Chapter-2
WATER AND ITS MANAGEMENT: CONCEPTUAL ASPECTS

The role and importance of water in our lives is well evident. Water is life sustaining and an important component of the environment we are living in. It has inextricable linkage to the domestic and industrial uses and probably in almost all economic developments. Agriculture, industry, mining, energy etc. are few commercial and economic activities that affect both the quality and quantity of water resources. Many countries are facing the challenge of distribution of limited water resources among economic activities and environmental degradation of water. There are number of factors such as, increasing population, growing urbanisation, rapid industrialisation and changing life styles that have put significant impact on the demand, quality and availability of this scarce resource. The water scarcity as well as abundance as in case of floods, both, are the threats of this resource and need equal attention. All these factors in the present scenario require immediate and long lasting solutions to tackle water looming crisis. Sustainable and efficient Water management is the need of hour, with due respect to the several issues and concerns connected to it, not only for the present age but also for future generations.

This chapter deals with the basic concepts of water management. It examines various water related issues, concerns and challenges emerging from the research and practices of water management in India.

2.1. Basics

Water is a unique element which supports all life on this planet. It is well known that water is indispensable for life. It is the most essential of all substances, upon which all life depends. Water is used for agriculture to grow our food, to generate electricity and acts as the lifeline of industry. Water plays a very vital role in nurturing our landscapes and serves as the habitat for many wildlife. Earth is said to be covered with 70 to 75 percent of water out of which more than 96 percent of it is too salty to be used by human being.¹ Total existing volume of water on earth is estimated to be 1386 million km² comprising of 94.5% in oceans, 2.5% Fresh Water, 1% Groundwater (saline) and 2.5% Fresh Water. Fresh water is existed in the form of Polar Ice (68.7%), Ground water (30.1%) and Surface Water(1.2%).²

Table 2.1. Amount and composition of water on earth

<table>
<thead>
<tr>
<th>Total volume of water on earth (1386 million km²)</th>
<th>Oceans (94.5%)</th>
<th>Polar ice (68.7%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh water (2.5%)</td>
<td>Groundwater (30.1%)</td>
<td>Surface water (1.2%)</td>
</tr>
<tr>
<td>Groundwater saline (1%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The oceans cover 97.5% of the water on earth. Two point Four percent of it is in land and the atmosphere holds less than .001%. Only one percent of the earth's water is available for drinking whereas two percent is frozen. Water is also an essential component in living organisms. Living organisms are composed of 50-90% of water. The blood contained in animals and sap in plants is mostly water. H. H. Mitchell stated in the Journal of Biological Chemistry that an adult human body is composed of approximately 60% water, where brain and heart are composed of 73% water, skin contains 64%, muscles and kidney 79%, the lungs have 83% water in them and even the bones are watery as they contain 31% water.

Freshwater resources such as rivers and lakes are extensively used by human beings for various purposes, has gradually increased over the centuries. Due to increases in population usage of water for agriculture, industry and other purposes like recreation has also increased making water an incredibly valuable resource. Scarcity of water as well as its quality has becoming an issue of concern. Subsurface waters have been contaminated as pesticides, mineral fertilizers, and herbicides have seeped into surface and thereby polluting the ground water making them beyond human consumption and disturbing the entire ecosystems. Rivers and lakes are polluted and threaten the world's most important resource as industrial wastes and toxins are dumped into it. If the situation goes on like this, there would not be sufficient amount of water to fulfil the requirements of our off springs.

2.1.1. Properties of Water

Water is the element that can exist in three states of matter namely solid, liquid, and gas at the temperatures usually found on Earth and hence it is a unique natural substance. Huge
amount of heat exchange occur due to the changes of state of water. This is eventually important in the rearrangement of heat energy in the Earth's atmosphere. Evaporation and condensation of water has contributed approximately 3/4’s of heat that is transferred into the atmosphere. Rivers, lakes, seas, etc. are formed by water, a fluid which comes down from the clouds in the form of rain. Water, exist as solids, liquids, gases and plasma, where the solid form of water is known as ice or snow and the gaseous form of water is called as water vapour or steam.

Water is a magical element. It is a simple as well as complex substance. A water molecule itself is simple, composed of three atoms i.e. two hydrogen and one oxygen (H₂O). One molecule of water is made up of two hydrogen atoms which are covalently bonded to a single oxygen atom. Water, a molecule with almost magical properties is formed by the makeup of these building blocks which offers the basis for its extensive diversity of uses.

Identification of any substance is done by its properties. Every Matter is associated with two very fundamental kinds of properties. These properties are known as physical properties and chemical properties. The Physical and Chemical Properties are the characteristics of an element which differentiates it from any other matter. These properties help us understand how this substance will behave and react under various conditions. The nature of a substance can be better understood by knowing all the properties of it.

2.1.1.1. Physical properties of water

The Physical properties of a substance are the features of it that can be detected without altering the matter into any another substance. These include colour, melting point, density, freezing point, boiling point, odour and hardness. The Physical Properties of water are as follows:

| Table 2.2. Physical Properties of Water

<table>
<thead>
<tr>
<th>Colour</th>
<th>Nearly colourless with a hint of blue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odour</td>
<td>None</td>
</tr>
<tr>
<td>Taste</td>
<td>Bland</td>
</tr>
</tbody>
</table>

---

10. Supra note 8.
11. Ibid.
12. Ibid.
13. Ibid.
14. Ibid.
Water is a colourless and tasteless liquid substance. In the condensed form the molecules of water contain wide hydrogen bonds resulting in extraordinary characteristics. As a result it also has a high melting and boiling points. Water has a higher specific heat, thermal conductivity in comparison to many other substances. It has also greater surface tension, dipole moment as compared to other liquids. These properties create the basis of its importance in the biosphere. Water is a great solvent and therefore it assists in carrying ions and molecules necessary for metabolism. It also has a high latent heat of vaporization which aids in the regulation of body temperature.\textsuperscript{15}

\textbf{2.1.1.2. Chemical Properties of Water}

The features that decide the reaction of a particular matter with other substances are called its chemical Properties. These properties can be seen only during a chemical reaction. It reacts to substances on burning, rusting, heating, exploding, tarnishing etc.\textsuperscript{16} The Chemical Properties of water are as follows:

\begin{table}
\begin{center}
\begin{tabular}{|l|p{15cm}|}
\hline
Density & 1.000 g/ml. The density of water is approximately one gram per cubic centimeter \\
\hline
Boiling Point & 100 °C \\
\hline
Conductivity & Water is a good conductor of heat \\
\hline
Compressibility & The compressibility of water reduces the sea level \\
\hline
Specific Heat & Water has a high specific heat. Specific heat is the amount of energy required to change the temperature of a substance \\
\hline
Surface Tension & Water has a high surface tension - it is adhesive and elastic \\
\hline
Cohesion & Water is attracted to other water \\
\hline
Adhesion & Water can also be attracted to other materials \\
\hline
\end{tabular}
\end{center}
\end{table}
### Table 2.3. Chemical Properties of Water

<table>
<thead>
<tr>
<th>Chemical Formula</th>
<th>H₂O - two hydrogen atoms and one oxygen atom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solvation</td>
<td>Water dissolves more substances than any other liquid</td>
</tr>
<tr>
<td>Ph</td>
<td>Pure water has a neutral pH of 7, which is neither acidic nor basic</td>
</tr>
<tr>
<td>Ionization</td>
<td>Water weakly ionizes</td>
</tr>
<tr>
<td>Reactivity</td>
<td>Metals such as gold, silver, copper, tin, etc. do not react with water</td>
</tr>
</tbody>
</table>

Water possesses a neutral pH in its purest state. Therefore, pure water is neither acidic nor basic. There occurs a change in the pH value of water when certain elements are dissolved in it. It contains carbon dioxide and Sulphur dioxide and has a naturally acidic pH of about 5.6. Except mercury water is the only liquid that conducts heat more easily. This causes large water bodies such as lakes and oceans to possess a uniform vertical temperature profile.

Water exists in liquid state in temperature from 0-100° Celsius. Hence water molecules exist in liquid state in most places of earth. Fresh water density is maximum at around 4° Celsius. Frozen water expands rapidly adding about 9% by volume. Water is the only substance existing on earth whose maximum density of mass does not occur on solidification. Water is a universal solvent and therefore has the ability to dissolve a huge number of diverse chemical substances. This feature plays an important role in enabling water to carry solvent nutrients in groundwater flow, runoff, infiltration, and living organisms water molecules causes their mass to occupy a larger volume at their frozen stage.

Water is the most essential thing for every aspects including drinking, bathing, cooking, construction, etc. It is a basic necessity for the existence of life on earth. The uneven

---

17 Ibid.
18 According to Encyclopedia Britannica, pH means quantitative measure of the acidity or basicity of aqueous or other liquid solutions. The term, widely used in chemistry, biology, and agronomy, translates the values of the concentration of the hydrogen ion—which ordinarily ranges between about 1 and 10⁻¹⁴ gram-equivalents per litre—into numbers between 0 and 14. In pure water, which is neutral (neither acidic nor alkaline), the concentration of the hydrogen ion is 10⁻⁷ gram-equivalents per litre, which corresponds to a pH of 7. A solution with a pH less than 7 is considered acidic; a solution with a pH greater than 7 is considered basic, or alkaline. available at https://www.britannica.com/science/pH (Visited on 4 January 2017).
20 Ibid.
distribution of water on earth leads to many conflicts and assertion over the rights or ownership over it. There exists a scarcity of freshwater in many parts of the globe that leads to acute ecological deprivation, agricultural restraints and limits on industrial production. This unavailability of fresh water in the inhabited areas also poses menace to human health, and increased conflicts within and with other nations. Rainwater is the source of water that we receive as a result of the Earth’s water or hydrologic cycle. Due to the heat of the Sun the surface water existing on earth evaporates and rises in the atmosphere, later it cools and then condenses to form clouds. When large amount of water vapour condenses, it comes back to the surface again in the form of rain, sleet, or snow. This process is repeated in a never-ending cycle.21

2.2. Classification of water

There are two main sources of water namely groundwater and surface water.

2.2.1. Groundwater

The rainwater or snow that melts and seeps into the ground accumulates in underground pockets called aquifers. Water levels in such aquifers mainly depends on the quantity of water being used and other factors such as rainfall, drought. Groundwater is generally extracted through a drilled well. It also comes through natural springs. Further, it can be classified into Definite Underground Streams and Underflow of Surface Streams.

Underground stream is similar to a surface watercourse, except that it is found under the earth. Certainly it is difficult to prove the differences in the physical properties. Usually there is an underflow or sub flow underneath a surface stream. This includes water in the sands, stones, and other subsoil matter over which the surface stream flows, running parallelly and in close contact with the surface stream. The boundaries of the surface channel may expand for considerable distances beyond the banks. The stream moving on surface and underflow of it are not two distinct flows from the physical as well as legal viewpoint rather these are part of a single watercourse. Law of watercourses governs the use of underflow like the rights in the water flow of surface water. Rights to the use of particular underground streams were regulated by the doctrines of law of watercourses namely the riparian or the appropriation, or both of them simultaneously.22

Wells A Hutchins and Harry A. Steele “Basic Water Rights Doctrines And Their Implications For River Basin Development available at
https://scholarship.law.duke.edu/cgi/viewcontent.cgi?article=2717&context=lcp (Visited on 11 August 2016).
2.2.2. Surface water

Water flowing into or gathered in different water sources like streams, rivers, lakes, reservoirs and oceans is called surface water and does not include water occurring underground. Most of the surface water cannot be directly used for drinking purpose. Oceans have almost ninety seven percentage of water that can’t be used for drinking due to its salty nature. The other source of water that is found in ice or glaciers is fresh and accounts to only three percent of water. Surface water can further be divided into surface water courses and diffused surface waters.

Surface Watercourse originates from a definite source of supply and consists basically a certain natural stream and flows in a particular definite natural channel. It also includes the underflow of it. The rights relating to use of surface water are regulated by the doctrines of the riparian and the appropriation.

One category of surface water named diffused surface waters are formed from rain and snow that melts and flows over the surface and that water which flows vagrantly over the ground, before meeting in watercourses or before sinking into the earth. Diffused surface water is generally called as surface waters. Law has not evolved in a great extent relating to the rights of use of such waters, rather in most part it considers such water as nuisance and has developed in terms of its removal or avoidance. Usually, the owner of premises is considered to have the right to collect and use such water while it is still on his land.

According to the Model Bill For The Conservation, Protection, Regulation And Management Of Groundwater, 2016 “Groundwater means water occurring under its natural state, where it exists below the surface in the zone of saturation whereby it can be extracted through wells or any other means or emerges as springs and base flows in streams and rivers. In its natural state, it is a common pool resource”.

2.3. Perceptions of Water

Water has multiple aspects or dimensions. Thus, while perceiving water in a particular way it is not easy to be focused only in one aspect. The perception of water varies with people. It is perceived by certain people in particular ways or by same people in different contexts in dissimilar ways. It may be considered as an economic good, commons, human right or sacred
matter. All these are incomplete views and all are right. One can say many things about water and be correct. One needs all of them to understand the importance of water in our lives.27

2.3.1. Water as commodity or economic good

To call water as an economic good is not acceptable to many of us. However, its uses in various contexts such as use for irrigation in commercial, agriculture or the use for cooling or steam generation or industrial processes or luxury uses as in saunas, swimming pools, gardening etc. make us consider it as a commodity. It means where it is a required input for commercial activity such as agriculture, industry, and commerce or a means of transportation or a means of recreation etc. must be perceived as an economic good.28 But, where water is used for performing essential functions of daily life it is hard to perceive it as a commodity. The description of water as an economic good for all purposes is not convincing, so, a better and convincing description is required. Therefore, to call it as ‘an economic and social good’ is generally more acceptable.29

Definitely, water is an economic good when it is used commercially for industrial activities or agricultural purposes. If the trading in water is allowed and property rights in water were demarcated, water markets would emerge, charges would be ascertained, resource preservation would occur and conflicts would automatically be resolved by market forces.30

Treating water as a commodity or an economic good is considered to be an effective mode of water resource management. In ‘Dublin statement’ it is stated that “Past failure to recognise the economic value of water has led to damage the environment and waste the precious resource. Managing water as an economic good is an important way of achieving efficient and equitable use and of encouraging conservation and management of water resources”.31 However the basic right of every human to have access to safe and clean water and adequate sanitation was recognised under the statement.32

In terms of the report of World water commission33 its view on pricing water in its support of full cost recovery stated that: “Making water available at low cost, or for free, does

27 Ramaswamy R. Iyer, Water Perspectives, Issues, Concerns 77 (Sage Publications, New Delhi, 2010).
29 Supra note 29.
30 Ibid.
32 Ibid.
33 The World Commission on Water for the 21st Century (WCW) was established in partnership by the UN and the pro-privatisation think tank World Water Council following the 1st World Water Forum in Marrakech (1997). The Commission was charged with the responsibility of developing a global
not provide the right incentive to users. A price should be fixed for all water services at full cost for all users, which means all costs related to operation and maintenance and investment costs for at least domestic and industrial users. Water should be made affordable to all, but this can be done effectively than by making all water available to all users at way below cost. Fixing price for water is an inducement factor for the private sector, large and small, domestic and international, to get concerned.”

There may arise certain problems while treating water as an economic good and fixing the price of water such as in case of domestic needs. Domestic needs need to be priced lesser than industrial use and requires interference by domestic or global law. Water is undoubtedly a social good when used for the purposes like sanitation or in hospitals or for fire extinguishing. It is also a social good when described as a basic human need as well as animal requirements. The right perspective may be to call it as ‘social and economic good’.

2.3.2. Water as commons

To call water as commons does not mean that it is a public good, but it is a resource that is commonly available but used separately. In some cases this community right may flow from the conventional assertion of rights over the use of the water resources. In many cases the community rights of use of water depends mainly on the conventional use and on the far-sightedness and planning of the forefathers and the significant use of native lands and water sources. Few communities like one in west named Sacramento35, claimed water rights at an early stage to ascertain ample water supply in future. There are few communities that do not have access to proper water supply to fulfil their requirements. In certain cases these communities fetch water from distant places such as from the places where it exists in ample or from certain water projects.36

Water being observed as a community resource pool resource is highly encouraged and promoted. But two things need to be noted here. The first is that it is not difficult to imagine the applicability of this perception of water as a community resource on smaller water bodies small lake or pond or tank or any other source of water existing on common land. One can think of it as owned by a particular community. But there arise difficulties in the case of larger

---


35 Sacramento is the capital city of the U.S. state of California and the seat of Sacramento County. It is at the confluence of the Sacramento River and the American River in the northern portion of California's expansive Central Valley, known as the Sacramento Valley.

36 Supra note 1.
water bodies or streams or rivers including the issues of upstream and downstream flows, rights of the riparian owners and so on. Secondly, this perception of commons also faced with difficulties in relation to water supply systems in urban areas. However, it remains a valid argument that the water as a source belongs to the community as a whole, or to civil society and that the issues or conflicts arising therewith can be resolved within the legal framework.37

### 2.3.3. Water as basic or fundamental right

Water sustains life on earth. Therefore, it is a prerequisite need and basic requirement of all living beings to sustain life. In this perspective it is a basic or fundamental right. The right to water is today well enshrined in law despite a specific mention in the Constitution of the nation. The real challenge does not relate to its existence but rather to its actual content and effective realisation. The Indian judiciary has repeatedly confirmed the presence of a basic right to water as under fundamental right to life. The Supreme Court in its several judgements read the fundamental right to water into the right to life contained in Article 21 of the Constitution.38 There are also certain decisions of High Courts that approve the presence of a fundamental right to water.39 High Courts have also linked the right to water to Article 47 of the Constitution. The High Court of Madhya Pradesh has ruled that it is the responsibility of the state to provide supply of safe and clean drinking water for improving the health of its residents.40 In addition, courts have also provided certain measures guiding the realisation of this basic right. The obligation to provide water, for instance, been recognised as a primary duty of the government whose violation would amount to abuse of Article 21 of the constitution.41

The Judiciary has played an important role in recognizing and the expansion of its content. Yet, there are certain judgements relating to this right that raised controversies. One such decision of Supreme Court is on the Sardar Sarovar Project. In this case the court justified its stance in support of the construction of the dam on the fact that it would fulfil the requirements of the persons residing there.42 However, the court did not take into account the adverse effects of the construction of dam on the realisation of this basic right to water of the persons displaced.

---

37 Supra note 29.
38 For example Subhash Kumar v. State of Bihar, AIR 1991 SC 420.
41 Vishala Kochi Kudivella Samarakshana Samithi v. State of Kerala, 2006(1) KLT 919 para 3, Similarly in Lucknow Grih Swami Prasad v. State of Uttar Pradesh, 2000(3) AWC 2139 para 4, the court ruled that ‘it is the bounden duty of the state to assure the supply of sufficient amount of qualitative drinking water to its people’.
42 Narmada Bachao Andolan v. Union of India, AIR 2000 SC 3751.
No doubt, the right to water is the basic right of every human as well as other living being. The real challenge does not relate to the confirmation of its existence but rather to define and demarcate its contours and active realisation.\(^{43}\) There exists certain significant loophole in the legislature that needs to be adequately addressed.

### 2.3.4. Water as sacred resource

Water is an important constituent of the nature and sustains all life on the planet. This fact leads to its being regarded as sacred. Water is regarded as sacred in many texts of different religions more than just being a basic element and life-giver. Water serves as the basis of foundation of many religions of the world. Water is used as part of ritual cleansing and purification or embraced as a symbol of growth and fertility, hence water management and conservation is integral for various religious practices.\(^{44}\)

Some examples:

- **Animism:** Native people give great regards to water as it is divine and sustains entire life. Their customs, traditions of life and life style were such that makes them responsible and teach them to treat this element as sacred which connects all life.

- **Hinduism:** In Hinduism all water is considered as divine and sacred, particularly rivers. Under Indian customs and religion rivers have always been considered as deities mostly feminine. Only the river Brahmaputra is regarded as masculine. Hindus believe that taking a dip in the holy river leads to forgiveness of sins and similarly immersing ashes of the dead person in the river Ganga sends the deceased soul to heaven. Water is treated as deity called ‘Varuna’ and revered almost in all the rituals. Hence water is used for many ritual activities and greatly revered. Several pilgrimage centers are also situated alongside the water bodies such as on the banks of rivers, lakes or the coast.\(^ {45}\) Spiritual cleanliness and well-being is also greatly emphasized in Hinduism.

- **Buddhism:** Buddhists consider water as a symbol of calmness, purity and clarity. It is very important for Buddhists to live in accord with the nature.

- **Judaism:** Under Judaism water is treated as an important substance in ritual cleansing practices. Environmental issues were addressed in Judaism around 2000 years ago long even before protection of environment became a global issue. The Talmud perspective states that we

\(^{43}\) Philip Cullet "Rethinking the right to water to ensure its realization for all" 27 Vol. 54 No. 1 (JILI, New Delhi, Jan-March 2012).


are free to use the nature and everything available in the environment for fulfilling our requirements but without causing substantial harm to the environment.

Christianity: Water in used for baptism in Christianity. Environmental stewardship, or the responsibility towards natural resources, including water, is a predominant and important principle of Christianity. Importance of water is reflected through the following lines enshrined in the Bible: “The earth was formless and empty, and darkness covered the deep waters and the Spirit of God was hovering over the surface of the waters.” (Genesis1:2). Before light, living creatures, plants or anything else, there was water.46

Islam: According to Islamic religion water serves as origin of life and an important gift given to us by God. The selling or buying of water as such is prohibited under this religion. It is also strictly prohibited to pollute water and monopolization. Islam also speaks on the concept of environmental stewardship. The Qur’an says that “Allah created every living creature from water. Some of them go on their bellies, some of them on two legs, and some on four.” (Qur’an, 24:45) So the Qur’an reminds us that all life existing on earth depends on water in its complete sense.47 In Islam water is treated as purifying substance, as the purity of Muslims is emphasized before prayer or salat to Allah. But Under Baptism water is perceived as the purifier not only of the body, but of the soul as well.

Taoism: Under this religion the following lines emphasized the significance of water "Be still like a mountain and flow like a great river". They believe that there is much to be learnt from water for humans. In this philosophy, water is depicted as the core element of nature as well as a model for human behavior and acts.

Baha’i idea on management of water echoes the Baha’i’s notion of unison of all humans and their inter-connections with all objects.48

To quote Rabbi Yonatan Neril, who is the director of Jewish Eco Seminars and the Interfaith Centre for Sustainable Development: “Environmental problems at their root are spiritual problems; they stem from a lack of awareness of the Source of all existence. Once we come to that awareness, we can address environmental problems in very different ways, i.e. from their roots. As there is a spiritual problem beneath every environmental problem, a spiritual solution is required for every environmental problem. Drop a stone in the pond and the ripples will reach far beyond you.”49

46  Ibid.
47  Ibid.
49  Supra note 47.
This perception supports that in order to find out a meaningful solution of our water problems from pollution to wastage, we should look at connecting on different level. Further if we have no reverence for water, it will only be superficial engagement in implementing efforts to sort out our water problems. But if we really re-engage ourselves with water’s true significance in our lives, our actions will follow naturally from there. This perception focuses on finding spiritual connection to water in taking required decisions for effective management.50

Water has been a source of inspiration for many culture and religion from time immemorial. This helped people in adopting a spiritual and religious belief that enabled in bringing about a bonding among them. These notions play an important role in management of water. Inspite of this wisdom about water, wise water management is still a bridge too far. Recently religious and spiritual leaders have taken steps to involve themselves in safeguarding the valuable earth's resources. A global approach is the need of the hour in the wise management of all the natural resources of the planet, including water. Various uses of water including its use, protection, sharing and management of water need to be regulated by spiritual principles of justice and equity and the fundamental concept of moderation. Any decisions concerning water need to be taken after a proper consultation with all the concerned or affected persons.51 The perceptions of water in different religions in household related water use practices also influences the day to day water use in the societies. There is lack of research on the social negotiation of water resources at the micro level especially in urban settings.52

It is pertinent to mention here that all the above discussed perspectives are partial perspectives. In each case there are significant limitations. However, it does not mean that it is invalid or irrelevant. All these perspectives are required and each perspective symbolizes significant values or principles. To consider and promote a partial perspective as an absolute one must be avoided. These perspectives are so diverse and the inter relationship are often too subtle and complex to arrange them in hierarchical structure or order. However, these uses are prioritised as included in ‘the National Water Policy, 2013’ or ‘the Draft National Water Framework Bill, 2016’. The perception of water as a basic life support and respect for the source, namely nature, seems to be more appropriate. Water is a resource embedded within the ecosystem. We cannot treat it as a freely available and irrationally usable resource, nor as a

50 Ibid.
51 Supra note 47.
source to be mined. An inclusive normative framework evolving certain principles of allocation and sharing and suggesting legal and institutional mechanism is needed to resolve the conflicts relating thereto.

2.4. Principles of Distribution and Resource Management

In relation to principles of distribution and management of water there are two kinds of concern that require to be discussed. The first is to understand the principles themselves their meaning, nature and their relevance with regard to water resources. The second concern is the assignment of rights with regard to water to whom it is to be distributed. It implies whether they are individual or groups or a state. Let’s begin with reviewing or analysing the principles.

These principles of water distribution have been usually discoursed in the context of inter-state or inter nation conflicts. But it does not mean that these principles have no applicability with regard to individuals. In legal parlance all kinds of legal persons are equal entities, whether they are states, corporate entities, groups or individuals. They are all legal persons in the technical sense. The significant point to realize is that principles of water distribution spring out of the principle of distributive justice. These principles are not dependent on whether the people who are seeking to apply these principles have formed themselves into a group, a community, a state or a nation, or are individuals. Therefore, these principles have to be evolved and will have the same applicability in case two corporate entities of any kind had been the contenders to water and had a conflict over water distribution in place of states.53

It is a wrong perception that principles of water distribution concerning inter-state disputes are irrelevant with regard to matters of internal water law within a community or state. In other words it is not correct to say that the inter-state dispute settlement is a different matter and consideration of water resources management has nothing to do with it. These are not different matters from the point of application of basic legal principles. There does not exist any such compartmentalization. Principles or notions of justice do not provide one set of measures or standards of equity between individuals and another between corporate bodies or states. What is equity between groups is also equity between individuals. These principles are discussed hereunder:

2.4.1. The Riparian Doctrine

Under Riparian doctrine, any person owning or possessing a land adjoining a river, stream, or lake has the right to use water. Therefore, people who are the owner or possessor of land adjacent to a source of water have right to access and use that water. However, the riparian landowners have this right to use the water only on that land which adjoins such watercourse. In addition to this, there are two rules determining the quantity of flow to be consumed or diverted by a riparian. The first one is the "natural flow" or "English rule". According to this rule the riparian landowner has the right to the natural flow of the water without any substantial retardation, diminution or contamination. Further, a riparian owner has the right to use all the water to meet out his domestic or natural requirements. He has even right to drain the whole source of water in doing so. Second is the "reasonable use" or "American rule". Under this rule, a riparian owner has right to use the water of a source for any beneficial purpose without interfering irrationally with the legitimate use and needs of other riparians.

Riparian right is a right that comes naturally. It cannot be fixed or taken away by anyone. This right comprises of the rights to use water for different purposes like drinking, fishing, domestic purposes, navigation etc. The riparian owner gets this right automatically by virtue of owning a land alongside the watercourse. The upper riparian as well as lower riparian are equally entitled to use such water. The requirement for use of water, the purpose and the residence are few things that entitle a person status of a riparian. Further, custom or long term use is also generally accepted to be a determining factor of defining the riparian rights of a person. However, this right is not an absolute and an unconditional right. The state can impose reasonable restrictions on the exercise of these rights. The ‘riparian rights’ are rights that exist in the extensive range of law relating to environment.

These rights are required to be protected like any other rights and there has always remained a tendency for accepting and upholding the riparian rights of the persons by the courts in India. Some of the earlier judgements that have recognised these rights are as stated hereunder:

55 Ibid.
56 Ibid.
In *M. C. Mehta v. Union of India*\(^{58}\) the Hon’ble Supreme Court of India recognized and revived the doctrine of riparian rights. It was popularly known as Ganga River Pollution case. In this case, the petitioner claimed that being a riparian he has right to initiate this proceedings and there is infringement of his riparian rights due to the pollution of river Ganga. This Writ Petition was taken as a Public Interest Litigation by the Court. The Apex Court accepted that the petitioner was a riparian owner who was keen in protecting the interests of the people using the water flowing in river Ganga. The Court accepted the Petitioner’s claim of being riparian having locus standi. The Honorable Courts agreed that nuisance due to the pollution of river Ganga was a public nuisance and was extensively spread. The Court arrived at a conclusion that the effects of the said nuisance were indiscriminate and could not expect any person to initiate proceedings to prevent it as different from the public at large.

In a judgement given by the Madras High Court in *Vippalapati v. Raja of Vijyanagram*\(^{59}\) the Court held that the riparian rights embraces in it the right to access free flowing water without any hindrance even if such hindrance is caused by a dam. The reinforcement of riparian rights is apparent in this case wherein it was a dam that was hindering the riparian rights. The case was a predecessor of the Ganga Water Pollution case.

There is another decision given by the Madras High Court relating to riparian rights in the case of *Sethramanamalingam v. Anada Padyach*\(^{60}\). There was dispute between the upper riparian rights and the lower riparian rights. One issue was relating to the applicability of riparian rights in artificial water bodies. It was held in this case that there should not be any substantial decrease in the amount of water by the activities of upper riparian for the lower riparian. However the court ruled that these riparian rights be exercised only over natural water bodies like streams or rivers and shall have no application on any kind of artificial water bodies.\(^{61}\)

The Madras High Court rendered another judgement in *Malipat Madhatil v. Neelamance*\(^{62}\) relating to contesting upper riparian owners and lower riparian owner. It was held by the court in clear and persuasive terms that the legitimate use of the riparian rights by the upper riparian must not affect the rights of the Court lower riparian owners.

\(^{58}\) AIR 1988 SC 1115.

\(^{59}\) AIR 1993 Mad 310.

\(^{60}\) AIR 1934 Mad 583.

\(^{61}\) *Sethramanamalingam v. Anada Padyach*, AIR 1934 Mad 583.

\(^{62}\) AIR 1938 Mad 649.
In a decision rendered by the Patna High Court in Ram Sewak Kaz v. Ramgir Choudhary\(^\text{63}\) the court while following its earlier judgements stated that the riparian right is a natural right. The right comes automatically to a person by virtue of him being riparian owner whether upper riparian or lower riparian.

The verdict in Kandukuri Balasurya Row v. Secretary of State for India\(^\text{64}\) was applied to establish the same. The relevant paragraph runs as follows:

“A riparian right is a natural right and is not acquired by immemorial user. It exists by law, it may be lost by the adverse enjoyment of another but it has not got to be enjoyed to be kept up. Whatever the enjoyment at the date of the grant may be, the measure of the right that passes is determined only by the configuration and the width of the river and stream. I therefore think in this case the plaintiff is entitled to draw water from the Addarapukalva in exercise of his rights as a riparian owner and so long as he does not exceed those rights he is not liable to water-cess. In India rights of the riparian owner include also the right to take reasonable quantity of water for purposes of irrigation scarcely admits of any doubt.”\(^\text{65}\)

The decision given in Tata Iron and Steel Company Ltd. v. State of Bihar\(^\text{66}\) is another landmark case pertaining to riparian rights. The decision was given by the Bombay High Court. Tata Iron And Steel Company Ltd. was given certain rights over the use of water from Swarnarekha River in order to meet out their industrial needs. The state government imposed certain restrictions on such rights of the said company due to scarcity of water that arose. The Company opposed this and claimed the riparian rights over the use of water. However, this claim was rejected by the Court on the ground that a riparian right is not an absolute and unrestricted right. Every individual is entitled equally to use the natural resources and the Government is empowered under law to impose any conditions or restrictions in the interest of the larger public.

In India riparian rights doctrine has been rejected in one way or the other in all river Tribunals Awards. The Narmada Water Dispute Tribunal invoked the notion of agreement as the legal basis for distribution in 1974 for Rajasthan, which has been a non-riparian state, could receive some water.\(^\text{67}\) The Godavari Water Dispute Tribunal adopted verbatim the observations

\(^{63}\) AIR 1954 Pat 320.
\(^{65}\) Supra note 59.
\(^{66}\) 2004 (3) BLJR 1948.
of the Krishna Tribunal in 1979. The Eradi, or the Ravi and Beas Water Tribunal similarly rejected the riparian rights doctrine in 1987, when distribution of water between Punjab and Haryana was concerned.

The doctrine of riparian rights can be criticised on several grounds. First the riparian rights are not well defined rights. These rights are demarcated in relation to other rights and must change with the changes in those rights. Further allocations of water under the riparian doctrine are highly uncertain and do not encourage economic development. A riparian owner has no fixed or permanent right to a specific amount of water. In addition to it a subsequent water use can defeat a prior use either completely or partially. There cannot be more beneficial use of the water under this doctrine as it requires that riparian water be used only on adjacent land. Thus it cannot be transferred and used in a more beneficially on non-riparian land. This requirement may lead to inefficient uses of water. The doctrine neither supports nor promotes preservation of water as it allows the riparian owner to drain the water entirely while consuming water. Further, the reasonable use rule stands unfairly in favour of the large landowners and does not essentially result in optimal use of water. There does not exist any mechanism for altering riparian water rights from a wasteful or less useful purpose to a more beneficial purpose. In absence of the definite rules or principles, the disputing riparians are compelled to enter into lawsuits, which may be expensive and uncertain as their results may differ depending on judge to judge and watercourse to watercourse.

There are number of limitations in accepting the universality of this doctrine. The mere geographical proximity to water provides no grounds for special claim or entitlement rights to a person, from the point of view of justice. People living away from the water source also have just as much right. The customary acceptance of riparian rights in law so long as there were no demands for justice in the distribution of water. The riparian rights provide no help in applying principles of distributive justice. It has been rejected wherever serious conflicts over distribution of water have occurred. No version of the riparian doctrine can suffice a ground

---

69 A sitting Judge of the Supreme Court who was appointed by Government of India as Chairman of the Ravi and Beas Waters Tribunal for adjudication of the dispute regarding sharing of the Punjab River waters between States of Punjab, Haryana and Rajasthan.
71 Supra note 56.
for water distribution in modern legal systems, whether national, municipal or international, simply because the doctrine is not based on juristic principles or notions. The doctrine of riparian rights does not provide a sound basis for claims regarding water rights as it is fraught with many drawbacks and limitations.

2.4.2. The Prior Appropriation Theory

Under the doctrine of prior, water rights are given to the person who uses the water first from a water source to put a certain amount of water for his beneficial use. As per the doctrine of prior appropriation anyone who uses specific source of water first gets a right to continued enjoyment of the same over the persons who begin to consume it later. The remaining waters can be benefitted by the subsequent users. Maximum water can be utilized by the upstream owners without causing any pollution downstream owners. As per this doctrine the upstream owners are responsible to pass over unpolluted water to downstream owners.

The appropriation doctrine does not take into account the requirement of contact of the land with the water course on which water is used. Under this doctrine, preference is given to the earliest right that is associated with specific watercourse over all rights emerged later. It is immaterial whether the early right used on land is in contact of the watercourse or not. The date on which such right accrues is known as the date of priority and this preference right is called as a priority. Undoubtedly, the priority of a legitimate right is a valuable property. But this does not mean that the riparian owner who first starts to use water gets preference over other riparian landowners only by reason of his earlier use.

The Calcutta High Court did not accept this doctrine in Balbhadra Prasad v. Sheikh Bhakat. However, it received international recognition when it was asserted to settle the conflict in Colorado in Wyoming v. Colorado in 1922. This doctrine was given up in 1930 in Connecticut

---

77 259 U.S. 419 (1922).
v. Massachusetts. The inadequacy of this doctrine as a doctrine of distribution are for various reasons. The main among them are as following:

a. The theory has no legal basis, it merely recognises acquisition or appropriation.

b. It provides no legal grounds, for why the new users cannot now appropriate water for their own beneficial use.

c. It does not recognise the rights or the just needs of new users for distribution.

d. It does not consider the needs or the rights of the future generations.

e. It disregards the rights of the downtrodden or the underprivileged people who cannot assert their needs or rights.

On all these grounds the prior appropriation theory cannot provide a sound basis for just distribution.

2.4.3. The Territorial Sovereignty Theory

This theory represents one sided extreme view, namely, that the upper riparian state has complete and exclusive control over the waters that flows through their land. It recognises the absolute right of the upper riparian owner to use waters in any way he or it pleases. The theory fails to take into account the dual character of a state, namely, that territorial sovereignty is a source of rights as well as duties.

‘The Territorial Sovereignty doctrine’ also called ‘Harmone Doctrine’ was first asserted by the USA. It is noteworthy that USA which asserted the ‘Harmone Doctrine’ or when it was upper riparian over Mexico, vehemently opposed or repudiated the same doctrine when it became the lower riparian with reference to Colombian river for which Canada is upper riparian. This doctrine has never won complete acceptance because it violates the concept of justice.

The theory has been rejected by India. It is evident in ‘Indus Water Treaty’ of 1960 between India and Pakistan Wherein India is an upper riparian state to all almost all rivers flowing into Pakistan. But in the context of the relationship of India with Nepal, objections were raised by India on the construction of many irrigation and hydropower projects. Few of them are Sikta, West Rapti (Bhalubang-Deokhuri), Kankai, Babai, and Tamur hydropower

---

78 282 U.S. 660 (1930).
79 Supra note 74.
82 Supra note 74 at 71.
83 Vandana Shiva, Water Wars: Privatisation, Pollution and Profit 77 (South End Press, Cambridge, 2002).
projects. The Indian Governments took stance that these works would be violative of the doctrine of territorial integrity.\textsuperscript{84}

International Water Law does not support this principle. The theory has also been discredited in international law such as ‘Helsinki Rules’.\textsuperscript{85} ‘The Territorial Sovereignty’ theory cannot generate any principle of distribution. On the contrary it denies the obligation or right to share. There is a similar doctrine called “Limited territorial sovereignty” which is broadly accepted and assists in the development of general laws and principles of international watercourses. ‘The UN Watercourses Convention’ is an example that embodies the doctrine. This doctrine specifies that there should be equality of enjoyment of rights by watercourse states. It also emphasized, on the fact that, each watercourse state must respect the sovereignty and shared rights of other watercourse states. Prime benefit of this principle is that it concurrently recognizes the rights of both states i.e. upstream as well as downstream nations without sacrificing the principle of sovereignty.\textsuperscript{86}

The more recent and just principles of distribution which though developed in international law or inter-state disputes but equally applicable at all levels, including individuals are as under:

\textbf{2.4.4. The Equitable Apportionment Theory}

‘Equitable Appropriation’ doctrine of Water distribution entails the notions of equality and fairness. The people amongst whom the resource is to be distributed must be treated as equal before law and fairness must be considered with due legal process.\textsuperscript{87} It must consider all relevant facts including the claims, needs and decision by appropriate authority in distribution of the resources. It has been generally recognized as the source for distribution of the water resources in international disputes or conflicts. ‘The doctrine of equitable and reasonable utilization’ is the basis of UN Watercourses Convention guiding water-sharing for international watercourses. It enables a watercourse state to the just and rational share of usages and benefits relating to a particular watercourse without disregarding the shared rights of other States in this respect.\textsuperscript{88}

\begin{flushright}
\footnotesize
\textsuperscript{84} https://www.internationalwaterlaw.org/bibliography/articles/general/Part-%203.pdf (Visited on 11 August 2016).
\textsuperscript{87} Supra note 74 at 71.
\end{flushright}
The Indus Commission, appointed in pre-independent India, to apportion the Indus Water between Punjab and Sindh did so, on the basis of equitable needs. The same principle has been followed in independent India in the distribution of waters of Narmada, Godavari, Mahi and various other rivers in different states. The equity principles speak about the equality of all claimants. It emphasizes on the allocation of the water through just legal mechanism in accordance with the needs of the respective states.\(^89\)

Although the superiority of this theory is not questionable, but it has its own shortcomings as follows. First the fair legal means demands adjudication or mediation through an authority which is acceptable to all parties. This authority can be a court or a tribunal, but where a legal system is not fairly developed there can be problems in accepting the authority. This is evident in international conflicts. Second the concept of needs is problematic one. The courts and tribunals have decided the needs on the basis of agricultural, industrial and domestic needs. Once the prioritisation principles is understood the needs principles can be accordingly worked out for each individual case. There can be no other principle guiding the definition of needs. The third problem arises for the reason that the needs are not static rather they are dynamic and continuously changing. This in turn makes the possibility of conflicting claims permanent and revision of allocation again and again.\(^90\)

2.4.5. The Equitable Utilisation Theory

‘The Equitable Utilisation theory’ is based on the presumption that every water user has a right to a just and rational share in the beneficial use of the waters of that portion of a hydrologic part within its own territory.\(^91\) ‘The theory of Equitable Utilization’ is universally accepted and applicable under international law. It has equal application at national, state or local levels. The other advanced concept of ‘Equitable Utilization’ is that every use of water must be taken in unison. That means water use must not be considered in isolation and must be treated in reference to all uses of the water resources within a particular hydrologic part.\(^92\)

‘The Equitable Utilisation Theory’ is somewhat similar to ‘the Equitable Apportionment Theory’. This theory is based on the utilisation of the resources fairly and on equitable basis. There are certain crucial differences between the two doctrines. This theory looks for equitable utilisation by the mutual agreement, negotiations or by third adjudicator.

---

\(^89\) Supra note 74 at 71.

\(^90\) Supra note 74 at 73.


\(^92\) Ibid.
Equitable utilisation when brought about by a third party adjudicator will amount to apportionment. While the apportionment bases itself on needs of the people or states, utilisation is more concerned with the resource itself. It looks for the optimum or maximum utilisation of the resource.

The directions laid down by the ‘Helsinki Rules’ for equitable utilisation of water resources can be applied to municipal law, including between individuals. This has also been the basis in the UN Watercourses Convention. Article 5 of ‘the UN Water Convention’ speaks about the equitable and reasonable utilisation of the water. It provides that Watercourse States shall in their respective areas utilise an international watercourse in an equitable and reasonable manner. It also obliges the states to participate in the development of an international watercourse in order to attain ideal and sustainable usage and benefits. It gives due regard to the protection of watercourse keeping in view the interests of the concerned states.

According to this doctrine, the watercourse states are responsible to participate in the use, development and protection of an international watercourse in a just, equitable and reasonable way. The participation of Watercourse States includes the right to utilise the water along with the duty to protect and develop the water course in accordance to this Convention.

---


94 Article V The Helsinki Rules, 1966 provides as under:
1. What is a reasonable and equitable share within the meaning of Article IV is to be determined in the light of all the relevant factors in each particular case.
2. Relevant factors which are to be considered include, but are not limited to:
   (a) the geography of the basin, including in particular the extent of the drainage area in the territory of each basin State;
   (b) the hydrology of the basin, including in particular the contribution of water by each basin State;
   (c) the climate affecting the basin;
   (d) the past utilization of the waters of the basin, including in particular existing utilization;
   (e) the economic and social needs of each basin State;
   (f) the population dependent on the waters of the basin in each basin State;
   (g) the comparative costs of alternative means of satisfying the economic and social needs of each basin State;
   (h) the availability of other resources;
   (i) the avoidance of unnecessary waste in the utilization of waters of the basin;
   (j) the practicability of compensation to one or more of the co-basin States as a means of adjusting conflicts among uses; and
   (k) the degree to which the needs of a basin State may be satisfied, without causing substantial injury to a co-basin State.
3. The weight to be given to each factor is to be determined by its importance in comparison with that of other relevant factors. In determining what is a reasonable and equitable share, all relevant factors are to be considered together and a conclusion reached on the basis of the whole.


97 Id., Article 5 (2).
The limitations of ‘the Equitable Utilisation theory’ are similar to those of ‘the Equitable Apportionment Theory’. In addition what use will be called as is difficult to decide. There is no such precise definition of ‘reasonable and equitable’. Accordingly “Although what is a reasonable and equitable share is to be determined in the light of all relevant factors in each particular case and despite the availability of a non-exhaustive list of those relevant factors, it remains that the term of reference against which to measure the relevance of such factors is apparently missing.”

2.4.6. The Community of Interest Theory

This theory is closely related to ‘the Equitable Utilisation Theory’. In fact, this is a specific form of ‘the Equitable Utilisation Theory’. This theory permits the groups participating in the distribution to be termed as ‘communities’ in various ways. These ways are as cultural specific groups, domestic specific groups or nation-state specific groups. All other considerations behind this theory are same as that of the Equitable Utilisation theory like maximisation of utility and productivity and equitable distribution. The theory suffers from the same disadvantages and limitations as the Equitable Utilisation theory does.

Undoubtedly, the recognition of the ‘community interest’ and of ‘equitable utilization’ is a big achievement in the legal regime of water resource management. The ‘Helsinki Rules’ included the ‘the water resources management plan’ to promote such principles and in setting-up mechanisms for the management and administration of international water resources and for the settlement of disputes.

2.5. Ownership Issues in Water Management: State Control

Who owns water—the government or the people of the country? The question has been debated more and understood less. Every time it is debated it has generated more heat than light. Issues relating to water are not only multifaceted but also dissimilar to other resources. The use, control or management of water resources is connected to many other factors such as ownership of land, irrigational structures, kind and purpose of use etc. So these issues cannot be discussed in seclusion. The issues of ownership pertaining to surface water and groundwater

are to be discussed separately. Further, management programmes are suffered with many drawbacks. Most of the watershed or inter basin management programmes are unable to address the issue of ownership regime. Howsoever difficult the issue may be, some sort of water rights and responsibility system has to be established. In order to have effective use of water such system must stipulate certain limits of withdrawing or entitlement of water.¹⁰²

The issues of ownership over water have been raised time and again. The increasing scarcity leads to a centralised system of governing water. However, these days, many nations are also in favour of decentralization of ownership rights.¹⁰³ The issues pertaining to ownership arise on the following aspects:

i. Individual Private Property (ground water)
ii. State or Public Property (surface water resources)
iii. Common Property (Tanks with PRIs or communities)
iv. Common Pool Resource – access to identified group but none has a right (village tanks)
v. No man’s property (open access bodies)¹⁰⁴

The liberties and rights provided to riparian owners have many forms and have paved way for various legal aspects of water boundaries.¹⁰⁵ The problems with state ownership and management are well known. The water resources are bound to degrade in absence of specific regulatory system fixing accountability and responsibility of maintaining and controlling them. The principles regarding the control or management of water resources by the state are discussed herein under.

2.5.1. The Doctrine of Sovereignty

The question of sovereignty is a legally very vexed question. The point here is not to discuss the sovereignty in general but only in respect of the natural resources law. It is a concept which is based on the absolute control of the state over natural resources. What can be the basis of such a doctrine is pertinent to understand here. One reason for asserting sovereign rights is to proclaim jurisdictions. In order to deal with other countries concerning water use the state has to exercise its absolute control over such rights. The issue of jurisdiction is just one aspect of it.¹⁰⁶

¹⁰⁴ Ibid.
¹⁰⁵ Ibid.
India inherited and kept intact a plethora of colonial water laws, which support a centralised surface water governance system. The colonial government had created a system to assert its ‘sovereign’ rights. These rights were deemed to be at a higher level than mere proprietary rights of individual landholders or customary rights of local communities. Colonial laws extended state ownership over all surface water resources including rivers and wetlands and colonial courts, through their orders, ensured that the state retained paramount control over water.

One of the first statutes in the area of water resource management that asserted the sovereign right of the state was ‘the North India Canal and Drainage Act, 1873’. The preamble to the Act says that “the Provincial Government is entitled to use and control for public purposes the water of all rivers and streams flowing in natural channels, and of all lakes and other natural collections of still water.” Similarly, ‘the Bombay Irrigation Act, 1879’ is another legislation asserting state’s control over water sources. It laid down that “whenever it appears expedient to the State Government that the water of any river or stream flowing in a natural channel, or any lake or any other natural collection of still water, should be applied or used by the state government ….the State Government may, by notification declare that the said water will be so applied.”

Around the same time, that is within ten years of the coming into force of the above said legislations, the natural riparian right to water also found a statutory recognition under ‘The Indian Easement Act, 1882’. The natural riparian right of a person under ‘The Indian Easement Act, 1882’ speaks about the entitlement of the riparian owner to use the water flowing through his land equally with other riparian owners. This right includes the free flow of water into his land without any obstruction and contamination. He has also the right to let the water go beyond his land without any hinderance. The Easement Act recognised the rights of persons by long term use or by prescription and by local customs. It also legitimised the customary rights of the people. However these rights were controlled by the overriding provision given under the statute. It provides that “any right of the Government to regulate the collection, retention and distribution

---

108 Section 5, the Bombay Irrigation Act, 1879.
110 Section 15, The Indian Easements Act, 1882.
111 Id., Section 18.
of the water of rivers and streams flowing in natural lakes and ponds and of natural channels, the water flowing, distributed, collected or retained by any channel.\textsuperscript{112}

It is pertinent here to mention that these Acts only contain provisions asserting the right of the state to regulate the use and control of water without talking about ownership. In British era it is clear that there existed the control of Government to regulate the water resources without violating the rights of riparian owners and diminish the supply of water traditionally utilised by them.\textsuperscript{113}

The declaration by the states to have absolute control over the water bodies however does not make the state absolute owner of the water. This is evident from the court’s judgements before independence. In many cases the Indian courts have addressed issues related to control over water particularly associated with land rights.

As in the case of Secretary of state v. NageswaralIyer\textsuperscript{114} while settling the nature of the state interest in water the court held that the right of the government to regulate the supply and allocation of irrigation water is not the proprietary right but a sovereign right of the state. The court also observed that a right by prescription can be acquired as against the proprietary right of another but not against the sovereign right of the state possesses to control water supply in public interest for optimum utilisation. In another case where it was contended that the river bed belonged to the riparian proprietor, the argument was rejected and it was held that the bed of the navigable river in any part of India, whether tidal or not, is vested in the government unless it has been granted to private individuals.\textsuperscript{115}

Cases in this era itself showed that in spite of the position that the right of the government to control irrigation in natural waters was sovereign in character, but it could not be exercised arbitrarily.\textsuperscript{116} There was a definite assertion of control of state over the water however it does not imply the absolute ownership of state over it. The state’s assertion of its rights over water continued following independence.\textsuperscript{117}

\subsection*{2.5.2. Doctrine of Eminent Domain}

There is another meaning of sovereignty by which a government can declare and exercise its powers over rights over resources and private property. Eminent domain may be defined as the related exercise of sovereign power of the State to acquire private property for

\begin{footnotes}
\item[112] Id., Section 2 (a).
\item[114] AIR 1936 Mad. 923 at 926.
\item[115] Maharaja of Pittapuram v. Province of Madras, AIR 1909 PC 3.
\item[116] Supra note 111 at 135.
\item[117] Id., at 139.
\end{footnotes}
‘public purpose’ by providing just compensation. The expression “eminent domain” appears to have been first coined in the year 1625 by an international jurist named Hugo Grotius in his work ‘De Jure Belii ac Pacis’. Presently it is accepted principle of constitutional law in almost all important countries.119 This Doctrine supports the control of state on private property in the name of public welfare. The state can acquire the private property only upon the payment of compensation which should be fair and adequate. The doctrine of Eminent domain is based on the principle that the state always acts for the public welfare and thus it has the right to acquire any property in the public interest.120

There are two Latin maxims that forms the basis of the principle namely ‘Salus populi supreme lexes to’ which means that the public welfare is the highest law and ‘Necessita public major est quam’, which means that public need is greater than the private need. This doctrine emerges from the democratic American law and not from the monarchical English law.121

The two necessary limitations on this power were stressed by Grotius himself. The first is that acquisition of property must sincerely be in public interest and the reasonable compensation must be given to the affected people. These two limitations on the power were explicitly recognised in Chiranjit Lal v. Union of India122 and in Kameshwar Singh v. State of Bihar123.

The Indian constitution underwrites the power of eminent domain through Article 31A. It protects the entitlement of the state to acquire any estate or any rights in such estate, or extinguish or modify any of the rights therein from challenge that such legislative actions are violative of fundamental rights conferred by the Constitution Particularly Article 14 and Article 21. This Article covers lands including that as held under any type of tenure or grant, as well as land used for agriculture and ancillary purposes. This provision, in effect, protects residual powers of the state over all land resources, which are critical in terms of water management as well.124

118 G. S. Pandey, Constitutional Law of India 600 (University Book House Pvt. Ltd., Jaipur, 2007)
119 Chiranjit Lal Choudhary v. Union of India, AIR 1951 SC 41, 54.
122 AIR 1951 SC 41, 54.
123 AIR 1952 SC 252.
2.5.3. Doctrine of Public Trust

The ‘doctrine of public trust’ encompasses the concepts that the sovereign holds shared water resources in trust for the public’s use and enjoyment. Like private trusts, with the public trust there is an identified trustee (the government), beneficiaries (every member of the public), and trust property.\textsuperscript{125} Under this doctrine, the state is not perceived as the owner of all water resources existing in the country, but as holder of them in trust for the public as well as for upcoming generations.\textsuperscript{126}

In the post-independence scenario, colonial laws which are relating to water sources and provisions regarding rights to control water created a dichotomy between the centralised model on the one hand and the demands of democratisation on the other. By the 1980s, with the clamour to expand the spaces for people’s participation, questions regarding the state’s dam centric water management model loomed ahead.\textsuperscript{127} Perhaps, this responsibility of the state has since taken the form of definite fundamental right of every individual. A highly activist interpretation of the Constitution of India by the apex and High courts has made it possible.

‘The Public Trust Doctrine’ has developed in India through several landmark cases in the Supreme Court. The Supreme Court has deduced this doctrine from various sources such as the Common Law and Article 21 of the Constitution, and Article 39 in Part IV of the Constitution which provides for equitable distribution of material resources. The doctrine was first invoked in 1995 by the Supreme Court in the famous \textit{MC Mehta v. Kamal Nath}\textsuperscript{128} (‘Span Motels case’). In this public interest litigation, the petitioner challenged a tourist resort namely Span Motels which proposed to alter the course of the river Beas by dredging, blasting and reconstructing the riverbed. The construction of the resort was planned on protected forest land procured on a ninety-nine year lease from the government. The redirection of the course of the river had been approved by the Ministry of Environment and Forests as well as the local Gram Panchayat.

The Supreme Court opined that “the area being ecologically fragile and full of scenic beauty should not have been permitted to be converted into private ownership and for


\textsuperscript{126} Ramaswamy Iyer, \textit{Water and the Laws in India} 586 (Sage Publications Pvt Ltd, New Delhi, 2012).


\textsuperscript{128} \textit{M.C. Mehta v. Kamal Nath}(1997), 1 SCC 388 (Supreme Court)(13 December 1996).
commercial gains”.\textsuperscript{129} It then expanded the existing legal concepts and held that water is covered by the doctrine of public trust. The Supreme Court ruled that the lease of forest land for resort construction as well as the diversion of the river violated the ‘Public Trust Doctrine’ and, therefore, were not tenable. It was concluded by the court that “where the public trust applies natural resources are meant for public use and they cannot be privately owned and used.”\textsuperscript{130} The court declared that “the Public Trust Doctrine, being part of the Common Law system is law of the land”. The Supreme Court summarized the Indian public trust doctrine as follows:

“Our legal system includes the public trust doctrine as part of its jurisprudence. For all natural resources which are by nature meant for public use and enjoyment the state serves as the trustee. The running waters, airs, sea-shore, forests and ecologically fragile lands are utilized by the public at large. It is the legal responsibility of the State as a trustee to protect the natural resources. These resources meant for public use cannot be converted into private ownership.”\textsuperscript{131}

The Supreme Court reiterated in the \textit{Fomento Resorts & Hotels Ltd. v. Minguel Martins}\textsuperscript{132} (‘Fomento Resorts Case’) that natural resources are common properties held by the state as a trustee on behalf of the people, particularly the future generations. Therefore, the state cannot transfer public trust properties to a private party, if such a transfer interferes with the access rights of the public. The public trust doctrine allows the judiciary to protect the rights of public at large to have access to light, air and water and also to protect rivers, seas, tanks, trees, forests and associated natural eco-systems.

The very nature of a trust is that it imposes positive obligations on the trustee such that they are bound to use the property rights for the benefit of the ‘Cestuique’\textsuperscript{133} trust. The higher judiciary has extrapolated this understanding to the Doctrine, such that not only should the state abstain from certain actions, but the state is also expected to perform positive duties while using water resources to ensure the benefit of the public at large. Although, the higher courts have invoked this Doctrine to restrict government actions keeping in view the environment protection, a reasonable allocation and equitable access to natural resources and concerns for

\begin{flushleft}\begin{small}

\textsuperscript{129} \textit{Id.}, at para 22.  \\
\textsuperscript{130} \textit{Id.}, at para 34.  \\
\textsuperscript{131} \textit{M.C. Mehta v. Kamal Nath} (1997), 1 SCC 388 (Supreme Court).  \\
\textsuperscript{132} (2009) 3 SCC 571.  \\
\textsuperscript{133} ‘Cestuique’ means the person who has a right to a beneficial interest in and out of an estate the legal title to which is vested in another available at \url{https://thelawdictionary.org/cestui-que-trust/} (Visited on 11 May 2017).
\end{small}\end{flushleft}
intergenerational equity – in the absence of legislation, the interpretation and enforcement of the doctrine remains doubtful.\textsuperscript{134}

The important recognition of the doctrine by the Supreme Court had no such effect in reality beyond certain judgements where courts have used this doctrine. In fact, States have not come up with the required changes in legislations recognizing state ownership over water. Even after the introduction of the principle of public trust, different case law indicates that courts have not found it easy to move beyond the outdated principles that have been cardinal to water law for years.\textsuperscript{135}

Further, in some cases, there has been a tendency to restrict the application of this doctrine. As in Mrs. Susetha v. State of Tamil Nadu,\textsuperscript{136} the Supreme Court used an earlier statement it had made that the public trust ‘does not exactly prohibit the alienation of the property held as a public trust’. The case was related to construction of a shopping complex in place of a disused temple tank. It was observed by the court that “there was no scarcity of water in the village and since the tank had been unused for a long time, it had to take a ‘pragmatic view’ of the doctrine of sustainable development and could thus condone the alienation of the property. The only additional element the court requested was to direct the State and gram Panchayat to ensure that other tanks in and around the village are properly maintained. This decision seems to empty the principle of public trust from its inner substance since the court did not base its decision on an assessment of the water needs of the area in the long term but only balanced present day use against availability.”\textsuperscript{137}

‘The Public trust doctrine’ can be used as an instrument to protect and preserve the natural environment. It has been recognized as an important component of Indian environmental law. It proclaims that the state is under obligation to preserve the natural resources and take effective measures to protect them.\textsuperscript{138}

Mere recognition of ‘the Public Trust Doctrine’ by the judiciary will not serve the purpose of better water resource management. This is because of absence of recognition of community rights and lack of legislative efforts to make participation of the community in water governance.

\textsuperscript{134} Paromita Goswami “Public Trust Doctrine: Implications for Democratisation of Water Governance” 9 NUJS L. Rev. 67 (2016).
\textsuperscript{135} Philippe Cullet “Water Sector Reforms And Courts In India” available in http://www.ielrc.org/content/a1006.pdf (Visited on 11 June 2015).
\textsuperscript{136} Mrs. Susetha v. State of Tamil Nadu, AIR 2006 SC 2893, para. 9.
\textsuperscript{137} Ibid.
\textsuperscript{138} Prof. Satish C. Shastri, Environmental law 457 (Eastern Book Company, Lucknow, 2012).
2.6. Concept of Water Management in India

The concept of ‘Water resources management’ is a complex one. It should be taken as the entirety of all activities ensuring ‘the conservation, preservation, use and development of the water resources of a particular basin or other hydrologic unit. The different resources of water have to be ascertained quantitatively as well as qualitatively for the effective water management.\(^{139}\)

The concept of ‘Water resources management’ includes the protection, development and use of the entire water body constituting single hydrologic unit. It takes in its domain the inclusive management. Water resource management has traditionally been perceived as handling of water for specific uses and isolated water-based projects. Hence it leads to separate legal rules and regulations. At present, Water resource management is viewed as being ‘rational’ and 'integrated'. It takes into consideration the optimum use of water resources including surface as well as underground water, control of pollution and their sustainable development.\(^{140}\)

Historically, there is a long history of human intervention in the management of water in India. This is perhaps due to diverse climatic conditions of the country from heavy rainfall to prolonged droughts. Furthermore, rainfall happens only in few months of the year and that too uncertain, irregular and unequal. All these make Indian agriculture reliant on other forms of irrigation. This reliance made people and the regulating bodies to come up with different ways and practices of control and allocation of water.\(^{141}\)

Water management in India suggests practical and effective measures to meet out the challenges posed by the ever changing water conditions in relation to the quality, quantity and unequal distribution.\(^{142}\) Water management has been a crucial affair in India due to different reasons such as socio-economic-political and ecological affecting water management policies.\(^{143}\)

2.7. Privatisation and Commercialisation of Water

Transfer of the control or ownership of resources of water from the public undertakings to the private sector is called as water privatisation.\(^{144}\) Several new developments have been made in the water privatization sector. The coming of bottled drinking water is a significant


\(^{142}\) Supra note 141.

\(^{143}\) Supra note 143.

\(^{144}\) “Privatising India’s Water Is a Bad Idea” available at [https://thewire.in/73597/water-privatisation/](https://thewire.in/73597/water-privatisation/) (Visited on 11 August 2017).
important feature of commoditization of water. Privatization of irrigation and hydropower are some other aspects of it. The task of providing water supply, management of the water supply projects are also privatised in certain cities or towns. Across the world it can be seen that the management and development of several water schemes and projects are being privatised. This process of privatisation had made the water a commodity that is priced and sold in the market, generally, on the basis of consumer’s ability to pay.\textsuperscript{145}

The private sector participation can be supported and advocated if we take into account the success achieved in other sectors. The private sector contribution in management and providing service in other sectors such as power, highways and telecom is commendable.\textsuperscript{146} Therefore it is conceived that the private participation in the water sector could realize several purposes like upgrading of water use effectiveness, better preservation of resources, capital mobilisation, use of advanced technology, professionalism and better services through the market mechanism.\textsuperscript{147}

Since 1990, the government has promoted private sector participation through its reforms in order to bring more transparency and accountability in the water sector.\textsuperscript{148} Private sector participation in water sector Measures got impetus after the year 2000 when several reforms were permitted by the government of India in consultation with international bodies like the Asian Development Bank and the World Bank.\textsuperscript{149}

The National Water Policy also supported and encouraged the private participation in the planning and management in the water sector. According to the policy, “Private sector participation should be encouraged in planning, development and management of water resources projects for diverse use, wherever feasible. Innovative ideas, improving service efficiency and accountability to users, generating financial resources and introducing corporate management can be brought about by the involvement of Private sector. Various combinations of private sector participation like operating, leasing building, owning, and transferring of water resources facilities, may be considered depending upon the need and specific situations.”\textsuperscript{150}

\textsuperscript{146} V. Sathyanarayana and D. T. V. Raghu Rama Swamy “Private Sector Involvement in Water” in India Infrastructure Report 231 (Oxford University Press, New Delhi, 2011).
\textsuperscript{147} Ibid.
\textsuperscript{148} Supra note 146.
\textsuperscript{149} Ibid.
\textsuperscript{150} Ibid.
Madhya Pradesh (now Chhattisgarh) has set the trend of privatising natural water bodies in the country seventeen years ago by selling the rights of the Shivnath river. It was given to a private company named Radius Water Limited (RWL) which extended to about 23.5 km of the river.\textsuperscript{151} It is not only RWL working in water sector. There are several private companies working in various regions of the country in the water sector like Vishwa Infrastructure Limited (VIL), Veolia Water India Limited (VWIL), Orange City Water Private Ltd (OCWL), Jamshedpur Utilities and Services Company Limited (JUSCO), MSK projects India Limited (MIL), etc.\textsuperscript{152} The state governments and Urban Local Bodies (ULBs) promote the participation of private parties in the water and sanitation sector by opening up ample opportunities like Jawaharlal Nehru National Urban Renewal Mission (JNNURM) and Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT) under Public Private Partnerships (PPPs) for them.\textsuperscript{153}

The primary supposition regarding privatisation of water is that it is not privatised. But this is not correct as there has been a trend that the individual has the right to draw unlimited amount of water beneath his land. The groundwater, an important resource is owned by the private individual. Groundwater in India is regulated by Common Law of 19th century. It entitles the owner of a land to extract unlimited quantities of water beneath that land. Thus, control over water existed in the hands of private individual. Such privatisation of groundwater inherited from the British rule is one of the major root causes of water problems today particularly of groundwater resource.\textsuperscript{154} Lacunae such as losses, inefficiency, unreliability, corruption, issues of quality, and mismanagement that prevails in the urban water sector justifies water privatisation. All these are indicators only, the root cause is the absence of democratic governance.\textsuperscript{155} There has not remained long term sustenance of privatisation of water in an inclusive way across the world. In some areas like water distribution there has been efforts to involve private sector while keeping the rest of the control in the public sector.\textsuperscript{156}

There are number of drawbacks in the existing system regarding privatisation of the water services. There does not exist any legislation specifically related to private sector in India. Further, the rules and regulations controlling the working of the private sector and the public-private partnerships have not been successful to bring any betterment in water services.

\textsuperscript{151} Ibid.
\textsuperscript{152} Ibid.
\textsuperscript{153} Ibid.
\textsuperscript{154} “Should we privatize water” available at \url{http://www.thehindu.com/opinion/op-ed/should-we-privatise-water/article18161255.ece} (Visited on 22 May 2017).
\textsuperscript{155} Ibid.
\textsuperscript{156} Ibid.
There are cases where privatisation in water sector has not been successful in achieving the desired objectives. Like in Nagpur city there is a complete failure of privatisation of services relating to drinking water. After privatisation, the tariff of water has increased to four times there and the NMC suffered great losses of about 180 crores annually.157

Water is not only a product and the urban water sector is not only about supplying fresh and clean drinkable water to people in urban dwellings. The urban water sector also performs several functions like creating sources of water, determining suitable options, setting up of purification plants for reasonable allocation, and management of the sewage.158 It involves not only providing and maintaining infrastructure for performing different functions and also to work for sustainable development.159

A report160 by the Transnational Institute (TNI), Public Services International Research Unit (PSRU)161 and the Multinational Observatory, a prime international research and advocacy organisation working on international water and other social development issues suggests that 180 cities and communities in 35 countries across the globe have “remunicipalised”162 their water systems in the last 15 years.

Privatisation of water is unjustified and unnecessary. There is need to have a better governance of water resources rather than privatisation. We are leaving the important issues and problems concerning the water sector by trying to privatise water. We need to have a system that is transparent, democratic, accountable and enabling participatory governance wherever privatisation is promoted. According to Mihir Shah163 “the SC’s Public Trust Doctrine, rather than privatisation or nationalisation, is the answer to India’s water problems.”164

2.8. Water Pricing

Governments have a pervasive role not only in the development and management of water resources and the regulation of their allocation between uses and users, but also in

157 Supra note 146.
158 Supra note 156..
159 Ibid.
161 It is part of the Business School of the University of Greenwich, UK and established in 2000. PSIRU researches the privatisation and restructuring of public services around the world, with special focus on water, energy, waste management, and healthcare.
162 Remunicipalisation is defined as the transfer of water services from private companies to municipal authorities. It is a way to show that the public sector can outperform the private sector and can be an efficient water provider anywhere in the world.
163 Former member, Planning Commission of India.
164 Supra note 156.
determining the price at which they are supplied to users. In the early phases of colonial rule, governments were not willing to invest public funds in irrigation unless it could provide a sufficient financial return after meeting operational costs. However it was excepted where such investment was made for certain protective works in regions prone to natural calamities like droughts and recurring scarcities.\textsuperscript{165} During the post-independence period the governments have followed a deliberate policy of supplying water from municipal systems and the energy used for irrigation at rates below cost, and have progressively lowering them even as costs have been rising. This led to far reaching harmful consequences for the effective and sustainable use of water, and has seen as a huge and growing burden on the fiscals of the state. In the early 1970s, the National Irrigation commission appointed by government of India underscored the significance of securing a sufficient return from investment in irrigational projects, and suggested that water rates be fixed at levels that would cover the working expenses and interest charges.\textsuperscript{166}

Water would be considered as economic good than as a social good in the view of the new regime of water tariff that will be realized in view of the water sector reforms. Nearly all states in India have acknowledged the principle of cost recovery for shaping water tariff as per the state water policies shows that. There was a lack in formal mechanism to establish the tariff regime based on this principle. So it has been endorsed by including required provisions in the new regulatory laws, such as Uttar Pradesh Water Management and Regulatory Commission Act,(UPWMRC)\textsuperscript{167} and Maharashtra Water Resources Regulatory Authority Act (MWRRA).\textsuperscript{168}

Both the UPWMR\textsuperscript{169} and MWRRA\textsuperscript{170} expressly mention in their preambles that the regulatory authority shall ensure just, reasonable and sustainable management and distribution of water resources.\textsuperscript{171} Thus, the legislators accept the equity as chief principle that shall guide the distribution of water resources.

\textsuperscript{165} A. Vaidyanathan, \textit{Water Resources of India} 102 (Oxford University Press, New Delhi, 2013).
\textsuperscript{166} Id., at 103.
\textsuperscript{167} Uttar Pradesh Water Management and Regulatory Commission Act, 2008.
\textsuperscript{168} Maharashtra Water Resources Regulatory Authority Act, 2005.
\textsuperscript{169} Act No. 26 of 2008.
\textsuperscript{170} Act No. XVIII OF 2005.
\textsuperscript{171} Preamble, Uttar Pradesh Water Management and Regulatory Commission Act, 2008 provides as under: An act to provide for the establishment of the Uttar Pradesh Water Management and Regulatory Commission to regulate water resources within the State, facilitate and ensure judicious, equitable and sustainable management, allocation and optimal utilization of water resources for environmentally, economically sustainable development of the State, fix the rates for water use for agriculture, industrial, drinking, power and other purposes and cess on lands benefited by flood protection and drainage works from the owners of lands benefited through appropriate regulatory instruments according to State Water Policy and matters connected therewith or incidental thereto.
State governments, however, have followed a deliberate policy of avoiding rising rates charged to farmers in step with costs. In many regions of India, the basis of criteria for determining water charges is the affordability to water users. Resulting thereby, in certain places, water is being provided free or at highly subsidized rates to certain sections of the society. Canal rates have been revised infrequently, with great reluctance and to a very limited extent. In the case of electricity, the rates have, in fact, revised downwards, with many states announcing free power for agriculture. Apprehensions of the adverse effects on the prospects of agriculture growth, and the rapid reduction of rural poverty through rapid rise in rural incomes and employment are increasingly used to justify the government policy.172

After agriculture, Industry is the second largest consumer of water. Groundwater is the chief source of water for industrial sector. The running cost of surface water is principally the money paid to the supplier i.e. the municipal bodies and the cost of the groundwater is the cost incurred in its withdrawal.173 Since the costs of all the necessary inputs like water, electricity and diesel are controlled by the government agencies, the ineffective use of water remains a normal practice. As the surface water supply remains inadequate in many cases, there is more dependence by industries on groundwater. Water demand for industries has been growing with the pace of industrial development. The growth in few of the water intensive industries has been quite noteworthy that puts further burden on the industrial demand for the water.174

Most of the industries use water as an input like all other inputs during the process of production. Therefore, this need for water depends, among other factors, on the demand for the goods in the market. Hence it is a derived demand. One of the chief factors is the poor water pricing is for inefficient use of water by the industries. In India the water pricing has the following parts. Water Cess paid to the pollution control boards, cost of buying water from the suppliers such as municipalities and the cost of extracting water from the sources such as rivers

Preamble, Maharashtra Water Resources Regulatory Authority Act, 2005 runs as under:

Province, Maharashtra Water Resources Regulatory Authority Act, 2005 runs as under:

to provide for the establishment of the Maharashtra Water Resources Regulatory Authority to regulate water resources within the State of Maharashtra, facilitate and ensure judicious, equitable and sustainable management, allocation and utilisation of water resources, fix the rates for use of water for agriculture, industrial, drinking and other purposes, and matters connected therewith or incidental thereto.

Whereas it is expedient to make a law to provide for the establishment of the Maharashtra Water Resources Regularity Authority to regulate water resources within the State of Maharashtra, facilitate and ensure judicious, equitable and sustainable management, allocation and utilisation of water resources, fix the rates for use of water for agriculture, industrial, drinking and other purposes, and matters connected therewith or incidental thereto, for the purposes aforesaid; it is hereby enacted in the Fifty-sixth Year of Republic of India as follows.

Supra note 167 at106.

Suresh Chand Aggarwal and Surinder Kumar “Industrial Water Demand in India” in India Infrastructure Report 276 (Oxford University Press, New Delhi, 2011).

Ibid.
or groundwater.\textsuperscript{175} According to Water (Prevention and Control of Pollution) Cess Act, 1977\textsuperscript{176} the industrial sector is required to pay a price for the use of water. However, this rate of water cess is nominal. Further, the main aim of the cess is not the promotion of the effective use of water but only for collecting financial resources to state pollution control boards. Even from the angle of the total cost incurred in production the water cess is highly insufficient. For example, even at new rates, the major water consuming industries like pulp and paper the water cess constitutes only 0.1-0.2\% and for iron and steel it constitutes 0.02-0.05\% of the total income.\textsuperscript{177}

Likewise, the government agencies of water supplying such as municipalities do not charge according to the marginal rate of supplying water. They charge following the simple average cost pricing rule ignoring the opportunity cost of water. Similarly, the cost of negative externalities that arise from the losses caused by industries in polluting surface water and groundwater are ignored in calculating water tariffs. Consequently, from economic point of view excessive amount of water is used and extreme pollution is caused.\textsuperscript{178}

Presently, there does not exist any legislation in the country that determines the actual amount for consumption of water by the various industrial sectors. Though, certain water consumption levels for some industrial sectors have been prescribed by the Central Pollution Control Board but they have no enforceability and are mere recommendations.\textsuperscript{179} Laws concerning extraction of groundwater are also outdated. Despite the recognition of public trust by the judiciary and certain legislations, it has remained mere declaration in majority of the laws in the country. The owner of a particular land has right to extract the groundwater limitlessly. One of the ill effects of such laws is that, there does not remain any control on the industries withdrawing groundwater.

\textbf{2.9. Integrated Water Resource Management}

Integrated Water Resource Management is viewed as a new approach for effective management of water and related aspects. This is conceived as a process to plan and formulate policies keeping in consideration the interdependence of several connected issues in water management.

\textsuperscript{175} Ibid.
\textsuperscript{176} Act no. 36 of 1977.
\textsuperscript{178} Id., at 277.
\textsuperscript{179} Id., at 279.
2.9.1. Need

There are many dimensions of preservation and sustainable use of water. Therefore, there exist a number of concerns in water polices and laws. These include deciding the priorities of distribution of water, ensuring clean drinking water, enhancing availability of water for other purposes like irrigation and Industry, ensuring management of drought and floods, ensuring participation of water users in decision-making and helping resolve conflicts between individuals, between States and also between the Centre and States in a federal country like India.\(^{180}\) In this context a Working Group on environmental aspects of the Union Ministry of Water Resources also suggested that water resources management must be developed within a comprehensive set of policies for (a) human health (half of the world population suffering from waterborne diseases warrant effective control of water pollution); (b) food production (c) disaster mitigation; and (d) environmental protection and conservation of natural resource base.\(^{181}\)

The concerns of water management are multidimensional and thus the approach to deal with it also requires to be multi-dimensional or multi-faceted. The problems of pollution of water, reduction of water sources, access to drinking water and resolution of water conflicts are all interconnected and there is need to have integrated and comprehensive approach.\(^{182}\)

2.9.2. Background

The concept of IWRM is not new to the water sector. It was first expressed in “the UN Conference on Water and Environment” held at Dublin in 1992 and later in Chapter 18 of ‘Agenda 21’.\(^{183}\) Water acts as the primary component in achieving the ‘Millennium Development Goals (MDGs)’ adopted at the ‘Millennium Summit’ in New York in 2000. It was based on a real and inclusive user’s involvement and improved development and management of water resources. The Summit associates gender equality, health, poverty, hunger, education and environmental deprivation to these goals. In this regards, a significant short term goal was agreed upon at the ‘World Summit’ for Sustainable Development in Johannesburg in 2002. The goal was “To develop integrated water resources management and

---


\(^{183}\) A consensus document which emerged from the UN Conference on Environment and Development at Rio in 1992.
water efficiency plans by 2005, with support to developing countries”, or in short the “IWRM Target”. The purpose was to highlight the vital role of improving water management through IWRM as a means towards the achievement of the ‘Millennium Development Goals’. These targets concerning IWRM were also reiterated at the third and fourth World Water Forums. In 2005, at the Thirteenth Session of the ‘Commission on Sustainable Development (CSD)’ in 2005, all countries were called upon to speed up the preparation of nationally-owned IWRM and water-efficiency plans.\(^{184}\)

One of the approaches in water management that has been gradually gaining importance in recent years, particularly in developing countries and which includes the application of the sustainable development doctrine is Integrated Water Resource Management (IWRM).\(^{185}\)

‘Integrated Water Resources Management’ is by now well recognized as a set of principles proper to address the current issues relating to water. It is being considered as the overriding set of principles appropriate to current water management problems.\(^{186}\)

The IWRM approach assists in resolving water related problems in a given country in every aspects of the society. It aims at better allocation of water to different water user groups by encouraging the participation of all users in the policy making process. It also involves gender participation concerning the land and water management policy making. It helps, inter alia, in the integration of water supply, waste management and groundwater protection. It also acknowledges that the protection of water and improvement in quality are essential for sustaining both humans as well as nature. This approach is also recognized as an agenda for the management of natural calamities like floods and droughts and the reworking of water management to climate change.\(^{187}\)

ECOSOC, UN\(^{188}\) to promote and facilitate sustainable water development and management formulated certain strategies. These are as follows:

\(^{186}\) Asit K Biswas and Others, Integrated Water Resources Management in South and South-East Asia 40 (Oxford University Press, New Delhi, 2006).
\(^{188}\) ECOSOC, one of the six main organs of the United Nations established by the UN Charter in 1946, is the principal body for coordination, policy review, policy dialogue and recommendations on economic, social and environmental issues, as well as for implementation of the internationally agreed development goals.
(a) “To promote social stability and adaptability to environmental change, by applying integrated water resources management strategies, disaster reduction schemes and equitable and efficient allocation and distribution of water resources”;\textsuperscript{189}

(b) “To promote and raise awareness and to build human and institutional capacity, through participation by stakeholders and partnerships among riparian States and between national and local user sectors and the public and private sector”;\textsuperscript{190}

(c) “To provide access to safe water supply and adequate sanitation for poor people as an essential component in poverty alleviation measures, with a view to improving health, economic productivity, food security and human dignity”;\textsuperscript{191}

(d) “To protect the quality of surface and groundwater and aquatic ecosystems”;\textsuperscript{192}

(e) “To strengthen international institutional arrangements, demand-driven technical cooperation and financing for sustainable water resources development and management”;\textsuperscript{193}

(f) “To strengthen the enabling role of Governments to enact and enforce water legislation and strengthen local water management and service capacities”.\textsuperscript{194}

2.9.3. Definition of IWRM

The notion of IWRM is generally debated one. There does not exist an unambiguous definition of it. The different countries develop their own IWRM practices using the concerted framework emerging internationally and regionally. The definition given by ‘Global Water Partnership (GWP)\textsuperscript{195} is widely accepted definition of IWRM. It defines IWRM as a “system which enables the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without negotiating the sustainability of vital ecosystems.\textsuperscript{196} IWRM constantly responds to changing situations and needs.\textsuperscript{197}

\textsuperscript{189} Supra note 187.

\textsuperscript{190} Ibid.

\textsuperscript{191} Ibid.

\textsuperscript{192} Ibid.

\textsuperscript{193} Ibid.

\textsuperscript{194} Ibid.

\textsuperscript{195} The Global Water Partnership (GWP) is an international network created to foster an integrated approach to water resources management (IWRM). The GWP was founded in 1996 with the support of the World Bank, the United Nations Development Programme (UNDP) and the Swedish International Development Cooperation Agency (Sida). Initially functioning as a unit of Sida, GWP became an intergovernmental organisation under international law known as the Global Water Partnership Organisation (GWPO) in 2002. The Secretariat is based in Stockholm, Sweden.


\textsuperscript{197} https://www.sswm.info/category/concept/iwmr (Visited on 26 July 2016).
One of the experts in the subject Ajith K Biswas stated that “this definition, on a first reading, appears broad, all-encompassing and impressive, however, such lofty phrases have little practical resonance on the present or on the future water management practices.”\textsuperscript{198} He further asserted that “the question that arises then is whether this well-intentioned and good sounding definition has any real meaning in terms of its application and implementation to improve existing water management or just is it an aggregation of trendy words collectively providing an amorphous definition which does not help water planners and managers very much in terms of actual application of the concept to solve the real-life problems.”\textsuperscript{199}

2.9.4. Concept of IWRM

There is a growing pressure on water resources from competition amongst various users. There is a growing threat to the water resources including availability and pollution. The ecosystem requires an approach that is comprehensive in nature and recognise the various actions concerning water management. The IWRM approach addresses water in quantity as well as in quality and provides basis for provisions of water services to all categories of users.\textsuperscript{200}

‘Integrated water resources management (IWRM)’ is an organized process for allocation, monitoring and sustainable development of water resource use in the context of economic, social and environmental objectives. IWRM is founded on the assumption that all uses of water resources are interconnected.

IWRM itself aims at accomplishing three key objectives.

a. effective to make water resources go as far as possible.

b. equal distribution of water across different social and economic groups (see stakeholder identification).

c. environmental sustainability, to protect the water resources base and associated ecosystems.\textsuperscript{201}

2.9.5. Principles of IWRM

IWRM has its base on four Principles known the ‘Dublin Principles’\textsuperscript{202}. ‘The National Water Policy, 2012’ of India has recognised and incorporated these principles.
The principles are as follows:

Principle 1: Fresh Water is a finite and vulnerable resource that is essential to sustain life, development, and the environment.

Principle 2: Participatory approach: There should be a participatory approach in water development and management, involving users, policy-makers, and planners at all levels.

Principle 3: Role of women: Women play a central part in the provision, management and safeguarding of water.

Principle 4: Economic and Social value of water: Water is a public resource and has a social and economic value in all its competing uses.\(^{203}\)

2.9.6. Integration in IWRM

Planning and policy framework in the water sector has not succeeded in perceiving the common pool nature of water. Water has generally been categorised as surface water, groundwater, local water and exogenous water.\(^{204}\) Individually, this is managed and controlled by separate agencies with slight or no collaboration with the other. In fact, this absence of integration is believed as one of the essential reasons for the mismanagement in the water sector.\(^{205}\)

The traditional water resources management envisions the concept of interaction of human system with natural environment. The notion of coordinated Water Resources Management is connected with the management of demand of water with its supply. Thus, two fundamental categories can be viewed of the notion of integration. These are integration of the natural system with its significance for resource availability and quality, and the human system with the resource use, waste production and pollution of the resource. Integration within and between these categories is the need of the hour with the changing times and conditions.\(^{206}\)

There is need to have an integration of freshwater management and coastal zone management. Freshwater systems are essential factors that determine the conditions in the coastal zone. Thus, while planning and managing freshwater resources there should be due consideration to the needs of the coastal zone.\(^{207}\)

---

\(^{203}\) http://www.gwp.org/contentassets/05190d0c938f47d1b254d6606ec6bb04/dublin-rio-principles.pdf (Visited on 26 July 2016).


\(^{205}\) Ibid.

\(^{206}\) Supra note 205.

\(^{207}\) Ibid.
‘Integration of land and water management’: Integration of land and water resources is another component of integrated water management. The planning and management of land use and vegetation cover including crop selection has an important impact on physical distribution and quality of water. Therefore, it must be taken into consideration for the effective water resource management.208

“Green water” and “blue water”: A distinction can be made between water flowing in rivers and aquifers (“blue water”) and water that is used directly for biomass production and “lost” in evapotranspiration (“green water”). “Blue water” and “green water” are interdependent and integration in approach is required for better management of water resources.209 The literature on IWRM and other related water management issues focuses more on the “blue water”, ignoring rain and soil water management. Management of “green water” is of great significance for water savings (crop per evaporated drop in rain fed and irrigated agriculture), increasing efficiency of water use and guarding the important ecosystems.210

‘Integration of surface water and groundwater management’: IWRM advocates the integration between surface and groundwater management for guarding the hydrological cycle. The drop of water retained at the surface of a catchment may appear alternately as surface and groundwater on its way downstream through the catchment. 211 The extensive use of agro-chemicals and pollution is threatening to the quality of groundwater. It urges some sort of connection between surface and groundwater management.

‘Integration of quantity and quality in water resources management’: Water resources management involves an adequate quality along with the progress of proper quantities of water. Water quality management is a prime objective of IWRM. The usability of the resource by the downstream stakeholders is reduced by the deterioration of water quality. IWRM supports of promoting the institutions that are capable of integrating the quantity and quality aspects. These have to be encouraged to put an impact on the way human systems operate in creation, reduction and disposal of wastes.212

‘Integration of upstream and downstream water-related interests’: for an effective water resources management conflicts of rights between upstream and downstream users should be identified and resolved. The consumptive “losses” upstream will lead to lessening of river flows. The river water quality will be degraded by the pollution loads discharged upstream.

208 Ibid.
209 Ibid.
210 Ibid.
211 Ibid.
212 Ibid.
Groundwater recharge and river flow seasonality may be altered by the land use changes upstream. Steps taken to control flood control in the upstream may harm the livelihoods dependent on floods downstream. IWRM acknowledges the resolution of such water conflicts. The approach requires the identification of downstream vulnerability to upstream activities.\textsuperscript{213}

Cross-sectoral integration in national policy development: The IWRM system focuses on the consideration of overall water-related developments including all economic and social aspects. Hence, water resources policy must be integrated with national sectoral policies as well as national economic policy. Likewise, the economic and social policies should give due weightage to the implications of water resource management. For instance, Food policies and integrated Water Resources Management energy may have a great effect on water resources and vice versa. Therefore, developments must be evaluated for possible impacts on or requirements for the water resource, and such evaluations should be considered when drafting and prioritizing development projects. As a result, the water resources management system must include co-ordination procedures and cross-sectoral information exchange for the assessment of individual projects concerning their consequences on the water resources.\textsuperscript{214}

‘Integration of all stakeholders in the planning and decision processes’: The concept of IWRM recognises the participation and involvement of the concerned users and stakeholders in the management and planning of water resources. It has been recognized as an important factor to obtain a balanced and sustainable use of water. Sometimes the users show conflicting interests and their purposes relating to water management may considerably vary. IWRM considers development of effective operational tools for conflict resolution and management to bring a balance between the competing interests.\textsuperscript{215}

‘Integrating water and wastewater management’: Integrating water and waste water is also one essential component of IWRM. Water is a reusable and renewable resource. Thus, the planning and management must ensure that wastewater flows are suitable to water supply or resource flows particularly when the use of water is non-consumptive. Failure of effective management of waste flows often result in reducing proper supplies by spoiling water quality and aggravating future costs of water supply. An efficient reuse system has to be designed along with the incentives to individuals for reuse of wastewater.\textsuperscript{216}
2.9.7. Implementation of IWRM

Water legislation is part of a framework for action for implementation of IWRM. Therefore, it is a prime thing within the enabling environment. Precise water laws have been implemented in many countries, but there is still lack of water resources law per se in many countries. Although, municipal laws contain several provisions relating to water resources but these are generally isolated in a number of sectoral oriented laws. Further there may exist some inconsistencies on some aspects of water resource usage.\(^{217}\)

It is essential to have a comprehensive and coherent water law. No doubt, it requires considerable time to establish coherent and comprehensive water legislation from a segregated and obsolete legislative patchwork. In many cases, the major problem is not the absence of appropriate legislation but lack of the political will, resources and mechanism to implement the existing statutes.\(^{218}\)

IWRM has basically included a bunch of following instruments: –
- A national water policy so that there is a cohesive, well understood normative framework to guide all players in the sector;
- A water law and regulatory framework for coordinated action for sustainable water resources management;
- Recognition of the river basin as the unit of water and land resources planning and management and creation of river basin organisations in place of territorial/functional departments;
- Treating water as an economic good by pricing water resource as well as services, especially outside lifeline uses, to reflect its scarcity value so that it is efficiently used and allocated to high value uses;
- Creation of water rights, preferably tradable, by instituting a system of water withdrawal permits;
- Participatory water resource management with involvement of women so that “water becomes everybody’s business”.

IWRM approaches recognizes water resource management in an integrated and holistic manner rather than being managed in a sectoral approach.\(^{219}\)

\(^{217}\) Ibid.
\(^{218}\) Ibid
2.9.8. National Water Policy on IWRM

‘National Water Policy’ foresees that the water resources of the country should be managed and developed in an incorporated manner.\textsuperscript{220} Integrated perspective of water resources planning, development and management has been specified in several provisions of ‘the National Water Policy, 2012’. One of the prime aims of the policy is that planning, development and management of water resources need to be governed by common integrated perspective considering regional, local, State and national context, having an environmentally sound basis, keeping in view the social, economic and human needs.

According to the Policy there should be a comprehensive legislation for maximum development of inter-State rivers and river valleys as per the policy. The legislation should facilitate inter-State coordination ensuring holistic and balanced development of both the catchment and the command areas ensuring scientific planning of land and water resources taking basin/sub-basin as unit with unified perspectives of water in all its forms (including precipitation, soil moisture, ground and surface water).\textsuperscript{221} Legislation should enable establishment of basin authorities, comprising party States, with appropriate powers to plan, manage and regulate utilization of water resource in the basins.

IWRM taking river basin/sub-basin as a unit should be the main principle for development, planning, and management of water resources for an integrated water resources management. There should be a restructuring and a multi-disciplinary approach in the departments / organizations at Centre / State Governments levels.\textsuperscript{222}

2.9.9. Challenges to IWRM

To deal with the complexity of water management problems, discussion over water resources is characteristically divided into different topics such as water quality, economics and the environment. In fact these issues are interrelated. For example, subsidised water prices can result in increasing water demand and results in the reduction of the quantity of water in the environment. Further increase in the pollution leads to degradation of water quality and increase in the fresh water demand. No doubt the governmental notifications mention the need for integration of inputs from different sectors yet there exists problems of practising it.\textsuperscript{223}

\textsuperscript{220} http://www.wrmin.nic.in/ (Visited on 28 July 2016).
\textsuperscript{221} para 2.3, National Water Policy, 2012.
\textsuperscript{222} Id., Para 12.4.
\textsuperscript{223} Jayanta Bandyopadhyay, Water, Ecosystems and Society 18 (Sage Publications, New Delhi, 2009).
The implementation of diverse legislations concerning water or particular economy can create conflicts among different stakeholders due to the interrelated nature of water issues. For instance, purchasing rights to access water to secure environmental flows may be a costly affair of increasing the quantity of water in the environment. Similarly reduced water extractions may also have adverse effects on farmers and communities dependent on irrigated agriculture.224

The implementation of economic and policy instruments cannot be done in isolation. They should be considered in the context of their large impacts on society and the environment. The economic, environmental, and social impacts of these policies and instruments should be considered by the planners for effective water resource management. Economic and policy instruments should be used as part of a wider integrated water resource management (IWRM) framework to deal with this complexity effectively.225

The goals of water management are to be jointly fixed by the policy makers. To achieve these goals they must coordinate the implementation of different instruments created within the broad framework of IWRM. There cannot be a single blueprint for IWRM as each country differs in terms of socio-economic conditions, history, cultural and political context, and environmental characteristics. IWRM may differ to address the issues that arise in a particular region.226

The goals of IWRM vary from place to place and diverse factors are considered keeping in view the significance of environmental, economic and social impacts. A more integrated approach to water resource management can achieve overall development encouraging more than one objective.227

It is difficult to come up with a precise definition of IWRM keeping in view the differences in implementing it across the countries. It can only be largely described through a number of important features. The absence of a precise definition of IWRM or absence of specific instruments to address water problems has led to disapproval of the approach. Another drawback of this concept include difficulty in the execution of the schemes. It is difficult to undertake IWRM particularly in context of the large projects as it is usually time-consuming and resource intensive. Further absence of coordination in different institutions makes it difficult to assess the desired goals of IWRM.

225 Ibid.
226 Ibid.
227 Ibid.
Despite these drawbacks the concept of IWRM has its own benefits as it permits the policies to be framed to meet out regional challenges as a whole. No doubt, any legislative framework providing specific solutions to all feasible applicable problems across all situations is somewhat practically impossible due to multiplicity of water issues in a given hydrological unit. However, there is increasing indications that implementing IWRM can lead to long-term advantages to water security and management.

2.10. River Water Management

A river is not to be perceived as merely a channel carrying freshwater. Rather, it is hydrological, geomorphic, ecological, biodiversity-rich, landscape level system. It is a vital component of the freshwater cycle that helps in balancing dynamic equilibrium among different sources of water like snowfall, rainfall, surface water and groundwater. Further it provides a large number of social and economic services to the people all through its course.\textsuperscript{228} A river is a multifaceted system of the nature that includes many activities natural as well manmade along its course.

River water management is an essential component of natural resource management. It covers a number of disciplines and different issues in itself. The concept of river management had focused on different objectives at different times and in different situations.\textsuperscript{229} Effective river water management requires public participation through proper institution and an action plan approach. Decision-making functions of river water administration mostly at regional or basin level are performed by the River water authority particularly concerning distribution of river water.\textsuperscript{230} The allocation of inter-state river water in itself is a disputable subject. The pollution of the river water is also a major threat to the environment these days.\textsuperscript{231}

2.10.1. Inter State Water Disputes and River Legislations

Inter-state water disputes are emerging as a serious national problem. This problem is more severe in India because 85\% of land in India lies within major and medium inter-state river systems. India has 14 major rivers\textsuperscript{232} and all are inter-state rivers. There are 44 medium rivers\textsuperscript{233}, of which nine are inter-state rivers having catchments or watersheds in two or more

\textsuperscript{228} http://sandrp.in/rivers/Rivers_Legal_and_Institutional_Issues_in_India.pdf (Visitted on 28 July 2016).
\textsuperscript{229} Kuntala Lahiri Dutt and Robert J. Wasson, Water First 33 (Sage Publication Pvt. Ltd, New Delhi, 2008).
\textsuperscript{231} Ibid.
\textsuperscript{232} A ‘major’ river is a river with a catchment area of 20,000sq.km or more.
\textsuperscript{233} A ‘medium’river is one with a catchment area of between 200 and 20,000 sq.km.
Such inter-state character of most of the Indian rivers has led to a number of disputes among basin states concerning sharing of waters of such rivers and their development.

Inter-state water disputes under the British rule were the main disputes between the Princely States and British India. They were confined to a patchwork of agreements concerning specific projects on certain rivers. General conditions to govern water resources could not come out of such agreements. The 1935 Act tried to create a federal structure by amalgamating the Princely States with British India. At that time the Princely States were not ready and enthusiastic to concede their sovereignty. The leadership of the freedom movement fought the freedom struggle on two grounds namely freedom from British rule in the British territories and freedom from autocracy in the Princely States.\(^{235}\) The nationalist leadership favoured the merger of the Princely States with an independent India to the scope of powers they were ready to cede to a centralized government.\(^{236}\)

Inter-state water disputes arise under centralized political systems. They exist at the juncture of two branches of law namely federalism under constitutional law and water law particularly river basin regulation. In India, constitutional federalism is the consequence of colonial rule. Whereas the River-basin management is due to the developments in capitalism particularly within the social context of Europe and United States. Later it found its place in the global law under the Helsinki Rules and the International Law Commission Convention on Law of the Non-Navigational Uses of International Watercourses.\(^{237}\)

The Constitution of India entitles the Central Government to legislate on the development and management of inter-state river waters. Under Article 262 of the Constitution the parliament passed the Inter-State Water Disputes Act 1956. The Act empowers the Central Government to constitute a Water Dispute Tribunal for settlement of Water Dispute on fulfilment of two conditions –

1) When the Central Government receives a request from any State Government concerning a water dispute, and

2) The Central Government is of the view that the dispute cannot be settled by negotiations.


\(^{236}\) *Ibid.*

\(^{237}\) *Ibid.*
Five Inter-States Water Disputes Tribunals have been constituted so far. These tribunals have adjudicated disputes arising out of allocation of the waters of the Krishna, Godavari, Narmada, Cauvery and Ravi–Beas rivers. Besides the above, the Parliament has passed ‘the River Boards Act’ in 1956 in pursuance of the power vested in the Central Government under the Entry 56 of ‘the Union List’. The Act enables the Central Government to appoint the River Boards for effective management of river basins, in consultation with the States Government. The main purpose of the such River Board is to advise the States Government relating to integrated development of waters of Inter-State rivers and river valleys. The Act has completely failed in its purpose as no River Board has been constituted under it, since its enactment.\textsuperscript{238}

However, few river boards were set up under other legislations. Brahmaputra Board is one of such river boards constituted for better management of the river water under ‘the Brahmaputra Board Act, 1980’. The main objectives of constituting the Brahmaputra (River) Board are the planning and integrated implementation of actions for the control of floods and bank erosion in the Brahmaputra valley.\textsuperscript{239}

‘The Damodar Valley Corporation Act, 1948’ provided for the establishment of a Corporation for the development of Damodar River Valley in the States of Bihar and West Bengal. Similarly, for the Rajghat Dam Project, on the Betwa River, Betwa River Board was created under ‘the Betwa River Board Act, 1976’. River Betwa is a tributary of River Yamuna and Rajghat Dam Project is an interstate Project of the States of Madhya Pradesh and Uttar Pradesh. This project is based on an inter-state agreement between the two States with regard to the Project.\textsuperscript{240}

Indeed, these laws have an inadequate influence on the river water management. The Central legislation like ‘the River Boards Act, 1956’ lost its significance keeping in view the requirement of some different approach. It is realized that the various river action plans for cleaning the rivers like the ‘Ganga Action Plan’, ‘The Yamuna Action Plan’ and the ‘National River Conservation Plan’ require different approach to preventing river pollution than the typical ‘end-of-pipe’ controls or permit system for effluent treatment plants under the ‘Water Act’ 1974. There is a need to have an ‘Ecosystem approach’ for the protection of river water while a mere pollution regulation approach is not sufficient.\textsuperscript{241}

\textsuperscript{239} Ibid.
\textsuperscript{240} Ibid.
\textsuperscript{241} Ibid.
Over the years, experience has shown that water cannot be treated purely as a state subject and should be considered as national resource with a greater role for the central government. The supporters of this view argue for the inclusion of water in the Concurrent List to enable the Constitution to empower the central government equally with the state governments. There are others who hold the view that water should be treated as a national resource and the central government should have a greater role in water management; however, they argue that this can be achieved even under the existing constitutional provisions without resorting to the inclusion of water in the Concurrent List through a constitutional amendment. The proponents of this view argue that this can be achieved by enacting central framework legislation and its adoption by the states.242

2.10.2. Principles of water sharing

There are several principles that the tribunals have been using in the adjudication of disputes relating to sharing of inter-state river waters. These include the international rules such as ‘Helsinki rules, 1966’, ‘United Nations Convention on the Law of the Non-Navigational Uses of International Watercourse 1997’, ‘the World Commission on Dams report, November 2000’ and ‘the Berlin Rules, 2004’. These rules have something common in them but they also differ in certain aspects. India’s ‘National Water Policy’ and ‘Draft National Water Framework Bill’ also mention some of the principles included in the above said international framework.243

‘The Interstate River Water Disputes Act, 1956’ does not indicate the principles that are to be considered by such tribunals in adjudicating water disputes. There are, however, some observations in the Cauvery Presidential Reference opinion of the Supreme Court that implies that one of the important considerations is the application of the principle of equity providing an equitable share to each contesting state in the allocation of water.244

The Supreme Court and tribunals headed over by renowned judges have also borrowed some of the principles that were applied in international water disputes. The jurisprudence of equitable distribution and the manner of its determination has been the subject of considerable evolution.245

The principle of considering water as a national resource can be effective in the redressal of inter-state water disputes, as well as addressing issues relating to the inter-linking

242 Ibid.
243 Ibid.
Sujit Choudhry (et. al.), The Indian Constitution 508 (Oxford University Press, New Delhi,2016).
river projects. Better results can be achieved by the effective implementation of national and state water policies as well as by formulating a national water framework law and its due adoption and implementation by all states. 246

2.10.3. Water Disputes with Neighbouring Countries

Many of the river systems pass through more than one country. Different political systems, growing demand and reducing availability of water pose new challenges and implications in water management. As a result various issues including allocation, development and management of water resources arise in the international context.

The major northern river systems in South Asia namely the Indus and the Ganga–Brahmaputra are trans-national in nature. The South Asian region faces severe and growing water stress as nearly one fourth of the world’s population resides here. Moreover there is less than 5 per cent of the world’s annual renewable water resources. This accentuates the significance of cooperative approaches and the need of effective water management across the nations. 247

India has entered into several agreements with its neighbour countries over the years for sharing and development of water resources. These measures have provided probable and clear frameworks for water sharing inspite of several ups and downs in bilateral relations. The relationship of India with its neighbours in relation to water management is discussed hereunder:

2.10.3.1. India – Pakistan

Issues of sharing water between India and Pakistan after partition have been settled by the Indus Waters Treaty of 1960. According to the Treaty the Indus river systems was divided by allowing the use of the Eastern rivers namely the Sutlej, Beas and Ravi to India, while allowing the use of the Western rivers namely the Indus, Jhelum and Chenab to Pakistan. About 80 per cent of the water was allocated to Pakistan and 20 percent to India. 248

India was also entitled to specific amount of water from the three Western rivers. The quantum for individual river and purposes of use were provided in detail in the Treaty. However, India has not yet fully utilised its entitlement from the Western Rivers, both in terms of irrigation and hydro-electric potential.

246 Supra note 237.
248 Ibid.
An Indus Commission with a Commissioner has been set up under the treaty on each side to monitor its working, maintain and exchange discharge data readings. The commission is also entitled to undertake inspections, site visits and deal promptly with issues and problems as they arose. The Commission has been meeting regularly each year and has a pivotal role to play in the smooth functioning of the Treaty.249

**Figure 2.1. Indus River System**

*Source: Down to Earth Magazine*

The dispute resolution mechanism of the Treaty was tested only once in more than 50 years. When Pakistan objected the construction of the Baglihar Project on the Chenab river the World Bank appointed a neutral expert on Pakistan’s request in 2005. However, India’s stance was broadly upheld and only minor changes were suggested by the experts. Again, in the year 2010 Pakistan raised its objections to an international court of arbitration with regard to ‘the Kishanganga Project’ on a tributary of the Jhelum. Pakistan raised its objection on the basis

---

that it has existing uses on the waters of the river Kishanganga or Neelum (as it is called in Pakistan). However, the particulars of the claimed existing uses are yet to be validated.251

2.10.3.2. India - Bangladesh

In the context of Indo-Bangladesh relationship, the major issue has essentially been one of water sharing. There are 54 rivers and streams that traverse through the Indo-Bangladesh Border.252 The issues of water sharing can arise with regard to any one of them. Both the countries recognizing the significance of cooperation and relationship on river waters signed ‘The Treaty of Peace, Friendship and Cooperation’ in 1979. ‘A Joint Rivers Commission’ was set up to work for mutual interests, distribution of water resources, irrigation and control of floods.253

Bangladesh was very concerned on the construction of the Farakka Barrage and canal by India to reduce siltation of Kolkatta port. As it may led to decrease in flow of water of the river Ganga below Farakka. India and Bangladesh have entered into several interim arrangements and agreements since 1974 for sharing the flows of the river Ganga particularly during lean season and for preparing a long term plan to increase the waters of the Ganga.254

The conflict over sharing of the Ganga waters between India and Bangladesh came to end with the coming into force of the historic Ganga Waters Treaty. It was signed on December 12, 1996 and is valid for 30 years. The treaty provides a long term solution to the sharing of Ganga waters and the operationalisation of the treaty is observed by a Joint Committee which meets thrice a year.255

2.10.3.3. India-Nepal

Nepal is a water resources rich country. It has a hydropower potential of over 80,000 MW of which around 44,000 MW is considered economically feasible. The development of hydro-power potential of Nepal with sale to neighboring markets, like India, could be important to transform its economy and over all development.256

India and Nepal entered into ‘the Mahakali Treaty’ of 1996. It provided for overall development of the Mahakali River by India and Nepal. The main feature of the treaty is the ‘Pancheshwar Multipurpose Project’ which would be jointly developed by India and Nepal on the border Mahakali River. The project is estimated to have a power capacity of 5600

---

251 Ibid.
252 Ramaswamy Iyer, Perspectives, Issues, Concerns 231 (Sage Publications, New Delhi, 2010).
253 Supra note 246.
254 Ibid.
255 Ibid.
256 Ibid.
M.W. The joint ‘Detailed Project Report’ (DPR) for the Project is still to be finalized. Presently the two nations have agreed to accelerate the project constituting a ‘Pancheshwar Development Authority’. Both the countries have also agreed to accelerate the completion of the long delayed joint Detailed Project Report for the Saptaparni-Sun Kosi High Dam Project. This project is estimated to have a total capacity of generating 4689 MW of power and 1 million hectares of irrigation potential in India and 0.7 million in Nepal. The project is also expected to have flood control benefits for both sides.

Nepal has been seeking an increased participation of the private sector in development of water projects. It has declared a vision to develop 25,000 MW of power in the coming twenty years. Since 2006, twenty eight survey licenses have been granted to Indian companies/Joint Ventures with a potential total capacity of around 8000 MW.  

2.10.3.4. India-China

Four major rivers are shared between India and China. These are Indus, Brahmaputra, Sutlej and Kosi. But these rivers are not exclusively shared between these two countries. It is noteworthy that China is the upper riparian state for all such rivers. India has the status of the middle riparian state in the Brahmaputra, Indus, and Sutlej rivers and a lower riparian state in the other river systems.

There exist more tensions along the Brahmaputra River among the shared rivers between India and China. There are mainly three reasons of this increased tension. First, China occupies a major part of the Brahmaputra River. It possesses over 50% of the Brahmaputra River basin area. Resultantly China’s activities with regard to the Brahmaputra River casts a bigger impact on other countries particularly India. Second, Brahmaputra River is of great importance to both the countries. For India, it accounts for nearly 30% of the freshwater resources and about 40% of total hydropower potential of the country. In the case of China at national level, the role of Brahmaputra River in the total freshwater supply of the country is very limited. However, it is highly significant to Tibet. The Brahmaputra River is considered as the birthplace of the Tibetan civilization and plays an important role in various sectors like agricultural and energy. Third, the Brahmaputra River is related to Sino-Indian border disputes.

The two countries have contested their respective claims in the Eastern Himalayas. It is the triple junction between India, China, and Bhutan from the west to the Brahmaputra River along

---

257 Ibid.
259 Ibid.
the Himalayas in the east. This disputed area is called South Tibet in China and Arunachal Pradesh in India.\textsuperscript{260}

The growing demand of water has been a major cause of tension between the two countries. Chinese efforts regarding diversion of the water resources of the Brahmaputra River from India is a matter of serious concern for the country. Such efforts will make the situation worse that has been tensed since Indo-China war in 1962. Further, the climatic change resulting in the melting of glaciers will also have a profound impact on the supply of river water. This will lead to many adversaries like scarcity, likelihood of floods, adverse impact on agrarian livelihoods and all these in turn foster the conflicts between the two nations.

A ‘Memorandum of Understanding’ was signed by India with China in 2002. It was settled for providing the hydrological information with regard to Brahmaputra River during the flood season to India.\textsuperscript{261} Further, in 2006, an expert level mechanism was established by two countries to discuss several issues. These issues include interaction and collaboration on sharing hydrological data during flood season, emergency management and certain other issues regarding management of trans-border rivers. After the expiry of first MoU on Brahmaputra River in 2007, a new MoU was signed in 2008.\textsuperscript{262} It was valid for five years. In 2013 this MoU was further renewed with a validity of another five years. In October 2013, a separate MoU was signed by both the countries on trans-border rivers, which brought changes in the time period of providing data from June 1–October 15 to May 15–October 15 every year.\textsuperscript{263} Practically, the main reason for lack of considerable cooperation between both the countries is the border disputes as the disputed state of Arunachal Pradesh (South Tibet in China) forms large part of river basin for Brahmaputra River. This makes any such agreement relating to sharing of water unworkable.\textsuperscript{264}

\textbf{2.10.3.5. India-Bhutan}

The cooperation in development of water resources has become a key component of relationship of India with Bhutan. Bhutan has hydro- power a potential of 30,000 MW. It has purposefully moved ahead to have better ties with India particularly in relation to water resources.\textsuperscript{265}
India assisted in the construction of three hydro-projects namely Chukha, Tala and Kurichu in Nepal. The surplus power from these projects is exported to India. It provides substantial revenue to Bhutan and secures certain supply of power to India. This surplus of the river projects had great impact on the socio-economic development of Bhutan and contributed significantly to bring greater prosperity as it brings significant increase in per capita income there.266

In 2006 India and Bhutan signed an Agreement. This provided for India to develop and import 5000 MW of hydro-power from Bhutan that later augmented to 10,000 MW in 2008. Both the countries have agreed to operationalize ten river projects. These are identified with an estimated joint capacity of around 11,000 MW. Three projects are identified namely the Punatsangchhu 1 and 2 and one on the Mangdechu are currently under construction, while concerning remaining seven the Detailed Project Reports are being prepared.267 However, the government of Bhutan is claiming that the delaying in projects is leading to increased burden and the debt on them and partnership is going to be backwards.268

China’s plans for development of water resources in the Tibetan plateau region, where many of the shared rivers of South Asia originate, are a matter of serious concern for many countries in south Asia including India. However, China has denied the planning of any project for the diversion of the waters of River Brahmaputra. It has also begun to share some limited information regarding the same.269

2.10.4. River Pollution Control

River pollution is a great hazard to the nature, well-being of humans and other living creatures and to the economy as well. It contributes to several health issues and ailments in humans. Aquatic lives are affected to a great extent resulting in the growth of unhealthy fish unfitting for human consumption and also large fish death due to river pollution. Even the lives of animals and birds are affected by the Polluted river, sometimes threatening their very existence. Eventually this continuous contamination of river water can result in the loss of biodiversity, disrupt the ecosystem as a whole and even extinct some species.

The quality of water in the water bodies like rivers and lakes is highly dissatisfactory and it is not even fit for bathing in most parts of the rivers. One of the major causes of river pollution is the untreated or inadequately treated sewage from towns and cities flowing into the

266 Ibid.
267 Ibid.
268 The Hindu (8th September 2017).
269 Supra note 246.
rivers. Untreated or partially treated industrial effluents also pollute water bodies and contaminate groundwater.\textsuperscript{270}

\subsection*{2.10.4.1. River Ganga}

The River Ganga has become one of the five most polluted rivers of the world due to mismanagement and unsustained practices of years. The Himalayas as well, from which the river originates, has become one of the most endangered ecosystems.\textsuperscript{271} Pollution is abolishing the ecological balance of the river and its natural ability to self-purify.\textsuperscript{272} Untreated domestic sewage is the main reason of contamination of the river water. According to the Central Pollution Control Board, 2723 million litres a day of sewage is generated by 50 cities situated along the river, contributing to about 85\% of the river’s pollution load.\textsuperscript{273} There are many reasons for the plight of the river from the discharge of untreated or inadequately treated urban sewage, open defecation and the discharge of human and animal corpses to the illegal mining activities in its riverbed. Resultantly, many parts of the river are completely drying up and many more are becoming poisonous and injurious to humans and the natural environment.\textsuperscript{274}

One of the recent efforts to clean and protect Ganga in a comprehensive manner is Namami Gange. This national mission was launched in June 2014 with a budget of 20,000 crore. The mission was aimed to accomplish the dual objectives of effective reduction of pollution and the transformation of the Ganga. It proposed a 10 year implementation plan and several activities to target short term as well as longer term impacts. However, this project was criticised on the ground that it has achieved only one third of its targets mainly due to lack of coordination between numerous authorities. The natural calamities also caused delays in the implementation of the programme successfully within the desired time. Many latest reports suggest that the progress of the mission continues to be slow and limits are recurrently increased while certain measures have been taken as 123 new ghats for restoration and 65 new crematoriums have been constructed to stop the dumping of dead bodies in the river.\textsuperscript{275}


\textsuperscript{272} Ibid.

\textsuperscript{273} Ibid.

\textsuperscript{274} Ibid.

\textsuperscript{275} Ibid.
2.10.4.1.1. Namami Gange Programme

Under Namami Gange mission, a total of 187 projects worth Rs. 16565.34 crore have been sanctioned. The programme includes various activities like sewage infrastructure, ghats and crematoria development, river front development, river surface cleaning, and institutional development. The other activities of the mission are conservation of biodiversity, afforestation, rural sanitation and public involvement. Out of 187 total projects 93 projects of 2205.08 MLD (Million Litres per Day) were approved for creation of new sewage treatment plants (STPs). The rehabilitation of existing STPs of 564.3 MLD and lying or rehabilitation of 4762.4 km sewerage network for reduction of pollution in river Ganga and Yamuna is planned.

The Executive Committee has approved 44 projects worth Rs 7,547.87 crore within a year of reconstitution of NMCG as an Authority (October 07, 2016 to October 07, 2017). These projects pertain to creation of adequate sewage treatment capacities in Ganga basin States namely Uttarakhand (17) Uttar Pradesh (10), Bihar (11) Jharkhand (1) West Bengal (3) and Delhi (2). Total STP capacity of 1402.26 MLD will be created with the approval of these projects and sewer network length of 1429.24 km will be laid down.

The official statement declares that there are 36 Water Quality Monitoring Stations functioning under ‘Namami Gange’ programme. Recently, a survey of all 1109 Grossly Polluting Industries (GPIs) was conducted for reduction of industrial pollution. Out of 1109 GPIs, 333 were closed and closure notices were given to non-complying GPIs.

A number of activities and efforts are being initiated under the programme. At present works at 111 ghats and 46 crematoria is in progress and likely to be completed by the end of year 2018. On rural sanitation front, all 4464 villages on the bank of river Ganga have been made Open Defecation Free (ODF) and 12,74,421 Individual Household Toilets have been constructed so far. Five State Ganga Committees and 34 District Ganga Committees are constituted for effective monitoring of projects and activities. Six public outreach programmes were organised in five main stem Ganga basin States. They are ‘Ganga Swachhta Pakhwada’, ‘Ganga Sankalp Divas’, ‘Ganga Nirikshan Yatra’, ‘Ganga Dusshera’, ‘Ganga Vriksharopan Saptah’, and ‘Swachhta Hi Seva Pakhwada’.

277 Ibid.
278 Ibid.
279 Ibid.
280 Ibid.
281 Ibid.
282 Ibid.
There is a demand by the civil society for enacting a legal framework to give due recognition to the rights of the Ganga river basin. The move acknowledges that necessarily a new form of governance is required to preserve and rejuvenate this valuable ecosystem and life line of many including humans and other living organisms. In April 2017, a draft was submitted to ‘Minister for Water Resources, River Development, and Ganga Rejuvenation’ Uma Bharti for the proposal of a new piece of legislation namely “the National River Ganga (Rejuvenation Protection and Maintenance) Bill Act 2017”. The main aim of this proposed Act is to ensure the cleanliness and rejuvenation of the river. If the proposed Ganga Act successfully enacted it will make the Ganga a first river in India to be protected by a legislation of the Parliament.

2.10.4.2. River Yamuna

Like Ganga, the Yamuna river is also a very important river of the country. But the pollution in the waters of the river Yamuna has caused the river into a flowing course of sewage particularly across Delhi. The chief source of pollution of the river Yamuna is the discharge of domestic and industrial sewage into its water, generated mostly within the NCT of Delhi. Efforts including expenditure of Rs. 872 crore, since 1994, were made in the establishment of infrastructure for sewage treatment of domestic as well as industrial before its release into the river. Inspite of the efforts, large amounts of untreated or inadequately treated sewage still falls into the river resulting in the drastic deterioration in the quality of water, particularly, at the point where the river leaves.

The Central Government constituted the ‘Central Pollution Control Board’ under the provisions of “the Water (Prevention and Control of Pollution) Act, 1974”. It also requires each State Government to establish similar ‘State Pollution Control Board’ to execute the provisions of the above said Act. In the context of Union Territories, the CPCB delegated its functions to the Governments of the Union Territory. In pursuance of the above provisions, Government of Delhi constituted the ‘Delhi Pollution Control Committee’ (DPCC) to check and abate pollution in Delhi in terms of the provisions and aims of the Act.

2.11. Interlinking of rivers

The ‘National River Linking Project’ (NRLP) is officially known as the ‘National Perspective Plan’(NPP). It envisions the transfer of water from water surplus basins where there is flooding to water deficit basins where there is drought or scarcity, through inter-basin
water transfer projects.\textsuperscript{286} According to the Government, the term 'surplus' means “the extra water available in a river after fulfilling the needs of the humans such as domestic use, irrigation, and industrial requirements”.\textsuperscript{287} That means the need of the water for the river itself is not given due consideration. The term 'deficit' has also been perceived in relation to humans only and not from perspective of the river, which includes several other aspects.\textsuperscript{288} Interlinking of rivers involves “the process of diverting surplus river water through a network of canals or water channels to comparatively drier areas either within a state or among two or more states.”\textsuperscript{289}

\textbf{2.11.1. Genesis and Growth of the Idea}

The notion of linking rivers is old one. It was Sir Arthur Cotton a British general and Irrigation engineer during the British rule, who had first proposed the networking of rivers more than a century ago. In the 1960s, Dr. K. L. Rao, the then Union Minister of State for Power and Irrigation in the Cabinet of Smt. Indira Gandhi, spoke of linking the Ganga with Kaveri through a canal of about 2,640 km.\textsuperscript{290} He revived this proposal in 1972. Undoubtedly, both were renowned engineers. Cotton’s main concern was for inland navigational network and Dr. Rao’s concern was for irrigation and power. In the early seventies one Captain Dastur, an air pilot, proposed linking of a 4,200 km long Himalayan canal and 9300 km long southern canal at Delhi and Patna. Captain Dastur’s proposal was popularly referred to as the ‘Garland Canal’.\textsuperscript{291}

The Government of India through ‘Water Resources Development plan’ (NCIWRDP) evaluated the feasibility of these grand schemes. The NCIWRDP in its report in 1999 concluded that the proposal given by K. L. Rao proposal was very costly and there is availability of lower cost alternatives and Dastur’s proposal was rejected summarily as being ‘prima facie impractical’.\textsuperscript{292} The National Water Development Agency’ (NWDA) was constituted on 17th July 1982 by Government of India as a Society under Societies registration act 1860 under the Ministry of Water Resources to study the viability of the links under


\textsuperscript{287} Ibid.

\textsuperscript{288} Ibid.

\textsuperscript{289} Ibid.

\textsuperscript{290} Linking India’s rivers may not be a fruitful exercise, say environmentalists available at http://www.downtoearth.org.in/news/linking-india-s-rivers-may-not-be-a-fruitful-exercise-say-environmentalists-50685(Visited on 12 July 2016).

\textsuperscript{291} Kuntala Lahiri Dutt and Robert J. Wasson (ed.), Water First 101 (Sage Publications, New Delhi, 2008).

\textsuperscript{292} Ibid.
‘Peninsular Component’ of ‘National Perspective Plan’. The NWDA is fully funded by Government of India. Subsequently in 1990-91, NWDA Society initiated the studies of ‘Himalayan Component’ also. Further, on 28th June, 2006 preparation of DPR of link projects and prefeasibility/feasibility reports of intra-basin links as proposed by States were also contained within the functions of NWDA Society. ‘The National Water Development Agency’ (NWDA) was set up as a self-governing body to carry out the water balance and feasibility studies of the river linking program of the country.

2.11.2. Supreme Court on River Inter-Linking Project

Abdul Kalam, the then President of India, proposed the river linking project as a solution to India's water crisis during a speech in the year 2002. Following this, an application was submitted in the apex court seeking an order from the Supreme Court on this matter. The application was converted into a writ petition and finally, in October 2002, the Supreme Court ordered the Central Government to initiate work on inter-linking the major rivers of the country.

The Supreme Court of India while commenting on the long time period of 43 years taken by the NCIWRDP for the completion of the proposed interlinking project ordered that:

“It is difficult to appreciate that in this country with all the resources available to it, there will be a further delay of 43 years for completion of the project to which no State has objection and whose necessity and desirability is recognised and acknowledged by the Union of India......We do expect that the programme drawn up would try and ensure that the link projects are completed within a reasonable time of not more than ten years.”

In the same year, a task force of monitoring the project was appointed and a deadline of 2016 was fixed to complete the whole project that would link 37 rivers. But nothing material happened until almost a decade after that. On Feb 27, 2012, the Supreme Court ordered the constitution of a “Special Committee for Interlinking of Rivers” headed by the Minister of Rivers.
The court had required the Central and state governments to accelerate the necessary feasibility and detailed project reports with regard to 30 links connecting various rivers. The Apex Court of the country has also directed the Central Government to constitute special committees to monitor the schemes. The judgment upheld the significance of interlinking of rivers. It has taken such a stance keeping in view the ironic situation where floods and droughts occur at almost the same time in different parts of the country.

There were few petitions raised before the Supreme Court concerning the negative impacts of interlinking of rivers. The renowned persons who questioned the project by raising a petition include former secretary of water resources, Ramaswamy R. Iyer and environmentalist Medha Patekar.

The Supreme Court has dismissed the petition that sought a review of its order. It directed the Central and state governments to accelerate the implementation of the interlinking rivers project to transfer water from water surplus areas to water deficit regions. At the same time, the apex court bench of Chief Justice S H Kapadia, Justice Swatanter Kumar and Justice A. K. Patnaik did not grant permission for filing of a similar review petition by twenty one renowned personalities. The bench, in its order on 26 September 2012, said both petitions were delayed and lacked merit.

It raised the question of judicial intervention in the legislative and executive domain of the state. Ramaswamy R Iyer in his writings says that “the Parliament is the responsible body to deal with such issues and not the Supreme Court. He further added that the Supreme Court's responsibility is to ensure the realisation of fundamental rights of the citizens, but as to how the fundamental rights will be ensured to the citizens is beyond its domain.”

Similarly, late VR Krishna Iyer, esteemed retired judge of the Supreme Court, pointed out then that “what the Supreme Court decided was final not because it was infallible; it was infallible because it was constitutionally final and structurally supreme. He, however, conceded that judges, ‘merely because they wear robes,’ cannot decide on the course of rivers, whether they should be linked or not. That was the realm of the Executive.”

---

299 Supra note 298.
301 Ibid.
302 Ibid.
303 Ramaswamy Iyer, Water Perspectives, Issues, Concerns 310 (Sage Publications, New Delhi, 2010).
2.11.3. Historical perspective at home and abroad.

Inter-basin transfer of water has already been done in the past in many areas both in India and overseas. One of such example in the country is the diversion of water of the west flowing Periyar river in Kerala to east flowing Vaigai basin in Tamilnadu to generate power and supply for irrigation, more than a century ago. Many more similar projects have come up since independence. The most noteworthy inter-basin transfer of water was done by ‘Rajasthan canal’ (Indira Gandhi Nahar) project where waters of Sutlej-Beas in Indus basin is being diverted to the desert state across many basins.

The ‘Sutlej-Yamuna linkage’ (SYL) is another classic example of inter basin transfer of water, though not finalized as yet. The much hyped Telugu-Ganga project is diverting water of Krishna river to Chennai city which is situated far-off from the Krishna basin. Gujarat’s Sardar Sarovar project is one where waters of Narmada are going across many basins to Kutch area. The water of west flowing Koyna River is being diverted to the east in Maharashtra. Krishna water is flowing in to Pennar basin through Kurnool-Cuddapa canal. In Tamilnadu, many dams have been constructed on some of the west flowing rivers where water is diverted to the Coimbatore area for irrigation benefits. In Odisha too, there are two such cases. Godavari water is being diverted to Mahanadi basin in Upper Indravati project. Water from Vamsadhara basin is coming to Rusikulya basin in Harbhangi project. In all these projects except Telugu Ganga, the concept was never to divert water from a surplus basin to a needy basin. The aim of the earlier executed works was to divert water to get some power and irrigation benefits in individual projects.

One of the earliest examples of interregional water transfer globally is found in Egypt where engineering efforts were made to effectively control the flow of water in the Nile River. Many canals and bridges were built by King Mina, ruler of Egypt in the first Dynasty, to bring the water of Nile to lower-basins.\(^305\) Such another ancient example is Japan, where transfers of water have been in practice for more than several 100 years. In the beginning these projects were initiated in Japan on small scale, mainly to serve the agricultural purposes, particularly cultivation of rice. Eventually, Japan had taken up large scale IWT projects owing to the extension and growth of the cities and industries in recent years.\(^306\)

Presently, there is a substantial growth of the inter-basin transfers of water projects, worldwide. As in China, works related to diversion of waters from Yangtze to Yellow river are

---

\(^305\) Jayanta Bandyopadhyay, *Water, Ecosystem and Society* 148 (Sage Publications, New Delhi, 2009).

\(^306\) Ibid.
in progress. This project started in the year 2002 and is partially completed now. The estimated cost of it is 80 Billion USD and it will divert about 45 BCM of water (Billion Cubic metre). There will be about 3000 KM of canals of different capacities involving displacement of 3, 30,000 people. It is noteworthy that Southern parts of China are water rich with two-third resources concentrated there whereas the Northern China is water scarce. The southern part of China is more populous with 65% of the agricultural land.

South Africa and Lesotho entered into a treaty regarding water transfer in 1986. Following this treaty, 750 MCUM of water is being diverted from Lesotho to South Africa’s Vaal River. The first phase of the project was completed in 2004 at a cost of 2 Billion USD. In 2004 itself, Lesotho got revenue of 31 million USD which is 5% of their GDP. In Spain too, Four river basins are inter-connected for the purpose of irrigating 1.76 lakh hectares and to provide water to 76 Municipalities.307

In USA, the existing projects of inter basin transfer through linking of rivers will divert 45 BCM of water and there is planning to divert another 376 BCM. Colorado river is diverted east ward (0.284 BCM) to Missori-Missicipi basin for providing water to 29 Municipalities and irrigation to a land of about 2,51,000Ha. Water from the same Colorado River is reaching Arizona State via a Concrete aqueduct 541 KM long involving lifting at 13 places. Water is being provided to several Municipalities and for irrigation at places situated more than 1000m above the Colorado River.308 In Canada, existing schemes when completed would divert 268 BCM of water.309 Many river linking projects are in progress in Pakistan as well. India, indeed, lacks behind in regard to inter-linking of rivers. However, the present government shows serious concerns to move ahead with inter linking project.

2.11.4. The Proposed Plan and Schemes

NWDA has already identified 14 links under Himalayan Rivers Component and 16 links under Peninsular Rivers Component as per the National Perspective Plan (NPP) prepared by Ministry of Water Resources. This is done for inter basin transfer of water based on field surveys, search and detailed studies.310

On July 24, 2004 the Union Cabinet approved the setting up of the Special Committee on ILR. Accordingly, Special Committee on ILR was constituted vide order dated September

308 Ibid.
309 Ibid.
23, 2014 following the directions of the Hon’ble Supreme Court.\textsuperscript{311} This Special Committee further constituted four special committees for various specific purposes namely:

1. Sub-committee for comprehensive evaluation of various studies / reports.

2. Sub-Committee for system studies for identifications of most appropriate alternate plan.

3. Sub-committee for consensus building through negotiations and arriving at agreement between concerned States, and

4. Sub-Committee for restructuring of National Water Development Agency.\textsuperscript{312}

Further three more groups were created to look into different issues. These are as following:

(i) Constitution of Group on legal aspects under Task Force for Interlinking of Rivers:

In pursuance of the decision of the Task Force for Interlinking of Rivers on 15th June 2016, a Group has been constituted to look into legal aspects and required enabling Provisions for implementation of Interlinking of Rivers and other related issues. The Group has completed its assigned task and submitted its report to the Chairman, TF-ILR during March, 2017. The report was independently examined by CWC. Later 7th meeting of the Task Force was specially convened to discuss the Report of the Group on legal aspects. After discussion it was decided to obtain legal opinion on the recommendations of the Group. Based on request, Prof. Madhava Menon, Retd. Director, Bangalore Law University has submitted his opinion on 11.08.2017 which was considered by the Task Force in its meeting held on 15.09.2017.

(ii) Constitution of the Financial Group under Task Force for Interlinking of Rivers:

A Group on Financial Aspects under Task Force was formed for Interlinking of Rivers under the Chairmanship of Dr. Prodipto Ghosh, former Secretary to the Government of India and Member of the Task Force on 12\textsuperscript{th} September 2017. As per terms of reference of the Group, the Group would look into the financial aspects of various inter-basin water transfer links identified by NWDA and suggest funding pattern for implementation of these links.

(iii) Constitution of Group on Intra-State River links

A Group on Intra-State River links has also been set up by MoWR, RD & GR on 12 March, 2015. Ministry of Water Resources, RD & GR vide O.M. dated 12.03.2015 constituted a Group on Intra-State river links under the Chairmanship of Shri A. D. Mohile, former Chairman, Central Water Commission.\textsuperscript{313} The Group has completed the assigned task

---

\textsuperscript{311} Ibid.
\textsuperscript{312} Ibid.
\textsuperscript{313} Ibid.
Figure 2.2 Proposed Inter Linking Project In India

Source: NWDA

2.11.5. **Response of different states to the Project**

The reaction of the different states in India to the Supreme Court order of 2012 regarding the interlinking project was different. Rajasthan, Gujarat and Tamil Nadu were in complete support of the project. Whereas the states of Karnataka, Bihar, Punjab and Sikkim gave conditional approvals and were in partial support of the project. These states were in favour that it must include quid pro quo. Punjab supported the view that water should be diverted through interlinking of rivers only from water surplus states to water deficit states. Kerala has opposed the project as its rivers are mostly monsoon-fed and not perennial in nature. According to the state of Kerala it would face acute water scarcity in the months of summer or off-monsoon, if the water of rivers flowing in it is diverted. The state of Kerala has opposed the long distance inter-basin transfer of river water in the state, saying it needs to maintain its intricate network of natural and manmade channels and supply water for irrigation and drinking. Assam and Sikkim have also raised their voices against the project on the basis that they should have an exclusive right to utilise their water resources and that such diversion affects their rights.  

The state of Karnataka has opposed the project. It has yet not granted permission for the ‘Bedti-Varada’ and ‘Netravati-Hemavati-Tapi’ links. The state government even opposed the feasibility study of these river links due to cases relating to water sharing pending in other courts. However, these views of the states are largely dependent on the political settings and ruling parties in the state.

Many states have shown their deep interest in the interlinking projects. They have agreed to cooperate with Central Government to speed up the projects but showed concerns to the problems associated with such projects. One of such issues is the rehabilitation and resettlement of the people to be displaced. It was observed by the Apex court in its judgement that the state hesitates in implementing the project because it experiences acute water shortage during summer and off monsoon months. The court had earlier noted that even states like Uttar Pradesh have not granted unqualified approvals for projects such as the Ken-Betwa project.

2.11.6. **Intrastate river linking projects**

The idea of intrastate river linking project gained popularity with the allocation of three projects in Bihar for flood control. Few projects have already been listed on the NWDA website which is part of the intrastate river linking concept and the work on them has been initiated. NWDA

---

317 Ibid.
so far has received 47 proposals of Intra-State links from 9 States namely Maharashtra, Gujarat, Jharkhand, Odisha, Bihar, Rajasthan, Tamil Nadu, Karnataka and Chhattisgarh. There are 20 such projects in Maharashtra, three in Odisha and Jharkhand, ten in Bihar, two in Rajasthan, six in Karnataka and one each in Chhattisgarh, Gujarat and Tamilnadu.\(^{318}\)

### 2.11.7. Benefits Claimed

Interlinking of rivers in India has been proposed by the Union government as the primary solution to its water woes. The primary purpose of this programme is to ensure greater equity in the distribution and allotment of water by increasing its availability in drought prone and rain-fed area.\(^{319}\) The government, under its Interlinking of Rivers programme, wants to form linkages between different river basins to ensure equity in distribution of water to the dry regions. This programme, as claimed by the Central Government, is of national significance and has been initiated on high Priority.\(^{320}\)

The Central Government claimed that the execution of ‘National Perspective Plan’ for the development of water Resources would create an additional irrigation potential of approximately 35 million hectare (25 million ha from surface waters and 10 million ha by increased use of ground waters) and generate 34000 megawatts (MW) hydro power in addition to other advantages such as flood moderation, navigation, drinking and industrial water supply, fisheries, salinity and pollution control etc.\(^{321}\)

### 2.11.8. Issues and Challenges

The ‘National River Linking Project’ (NRLP) is considered as one of the biggest construction project in the world. It is estimated that only the construction cost of the project may be of the order of US $123bn (Rs. 5, 60,000 crore approx.).\(^{322}\) The huge expenditure may likely to create fiscal problems that are not easy to manage. The maintenance cost and physical position of the dams, canals, tunnels and power generation will also involve enormous financial loads.\(^{323}\) Besides, the financial cost of the project there are certain other issues involved such as the social, legal, environmental as well as the functioning costs. Due to lack of availability of comprehensive technical details of the inter linking project, it is impossible to take any clear stance on the technical feasibility or on the claims made by NWDA. It is very difficult to turn

---


\(^{319}\) Ibid.

\(^{320}\) Ibid


a blind eye to the project involving a huge investment by the country, which can change the hydrographic picture of the country drastically.\textsuperscript{324}

The basis of the interlinking project is the subjective notion of the availability of 'surplus' flows in some river basins. Conceptually, it will be overall winning situation if one can simply utilise the water, else be wasteful in the surplus river basins. But practically, it is impossible to recognise and measure the various ecosystem services performed by water in all parts of the river basin. Water plays an important role in the ecosystem from its precipitation to the moment it is drained out into the sea. It is hard to recognise that in all river basins there exists any 'surplus' water as every drop of it performs some ecological service all the time. The ecosystems are evolved by making best use of all the water available. If certain quantity of water is taken away from a basin, it leads to a proportional harm to the related ecosystem. The injury caused to the ecosystem will depend on the services provided by that quantity of water. Thus, no amount of water in a river basin can be taken out without causing some harm to the ecosystem services. In other words, there exists no 'free' 'surplus' water in a river basin that can be diverted without any harm. Such perceptions are absent in the narrow viewpoint of arithmetical hydrology. Therefore, it is difficult to identify water in the river basins as 'surplus' and transferring that 'surplus' water from such basin without realising any damage in such act.\textsuperscript{325}

Such diversion of flows of water will affect the courses of several ecosystem services. It is likely to generate a false concept of 'surplus' flows, if the services performed by water and the scientific status of it in the ecosystem are not recognised. Thus, overall, there always exist costs, big or small, linked with diversion of water from one basin to another leading in damage to several ecosystem services.\textsuperscript{326}

Many adverse impacts are associated with the ILR project including submergence of land and forests, devastation of rivers, loss of aquatic and terrestrial biodiversity, downstream impacts, destruction of fisheries, salinity ingress, pollution concentration, destruction of groundwater recharge and increased methane emission from reservoirs. Unfortunately, there is no overall evaluation of all such possible impacts for a single link in any reliable manner.\textsuperscript{327}

\begin{flushleft}

325 Ibid.

326 Ibid.

327 Ibid.
\end{flushleft}
Indian National Water Development Agency’ plans to construct more than 600 canals and dig hundreds of reservoirs. This may lead environmentalists to raise their voice against this plan. Environmentalists showed their deep concerns on the ecological impact of the project of such huge magnitude. It is scientifically believed that the water flowing into the sea does not go in waste. It is a vital link in the water cycle. When this link is broken, the ecological balance of land and oceans, freshwater and sea water, also gets disturbed and become harmful to nature.\textsuperscript{328} The estimation of financial cost and identification of the environmental damages that may be caused by the interlinking project are pertinent issues connected to the project.\textsuperscript{329}

The rehabilitation and resettlement of people affected by the water infrastructure projects will also be a great challenge before the concerned authorities. It is estimated that more than 583,000 people will be displaced in the construction of reservoirs and river linking canals in the peninsular component alone and large areas of forest, agriculture and non-agriculture land will be submerged.\textsuperscript{330}

The conflict among states is another burning issue associated with the project. The possible reason of such conflicts is that no state is willing to transfer its water to another state, even when it is surplus, keeping in view the possible future use of such water. The country is already experiencing such disputes between different states concerning Interstate River water sharing. This project will only add fuel to the fire. Several states including Kerala, Andhra Pradesh, Assam and Sikkim have already raised their voices against ILR projects.\textsuperscript{331} In absence of a sound and efficient mechanism to deal with interstate water dispute handling, one cannot expect the easy ongoing of these projects.

One of the criticisms of the project is on the ground of non-conformity to the established principles of international law. Some of the ILR schemes have international implications. The operationalization of such schemes will leave adverse impacts on the lower riparian neighbouring countries namely Bhutan, Nepal and Bangladesh. The project may be said to be in contravention of the legal instruments relating to water sharing among the countries.

There is a section of scientists that claim that construction of large scale dams and reservoirs also cause earthquakes. The controversial koina dam, Tehri dam were also criticized on the said ground. A number of earthquakes being experienced these days, in view of this, the presence of large number of reservoirs may prove to be disastrous in case of any such

\textsuperscript{328} Ibid.
\textsuperscript{329} Ibid.
\textsuperscript{330} Ibid.
\textsuperscript{331} Ibid.
contingency. Inter-linking a river containing toxicants with a non-poisonous one will have a distressing impact on all our rivers and, resultantly, on all human beings and living organisms.332

Inter linking project of the country displays and promises a great concern for water preservation and best utilisation of available water resources. Undoubtedly, there is urgent requirement to have a water management plan like IRL, which will enable availability of water to the farms, villages, towns, cities and industries throughout the year and to combat with both flood and drought simultaneously.333

Some of the main criticisms of the project are related to its socioeconomic feasibility, environmental impacts, resettlement and rehabilitation of project affected people, the challenge of resource mobilization, geo-political limitations, as well as domestic political dynamics. The researcher has personally interacted with famous environmentalist named Rajendra Singh, the Water man of India and M. C. Mehta a renowned Advocate in environmental matters, both are in vehement opposition and criticisers of the idea of inter-linking rivers.

There is a definite need to take into account all the Socio-environmental concerns related to IRL Project. A detailed hydrological, geological, meteorological and environmental analysis of the project is necessary. Further, there is severe necessity of examining all the assumptions on which the entire inter linking project is perceived in the interest of the country.

2.12. Groundwater Management

The reckless and unregulated exploitation of the groundwater has resulted in severe problems in the groundwater resource. Two of them are sea water ingression in coastal areas and contamination of groundwater in many parts of the country. The challenges ahead in the development of groundwater systems are two-fold namely:

(i) How to control groundwater use in overexploited regions?
(ii) How to develop the large available groundwater potential existed in eastern India?

There is lack of will to control the overexploitation of the groundwater resource by farmers. Power supply at subsidized rates in most parts of the country has further worsened the condition.334

It is well known fact that the surface and groundwater together represent less than of one percent of the water resources of the earth. Groundwater constitutes more than 97% of the

332 Ibid.
333 Ibid.
usable freshwater resources and is a key source of renewal of the surface water. Water resources are renewable but finite and scarce. Only that water is renewable which is flowing through the solar-powered hydrological cycle.\textsuperscript{335}

According to a World Bank report Groundwater is an important resource in India. However, a growing number of aquifers are attaining unsustainable levels of exploitation. If sufficient and urgent efforts are not made to control the situation, about 60\% of all aquifers in the country will be in a dangerous condition in the next 20 years.\textsuperscript{336} This in turn will lead to serious consequences for the sustainability of agriculture, long term food security and economic progress. It is imperative to change the status quo for the benefit of the country.

The management groundwater resources are complex one as exploration as well as extraction of groundwater requires specific treatment. Some of the measures for effective and sustainable groundwater resource management include the requirement of capacity licences with the drillers, exploration of groundwater on the basis of hydrogeological data and the installation of piezometers where ever water is found. Further, there is need to differentiate the shallow and deep-wells operations as phreatic, deep and restricted aquifers\textsuperscript{337}

The groundwater fulfils the maximum requirements of the agricultural sector in India for irrigation. Groundwater accounts for about 60\% of irrigated land in the country. It was calculated by the ‘Ministry of Water Resources’ (as on March 2011) that the annual ground water withdrawal for domestic and industrial purpose constitutes only 9.27\% of the total ground water withdrawal while the remaining 90.73\% is for irrigation purposes. It is noteworthy that the use of groundwater for irrigation increased with the commencement of green revolution in India. According to The UN World Water Development Report, 2015 India’s mechanised tube wells, used in irrigation, augmented from one million to 19 million between 1960 and 2000.\textsuperscript{338}

\subsection{2.12.1. Government Subsidies}

The subsidies for irrigation equipments and cheap electricity provided by government have promoted the usage of groundwater that has resulted in uncontrolled and overexploitation of groundwater. Due to decline in the levels of groundwater irrigation has become very difficult

\begin{footnotesize}
\begin{itemize}
\item \textsuperscript{335} Ibid.
\item \textsuperscript{336} http://web.worldbank.org/archive/website01291/WEB/0___CO-38.HTM (Visited on 12 September 2016).
\item \textsuperscript{338} https://sandrp.wordpress.com/2016/01/01/ground-water-crisis-deepened-in-india-in-2015/comment-page-1/ (Visited on 12 September 2016).
\end{itemize}
\end{footnotesize}
and farming is becoming unmanageable. Extraction of groundwater from deep aquifers requires expensive tube wells that result in financial burden on the farmers. Further, the state electricity utilities are mostly in poor state as they have not adequately developed to meet the increasing requirements of the agriculture, industrial and other sectors. This leads to power shortages implying reduced supply to farmers contributing to their difficulties.\textsuperscript{339}

2.12.2. Cropping Pattern

The cropping pattern in India has worsened the situation. The groundwater is in a comparatively better state in the eastern India. But in these areas, irrigation suffers due to power shortage. One does not see the increase in the water intensive crops in these areas such as sugarcane or paddy and these crops have continued in water stressed states like Maharashtra, Karnataka and Tamil Nadu. The share of Maharashtra in total sugarcane production has gone up by nearly 9 percentage points, while states like Bihar and Assam have lagged behind.\textsuperscript{340}

According to Centre Groundwater Board the following are the main issues of the groundwater management that require due consideration of the policy makers and users:

a) Uncontrolled and Over-exploitation of ground water resources.

b) Sub-optimal use of Ground Water Resources.

c) Quality of Ground water & contamination.

d) Water logging and salinity issues.

e) Effect of climate change.

f) Site-specific availability of ground water in hard rock areas.

g) Development of springs in hilly areas.

h) Ground water management in coastal areas.

i) Water logging and salinity issues.

j) Aquifer recharge management particularly in to agro-climatic regions.

k) Participatory groundwater management.

l) Ownership and sectoral distribution of ground water.

m) Energisation and Pricing Policy in Irrigation Sector.

n) Infrastructure development and Capacity building in ground water sector.

o) Research and development studies on different aspects of ground water management.\textsuperscript{341}

\textsuperscript{339} Ibid.

\textsuperscript{340} Ibid.

\textsuperscript{341} http://www.cgwb.gov.in/focusarea.html (Visited on 13 September 2016).
2.13. Drinking water

The role of the State on public-private or community involvement and participation in the drinking water supply has been in question in the past two decades. The official data regarding the percentage of population with access to clean drinking water in rural and urban areas in India is provided by the ‘Five Year Plan’ documents and the ‘National Sample Survey’. However, the Planning Commission of India (now NITI Ayog) asserts that these figures do not match the ground realities. This means that the situation is not as healthy as projected in the official figures.342

Conventionally, the usable water supply in India was provided to the major towns and cities and that too in the areas falling under the municipalities. Owing to widespread urbanisation and deteriorating public health standards in both urban and rural India, the Government took a thoughtful initiative in terms of legislations and policies. In this context two way approaches is adopted. First is the Acts focusing on water supply and on water supply and sanitation that are controlled by the state agencies. Second is the Policy initiatives by the central government in order to support and complement the measures taken by the states with the overall purpose of providing safe and clean drinking water and thereby encouraging public health.

There exist some restraints in connection between the fundamental right to drinking water and the responsibility of the State for realization of the right. These restraints include the distribution of legislative power on water supply to the states under the Constitution, lack of finance availability at the disposal of states and the absence of administrative and financial autonomy of the local institutions. In spite of the wide powers conferred on such local bodies by the 73rd and 74th amendments to the Constitution of India, there is still lack of autonomy in terms of administrative or financial actions taken by these governing institutions.

These limitations imply a difficult way in the effective realisation of the right to drinking water in the country. The Tenth Plan suggested certain actions to bring reforms in the drinking water sector. These include the need for public participation, need to create general awareness about the optimum and economic utilisation of water, need for private actors’ involvement, preservation of water resources, effective integration of drinking water supply with sanitation programmes. Others measures include the constitution of village committees to

control the operation and maintenance of water projects, and encouragement of traditional and conventional methods of water conservation.  

2.14. Water Management and Irrigation

India is agriculture based economy. It is well known fact that the water requirement for agriculture sector is highest in the country. Historically, investment in irrigation sector was a common practice in India keeping in view the diverse climatic nature. Many emperors and local rulers had developed different means of storing water in reservoirs, ponds and tanks. The British Government initiated investing in irrigation resources on a large scale. During British era, some large barrages and reservoirs were constructed to store rainwater for the sustenance of agriculture in times of drought and bleak rainfall. There was about 22.5 million hectare of area under irrigation in India, at the time of independence. Presently, out of about 141 million hectare of net area sown in the country, about 65 million hectare (or 45%) is presently covered under irrigation. The growth in the availability of water for irrigation and non-agricultural purposes after independence is notable and extraordinary.

Irrigation in the country comprises of a network of major and minor canals from rivers, groundwater well systems, tanks and rainwater harvesting projects. The groundwater system is the largest among these sources.

There are several kinds of systems of irrigation practices in different regions of India. These include irrigation through wells, tanks, canals, Perennial canals, Multi-purpose river valley projects, etc. Wells are mainly found in U. P., Bihar and Tamil Nadu. These wells are of different kinds namely shallow wells, deep wells, tube wells and artesian wells. In the shallow wells water is not always available as the level of water declines during the dry months. Deep wells are more appropriate for irrigation purpose as they contain water throughout the year.

Tube-wells are also installed near the agricultural land for irrigation purposes. A deep tube well, run by electricity, can irrigate larger area (about 400 hectares) in comparison to a surface well (1/2 hectares). Irrigation by tube wells are mostly done in U.P., Haryana, Punjab, Bihar and Gujarat. In Rajasthan and Maharashtra, artesian wells are being installed near the

---

343 Ibid.
345 Ibid.
346 Ibid.
agricultural lands to supply water for irrigation. In artesian wells, water level remains at a high-level because of the natural flow of water due to high pressure.\textsuperscript{348}

Water reservoirs are prepared by constructing dams in the Deccan zone. This practice is generally adopted in the States of Tamil Nadu, Andhra Pradesh, and Karnataka. Tanks are also constructed in Northern India for storing water. These tanks are used for carrying water to the farms through canals.\textsuperscript{349}

In Indian agriculture, canal irrigation is playing a significant role. It provides water to about 42\% of total irrigated area. In many areas during the rainy season, there comes flood in the rivers. The flood water is carried to the agricultural lands through canals. These canals are generally found in West Bengal, Bihar and Orissa.\textsuperscript{350}

One type of canals is the perennial canals that get the supply of water either from the river directly or through the reservoirs constructed by the river projects. Such reservoirs are constructed for storing water for providing water supply throughout the year. Water is supplied through these reservoirs in order to meet the water requirements in the fields. This system of irrigation guarantees the supply of water in all seasons. This kind of perennial canals is mostly found in Punjab, U.P. and Tamil Nadu.\textsuperscript{351}

In Punjab, the upper Bari Doab canal linking the Ravi and the Beas and Sirhind (from the Sutlej) canal is well-known. In U.P., the Upper Ganga and the Lower Ganga canals, Agra and Sarda canals are important. In Tamil Nadu, popular are the Buckingham canal and the Periyar canal.\textsuperscript{352}

In recent years, multi-purpose river valley projects are assisting in fulfilling the water requirements in agriculture sector. The most important are:

- the Damodar Valley Project in West Bengal,
- the Mor (Mayurakshi) Project in West Bengal,
- the Mahanadi (Hirakud) Project in Orissa,
- the Kosi Project in Bihar, and
- the Bhakra Nangal Project in Punjab.\textsuperscript{353}

The Central Government is also committed to enhance the total area under irrigation for yielding better results in agriculture. Thus, it has time and again come up with various


\textsuperscript{349} Ibid.

\textsuperscript{350} Ibid.

\textsuperscript{351} Ibid.

\textsuperscript{352} Ibid.

\textsuperscript{353} Ibid.
programmes and schemes. One of such recent scheme launched by the central government is ‘Pradhan Mantri Krishi Sinchayee Yojana’ (PMKSY) with the motto of ‘Har Khet Ko Paani’. The Central Government has proposed to encourage water preservation and ground water replenishment by harnessing rain water through ‘Jal Sanchay’ and ‘Jal Sinchan’. The vision of ‘Pradhan Mantri Krishi Sinchayee Yojana’ (PMKSY) is to produce ‘per drop more crop’. The vision of the scheme reflects the idea of providing access to some resources of secured irrigation to all agricultural farms in the country to bring prosperity in rural India.

Objectives:

“The prime objective of PMKSY is to enhance the total cultivable area under assured irrigation.”

The broad objectives of PMKSY are:-

a) To accomplish convergence of investments in irrigation at the field level (preparation of district level and, if required, sub district level water use plans);

b) Improve physical access of water on the farm and expand cultivable area under assured irrigation (Har Khet ko Paani);

c) Integration of water source, distribution and its efficient use, to make best use of water through appropriate technologies and practices;

d) Improve on-farm water use efficiency to reduce wastage and increase availability both in duration and extent;

e) Enhance the adoption of precision-irrigation and other water saving technologies (More crops per drop);

f) Enhance recharge of aquifers and introduce sustainable water conservation practices;

g) ensure the integrated development of rainfed areas using the watershed approach towards soil and water conservation, regeneration of ground water, arresting runoff, providing livelihood options and other NRM activities;

h) promote extension activities relating to water harvesting, water management and crop alignment for farmers and grass root level field functionaries;

i) Explore the feasibility of reusing treated municipal waste water for urban agriculture, and

j) Attract greater private investments in irrigation. This will in turn increase agricultural production and productivity and enhance farm income.

---

356 Ibid.
To achieve these objectives, PMKSY will strategise by focusing on end-to-end solution in irrigation supply chain, viz. efficient farm level applications, water sources, distribution network, extension services on new technologies & information etc.  

The current related schemes of the Central Government have been amalgamated by PMKSY. A decentralized State level planning and project wise execution structure has been approved under the scheme. Accordingly, States are entitled to come up their own irrigation development plans based on ‘District Irrigation Plan’ (DIP) and ‘State Irrigation Plan’ (SIP).  

2.14.1. Problems of implementation and management in Irrigation Sector  

Deficiencies in both the organisation and management of water in India affect the efficiency with which it is utilised. The management of Major and medium surface systems is done by the government officials, generally engineers. The demarcation of command areas, allotment concerning water distribution, permitted cropping patterns, scheduling of canal supplies and the withdrawal of groundwater in the command areas is utterly under the government domain. These rules are generally in the form of executive orders and sometimes contained in the legislation. They are mostly based on presuppositions with regard to availability of water and cropping patterns at the time of construction. These rules are pretty general and do not explicitly imply how they will be adjusted under different eventualities. The basis of the rules is seldom spelt out or made known to the users. The rights of individual users are ill-defined and non-enforceable. Further, there does not exist any institutionalised mechanism for users’ participation in formulating and amending these rules. There is also absence of redressal mechanism in relation to the complaints of stakeholders in an effective manner.  

Further canal and distribution networks tend to deteriorate due to poor maintenance, and natural and man-made damages. Allocations for recurrent expenditures of irrigation departments have been inadequate, both for maintenance and repair as well as for operational staff.  

To bring efficacy in water management, ‘the National Water Management Programme’ was launched in the 1980s. It installed telecom networks to facilitate

357 Ibid.  
358 Ibid.  
359 Ibid.  
360 A. Vaidyanathan, Water Resources of India 91 (Oxford University Press, New Delhi, 2013).  
361 Ibid.
communication between field level and higher-tier functionaries. There were also plans to remote-sensing satellites to regulate water distribution between different segments of the command, based on real-time information on segments facing water stress. The results have not been evaluated. In any case, the project has been discontinued.\(^\text{362}\)

The focus has since shifted to user participation in the management of surface systems. Several states have made it mandatory to set up water-user associations at the tertiary level. The expectation was that they would facilitate active involvement in maintenance and repair, improved collection of water charges, and more efficient use of water.

2.14.2. Participatory Irrigation Management (PIM)

It is observed that the technology alone cannot bring efficacy in water resources management. Institutional settings are also important. An analysis of deficiencies of the traditional irrigation management reflects the want of meaningful participation of farmers in policy making and several physical activities. This realisation led to the rising emphasis on PIM.

PIM infers the involvement of all stakeholders in different aspects and levels in the management of water concerning irrigation. These aspects or levels include planning, design, construction, maintenance, and distribution as well as financing. The main objective of PIM is to attain improved availability and use of water through a participatory process. It allows farmers to have a significant role to play in water management. These participatory irrigation management bodies are commonly called as water users’ associations (WUA). These may also be called by other names as irrigation cooperatives or partnerships. Several WUAs are formed covering a hydraulic unit such as the area irrigated by a minor canal. The command area may cover an area less than a village or about two villages or even larger. It does not require having any specific eligibility to be a member of such association. Generally all farmers who possess land within the command area may be members of the WUA. WUAs are not restricted to surface water irrigation only. Like in Gujarat and Maharashtra, informal tube well cooperatives, check dam user

\(^{362}\) Ibid.
groups and lift irrigation cooperatives also exist. These WUAs may be formally registered or be informal associations.\textsuperscript{363}

\textbf{2.14.3. Legal Framework for PIM}

The Central Government has formulated a Model Act concerning PIM. This Model Act serves as a model assisting states to frame the legal framework to support water institutions. In tune with the Model Act few states have come up with the legal frameworks for PIMs such as Gujarat, Andhra Pradesh and Maharashtra. The Andhra Pradesh Assembly passed a special Act called ‘The Farmers Management of Irrigation System Act, 1997’. It attempted to change the role of the irrigation department from a doer to a facilitator by shifting the responsibility of planning and implementing water distribution, management and improvement of irrigation systems to WUAs.\textsuperscript{364} This statute confers local water rights and control of the systems mainly to WUAs which are supported by legal rights and obligations. It grants operational and administrative autonomy to such associations in taking independent decisions. The three tier farmers’ association is envisaged by this Act. It also makes irrigation department accountable to the WUAs.

Maharashtra also enacted a new legislation namely ‘the Maharashtra Management of irrigation System by Farmers Act’ in 2005 and formulated policies to transfer irrigation management to the farmers in the state. Unlike Andhra Pradesh, the Maharashtra Act envisions to form WUAs at the minor canal level and seeks to transfer responsibilities concerning operations and maintenance for the minor and small channels to WUAs. According to this Act water is allocated to them through a five year agreement, and charge them on the basis of the quantity of water actually taken from such sources.\textsuperscript{365} The government has encouraged the participation of NGOs and officials of irrigation department to assist farmers in creation of such WUAs. Unlike Andhra Pradesh, the state of Maharashtra offers various incentives to the farmers, such as support for channel repairs, rebates for prompt payment of irrigation fees and maintenance grants.\textsuperscript{366}

\textsuperscript{363} Supra note 347.
\textsuperscript{364} Ibid.
\textsuperscript{365} Ibid.
\textsuperscript{366} Ibid.
The state government of Gujarat in the year 1995 formulated policy resolutions for realizing PIM in the state through a state level working group for implementing 13 pilot projects.\(^{367}\) The Gujarat Act was passed in the year of 2007 to provide legal basis to frame such associations for better management of irrigation practices in the state.\(^{368}\) Unlike other states, ‘the Gujarat Water Resource Development Corporation’ has been encouraging farmers to create WUAs for tube well irrigation.\(^{369}\) The public participation in irrigation management can be viewed as a paradigm shift in the control and management of water resources systems of the country.

### 2.15. Sanitation and Water Management

Nearly 600 million of the 1 billion people globally are with no toilets in India and 50% of India’s population defecates in the open.\(^{370}\) In India for the purpose of management and action plans sanitation can be divided under the two heads rural sanitation and urban sanitation schemes and plans.

#### 2.15.1. Rural Sanitation

Over the past few years, there is a major shift in the Government policy concerning rural sanitation. It has shifted towards a more demand-based strategy from providing state-level subsidy based on need.\(^{371}\) The need for creating awareness on target basis has been recognised as a means to encourage villagers to bring improvement in their sanitary conditions. Under the reform process, a programme named ‘Total Sanitation Campaign’ (TSC) has been introduced since April, 1999. TSC is community led and people centred programme. The components of the TSC include the construction of household latrines, construction of sanitary compound for women, toilets for schools, and toilets for Balwadi/Anganwadi. Besides these, ‘Information, Education and Communication’ is advocated and wholly promoted under the programme.

The main features of the TSC include (i) shift from high subsidy to low-subsidy regime i.e. from Rs.2000/- to Rs.500/- per latrines, (ii) greater household involvement and participation, (iii) technology options as per choice of the households, (iv) stress on Information, Education and Communication (IEC) as part of the Campaign, (v) emphasis on School Sanitation, (vi) linkages with various rural development programmes, (vi) involvement of NGOs and CBOs

\(^{367}\) Ibid.  
\(^{368}\) Gujarat Water Users Participatory Irrigation Management Act, 2007  
\(^{369}\) Supra note 347.  
and local groups, and (viii) promoting access to the institutional finance. The Total Sanitation Campaign has been launched in 163 districts with the total outlay of Rs.19.52 billions (US$ 417 million) for the construction of 16.5 million individual household latrines, 163 thousand latrines for schools and other environmental sanitation works.372

2.15.2. Urban Water and Sanitation

The existing conditions and trends in India indicate that 85 percent of people residing in urban areas have access to safe water supply. This is even less in slum areas which is estimated to be 65 percent. In India, Only 49 percent of urban population have adequate toilet facilities. It is now well recognized fact that the problem is more institutional than technical in the urban sector too. Presently, there is no such financial instrument available with the Union government which could be utilised to support states to perform their urban water services. The reforms in urban water supply services are in their beginning stage. The inefficiency and poor service quality are the dominant features of the Urban Water and Sanitation Services. So far no city in India is provided with 24 hour quality water supply. In fact, most cities are having irregular water supply with erratic periodicity and quantity. Some financial sound families make private investments to increase quantity and improve quality for their families. Clearly, these private investments are far from reach of the common people and lead to have adverse impacts on quality of water and on groundwater level. Obviously, the poor suffer the most by this state of affairs. In reality, poverty gets coupled with water poverty.373

2.16. Wastewater Management

Wastewater Management poses a great challenge to the state authorities owing to the rapid increase in population, robust urbanisation and lack of infrastructural facilities. Most of the towns and cities in India do not have sewerage and sewage treatment services. There is expansion of many cities beyond municipalities in the country. The new urban area of such extended city or town does not have the capacity to manage the sewage as it remains under rural administration. In smaller towns the sewage is either directly dumped into rivers or lakes or in open fields making the condition worse.374

The amount of wastewater is increasing equally with fast extension of cities and domestic water supply. It is estimated by the ‘Central Public Health & Environmental

373 Ibid.
The Central Public Health and Environmental Engineering Organisation (CPHEEO) is Technical Wing of the Ministry of Urban Development, Government of India, and deals with the matters related to Urban Water Supply and Sanitation including Solid Waste Management in the Country. The CPHEEO was constituted under the erstwhile Ministry of Health & Family Welfare, Directorate General of Health Services (DGHS) in 1953 as per the recommendations of the Environmental Hygiene Committee to deal with Water Supply and Sanitation in the Country. In 1973-74, the CPHEEO was affiliated to the Ministry of Urban Development (erstwhile Ministry of Works & Housing). Since then, it is functioning as the technical wing of the Ministry.


Litres Per Capita Daily.


Ibid.

Ibid.

Ibid.

Nadu, Uttar Pradesh, Delhi & Gujarat account for approximately 50% of the total sewage generated in the country. Maharashtra alone accounts for 13% of the total sewage generation in the country.\cite{383} Maharashtra, Delhi, Uttar Pradesh & Gujarat account for 67% of the total sewage treatment capacity installed in the country.\cite{384} Arunachal Pradesh, Chhattisgarh, Daman Diu, Nagaland, Assam & Tripura are the states and Union Territories where no sewage treatment plant has been established.\cite{385} Himachal Pradesh & Sikkim have STPs installed which is adequate to treat the total quality of sewage generated in these states.\cite{386}

Table:2.4. State/ UT-wise list of Common Effluent Treatment Plants\cite{387}

<table>
<thead>
<tr>
<th>State/UT</th>
<th>Number of CETPs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andhra Pradesh</td>
<td>11</td>
</tr>
<tr>
<td>Gujarat</td>
<td>30</td>
</tr>
<tr>
<td>Haryana</td>
<td>14</td>
</tr>
<tr>
<td>Himachal Pradesh</td>
<td>1</td>
</tr>
<tr>
<td>Jammu and Kashmir</td>
<td>1</td>
</tr>
<tr>
<td>Jharkhand</td>
<td>1</td>
</tr>
<tr>
<td>Karnataka</td>
<td>9</td>
</tr>
<tr>
<td>Kerala</td>
<td>5</td>
</tr>
<tr>
<td>Madhya Pradesh</td>
<td>1</td>
</tr>
<tr>
<td>Maharashtra</td>
<td>27</td>
</tr>
<tr>
<td>NCT of Delhi</td>
<td>13</td>
</tr>
<tr>
<td>Punjab</td>
<td>4</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>14</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>49</td>
</tr>
<tr>
<td>Uttar Pradesh</td>
<td>8</td>
</tr>
<tr>
<td>Uttarakhand</td>
<td>4</td>
</tr>
<tr>
<td>West Bengal</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>193</strong></td>
</tr>
</tbody>
</table>

Source: CPCB 2016, Updated on December 8th, 2016

\cite{383} Ibid.  
\cite{384} Ibid.  
\cite{385} Ibid.  
\cite{386} Ibid.  
\cite{387} Ibid.
The table shows the number of common effluents treatment plants. There are total 193 common treatment plants up to December 2016 as shown in the table above.

Table 2.5. State/ UT-wise list of Sewage Treatment Plants(upto 8th December 2016)\textsuperscript{388}

<table>
<thead>
<tr>
<th>State/UT</th>
<th>Total No. of STPs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andhra Pradesh</td>
<td>12</td>
</tr>
<tr>
<td>Arunachal Pradesh</td>
<td>-</td>
</tr>
<tr>
<td>Andaman &amp; Nicobar Islands</td>
<td>8</td>
</tr>
<tr>
<td>Assam</td>
<td>5</td>
</tr>
<tr>
<td>Bihar</td>
<td>6</td>
</tr>
<tr>
<td>Chandigarh</td>
<td>5</td>
</tr>
<tr>
<td>Chhattisgarh</td>
<td>36</td>
</tr>
<tr>
<td>Delhi</td>
<td>35</td>
</tr>
<tr>
<td>Daman Diu and Dadra &amp; Nagar Haveli</td>
<td>-</td>
</tr>
<tr>
<td>Goa</td>
<td>7</td>
</tr>
<tr>
<td>Gujarat</td>
<td>52</td>
</tr>
<tr>
<td>Haryana</td>
<td>41</td>
</tr>
<tr>
<td>Himachal Pradesh</td>
<td>68</td>
</tr>
<tr>
<td>Jammu &amp; Kashmir</td>
<td>25</td>
</tr>
<tr>
<td>Jharkhand</td>
<td>24</td>
</tr>
<tr>
<td>Karnataka</td>
<td>57</td>
</tr>
<tr>
<td>Kerala</td>
<td>10</td>
</tr>
<tr>
<td>Lakshadweep</td>
<td>-</td>
</tr>
<tr>
<td>Maharashtra</td>
<td>78</td>
</tr>
<tr>
<td>Madhya Pradesh</td>
<td>17</td>
</tr>
<tr>
<td>Manipur</td>
<td>-</td>
</tr>
<tr>
<td>Meghalaya</td>
<td>1</td>
</tr>
<tr>
<td>Mizoram</td>
<td>1</td>
</tr>
<tr>
<td>Nagaland</td>
<td>-</td>
</tr>
<tr>
<td>Odisha</td>
<td>47</td>
</tr>
</tbody>
</table>

\textsuperscript{388} Ibid.
There are total 920 Sewage Treatment Plants which are state wise given above in the table. Punjab has the highest sewage plants followed by the state of Maharashtra and Tamilnadu.\(^3\)

### 2.16.1. Policies and institutional set-up for wastewater management:

At present there does not exist any independent and distinct regulations or guidelines for safe treatment, transport and disposal of wastewater in the country. The current policies for wastewater management regulation are based on certain environmental laws and few policies and legal provisions. These are constitutional provisions on sanitation and water pollution, ‘National Environment Policy, 2006’, ‘National Sanitation Policy, 2008’, ‘Hazardous waste (Management and Handling) Rules, 1989’ and Municipalities Act including District Municipalities Act etc. It is the responsibility of the states or local governing institutions to set up infrastructure for sewerage disposal. The working and maintenance of sewerage infrastructure including treatment plants are responsibilities of State governments or urban local bodies and their agencies. Though, Union Government support and supplement the states’ efforts through central schemes like ‘National River Conservation Plan’, ‘National Lake Conservation Plan’, ‘Jawaharlal Nehru National Urban Renewal Mission’, and ‘Urban Infrastructure Scheme for Small and Medium Towns’. The Water Act, 1974 empowers the ‘State Pollution Control Boards’ to initiate an action against any defaulting institution or agency. This Act also stresses on the use of treated sewage for irrigational purposes. However,

\(^3\)Ibid.
the state governments have not taken any effective steps in this regard. The Central Govt. started a technical and financial support scheme to encourage and promote common facilities for effective treatment of effluents generated from industrial units situated in bunches. The ‘Common Effluent Treatment Plant’ (CETP) under its financial assistance scheme provides 50% subsidy on project capital cost and 25% share each of Central and State Governments. This eventually resulted in the setting up of 88 CETPs having total capacity of 560 MLD throughout India covering more than 10,000 polluting industries. The Central Government, State Government and the Board also encourage the industrial units to make investment in pollution control by providing fiscal incentives to them.

2.16.2. Practice on different aspects of wastewater:

The treatment of the sewage water is done in different stages. The water quality treatments of sewage evaluate the ‘total suspended solids’ (TSS), ‘biological oxygen demand’ (BOD), chemical oxygen demand and nutrients (nitrates and phosphates) in the wastewater.

Nowadays, several technologies are being used for the treatment of wastewater. ‘Waste Stabilization Ponds’ (WSP) and Duckweed ponds are the most basic level technologies that work on biological processes. ‘Activated Sludge Process’ (ASP) and ‘Sequential Batch Reactor’ (SBR) are the methods that are generally adopted by the municipalities or large scale industries. These processes are partly automated and partly biological and are designed to meet specific output quality parametres. Both these technologies are suitable to Indian conditions as they can efficiently treat both diluted and concentrated wastewater as well as mixed household and industrial waste. It is well evident that there has been more focus on investing on water supply infrastructure in comparison to sewage networks in the country. Thus, huge investment is necessary to bring reforms in the existing condition of sewerage infrastructure and to bring it to the required level.

2.17. Flood Management

Floods are regular and recurrent phenomena in India. Out of the total geographical area of 329 million hectares (mha) of the country more than 40 mha is flood prone. Further, India is highly vulnerable to floods. Due to different climatic and errant rainfall patterns in different parts, certain regions suffer from devastating floods while some areas faces drought at the same

---

390 Supra note 379.
391 Ibid.
393 Ibid.
time. Over the years, floodplains are also occupied with the rise in population and developmental activities leading to more serious damage. The areas which are usually not prone to floods also experience severe inundation due to the errant and varying rainfall. Undoubtedly, floods are the most repeated natural calamity faced by the country.\textsuperscript{395}

Flooding increases erosion and silting of the river beds which affect the carrying capacity of river channels. Earthquakes and landslides further aggravate the problem leading to changes in the river courses and obstructions to water flows. Certain problems related to floods are synchronization of floods in the main and tributary rivers, retardation due to tidal effects etc. The possible causes that contribute to ill effects of the floods include encroachment of floodplains and haphazard and unplanned growth of urban areas. Some parts of the country, mainly coastal areas of Tamil Nadu, Andhra Pradesh, Orissa, and West Bengal, experience cyclones, which are often accompanied by heavy rainfall leading to flooding.\textsuperscript{396}

In India, flood problems are presented by four zones of flooding as (a) North-West Rivers Basin, (b) Ganga River Basin, (c) Brahmaputra River Basin and (d) Central India and Deccan Rivers Basin.\textsuperscript{397}

The following structural measures are generally adopted for flood protection:

- Embankments, flood walls, sea walls;
- Dams and reservoirs;
- Natural detention basins;
- Channel improvement;
- Drainage improvement; and
- Diversion of flood waters.

Embankments are the most common structural measures among these. This measure provides speedy protection as the material and labour is available nearby. The important embankment projects undertaken in India after independence are on the rivers Kosi and Gandak (Bihar), Brahmaputra (Assam), Godavari and Krishna (Andhra Pradesh), Mahanadi, Brahmani, Baitarni and Subarnarekha (Orissa) and Tapi (Gujarat). These embankments are significant as they provide adequate protection to the easily affected areas. Reservoirs play an important role in controlling the ill effects of floods and regulating the downstream flows. Thus, flood control


\textsuperscript{396} Ibid.

has been considered as one of the chief aims of the multipurpose dams. On the Damodar system in Jharkhand and the Hirakud and Rengali dam in Orissa the reservoirs have been constructed with flood cushions on certain parts in order to impound flooding. However, certain other large storage dams without any reserved flood storage are also useful in flood moderation.\textsuperscript{398} One example of such dams is Bakhra Dam on Sutlej River.

After independence, many multi-purpose projects have been initiated in India. The objects of these projects are to increase food production, energy generation, drinking-water supply, fisheries development, employment generation, flood moderation etc. The Nagarjuna Sagar project, Damodar Valley Corporation (DVC) reservoirs, the Bhakra-Nangal project, Hirakud dam are few examples of these projects. These large dams have helped in moderating flood to a considerable extent. Damodar Valley reservoirs Project is one of the best example of flood moderation achieved by the dams. It is noteworthy that flood management was one of the purposes of the construction of all these reservoirs.

\textbf{2.18. Drought Mitigation and Water Management}

Like floods, drought is also one of the natural disasters repeatedly faced by the country. Drought is a recurring natural phenomenon that remains over a long period of time (e.g. a season or several years) due to lack of precipitation. It is an impermanent deviation of rainfall and moisture conditions from the mean in a particular region. Thus, it differs from aridity and seasonal aridity. Drought is a creeping phenomenon and can remain for months or years in severe cases. It affects nearly all climatic regions Thus every year, more than one-half of the area of the earth is vulnerable to droughts. Mostly, regions with erratic and surplus rainfall are more susceptible. The phenomenon of drought can be classified in different ways, such as hydrological, meteorological and agricultural. The area wise extent of drought is comparatively much larger than any other hazard and is not limited to basin or political or administrative boundaries. There are number of adverse impacts of the droughts on the environment. Particularly, prolonged droughts results in social disruption and the degradation of soil, plant and animal habitats.\textsuperscript{399}

Drought is a complex natural as well as man-made phenomenon. Thus, management of drought requires addressing complexities of different levels. There is need to have an institutional framework to coordinate the inputs from different agencies without interfering in their functional autonomy. Presently, The Indian Meteorological Department (IMD) is such

\textsuperscript{398} Ibid.
\textsuperscript{399} Ibid.
an agency of the Central Government responsible for forecasting of weather and rainfall and aridity variance by the IMD. Another agency at the central level is The Central Water Commission that monitors droughts through reservoir storage position. At State-level Departments like Agriculture, Irrigation, Economics and Statistics performs various functions with regard to same including monitoring of crop and seasonal situations.400

2.18.1. Programmes/Schemes at the National Level

There has been a considerable change in the policy of management of droughts in India over the years. It has now shifted from the post event management to early warning system, disaster management, preparedness, mitigation and long-term drought management measures. The Central Government has come up with several long-term and short-term programmes for drought management in India particularly in rural areas. Few of them under different Ministries or Departments of the Central Government are the ‘National Rural Drinking Water Programme’ (NRDWP), ‘Pradhan Mantri Gramodaya Yojana’ (PMGY), ‘Food for Work Programme’ (FWP), ‘National Watershed Development Programme’ (NWDP), ‘Mahatma Gandhi National Rural Employment Guarantee Scheme’ (MGNREGS), ‘Integrated Watershed Management Programme’ (IWMP) and ‘Food & Fodder Development Programmes’.

A ‘National Action Plan’ for drought mitigation is also prescribed under ‘The National Disaster Management guidelines’ as required under the ‘National Water policy’.402 According to the Plan, the drought relief and management are to be planned by the Central as well as by the states. Further, the plan emphasises the importance of The Mahatma Gandhi National Rural Employment Guarantee Scheme and Water Conservation Programmes managed by the Government of India in the drought management. According to the Plan, these two programmes are the most notable that will be used for performing activities of relief and management of drought. According to the National Plan the erstwhile Calamity Relief Fund (CRF) and National Calamity Contingency Fund (NCCF) were renamed as the State Disaster Response Fund (SDR Fund) and National Disaster Response Fund (NDR Fund) respectively.

Other major effort to manage drought and relief activities is from the credit sector. Commercial, Regional Rural Banks and the Cooperative Credit sector provide financial credit


401 Ibid.

to the agriculturists on easy terms. The Crop Weather Watch Group at the Central level brings in data from monitoring mechanisms for rainfall, water resources, crop-growth etc. and assesses the status of these parameters on a weekly basis.

2.18.2. At State Level

The primary responsibility to manage drought and provide relief thereafter rests with the respective State Government. There are a number of drawbacks in the planning and management of drought in the existing system. Few of them are as follows:

i. There is no fix time limit for declaration of drought by the States.

ii. There occurs delay in effective and timely coordination as a number of various Ministries/Departments/Organisations are involved in several activities concerning drought management. Further, there is no uniformity in the mechanism followed by states regarding assessment and monitoring. Each state adopts its own methodology for assessing drought intensity and drought monitoring.

iii. There exist difficulties in determining the commencement and culmination of drought due to various reasons.

iv. There is lack of quick decision making, due to delay in data analysis, which existed in scattered manner with different agencies.

v. The important data used for assessment of drought intensity such as rainfall, crop sown areas, and reservoir levels varies from state to state. The procedures for collection of data and database maintenance differ across the states.

vi. Want of public involvement and participation in drought management activities at different levels diminishes the overall worth of the effort. 403

2.18.3. Current Challenges

There are three key components of Drought Management. These are as following:

(1) Drought monitoring and drought intensity assessment.

(2) Declaration of drought and prioritising areas for drought management.

(3) Development and implementation of drought management strategies. 404

Presently, the drought management faces a number of challenges, from the assessment and monitoring of droughts to the framing and execution of the strategies. Drought assessment can be done either by examining the conditions that causes drought or by predicting and forecasting the weather conditions. 405

403 Ibid.
404 Ibid.
405 Ibid.
Drought monitoring requires the advanced technical or scientific means to provide an early warning of droughts and also to provide precise definition of droughts including an objective. It also requires transparency in the allocation of resources. But, at present the system of using the available information is incomplete and unsystematic. It requires strengthening of the institutional relationship between early warning and decision making. There exists a link of drought with the performance of the monsoon. Thus, it can be predicted by examining rainfall and rainfall history of the monsoon seasons in a given area.

There is one more method of drought monitoring and assessment namely Vulnerability analysis. Vulnerability is expressed as the level of susceptibility to a calamity or hazard. Vulnerability analysis assists in bridging the gap between impact assessment and formulation of strategies and policy by taking into account the fundamental causes and not the impacts after disaster. Vulnerability to drought is ever changing and is dependent on a number of factors. These include rise and regional shifts in population, urbanization, and advancement in technology, government policies, use of land and other natural resource management practices. These also include desertification processes diminishing the yields and the natural resource base, water use trends and the standards of environmental awareness in the society. Individually, each factor is of significance as it may increase or decrease vulnerability.

Early warning system (EWS) is the method used for monitoring of droughts. The task of designing a EWS is to examine the key indicators like agro-climatic, market socio-economic indicators and late anthropometric indicators. It is done to get sufficient time to intervene and make efforts at the early phase of drought commencement. However, most interventions are based on late indicators that compel the governments to adopt a post crisis management approach particularly to deal with the threat of food insecurity. There exists several drawbacks in this approach, as it does not substantially diminish vulnerability to drought in the long run. The effective warning systems should have meteorological or agricultural information, production estimates, price trends of food and feed, availability of drinking water and household vulnerability to address several issues concerning production, exchange and consumption.

The mitigation of the drought effects is, essentially, a vital component of drought management. The effects of drought can be reduced either by adopting preventive measures or by developing a preparedness plan. Preparedness plan includes the sum of activities necessary

406 Ibid.
407 Ibid.
to enhance the readiness or improve functional and institutional competences to respond to a drought. The drought mitigation strategy includes the identification of drought prone areas. It can be done on the basis of historical records of drought in such areas.

The State Governments in India have their own relief manuals/codes prescribing functions for each Department or officer in the State for managing natural disasters. These are reviewed and updated periodically based on the experience of managing the disasters and the need of the regions. The policy and the funding mechanism for provision of relief assistance to those affected by natural calamities are clearly laid down. These are reviewed by the Finance Commission appointed by the Government of India every five years. The division of tax between the Central and the State Governments are concerning the policy for provision of relief assistance. The Finance Commission also recommends their expenditure share. As per the recommendations of the Eleventh Finance Commission a ‘Calamity Relief Fund’ (CRF) has been set up in each state. The amount of the CRF has been determined by the Finance Commission after considering the relief and rehabilitation expenses incurred in the last ten years.

The Central Government contributes Seventy five percent amount of CRF in each State and the remaining Twenty five per cent is contributed by the respective state. People affected by the disaster are entitled to receive a relief from the CRF. The norms for providing relief assistance are shaped by a national committee including representatives of States as members. Each State has its own norms in accordance with the recommendations made by a state-level committee headed by the Chief Secretary of the concerned state. If the funds available in CRF are insufficient for providing reliefs in case the disaster is of high proportion, the State seeks assistance from the ‘National Calamity Contingency Fund’ (NCCF) which is created at the Central Government level. In such cases, the assessment of the requirements is done by a team from the Central Government and thereafter the assessed requirements are cleared by a high-level committee chaired by the Union Home Minister.

It is viewed that the institutional settings for response and relief are well settled and have proved to be operative. Further, the integration of drought management with different schemes or plans including programmes of forestry, watershed, public health, and pollution control and wetland conservation is well recognized now. But the association of drought management with the management of epidemics, forest fire and pest, environmental health, power generation, and socio-political conflicts, including risk of terrorism and war-related disasters still need to be institutionalized. It is also vital to recognize the issues of ‘urban
drought’ and ‘water drinking industries’ with drought management. Undoubtedly, there is need to have a comprehensive approach to ensure effective output of drought management activities.

2.19. Rainwater Harvesting

Rainwater Harvesting can be viewed as an effective mode of conservation of water and a useful technique to handle the problem of water scarcity, particularly in water stressed areas. The ancient and simple technology for catching and storing rainwater has received a lot of attention in several countries in recent years. Rainwater harvesting is a significant and promising method to restock and recharge the groundwater in regions where geologic conditions are conducive. Rainwater harvesting for agricultural purposes generally involves the construction of structures such as check dams, reservoirs, and purification tanks to purify the water, and to collect and hold specific amount of water at particular places along the flow path. The main purpose of the rainwater harvesting is to augment the percolation of the rainwater into the surface to recharge the groundwater table. This results in the rise in the water table levels, enhanced supply of water in wells, and availability of water for longer periods.

There has been considerable progress concerning rainwater harvesting through certain legal provisions. Besides it, there has also been significant advancement in the technology as well in recent years related to rainwater harvesting in India. It has now become part of the project design for government buildings and buildings for public use. Several State laws including Municipal and Panchayati Raj Acts have been amended to provide for rainwater harvesting as part of building plan. The approval of the building plan has been made contingent on such facilities being provided. A large of varieties of designs and cost options have been provided by some government agencies as well as several non-governmental organisations.

Rainwater in India is not utilized to its maximum extent mainly due to the errant and high variance of rainfall in a year. India receives Seventy four percent of its rainfall due to South-West monsoon in the period of three or four months viz. June to September. Even this is not certain and does not convey big spells of rain. The uneven and irregular distribution of rainwater may lead to long dry periods and affects the agricultural yields. If water is not retained or made available in some other way it may result in the substantial damage to agriculture. Further, the reluctance of the people to construct such structure and use them for

---

410 Ibid.
water storage, particularly in residential buildings are other known reasons for non-implementation of rainwater harvesting plans.

2.20. Large Dam Projects and Displacement

The number of development induced displacement is the highest. Among all the forms of development projects, the water related projects ranks first in causing the largest displacement. There has been a significant increase in the acquisition of private lands by the government with the increasing pressure on land due to urbanisation, increasing infrastructure requirement etc., in a fast growing economy like India. Most importantly, the government acquires land under the doctrine of ‘eminent domain’ with citing the purpose of development and consequently masses of people get displaced in the name of development.\textsuperscript{411}

The construction of dams, particularly large scale, causes maximum displacement in India. Such forced displacement is due to the construction of such dams for irrigation, hydropower or multi-purpose. The underprivileged and economically backward people suffer the most by displacement, as they usually get inadequate compensation. It is a known fact that several displaced families have been displaced twice or thrice. This is more ironical that we do not have the exact figure of people displaced by such dams in India even after independence.\textsuperscript{412} Further, India ranks third in the list of dam builder countries in the world and has about 3600 large scale dams and over 700 more in the process. The above stated facts are sufficient to prove that rehabilitation and resettlement of the displaced people has not remained a matter of substantial concern for the planners of such projects. It is estimated that about 50 Million people have been displaced in India over the last fifty years in the name of public welfare and national interest.\textsuperscript{413}

There are a number of issues and challenges with regard to the displacement caused due to dams. One of such prominent issue is related to the estimation of the displacement. Dam related displacement in the country has been differently estimated. The people started moving or get displaced even before the surveys are done. This apparently results in underestimation of the exact number of persons displaced. The fact that only reservoir displacement is considered is another drawback of the estimation procedure. The people who get displaced due


\textsuperscript{412} “Large Dam Projects and Displacement in India” available at http://sandrp.in/dams/Displac_largedams.pdf (Visited on 25 September 2017).

to the construction of colonies for displaced people, canals, downstream effects, catchment area treatment, compensatory afforestation, and due to related conservation schemes like sanctuaries and national parks are not taken into account for the estimation of displacement. This figure including all such kinds of displacement can lead to much larger figures of displacement. It is evident in the case of Sardar Sarovar Project on Narmada River in the state of Gujarat.\textsuperscript{414}

The time when these projects were commenced, it was clear that large scale projects require the displacement of considerable populations. Such displacement is greater for hydro power projects which involve large-scale submergence for reservoirs. However, national leaders and policy-makers considered these displacements as just and legitimate in the larger public and national interest. Jawahar Lal Nehru, the first Prime Minister of India, while laying the foundation-stone of the Hirakud Dam in Orissa in 1948, the first major river valley project of the country, said the following to all those who suffer displacement due to the project ‘If you have to suffer, you should do so in the interest of the country’.\textsuperscript{415} A similar view was echoed 36 years later by Indira Gandhi then Prime Minister of India, in a letter to a renowned social worker Baba Amte. She wrote that “I am most unhappy that development projects displace tribal people from their habitat, especially as project authorities do not always take care to properly rehabilitate the affected population. But sometimes there is no alternative and we have to go ahead in the larger interest.”\textsuperscript{416}

\textbf{2.20.1. Preparation, Examination and Approval of Projects}

The task of planning and preparation of a dam project is generally in the hands of state government. The state government does it through its concerned departments and the chief among them are the Irrigation or Water Resources Department. These are generally departments of engineers. Several non-engineering aspects viz. agricultural, environmental, energy, financial, economic, social, etc. are partly dealt with departmentally and partly through consultation with agencies and departments concerned. In the preparation of the project the guidelines issued by the CWC and the Ministry of Environment and Forests are taken into account. A project so prepared goes through the usual approval procedures within the state

\textsuperscript{414} Ibid.
\textsuperscript{416} Ibid.
Governments for consultation with the Finance, planning and other departments concerned if any.\textsuperscript{417}

After the project gets approved at the state level, it goes to the Central Government for approval. There does not exist any specific constitutional or legal prescription with regard to approval of such state approved projects by the Union Government. But the requirement has become established in two ways. Firstly, to include the project in national plan as a major or medium Project and secondly as a requirement of clearance by the Ministry of Environment and Forests under the Environment Protection Act and under the Forest Conservation Act. In case of the inter-state rivers the Union Government takes into account an inter-state perspective.\textsuperscript{418}

The project sent by the state government to the CWC as the Secretariat of the ‘Technical Advisory Committee’ (TAC) is examined in the different Directorates of CWC. It is also examined and consulted by the other concerned agencies. After all the purposed amendments, if any CWC submits its report to TAC. Representatives of other concerns e.g. agriculture, environment, energy, finance, the welfare of Scheduled Casts and Scheduled Tribes, women’s issues etc. are expected to participate in its meetings. In relation to inter-state rivers, the addressal of concerned and pertinent issues is an essential component of the examination. The discussion at the TAC is preceded on the basis of the observations made by CWC. If the project is found acceptable, the techno-economic clearance of the project implying its technical soundness and economic viability is communicated by the TAC.\textsuperscript{419}

Further, two separate clearances by the MOEF are also required. These are clearance under the Forest Conservation Act and under The Environment Protection Act. After the techno-economic clearance by the TAC and the clearance by the MOEF from the perspective of the environment and forests, the Planning Commission examines the project from the point of view of investment prioritises, sectoral planning policies and provision of funds in the national Plan and issues a letter of acceptance with conditions attached, if any.\textsuperscript{420}

Thereafter, it becomes the responsibility of the state to implement the project. Most of the large scale Dam projects whether for irrigation or hydroelectric power or multipurpose involve the issues and problems of displacement and environmental impacts. These issues need

\textsuperscript{417} Ramaswamy Iyer, \textit{Water Perspectives, Issues, Concerns} 155 (Sage Publications India Pvt. Ltd., New Delhi, 2010).

\textsuperscript{418} \textit{Ibid.}

\textsuperscript{419} \textit{Ibid.}

\textsuperscript{420} \textit{Id., at} 156.
to be carefully dealt with, under sound legislation and policy framework keeping in view the interests of affected people.

### 2.20.2. Legal Framework Related to Displacement

Displacement is viewed as a matter of balance between the rights of the individual and authority of state, at the state level and at global level, it is regarded as an abuse of human rights. In India, these issues have been regulated through certain legislative provisions and policy initiatives. It includes Land Acquisition Act of 1894, National Rehabilitation and Resettlement Policy of 2007, the Land Acquisition, Rehabilitation and Resettlement Act of 2013, and the different state legislations on land acquisition. The impact of 2013 land acquisition Act and the different state legislations on land acquisition, on the displaced people is quite significant among the different legal initiatives on land acquisition and rehabilitation.

In September 2013, India adopted the legislation called The Rights to Fair Compensation and Transparency in Land Acquisition, Resettlement and Rehabilitation Act. The concerns of displacement caused by land acquisition were adequately addressed by this legislation. This Act abolishes more than a century old land acquisition Act of 1894 which was based on coercive land acquisition by the state authority. Moreover, the 1894 act also grants power to the state authorities to violently expropriate the land of people. In fact, the states in the name of ‘Eminent Domain’ principles acquire the land not only for public purpose but also for private purpose and thus acted against the interest of their own people. This attitude of the state leads to millions of people left landless, homeless, and jobless. Apart from the above this act is also silent on providing rehabilitation and resettlement or durable solution to the people who are displaced due to forcible land acquisition.

The scale and disastrous consequences of displacement leads to the rising resistance by the people who are displaced by forceful acquisition of land. The places like Narmada, Sardar Sarover in Gujarat, and Singur in West Bengal among others have witnessed the severe criticism of the state land acquisition policy.

---


422 Act No.1 of 1894.


425 Id. at 1487.

The resistance by the tribal people in this area to defend their lands succeeded in delaying or completely abandons the states project. In fact, the continuance of resistance also played an important role in replacing the anarchic land acquisition Act.\textsuperscript{427}

The most of the ruthless provisions of land acquisition Act of 1894 were diluted by the land acquisition Act of 2013 and the most importantly, the new Act made a cautious effort to restrain the easy accessibility of land.\textsuperscript{428} It includes, the Act’s fundamental change is to the introduction of compulsory prior consent from the farmer for acquiring land. Secondly, the major change in terms of replacing the administrative coercion for land acquisition with market transaction and increased finance to those left without land or livelihood. Thirdly, the new Act also provides for a new national wide institutional architecture for rehabilitation and resettlement. Due to these changes, the 2013 Act considered as progressive and people oriented act. New rules for acquiring land are set by the land acquisition Act of 2013 and it also imposes the obligation on projects owner who causes displacement to resettle affected community and provides effective assistance and protection to these peoples.

Forced eviction in the name of “development” is growing rapidly around the world and there is no organized solution to this human right and humanitarian crisis. The protection of Displaced People around the world is a big challenge for the world communities. In this regard the question before us is that how the nation and international law can guaranty the protection of human rights of displaced people. Immediate solution to this problem is that the strong political will of national governments and effective utilization of human rights laws and policies will help in mitigating the problem of displaced people.\textsuperscript{429} But for the long term solution to the problems of displaced can be seen in the following way. Firstly, the state authorities should define “public interest” in their national laws and any project which is approved for public interest must meet certain specified, pre-determined criteria to ensure that it truly is in the national interest of the majority of the people.\textsuperscript{430} Secondly, any project approved for developmental purpose need to be evaluated with certain indicators to assess whether the project brings an overall improvement in well-being for the people or does it results in more


\textsuperscript{428} Ibid.


\textsuperscript{430} Id. at 643.
harm than good. Thirdly, the persons directly affected by their acquiring land or natural resources should have the right to get involved in the decision and policy making in the management and control of such resources. Fourthly, when the authorities feel that the displacement is inevitable, in that circumstances utmost priority should be given for just and adequate rehabilitation provides immediately for displaced people. Fifthly, the national authorities should strictly follow the principles of adequate ‘Consultation’ and ‘Prior Informed Consent’ from the people who are going to be displaced by the developmental activities. Sixthly, comprehensive social impact assessment must be conducted to determine the appropriate compensation for the displaced people. Finally, the rights of special vulnerable group such as indigenous people, women, and children must be taken into account. It is need of the hour to formulate comprehensive policy at national level to address the concerns of peoples who have been displaced due to developmental projects.

2.21. Women and Water Management

Whilst introducing a gender perspective into water management, experts have been divided amongst themselves with regard to women and water. It is well known fact that the relationship between gender and community has direct consequences on the productivity and sustainability of natural resources as well as on the livelihood of the people depending on those resources. The linkage becomes more relevant in the context of devolution of the responsibilities on the local communities in the wake of decentralised governance era. It becomes vital to know and examine in the community, who carries on what task and who regulates use, decision making and managing the tasks. The following are the key points to be considered with regard to water management from a gender perspective:

1. The methods and purposes of the use of water resources by men and women;
2. The division of labour, use, payment and time allotment for water supply improvements between men and women, rich and poor;
3. Decision making with regard to water resources between men and women;

431 Id. at 644.
432 Id. at 644.
433 Id. at 644.
434 Id. at 645.
435 Id. at 645.
4. Equitable sharing of costs and advantages of managing water resources;
5. Institutionalisation of the gender-equitable approaches.438

In most of the recent global initiatives and declarations, an emphasis on women has been considered as an important factor for better governance of water particularly in context of poverty reduction. It was widely recognised by the participants at the ‘Second World Water Forum’ in The Hague (2000) that, in addition to being prime users of ‘domestic water’, women used water in food production and that women and children are most vulnerable to water-related disasters.439 It was also observed at the forum that women’s involvement and participation at all steps of management would be helpful in better governance. Since the impact of poor management rests on women the most, the efforts should be made to empower them through greater involvement and effective participation.

At another global initiative namely “the International Conference on Freshwater in Bonn” in 2001, the policy statement underlined the necessity of a gendered approach involving both men and women. It was also observed that there is need to strengthen the roles of women in water related areas in order to achieve gendered approach.440

Further, Third World Water Forum in Kyoto in 2003 emphasised equality including gender equality in its statement. It was observed in the forum that at present, many governments are facing a crisis of governance and require an integrated water resources management approach with transparent and participatory approaches that addresses ecological and human needs. The Ministerial Declaration stated, “In managing water we should ensure good governance with a stronger focus on household and neighbourhood community-based approaches by addressing equity in sharing benefits, with due regard to pro-poor and gender perspectives in water policies. We should further promote the participation of all stakeholders and ensure transparency and accountability in all actions.”441

Few international arrangements and policy statements are concerned with a broad range of objectives from poverty eradication to environmental sustainability. These have been concerned with both water and gender equality. The ‘Millennium Development Goals’ adopted at the ‘Millennium Summit’ at the United Nations in New York in 2000 included goals to

---

439 Ibid.
“Promote gender equality and empower women” and to “Ensure environmental sustainability”. One of the targets for the goal on ensuring environmental sustainability is to “Halve by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation”.442

At the World Summit on Sustainable Development in Johannesburg (2002) the parties were made committed to encourage empowerment of women and to incorporate gender equality in all the activities stated in Agenda 21, the ‘Millennium Development Goals’ and the Plan of Implementation of the Summit.443

It has been universally accepted that women play vital role in the management of water. Thus, their role should be enhanced through the policy of gender mainstreaming. Gender mainstreaming is the process of assessing the implications for women and men of any planned action, including legislation, policies or programmes, in all areas and at all levels. It is a strategy for making women’s as well as men’s concerns and experiences an integral dimension of the design, implementation, monitoring and evaluation of policies and programmes in all spheres so that women and men benefit equally.444

In regulation and strategies relating to water, gender mainstreaming is acceptable as it enhances efficiency and usefulness. A gender sensitive approach assists to ensure that water is managed more sensibly and sustainably. Gender mainstreaming also helps to empower women and to achieve broader goals of equality within society and poverty reduction.445

Indian women suffer the most of the scarcity of water as being the primary user of water. In many villages, women travel far distances to reach water resources and fetch water from there for household purposes. According to a report by a renowned environmentalist Dr. Vandana Shiva, on average, a rural Indian woman traverses 14,000 km a year just to fetch water.446 “In every household, in the rural areas in the desert state of Rajasthan, women and girl children bear the responsibility of collecting, transporting, storing, and managing

water….Natural sources are drying up which adds the kilometres for women every day to
quench the thirst of their family as well as animals,” writes Shiva.447

The role of women in the management and preservation of the water resources is
cardinal. Despite the global recognition rendered to the important role played by women in
water management, the extent of regulation and policies relating to water regarding women
participation and empowerment in India remains under scanner.448 It is noteworthy that the
integration of women in the planning, provisioning, and management of water resources
continues to be disregarded in the three national water Policies of 1987, 2002, and 2012. The
care of the women in the water management are generally voiced around their domestic
roles and considered under the concepts of ‘household’ and ‘social equity’.449 The important
and larger issues of water rights of women, in terms of access as well as participation in
decision-making, generally remain unaddressed.450

Better governance in the water sector in the context of gender issues is the need of the
hour. Effective management of water calls for a need for synergy with issues in the water sector
while attending to specific concerns of the women in the context of water sector reform.451
Policy and practice, therefore, have to consider the gender perspective in order to attain better
results and effective management of water.

2.22. Role of World Bank in Water Management

The World Bank plays an important role in water management by working across
various sectors and nations. It is one of the important sources of data information and technical
assistance on water worldwide. The World Bank is the largest donor for water development
across the globe with a water portfolio accounting for 18 percent of its overall portfolio. It
represents 32 billion dollars in ongoing commitments as of 2014, with a clear emphasis on
building foundations for collective prosperity and poverty reduction.452
The World Bank works in tandem with the different partners including nations and other agencies to achieve the goal of ‘A Water-Secure World for All’. It is the world’s largest multilateral source of sponsoring for water projects in developing nations and invests in water solutions enabling equal access, promotes water security, and builds resilient societies. The Government of India and the World Bank partnership over the past decade has made substantial progress in developing and implementing innovative plans and strategies to improve the Rural Water Supply and Sanitation sector.

The World Bank-assisted Rural Water Supply and Sanitation project popularly known as Swajal (pure water) in Uttar Pradesh has been acknowledged domestically and globally as one of the best practice example in employing a demand responsive approach. Similarly, the participatory evaluation technique of sustainability monitoring using the village immersion process adopted in the state of Karnataka has become an important part of the country’s implementation supervision.

India with the support of World Bank in 1998 developed a national sector strategy for Rural Water Supply and Sanitation. It was prepared after wide discussions with the states and other concerned agencies. This strategy widely demonstrated the achievements of these projects. India is now committed to institutionalize a demand-driven and community-driven approach for rural water supply across the nation to be implemented in 64 districts of 26 States. The World Bank and the Government of India have agreed to draw up a generic programme design that includes the above stated approaches.

India has enjoyed a long history of association from the World Bank in several of Water Resource Management efforts and initiatives. Success in participatory irrigation management focusing on watersheds and other water management projects has been the forerunner to many pioneering irrigation management initiatives in India. ‘Water and Sanitation Program South Asia’ (WSP-SA) through a formal Strategic Alliance is an important step in this regard. The WSP is a Bank executed programme funded by several External Support Agencies including DFID, SIDA, SDC, and Dutch Aid. WSP-SA is playing an important role for capacity support in the implementation and innovation of the programme. Water sector is reaching new heights.

---

455 Ibid.
456 Ibid.
and is in the process of achieving the desired goals with the support of the World Bank and its agencies.\textsuperscript{457}

\textbf{2.23. National Water Commission}

A report titled ‘A 21st century institutional architecture for India’s water reforms’ was submitted by an expert committee headed by Dr. Mihir Shah on reorganization of the ‘Central Water Commission’ (CWC) and the ‘Central Ground Water Board’ (CGWB) to form a new ‘National Water Commission’ (NWC). It echoed the commencement of a paradigm shift in the water management and governance in the country.\textsuperscript{458}

Preferably, the above report is required to be observed along with two other important documents that came out recently namely ‘the Draft National Water Framework Bill, 2016’ and ‘Draft Model Bill for the Conservation, Protection, Regulation and Management of Groundwater, 2016’ (both of May 2016).\textsuperscript{459}

The report suggests that the creation of CWC and CGWB was in a different era under different settings. At present, there is a drastic change in the objective conditions on the ground, the demands of the Indian economy and society, and our understanding of water. Thus there is a need of a novel planning of regulation and governance of this vital resource.\textsuperscript{460} Undoubtedly, the CWC as well as CGWB have valuable and arduous capabilities for exploration of water resource, assessment, and monitoring, and planning of infrastructure projects. At present, the different tasks in relation to water management can be performed in a better manner and in a more cost-effective. So, these capabilities must be conserved, cultivated, and reformed possibly by creating a new institutional set up.

The Report asserts that, so far, water strategy of the country has focused on public investment in infrastructure. No doubt, it has played vital role in meeting the goal of national food security, but a little emphasis was placed on advances in management, governance reforms, and institutional innovations. This is why returns to public investments in water infrastructure in India have been unsatisfactory and inadequate. It can be said that the water projects have suffered from the ‘build–neglect–rebuild’ syndrome.\textsuperscript{461} The country can make

\textsuperscript{457} Ibid.
\textsuperscript{458} http://www.indiawaterportal.org/articles/what-we-should-know-about-national-water-commission (Visited on 5 October 2017)
\textsuperscript{460} http://www.indiawaterportal.org/articles/mihir-shah-committee-report-how.solve-water.crisis (Visited on 11 November 2017).
\textsuperscript{461} Ibid.
swift paces in water security by focusing on management advances and institutional reforms rather than just public investment in water infrastructure. Further, the CGWB evolved or raised out of a minor organisation with a narrow and specific purpose namely the assessment of groundwater resources in the wake of drilling exploration. The CGWB has been unable to keep pace with the changing requirements. The situation in India demands a shift in capacity from a well-constructed organisation to a resource management entity.\(^\text{462}\)

The existing settings require multidisciplinary skills that will enable a transition to an organisation with a capacity to lead and formulate a national programme on water resource management in different parts of the country. We need to have an organisation that is forward looking, strategic, alert, and trans-disciplinary in its skill set. This has to be conceived of as an action organisation, not merely an assessment and monitoring organisation, although these too will remain aspects of its mandate. It is true that all the action in the water sector lies with the state governments. Yet a well-designed central organisation can deploy and use funds, as well as scientific and knowledge resources, to influence and support what states do in water governance.\(^\text{463}\)

According to the report such new organisation should have a compact leadership with a wide-ranging expertise concerning water. There has to be an inter-disciplinary culture in the organizational set up. It is the need of the hour to have a new organizational set up, a new operating style and new approach. These are huge institutions utilizing enormous resources in managing themselves. A highly dysfunctional organisation affects their culture functioning. In these organisations there existed hundreds of different designations, which have frightening effects for framing recruitment rules, career progression ladders, promotions, seniority, pay scales, and the like.\(^\text{464}\)

Certainly, these drawbacks affect the capability of these agencies to address new issues and to meet the new challenges of water sector. A modern, active and compact apex institution is the need of the hour to meet the greater water governance challenges. The organisation should be unrestrained by the burden of having internal management intricacies such as cumbersome bureaucracies. There is need to view the surface water and groundwater in an integrated and comprehensive manner. Both the organisations the CWC and CGWB need to work in a unified organisation and cannot last to work in their present independent manner.\(^\text{465}\)

\(^{462}\) Ibid.
\(^{463}\) Ibid.
\(^{464}\) Ibid.
\(^{465}\) Ibid.
There is absence of essential capacities of the CWC and CGWB required meeting out the necessities of the water sector in the present age in India that are crucial for effective water management. This requires institutional reforms and setting up of a new institution equipped with all required changes to meet out the challenges of water governance.

2.24. Water Management and Public Participation

Non-Governmental Organisations can be effective in conservation, protection and management of water resources through public participation process. This can be done by keeping in view the local customs, beliefs and practices of an area. These organisations help in bridging gap between government and community by capacity building and creating awareness about government policies and benefits. The NGOs can be instrumental in effective water management by spreading information, creating awareness, sensitizing public, capacity building measures and by forming different clubs and societies to work for the different activities relating to water management in a particular area. The interactions of NGOs with governmental agencies, public and media create awareness regarding water issues.

Colonial law relating to water which mainly aims at fostering control over water sources neglected the concept of public participation in water management activities. These laws generally gave no space to farmers or water users. Irrigation laws in colonial period were mainly focused on the control of state over the water bodies and activities related to irrigation to foster the revenue of the Government. Many of these laws were transposed in the present era as well. The Bihar Irrigation Act confirms the theory of state control and neglects the needs of the farmers and water users directly. Most of the statutes relating to irrigation are based on the principles that are largely anti-participation.

Similar is the case with ground water rights as they are also not changed much from the colonial time. However one sector that experienced change is the participatory irrigation management in irrigation laws. Many of the state irrigation laws strengthened the concept of participation of farmers in the irrigation practices by forming associations and users groups in a particular region. At the constitutional level, the inclusion of Article 243G in Eleventh Schedule and 243W in Twelfth Schedule which strengthens the rural and urban local self govt. institutions in relation to, inter alia, water related activities is a landmark step in increasing the

467 Bihar Irrigation Act, 1997 available at www.ielrc.org/content/e9703.pdf.
involvement of public in water management. However the implementation of these provisions in the country is uneven, partly because it largely depends on the state legislations making this constitutional framework a reality in the legal framework.  

A participatory approach should be adopted in managing the water resources for various uses. This can be done by involving the various governmental agencies as well as the users and other stakeholders in an active and decisive manner in different aspects of strategy, growth, preparation, and management of the water resources projects and schemes. To ensure the involvement of all concerned authorities and stakeholders, necessary changes in legal and institutional set up are required at various levels. Local governing bodies like municipalities and Gram Panchayats as well as WUAs should particularly be involved in the working, maintenance and the management of water infrastructures or facilities at appropriate levels. They need to be involved progressively with the purpose to ultimately transfer the management of such facilities to the user communities or local institutions. It is impossible to imagine or implement effective and sustainable solution without full and active participation of the public at all levels of water management. The public involvement and participation can be achieved by raising the awareness of the public regarding the same. Such awareness can be raised by bringing requisite changes in the existing education system, promoting and enhancing research and development, and with the cooperation of civil society.

2.25. Role of NGOs in Water Management

There are number of NGOs those are instrumental in implementing the governmental policies and plans, and are involved in research and advocacy with regard to water resources. Arghyam (Karnataka), CSE (Delhi), MYRDA (Rajasthan), Sadguru Foundation (Gujarat), WOTR (Maharashtra) are few of examples of the NGOs working in the preservation, conservation and management of water resources in the country.

Tarun Bharat Sangh is one such organisation whose works are commendable in this field. This organisation is run by renowned environmentalist named Rajendra Singh and is supported by the United Nations. It has also received Magsaysay Award for Community

---

469 Ibid.
leadership in the year 2001. This was given for the endeavors it made for collecting rain water by constructing check dams in the state of Rajasthan. Rajendra Singh is renowned personality in the field of water management and popularly known as the 'Jal Purush' or the 'Water man of Rajasthan' and later Water man of India.473

Tarun Bhagat Sangh has been actively working in the district Alwar of the state of Rajasthan since 1985. It has been focusing on the restoration and revival of streams, Johads474, and rivers in the area. Presently, there are over 4500 working Johads in district Alwar and nearby areas. This organization revived the traditional techniques of storing water in those parts of the villages which were abandoned for decades in the past.

The work done by the organisation for the revival and replenishment of the five rivers that remained without water for a long period is really admirable. It is the result of the efforts of the organisation that after a long period of dryness for almost three decades river Ruparel has started flowing again. Even the Arvari River basin became a water source again due to the active contribution and efforts of the organisation. In addition to this, reconstruction of the traditional structures of water storage on such a large scale is a positive sign of development in the state. The entire credit goes to Rajendra Singh and his active team for their sincere efforts in reducing water insufficiency in the rural areas of Rajasthan. Now in many villages, people have begun constructing their own Johads. In many places now, Women no longer need to walk over distant places to fetch water for their families. People were made aware to understand the significance of water conservation. They were educated that building Johads is an appropriate solution for their problem of water scarcity. In addition to this, they were also educated that Johads is a decent means to manage the ill consequences of drought and floods. The villagers were persuaded by Rajendra Singh along with his other team members to revitalize their traditional sources and consequently it has brought great changes in the lives of people in Rajasthan.

Rajendra Singh strongly opposes the commercialisation and the business community participation in water related activities. According to him “The companies always bother about the profit, they are not bothered about our common future.”475 Rajendra Singh insists on the local solutions and practices of water preservation and management and asserts people to find

474 ‘Johad’ is concave structure which collects and store water throughout the year. It is used for the drinking purpose by humans and cattle.
475 Supra note 473.
ways to help themselves.\textsuperscript{476} He opposes money and technological solutions offered by corporations to the water stressed areas and the local and regional communities facing water crises.\textsuperscript{477} The works performed by Rajendra Singh is a motivation for many other countrymen.