



A Research Paper on Impact of Large Dams on Environment in India

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Abstract: - Water is very important and key elements of human life for drinking purposes as well as related to human daily need. Increasing demand of water caused the emerging science of dam engineering and also construction large dams for Irrigation purposes, drinking, industrial, flood control, power generation, recreational, fishery and tourisms etc. In India inland water bodies combined together, stretch over 45,000 km across the country, making India one of the richest fish germ-plasm in the world. However, the reallocation of water through dams has severely affected the ecosystem of these rivers, as the downstream flows are restricted and mangroves vanish. Large dams can remarkably effect on the environment as a non- stabilizing factor in nature in various stages of construction, operation and end of life by stopping the flow of the river and stored water on its up-steam site. However, if the environment cannot tolerate this instability, the results of the destruction of this structure will gradually rise and the objective of dam construction will be lost. In this paper, we will review the environmental impact of construction large dams on some rivers across the country and we will separately examine the use of several large dams as an important and effective option.

Keywords: - Large Dams, River, Environment.

I. INTRODUCTION

Water is considered as one of the fundamental basis element of development, economic prosperity and social well-being and its shortage will cause many limitations in modern world. Water shortages directly and indirectly effect on many industrial sectors such as the control, storage and water supply, distribution types, transmission, factor productivity, planning, conservation management and in this regard, it is considered to be constructed large and small dams and irrigation networks of rivers in different countries to take advantage of the water potential to meet the needs and objectives such as drinking, agriculture, industry, generating hydropower energy, flood control. In additions, dams provide water during a year; they can be used for fishery, boating and recreational opportunities and tourist purposes. Besides all the benefits mentioned regarding to dam construction and especially for large dams, construction of dams and power plants can be short-term and long-term negative consequences on environmental situation where the dam is constructed directly and indirectly. For this reason, the below are some of the damaging environmental effects of dams according to the guidelines of the International Committee on Large Dams.

India is the second biggest inland fish producer in the world. However, though blessed with one of the richest riverine fish gene pools and a network on hundreds of rivers, floodplains and countless tributaries, floodplains, riparian tracts, mangroves and capture fisheries is declining sharply and many have collapsed, despite having a great potential to grow.

II. ENVIRONMENTAL IMPACT OF LARGE DAMS

Below are some of the damaging environmental effects of dams according to the guidelines of the International Committee on Large Dams.

- i. **Physical and Chemical Effects:** Creation barrier motion of flow, sedimentation in reservoirs, severe erosion along the river, valve blockage, raising humidity, climate changes, ground shaking, increased surface evaporation, rising ground water and changing lands to salinity.
- ii. **Biological Effects:** Reduction in nutrient concentrations downstream of dams, growth of phantoms, Growth of river plant, extinction of some species, getting limited fish spawning areas, thermal stratification, serious changes in water quality, increased opacity of water, Releasing of toxic substances (pesticides, toxic metals such as arsenic, lead, nickel, mercury, cobalt, and zinc etc.), increasing the concentration of pollutants in the intake water in periods of water shortage, deterioration of vegetation, Greenhouse gas emissions.
- iii. **Health Effects:** source of many infectious diseases (ex. malaria), creating a favourable environment for oviposition of mosquito or other insects.
- iv. **Economic and Social Effects:** increasing urban population, immigration of people, destruction of roads and power transmission lines, lack of access to some of Points of the range, loss of valuable agricultural lands, unemployment, destruction of historical and archaeological sites, destruction of some places with specific topographic.
- v. **Impacts of Dams on Noise Pollution:** During the construction phase, disturbing the peace of leaving wildlife, increased risk of loss of animals, demolishing there habitat. Large dams and power plants, has caused large changes in the environment and it will lead to the destruction of many environmental structures and migration of bird species due to noise.

- vi. **Effect of Dams on Ecosystems of Aquatic Organisms:** Increasing of BOD in water formation of anaerobic degradation environment, formation of dark and funky environment, the exceeding of phytoplankton, growing of macro-flora in the water, decline in fish populations, increasing evaporation and transpiration, making a barrier to stop fish from passing.

III. FOUR LARGEST DAMS IN INDIA AND THEIR ENVIRONMENTAL IMPACT

- i. **Tehri Dam:** Located at the confluence of the Bhagirathi Rivers, near the city of Tehri, the dam is a multi-purpose, rock and earth-filled embankment dam and at 260 metres is the tallest in India located in Uttarakhand, with a maximum planned capacity of 2,400MW. The Tehri Hydropower Complex consists of the Tehri Dam and Tehri Pumped Storage Hydroelectric Power Plant. The construction of the dam has resulted in destruction of houses of thousands of people. The relocation of more than 100,000 people from the area has led to protracted legal battles over resettlement rights and ultimately resulted in the project's delayed completion.
- ii. **Koyana Dam:** Located near Paltan, in Maharashtra's Satara district, close to the Koyana River, the Koyana Hydroelectric power plant with a capacity of 1,960 MW. Construction began in 1954, and the project has been developed in four stages. The Koyana Project has four dams, the largest of which is constructed across the Koyana River. Koyana dam has responsible for the triggering the earthquake in Koyana catchment region due to excessive water pressure created in the micro-cracks and fissures in the foundation units under and near the reservoir.
- iii. **Srisailem Dam:** Srisailem Dams on Krishna River construction is began in 1960, but took more than two decades for completion, being unveiled only in 1981, with a length of 512 metres and a height of 145 metres and installed capacity is 1,670MW. Srisailem Dam is considered to be India's third-largest working hydroelectric power project. It has a reservoir measuring 616 square Km. Constructing Srisailem dams across rivers causes the deterioration of the rivers, but also damage and exclude valuable ecological services, which creates a threat to biodiversity by changing flow patterns.
- iv. **Sardar Sarovar Dam:** The Sardar Sarovar Dam, which has a capacity of 1,450MW and is operated by the Sardar Sarovar Narmada Nigam. This concrete gravity dam is located on the Narmada river, near Navagam in the state of Gujarat. Although the foundation stone was laid in 1961, the project began to take form in 1979 with the help of a World-Bank funded development scheme and construction began in 1987. The Sardar Sarovar Dam is one of the major big dams that has an issue in India that has good outcomes for being built and also bad ones too.

This dam will have the one of the biggest impacts in India considering it will be the biggest dam constructed in the world. But the plans for it will leave many people in India without homes and will harm their food production. Narmada River system on the west coast experienced significant decline (68.24%) in Hilsa catch in 2004-05 (4866 tons) as compared to 1993-94 (15319 tons) and this decline was prominently recorded from 1998-99 onwards. (Akash Kumar Gupta, IJMER-2018).

A. Abbreviations and Acronyms-

BOD- Biological Oxygen Demand and MW- Mega Watts.

B. Units-

Km- kilometer and MW- Mega Watts.

IV. CONCLUSION

- The reality is that, the environmental effects are not considered fully and completely for the most dams have been constructed in India. One of the effects and interference of human in the ecosystem is constructing large dams on rivers which cause big changes in ecosystems and lengthening project.
- Fish populations are highly dependent upon the characteristics of their aquatic habitat which supports all their biological functions. Migratory fish require different environments for the main phases of their life cycle which are reproduction, production of juveniles, growth and sexual maturation.
- The life cycle of diadromous species takes place partly in fresh water and partly in sea water: the reproduction of anadromous species takes place in freshwater, whereas catadromous species migrate to the sea for breeding purposes and back to freshwater for trophic purposes. The migration of potamodromous species, whose entire life cycle is completed within the inland waters of a river system, must also be considered.
- The construction of a dam on a river can block or delay upstream fish migration and thus contribute to the decline and even the extinction of some species that depend on longitudinal movements along the stream continuum during certain phases of their life cycle.
- Mortality rate of fish passage through hydraulic turbines or over spillways during their downstream migration can be significantly high. Habitat loss or alteration, discharge modifications, changes in water quality and temperature, increased predation pressure as well as delays in migration caused by dams are significant issues.
- Surface water in dams is naturally replenished by precipitation and naturally lost due to evaporation; excessive evapotranspiration and excessive groundwater recharge which leads to humidity and soil salinity and affect aquatic ecosystem.
- Adverse and inconsistent impacts of large dams in India can be found in precipitation socio – economic, string, lack of proper utilization management, water loss issues, displacement of people and dam lake water problems in order to provide drinking water due to the poor quality.
- It must be admitted that conceptual for all definitions provided of sustainable development are based on system integration, relationship system of economic, social and environmental factors and emphasis on responding to the needs of the current generation and next generations and accepting capacities and limitations of environment, so, the only way to achieve sustainable development is enough attention to all ecosystems in downstream and upstream dams that have decided to build them.
- Although the only natural input to any surface water system is precipitation within its watershed, the total quantity of water in that system at any given time is also dependent on many other factors. These factors include storage capacity in lakes, wetlands and artificial reservoirs, the permeability of the soil beneath these storage bodies, the runoff characteristics of the land in the watershed, the timing of the

precipitation and local evaporation rates.

- Human activities can have a large and sometimes devastating impact on these factors. Humans often increase storage capacity by constructing reservoirs and decrease it by draining wetlands. Water conservation is a practice in which the effective and efficient way of use water that reduce the demand of water for establishment. For example, recycling of wastewater comes from domestic and industrial activity used for some other purposes like cleaning, agricultural, etc.

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