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The Environmental Impact of Hydroelectric Power Generation

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Abstract: Hydroelectricity is daily elements that appears everywhere in human societies. It is a clean and renewable resources that is produced by fast speed of water. The effective way of generating energy feasibly prompted to different countries that have rivers. The construction of dams boosted tourists, fishing industries, timbering, and hunting. Expanded more leisure activities for people. The increases of dams also impacted on local economies such as jobs and selling electricity. However, this paper also highlights that these dams also damaged local ecosystem, deforestation, and pollution. They generate electricity by spinning the blades. As a consequence, fishes can smash and crewed into those machines and killed, including some endanger animals. Dams destroyed their biomes. Some weak dams still depend on burning coals and fuels. Waste gases get absorbed by water and algae, and finally pollute water. The polluted water can kill plantations and crops, hence causing economic losses and damaging the ecosystem. Deforestation is also caused by those waste chemicals and gases. The waste absorbed by soils caused acidic soil, and waste gases will cause climate change, which is the main reason of biome shift or deforestation. Poor soil availability conducted by acidic soil step forward decreasing of plants. Generally, dams directed and undirected caused environmental damage, that humans can never affords.

Keywords: Hydroelectric dams, pollution, ecosystem, heavy metals.

1. Introduction

With the development of the technology, hydroelectric power has become a popular way to generate electricity. Countries such as USA, Canada, China and certain European nations have widely adopted it in their daily lives. The usage of hydroelectric power is the most widely used energy, accounting for around 16% of the world electricity generation [1]. It is considered the cleanest energy source available. China, for example, has the world's biggest hydroelectric dam, the Three Gorges Dam. It offers the cheapest cost of resources, because of excellent location and a huge amount of flooding water.

However, even though hydroelectric power is considered as the cleanest and cheapest form energy, the environmental damage it causes is tremendous. Building hydroelectric dams can damage river ecosystem, forests, and can lead to ecotoxicity if the dam release contaminating chemicals into the environment [1]. This paper examines the impact of hydroelectric power generation in our daily activities, health, environment, and local economy. More specifically, it is one of the classic examples of humans' interpretation of natural habitats.

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2. The Benefits of Hydropower Dams

Hydropower dam is a construction that can transfer flowing water into electricity, which usually build in the middle of the rivers. Like other dams do, it can store the water when it's needed, attracting tourists, and also renewable. The exist of these dams greatly improved and enhanced those areas that are lacking of electricity resources, and it can be transferred to all over the place around that region.

Research shows those kinds of dams can produce 16% of electricity in the year of 2010, are the most productive renewable resources in the world, providing 97% of world renewable resources around the world every year [1]. The dams give the access for people to hunt and fishing on the dam which allows people to develop their leisure hobbies. Dams are the cheap and sustainable constructions, means that the water can cycle back to the rivers by perceptions and floods, if the rivers are not dries, the dams will keep on working until the water gone.

The surrounding areas of those dams are also well protected by humans. Dam operators usually rent or bought these areas as constructions and parks. People can go for a walk and spend their time beside the dams. Moreover, the dams may impact the local economies by open more opportunities for jobs and by selling tickets to tourists. The extra electricity will be sold to electric companies or the local government. The income of selling electricity will goes to employees and supporting rural areas development. Three Gorges Dam's income each year will goes to the local government in their further use, which goes to the construction of the towns in Guizhou and southwest areas [2].

Hydroelectric dams also played a role of blocking plastic and other trash going into downstream – the unique design of the filters, and their spiral blades, they significantly blocked the wastes from upper stream, prevent them decomposed in downstream. The most positive affect of hydroelectric dams is actually achieved automatic control, 24-hour non-stop operation, and unmanned operation, beside the basic technology repairman and securities, it can run without anybody by itself. Auto operation provided employees an easy work, without generating water by employees themselves. The Tree Georges dam in China also helped with suppling water to rural area households. Waters its supplied can use for agriculture, daily usage, and city cleaning [3]. Those examples have reflected dams' influences on our daily life.

3. The Disadvantage and Damages of Hydroelectric Dams

Even though the hydroelectric dams are considered as the cleanest renewable electricity production, but it will actually bring environmental damage such as pollution, deforestation, damage of ecosystem and biodiversity.

Water will get polluted while the hydroelectric dams built on the rivers. More carbon dioxide gets produced. Carbon dioxide is the gas that produced by combustion, and respiration, it is an acidic gas, it will damage the balance of alkali and acid in the water. Carbon dioxides, sulfur dioxide, and nitrogen dioxide will go into atmosphere and percipients drop into the water cycle, caused rivers, forests, and deforestation. The common phenomena of water acidification present in decrease of carbonade organisms, for instance clams, snails, and other animals with shells. The acid in the water will decrease the oxygen level in a body of water [4]. Soils from Lanceng river upstream and down streams shows the heavy metals are over ranged in 2005 [5]." Due to the deforestation, plants will willow because roots lost. Roots are natural filter, they can absorb contaminated materials, with the decrease of roots will cause plants lose the support and lost their straw to filter the food and pollutions [6].

The hoover dam is an old hydroelectric dam that cite on the Colorado River, linking Arizona and Nevada together. It was built between 1931 and 1935. They research shows that the Dam tremendously consumed the Colorado river in 100 years, the river nowadays is only third full compared to the river before 100 years ago, landscapes seem become permanent desert with few

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grasses on the shores. Most importantly, people in Arizona are depending on this river to irrigate the crops on the fields [7]. Experts comes up with an assumption of utilizing the rain from storms to refill the water in the river, but depend on the disadvantaged location of this dam, it could not work out.

Deforestation and certain health concerns can be caused by these dams. The original use of the dams was avoiding flooding in the provinces like Hunan, Guizhou, and Sichuan. But some areas, especially some forests need flood as their water supply. Dams as a block to impede flood getting into lower reaches, it somehow indirectly dried these lands and the plants there. Contamination caused by hydroelectric dams also directly influenced deforestation. Heavy metals like arsenic, cadmium, chromium, and so on, those chemical materials are the waste from the industries.

Some hydroelectric dams store chemical wastes in containers, and destroyed in concentrated ways, the cheapest way of it is to pour the waste in to the river, let it go with the water flows. Unfortunately, the waste can kill trees, pollute soil, degrade soil quality, erose the soil, and reduce the plantations around the polluted areas. Chemical wastes will leak into farmlands at lower reaches. Crops absorb the waste, transport and stored in roots and leaves. Chemicals and heavy metals cannot disappear while people or livestock consume them. They may remain in the body for a long period, slowly vanish the organs until consumers die.

Like deforestation, forests are the home for plants and wild animals. As forests disappearing, the extinction rate of these wild life tremendously increased. Birds in North America are facing extinction, because they are starting to lost their natural habitats along the rivers. New born fishes in Yangtze River will get stuck on the electric generator of the dam, as the machine start, those fishes will brutally get smashed.

The waste gases can influence climate change. Some dams are not that advanced, they might need to burn some fuels to help it spin faster in order to get electricity generated. Low concentration of heavy metal can also unbalance the algae population in a river stream. Excessive number of algae can consume oxygen and block the sunlight, it directly kills aquatic plantations, aquatic organisms, and pollute rivers by creating dead zones. As the ecosystem got damaged, food chains will get effected, local economic will also got impact by decrease of fishing catch and dropped the number fishers around that area [8].

Certain dams are considered as a tourist's place, such as the Aswan Dam in Egypt, the Hoover Dam in Las Vagas, and the Three-Gorges Dam in China, it takes around 1~7 millions of tourists each year [9]. Within dams bringing local economy growth, trashes that tourists produced are astonishing. Some of the trashes are plastic, which can not be degraded by environment. The nanoplastic will flow with water, stick or absorb by organisms.

There are two common results. First, nanoplastic will consume by other organisms, could be human, other natural enemies. Nanoplatsic is ecotoxic, it is soluble in body, can be release with biofouling and oxidative degradation, the degradation of nanoplastic will sediment in soil, accelerate soil moisture evaporation and loss, creating a harmful environment for plantation, agriculture, and pasture. Decrease and step forward the reduction of crops lifespan [10]. Second, nanoplastic will be easy to access the environment by flowing with water into ocean, sediment in the deep ocean, from 9 to 23 million metric tons per year. Nanoplastic will get into water cycle to travel around landscapes; mountains, lakes, rivers, oceans, cities, and rural areas, impacting organism's lifespan, daily activities, damaging public facilities [10]. Trashes can cause serious harm to dams. They could stick into small gaps between engine and engine shaft, engulf the normal power generation of the dam, influence the usages of dams, and slowing down the generation efficiency.

4. Conclusion

Undeniably, hydroelectric dams are still the one of the cleanest direct energy generators that exist in the world today. Unlike other electricity generators using burning fossil fuels as the motivator.

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Hydroelectric dams used the speed of water drive the spiral blades to rotate as the motivation to generate electricity. While it generates electricity also prevented flooding. However, it is renewable but harmful. Deforestation, water pollution, damage of biodiversity and ecosystem are the obvious environmental aspect that people need to consider about. Potential damages and harms can result from these dam constructions, including soil lost, degradation, and the drought caused by the unbalanced ecosystem. These perspectives are the factors that politicians and individuals need to reflect on and take actions to address.

The ways to prevent them include the following measures. First, local administrative institutions should hire manpower to monitor tourists, recruit official experts to regularly check and examine the forest's ecosystem, and set up a special gate for circuitous organism. At the last but not least, hydroelectric dams did bring lots of advantages and efficient energies to our daily life. However, human interventions into the environment are also damaging other species and plants in this planet. The Mandela Effect reveals that human behaviors will eventually effect on human themselves. These issues necessitate significant efforts and resources to protect and improve the current environment and ecosystem balance. To put these measures into practice, it is never too late to pay attention to individual behaviors and seek to protect environment as well as human's future.

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