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Evaluation the Impacts of Dams

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ABSTRACT

Dams; are used for various purposes as drinking water supply, energy production, recreation, strategical purposes, fisheries, socio-economic purposes, irrigation, flood control, river transport and others. Food, water, and energy, three of the most critical issues for human development, are all connected with dams. Dams are one of the most important structures in the water resources transmission and storage systems. Dams are the most natural and cheapest way of energy production in the country; due to the significant positive or negative effects to the natural environment and human life have always became focal point of the national and international society past and today. However dams have some positive and negative effects on the environment; very large dams increase the humidity of the air and change the climate and ecological balance of the region. Hence, given the importance of the positive impacts of dams, it is essential that negative environmental impacts of the dam to be minimized for sustainable development. The current paper evaluates the positive and negative environmental effects of dams.

Keywords: Dam, ecosystem, environment, positive effects, negative effects.

I. INTRODUCTION

Dam; the set built on rivers with human labor and technique to collect water is defined as lakes or artificial lakes. In other words, dam lakes; are artificial lakes built on rivers for electricity generation, drinking water supply, irrigation, fishing, flood control, river transportation and recreation, where water accumulates in the basin formed by a blocking structure. Dams are structures that prevent the flow of water and allow it to accumulate in a certain area. Dams can be established in large or small areas where geographical conditions are suitable. Established dams are used in many ways, from inland water supply to electricity generation. However, dams can cause some problems in the regions where they are established. At the present time, dams are considered as important water structures constructed in all parts of the world, especially in arid and semi-arid areas for surface water management. Dams have close relationship with geological conditions in which they were constructed. Hence, all risks and all negative effects of dam and reservoir need to be reduced, as much as possible [1]. The dam construction has been known for long time as being a suitable solution to supply water for agricultural, industrial consumptions, stopping the river flow and water storage, drinking, flood control, production of hydroelectric energy, quality control, and so on. In addition, construction of dam can result in development of urbanization, agriculture, industry and it finally leads into a suitable environment for biological activities of microorganisms and reduced water quality [2].
Although dams have benefits, it should be claimed that there is almost no dam without environmental negative affects in various forms [3]. “The environmental effects of construction of dams and reservoirs after the end of the World War II were well recognized and knowledge on the risks of dam construction on the environment reached its peak in the twentieth century” [4]. “Paying increased

attention to environment has caused conflicts among engineers, planners, and some eco-friendly groups against structural activities. Moreover, preventing the construction projects will not possible for development of technology and enhancing the quality of life. Thus, in addition to technical and economic standards, environmental standards should be considered" [5]. The construction of dam and reservoir projects plays important roles in the development of hydropower and the regulation of water resources of a country. But it also makes a profound effect on regionecological environment. It has become the key issue of dam and reservoir projects how to coordinate the relationship between construction and environmental protection, and to realize their harmony development. Impacts of dams can be positive or negative. Before the dam is built, some important considerations should be taken into account to mitigate adverse effects of dams, such as; reservoir project mainly focuses on water temperature, aquatic livings, environmental geology, terrestrial livings, hydrological regime, landscape and heritage, and the resettlement of migrants from reservoir. Dams substantially affect their places and close vicinity from sociocultural, economic, ecological and ecosystem aspects. Nowadays studies about positive and negative affects of dams on the environment and on the ecosystem often deal with impacts of dams on both local and regional climate; it was found out that dams often affect the climate at local level. In addition, all the effects of dams on the ecosystem should be taken into account and the dam construction should be decided accordingly.

According to the studies of the World Dams Commission, while the economic output of dams is generally increased, their social and environmental costs are not taken into consideration or shown low. The socio-economic and cultural effects of dams are felt positively or negatively from the construction phase. Today, due to dams, many settlements are inundated, nature and cultural riches are damaged, fertile agricultural areas disappear, transportation systems routes change.

When the positive and negative effects of dams are examined, we see that they have more positive effects. Therefore, hydroelectric energy generated from dams is considered as renewable energy. In addition, the use of the current stream potentials is an important issue for countries and our country. In this article, we give information about the positive and negative effects of dams, and the precautions and suggestions that should be taken in order to minimize the damage of the said structures to the environment.

II. EFFECTS OF DAMS ON THE ECOSYSTEM

Dams, besides all these positive effects; they also have negative environmental impacts on seismic events, ecological balance of the basin, architectural and cultural values, water quality, parasitic diseases caused by water, hydrological regime, the forest and agricultural areas in the reservoir, and the effects on the local people who are forced to migrate. Therefore, when planning dam projects, technical and economic considering many environmental and social factors as well as feasibility, environmental and social feasibility criteria are also important. In these projects, the importance of national and universal values that are likely to be lost or affected should be evaluated in terms of the future of the society.

Rivers are one of the most important factors that shape the earth. Dam construction is seen as the most intensive use of rivers all over the world.The intensive use of dams brings environmental problems with it. The increase in the number and size of dams on a river is directly proportional to the magnitude of natural destruction. These negativities caused by the construction of the dam generally arise due to the land potential not being evaluated correctly. It is also known that the dam lakes change the climate characteristics of the region in which they are located and give a different climate structure to the region. The changes that occur with the start of dam construction are two fold. The first of these emerges in space as a human living space. It causes the change of settlements and the destruction of cultural areas. Secondly, it shows itself in physical conditions. These are destruction of

flora and fauna or forced migration, shrinkage of agricultural areas and all kinds of environmental pollution.
The impact of the environment on lake of dam might emerge in two forms; negative or harmful environmental impacts and positive or beneficial environmental impacts. "Generally, environmental studies of dams should be conducted in the form of sections, which include physical and chemical impacts, biological impacts, health impacts, and social and economic impacts. However, in most of the cases, the environmental impacts are examined and evaluated separately for the two periods of construction and exploitation" [5]. Some social and economic effects of Dams; the majority of people settle around the reservoir of the dam's lake, and this phenomenon leads to increased population of cities; dam construction also has a negative impact on facilities and structures; loss of agricultural lands to provide materials cause unemployment for great number of people and the employment gets some problems such as security of city and village, attracting tourists, and they can change the traditional and cultural structure of settlement unit; historical places with special and beautiful topography, found rarely by going under water [6]; by development of region because of dams, traffic state will change and the traffic of vehicles increases, leading to increased air pollution [7]. Some physical and chemical effects of Dams; dam construction acts as a barrier for movement of floating objects along rivers; sediment materials in the lake of dam causes reduction of the solid materials, blocking the floodgates and dischargers; occurrence of many floods causes some physical, chemical, and biological changes in downstream of dams; it can causes salinization and salinization of lands reduces yield of salinity-sensitive products, which it make land unproductive [8].

Dams have negative effects on natural systems, from deterioration of water quality to the change in the balance of the water flow of rivers, from the decrease in groundwater level to the drying of reeds, the destruction of many species due to the endangerment of living habitats and coastal erosion. The rivers with dams on them hold the nutrients transported due to the sediments of the dams. For this reason, efficiency in the deltas decreases as it cannot carry sediment to the deltas on the coasts. Such impacts have serious consequences as they are not fully taken into account during project phases.

Some health effects of Dams; lake of dams can be source of malaria and blood diseases; insects and pathogenic bacteria is seen more [9]. Some negative effects of aquatic organisms of dams; in the construction phase of the dam erosion and sedimentation occurs at the dam downstream, which causes aquatic animals die and interference of ecological balance of these environments [7]; dams are considered barriers for movement of fish from the upstream of river to downstream of river; "Drainage of swamps and cases like this and drilling operations alongside of river will have destructive impacts on aquatic animals and even lead to their death" [10]. Temperature, salinity, and oxygen amount can be changed vertically, resulting in non-oxygen conditions in the dams lake; flow regime of river might change, and the sudden flood of water behind the dam threatens the vegetation and animal life around the coasts [5]. Some biological impacts of dams; decrease amount of the nutrients at dam downstream and these situtiation affects on the plant and animal community of cited area; water storage impact in shallow reservoirs on the growth of planktons and may causes eutrophication; water temperature, water quality, distribution of salt, and oxygen might be changed due to formation of the reservoirs; some species might change or die out due to erosion or water turbidity; one of the most affected areas are coastal waters, when the reservoirs are filled, as lands are pulled toward under water, dry lands are reduced and water boundaries are expanded, therefore, habitat of humans, animals, and plants is changed, and the forests and agricultural lands may be pulled toward under water; the concentration of surface water pollutants is increased in downstream parts pending the water shortage time [7].

The evaporation of some of the water in dams causes an increase in the ratio of salt and other minerals in the water. In addition, as the oxygen intake capacity of the stagnant water in the dams

decreases, the natural cleaning capacity decreases and the eutrophication process begins in the lake. Changes in lake water quality also change aquatic life.

Some effects of dams lake on atmospheric system; dams cause change in the content of air humidity, air flows, air temperature and climate in the region and the surrounding areas and these changes affect the human health and other living organisms; some of these changes are increased absorption of solar energy at the region level, the exchange of temperature between the lake water of dam and surrounding atmosphere and changes in the rate of evaporation and fog; dams is release of greenhouse gas from reservoirs due corrosive vegetation and carbon flow from the basin and these causes global warming [8]. Some effects of dams lake on noise pollution; machinery, devices and explosions used for construction of the dam during the construction phase, the noise level in the region is increasing sharply and these operations disrupts the relaxation of the region and leaves undesirable impacts on wildlife and human life.

Some impact of dams construction on seismicity and hydraulic system; some earthquakes and erosions are attributed to dam construction; these earthquakes occur due to the heavy weight of lake water and disturbed balance of pressure in various layers of the earth; the main important hydraulic effect is the drainage of the basin flows into a fixed water resource rather than discharge into river bed; thus,the stability change will occur in the downstream, since downstream would dry partially or completely due to closure of floodgate it leads to disturbed balance in the downstream ecosystem,

III. RESULT AND RECOMMEDATIONS

As the size and number of dam projects increase, their environmental impacts and the magnitude of destruction increase in parallel. Large dam projects that cause rapid changes in the geographical environment, in general, due to incomplete and erroneous planning, due to the fact that the land potential is not evaluated correctly, it causes serious problems in catastrophic scale and causes the hydro-electricity projects to be viewed with suspicion. The dam and reservoir construction play the important role in Turkey's hydropower development and water resources regulation. Dam construction projects are considered as national basic items, fort his reason it is necessary to carry out environmental impact post assessment to assess the actual impacts of the dam construction on ecology and environment, which can provide scientific basis for better development of dam projects and propose some reasonable measures to reduce the adverse impacts.As discussed in the present paper, despite many benefits of construction of dams and ignoring their negative impacts on the environment, and finally human life in the long term, it might be better to think on using alternative methods to control water and flood.

Some of the measures can be taken in order to decrease the negative impacts of dam construction: plant and animal species especially endemic ones in the region must identified by experts; ecological boundaries of the project should be determined; training and enhancing the knowledge of residents of the affected region to reduce environmental damage especially when dam's lake is used as a tourism region. Dams are also one of the most important sources of energy production in countries like our country, whose economic policies are largely industry-centered and are rapidly industrializing. With the construction of the dam, spatial and socio-economic changes have occurred in our country as in the world. In addition to contributing to the national economy, the projects developed in particular accelerate the social and economic development of the region, thus creating different employment areas in the region and increasing the income level and living standards. On the other hand, dam construction causes many physical and human problems in the region and indirectly throughout the country.

Today, various problems have arisen with rapid industrialization. The most important of these problems is the deterioration of the balance in the ecosystem. Ecosystem disorders affect humanity

directly or indirectly. For this reason, planning dams considering their pressures on the ecosystem is of great importance both for the protection of our country's natural resources and for the future of humanity. In addition, a regular layout plan should be constructed in addition to the functions that existed in the previous settlement and suitable for the settlements that were evacuated with the dam construction. Otherwise, the people in these evacuated settlements are forced to migrate because they cannot continue their activities and social lives in the area they were previously and these migrations cause unresolvable problems in big cities.

Due to the increased needs of people to hydroelectric power, dam projects has become a highly essential issue in human life. As the positive side in the cannot be neglected. On the other hand construction of dams has a great negative impact to the environment. Therefore hiding behind the construction of dams must involve the introduction of latest techniques which would further minimize the negative effects of dams on environmental, ecosystem, climate, health, biological, chemical, physical, social impacts that are which should focus on the sustainability of the environment and the nature.

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