle Assessment (LCA) studies which include defining goals and scope of the assessment, carrying out water inventory analysis, impact assessment and interpretation of results.

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It is widely used for industrial and agricultural applications as well as for regulatory compliance and ESG reporting purposes.

1. Water Footprint Assessment in Industrial Sectors

Industrial sector is one of the most water intensive sectors that use large volumes of water for different industrial processes apart from using it for cooling, cleaning, power generation and waste disposal. Textile, chemical, mining, power, food processing, pharmaceutical and other industries are known to use huge volumes of water resulting in water pollution and depletion of freshwater resources. Water Footprint Assessment helps industrial sectors carry out water footprint analysis for formulating strategies for sustainable freshwater management and meeting regulatory requirements.

Water Footprint Assessment in Agricultural Sectors

Agricultural activities are estimated to contribute to nearly 70% of the total freshwater consumption globally. Agriculture requires huge volumes of freshwater in the form of irrigation water, fertilizers and pesticides that lead to water pollution and depletion of freshwater resources. Water Footprint Assessment (WFA) helps understand the various aspects of freshwater footprint in agriculture including irrigation water, rainwater, fertilizers and pesticides, moisture retention and water consumption by different agricultural crops. Water consumption varies significantly across different agricultural crops with rice, sugarcane, cotton and other commercial crops registering high water footprints. WFA can help promote sustainable agricultural practices such as judicious use of water, drip irrigation, rainwater harvesting, growing less water intensive crops, etc. This, in turn, would help the agricultural sector meet regulatory requirements concerning sustainable use of freshwater resources.

Legal Regulation of Industrial Water Use

Environmental regulations and laws play a significant role in promoting sustainable industrial water use. Various countries have put in place laws and regulations to promote water conservation and ensure industries do not contribute to water pollution. In India, water pollution and freshwater conservation is governed by the Water (Prevention and Control of Pollution) Act, 1974; Environment (Protection) Act, 1986; National Water Policy and the Environmental Impact Assessment (EIA) Notification, 2006, among others. These laws require industries to adhere to stipulated norms concerning water use, recycling of water, effluent treatment, etc. Water Footprint Assessment findings have been widely used in India for carrying out Environmental Impact Assessment (EIA) of proposed industrial projects. Consequently, industries are required to provide details concerning freshwater withdrawal, effluent discharge, groundwater usage and recycling to the regulatory authorities. In addition, the ESG reporting requirements of corporations also require companies to report water footprint details as part of their ESG reports. ISO 14046 standards provide an overview of WFA which can be used globally.

Legal Dimensions of Agricultural Water Use

Groundwater extraction by the agricultural sector has caused significant decline in freshwater availability resulting in governments imposing restrictions on groundwater extraction by farmers. Agricultural runoff that contains fertilizers and pesticides has contributed to water pollution necessitating stricter environmental regulations concerning agricultural water use. Agricultural water use requires balancing agricultural production and freshwater conservation while considering the farmers' interests. Farmers are key stakeholders in freshwater governance frameworks as their activities directly influence freshwater quantity as well as quality. In addition to that, water availability has been greatly affected by climate change and rising temperatures that have caused extreme weather conditions. Water Footprint Assessment can help develop policies that promote climate resilient agriculture as well as freshwater governance frameworks.

2. International Legal Framework

ISO 14046

ISO 14046 provides principles, requirements and guidelines for carrying out water footprint analysis and its application based on life-cycle assessment procedures.

United Nations Sustainable Development Goals

Water Footprint Assessment findings have been widely used in achieving several of the United Nations Sustainable Development Goals (UNSDGs) such as Sustainable Management of Water (UNSDG 6), Responsible Consumption and Production (UNSDG 12), Climate Action (UNSDG 13) among others.

The Paris Agreement, 2015

Indirectly promotes sustainable management of freshwater resources.

Human Rights Perspective

Right to clean and healthy water is also recognized globally as a fundamental right, making sustainable freshwater governance a matter of environmental justice.

Judicial Approach and Environmental Principles

Judiciaries have played a significant role in promoting sustainable environmental governance through various judgments. Several judicial principles have been evolved that promote freshwater governance and management. Some of these principles are discussed below:

Polluter Pays Principle

This principle holds industries that contribute to water pollution responsible for funding mechanisms that help in restoring the affected water bodies to their original state.

Precautionary Principle

This principle states that industries must implement measures that prevent pollution caused by their operations even if the impact of such emissions is not established.

Public Trust Doctrine

This principle holds that natural resources such as water are public property and, therefore, the government has a duty to protect and conserve them.

Sustainable Development Principle

This principle requires that economic development should be achieved in a manner that does not compromise the ability of future generations to meet their needs. Indian judiciary has taken a progressive stand in interpreting the Right to Life under Article 21 of the Indian Constitution to include the right to clean and healthy water.

Challenges in Implementation of Water Footprint Assessment

Despite the numerous benefits associated with Water Footprint Assessment (WFA), it faces several challenges that hinder its effective implementation. Some of these challenges include:

The absence of legal framework that requires industries and agricultural activities to carry out water footprint audit.

Lack of adequate data concerning water footprint.

High cost associated with carrying out WFA especially for small industries and farmers.

Multiplicity of agencies involved in freshwater governance resulting in regulatory overlaps.

Lack of awareness concerning sustainable water use.

Conclusion

Water Footprint Assessment (WFA) has emerged as a critical tool in promoting sustainable freshwater management by addressing issues concerning water pollution, scarcity and unsustainable use of water by industries and agriculture. The research discusses the environmental, legal, social, economic and regulatory aspects of WFA while advocating for its inclusion in legal frameworks for conserving freshwater resources. Freshwater is a finite resource and, therefore, its governance and management has far-reaching implications on the environment, society as well as the economy. The implementation of WFA in various countries will promote environmental justice while conserving and promoting sustainable use of freshwater resources for generations.

Recommendations

It is recommended that the following measures should be undertaken to promote sustainable freshwater management through WFA:

- a. Making water footprint disclosure mandatory for water intensive industries.
- b. Incorporating Water Footprint Assessment in Environmental Impact Assessment procedures.
- c. Strengthening laws governing groundwater conservation.
- d. Encouraging sustainable agricultural practices and promoting irrigation efficiency.
- e. Encouraging corporate ESG reporting on water sustainability.
- f. Promoting international cooperation in freshwater governance.
- g. Creating awareness on freshwater sustainability and the implications of water footprint.
- h. Providing subsidies on water footprint friendly technologies.

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Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

References

1. Water Footprint Network
2. International Organization for Standardization, ISO 14046:2014 Environmental Management – Water Footprint – Principles, Requirements and Guidelines.
3. United Nations Sustainable Development Goals, Goal 6: Clean Water and Sanitation.
4. Paris Agreement, 2015.
5. Water (Prevention and Control of Pollution) Act, 1974
6. Environment (Protection) Act, 1986.
7. National Water Policy, India.
8. ISO 14046 and lifecycle based water management studies.