CLIMATE CHANGE AND WATER CRISIS

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Abstract: India is facing the worst water crisis in recent history. The increasingly severe situation is getting worse with nearly 600 million Indians facing high-to-extreme water stress. By the year 2030, India's water demand is expected to be twice the available supply as the water supply continues to decline. This is largely due to the impacts of climate change. Global warming targets already vulnerable communities through droughts and floods and has enormous effects in the days to come.

Introduction:

Water is a critical ingredient to all life on earth and is without substitute. Although there is an abundance of water globally, only a limited amount of that water is suitable for human consumption and just a fraction of that is accessible through current technologies. As populations continue to grow and temperatures continue to rise, the already finite stock of fresh water is being drawn on at an exponential rate. An important question to ask then is how will a changing climate affect the hydrologic cycle in the future? As temperatures change, so will the distribution and availability of fresh water. The potential for global warming to disturb fresh water resources is tremendous, so it is important to predict and prepare for these changes. This article focuses on the effects of climate change on fresh water resources in India and discusses the potential impacts on the country's demography. The predicted effects of global warming vary, but India is especially susceptible in terms of environmental, economic, and social impacts. India has one of the largest populations in the world and depends heavily on agriculture. As a result, there is a huge demand for fresh water. With an increase in temperature, the distribution and availability of fresh water is likely to change and the country's demography

More than 600 million Indians face acute water shortage according to a report by NITI Ayog, a prominent government think tank. Seventy percent of the nation's water supply is contaminated causing an estimated 200000 deaths a year. Some 21 cities could run out of ground water as early as next year including Bangalore and New Delhi. Forty percent of the population or more than 500 million people will have no access to drinking water by 2030. These sources indicate that India will experience more intense monsoon seasons with less rainfall during the winter, which will result in regular extreme weather events and a shift in India's demography as

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its agricultural sector could be crippled. There is some skepticism as to how severe the effects of climate change will actually be, but predictions show that India will be put under immense pressure to provide for its people as fresh water resources diminish. India is a unique location in terms of its geography and demographic characteristics. With the Indian Ocean bordering the south and the Himalayan Mountains in the north, India has an incredibly diverse landscape those transitions through forests, deserts, plains, and mountains. Home to more than a billion people, India's landscape is put under tremendous pressure to provide for its dense population. Fresh water is an especially important resource as India relies heavily on irrigation to keep up food production: About 83% of the available water is used for agriculture alone [1]. With an increasing demand and only a limited supply, fresh water is becoming more and more difficult to come by. Climate change will surely make problem worse. It's uncertain what role of higher temperatures have played in recent droughts, as the climate models have mainly predicted increasingly intense monsoons. But the longer term forecast is that the extremes will become more extreme threatening more frequent flooding and longer droughts.

In the past few decades, India has seen rapid growth in its populations as well as its economy, industry, and agricultural sector. India's growth coupled with climate change has put a huge strain on the nation's fresh water resources: Urban agglomeration is causing radical changes in groundwater recharge and modifying the existing mechanisms [2]. India's large, developing population is forcing climate change that will no doubt have an affect on the hydrology of the region. The IPCC Special Report Emissions Scenarios from 2000 predict greenhouse gas emissions to increase in the future, leading to higher temperatures and more precipitation by 2100 [3]. Climate change will disturb the distribution and availability of fresh water in India, which will result in a number of social, economic and environmental repercussions.

Most climate studies predict that India will get more rain on average in the decades to come, though regional and seasonal patterns will vary sharply. A paper published last in geophysical research letters found that flash flooding will significantly increase in 78 of the 89 urban areas evaluated if global temperature rises to 2 ° C above preindustrial levels. The resulting catastrophes will disproportionately harm India's poor, who settle along anthropogenic greenhouse gas emissions are a large contributor to the changing climate and are set to grow as developing countries like India transition into a more stable position. The effects of these emissions on temperature and rainfall patterns have a number of implications, including

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increased chance of water-borne diseases, loss of soil fertility and decreased agricultural productivity [4]. As these changes take effect India's agriculture will perish, its economy will be crippled, and its demographic transition will be delayed. Higher birth and death rates, extreme levels of poverty, and instances of disease are likely to follow these changes. Together with the effects of climate change, overuse of fresh water is set to cause major changes in India's environment and economy. Fresh water constitutes only about 2.5% of the globe's 13,860,000 km^3 stock of water [5]. As climate changes and India increases its consumption of this vital resource, things like drought, salt-water intrusion, and pollution will become more common. Extreme events such as flooding and landslides will also occur more frequently with rising temperatures. Therefore, it is important for India to prepare for a number of possible climate change scenarios in which fresh water distribution and availability will evolve. As temperatures continue to rise, India's landscape will be altered in many ways. Based on the 2000 SRES 'Marker' scenarios from the IPCC, the temperature in India is expected to increase 1.4 – 5.5°C depending on emission levels [6]. This shift in temperature has the potential to change weather patterns and in turn the landscape of the country. By the year 2100, India will be faced with regular drought patterns and intense rain during monsoon season, which will lead to higher incidence of extreme rainfall events. Flooding and landslides, especially in the Himalayan region, could become a common theme of the future. Although most climate change scenarios predict increased rainfall and extreme weather events over the next century, it is difficult to know exactly what to prepare for. India is expected to experience up to a 25% decrease in winter precipitation and a 7-10% increase in summer precipitation. This change in precipitation will have both regional and national effects. For example, water stress may dry out soils to a point that they are unable to absorb the intense monsoon rains, resulting in more runoff and even greater water stress. The potential for climate change to disrupt fresh water resources varies as India has such a diverse landscape but the likelihood of disaster will only increase as temperatures continue to rise.

India's diverse landscape makes it prone to most natural disasters but as the climate changes it is likely that these disasters will occur much more frequently. The effects of extreme weather events can create a vicious cycle where damage can be compounded by hunger, which can increase chance of disease and so on until entire regions are displaced. As fresh water becomes less available crops are unable to produce as much. So climate change can also lead to increased risk of disease and hunger. The effects of climate change act like a series of dominos,

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complicating much more than just fresh water resources. For example, more severe weather events coupled with increased levels of runoff can cause rivers to change direction. Migrating rivers are a huge concern because they increase the risk of flooding and can cause displacement of millions. With India's landscape under immense pressure as it is, just a slight increase in temperatures can result in many environmental and social catastrophes.

Climate change predictions by the IPCC suggest that India's fresh water resources will become scarce in some areas and a hazard in others as weather patterns change throughout the century. India's policy makers will face many tough decisions in the near future as water resources change and the country continues to grow. There are a number of challenges that policy makers must overcome in order to prepare for the changing climate. For example, the government needs money to fund projects and further research is necessary to ensure the accuracy of these predictions. There is no doubt that India's hydrology will be affected by climate change, but further research is needed for policy makers to know exactly what to prepare for. Although there is some variability in the predictions, most sources suggest that India's booming cities and large agricultural industry will be crippled by these changes unless measures are taken to prepare for them.

India's states have created climate adaptation strategies that call for big changes in behavior. The southern state of Karnataka, for instance, developed a plan recommending increased use of rainwater harvesting structures wider adoption of drip and sprinkler irrigation in agriculture, tighter restrictions on bore wells and improved sewage management to prevent water bodies and aquifers from being polluted. But experts say these plans would be incredibly difficult and expensive to implement and inadequate even if they were realized. India needs to overhaul the way it uses water. The dry parts of the country will have to create jobs in industries other than agriculture which currently employs nearly half the workforce. Cities will need to build modern networks of water and sewage pipes, treatment facilities and wetlands and restrict development and add flood protections along waterways

Conclusion:

To say that the state of water in India is concerning is an understatement. Vast areas and the populations that live within them are being starved of water as the average temperature warms. Hundreds of millions of Indians already suffer from water stress. Climate change will only make this worse. Poor governance over the precious resource combined with irresponsible usage practices compounds the effects of an already endangered national water supply. In regions that

experience increased flooding and glacial melt, short-term spring-time excess is met with limited capacity to store and clean water, causing immediate inundations in the warmer months and scarcity in the colder ones. Such flooding has worrying implications for health, livelihoods, homes, and food security. Hostilities rise to the surface and groups with pre-existing grievances are tipped over the edge when having to compete for a limited yet essential resource. Without immediate and widespread investment into water infrastructure and profound changes to governance and policy, a changing climate will add significantly to an already difficult situation.

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