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Perspective

Impact of Climate Change on Ground Water

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INTRODUCTION

It is true that water plays a role in how climate change affects the earth's ecology, especially since any bad effects on it have an impact on practically everything else. The replenishment of groundwater storage is impacted by variations in temperature, rainfall intensity, frequency and patterns. Groundwater residence durations, however, can vary greatly, from days to tens of thousands of years or longer. This causes the consequences of climate change to be delayed and dispersed, making it difficult to identify groundwater responses to climatic variability and change. Therefore, it is more difficult to comprehend the possible consequences of climate fluctuation and change on groundwater than it is on surface water.

There is a dearth of research on the possible consequences of climate change on groundwater, despite numerous studies on the impact of the phenomenon on bodies of surface water. The purpose of this review of the literature is to provide context for a research study on what and how appropriate reaction measures should be implemented by compiling and illustrating prior work on the impact of climate change on groundwater, with a particular focus on Southern Africa. A study employing a basic empirical correlation between the average yearly precipitation and recharge demonstrated that a reduction in rainfall in the central regions of Southern Africa could have catastrophic effects on people that rely on groundwater.

DESCRIPTION

It was discovered that for places that now receive 500 mm or less of rainfall annually, a 20% decrease in mean annual rainfall volumes might result in an 80% decline in recharging. According to additional research, many coastal towns would have less access to freshwater as a result of sea level rise and climate change. This is because groundwater will become brackish and unfit for human use without significant treatment. This demonstrates that the effects of climate change on groundwater may be felt in terms of quantity or quality, with salt intrusion causing water to deteriorate.

The Intergovernmental Panel on Climate Change (IPCC) predicts that Africa would be disproportionately impacted by climate change in its fourth assessment report. Africa is expected to warm at a rate 1.5 times faster than the world average. Many parts of Africa, especially the Sahel and Southern Africa, are already experiencing these very high temperatures, as demonstrated by the increased frequency of El nino-linked heat waves and droughts. The Earth's ecosystem is impacted by climate change through the medium of water.

In addition to having an impact on groundwater storage replenishment, variations in rainfall frequency, intensity and patterns also influence the selection of suitable sanitation technology. The goal of this literature review is to locate prior studies on the effects of climate change on groundwater that have been conducted at the national, regional and international levels. Changes in recharge, base flow, seawater intrusion into coastal aquifers or increased evapo-transpiration in dry and hot weather are common ways that climate change affects groundwater.

Groundwater recharge is the remaining flow of water that is added to the saturated zone as a result of precipitation losses through transpiration, evaporation and runoff. Diffuse infiltration, favored pathways, surface streams and lakes are some of the ways it might happen. Thus, the local geology, topography, land use and climate all have an impact on groundwater recharge. Regarding the effects on water quality, rising sea levels brought on by climate change frequently cause saltwater intrusion into coastal aquifers.

Indirect impacts of climate change on groundwater

Water demand frequently rises in response to climate change. Nonetheless, a number of stressors, both climatic and non-climatic, are responsible for the rising consumption. There is a growing interest in analyzing how climate change is affecting groundwater resources, especially in Southern Africa. This is because there is a shortage of water due to rising water demands for drinking, industrial and agricultural uses.

On the other hand, the hydrological reaction in surface water systems is quicker than the groundwater response to rainfall events. In general, the short-term effects of variations in rainfall on groundwater are mitigated. Because of this, groundwater supplies are comparatively well-insulated from the effects of climate fluctuation and offer a useful resource for coping with temporary drought situations, especially when used in conjunction with other resources.

"What then does this relationship between recharge and climate change as evidenced by studies alluded to, mean for water resource management?" may be one of the central questions. It may be inferred that modest variations in rainfall can result in huge variations in recharge and, consequently, in groundwater supplies. A 15% drop in rainfall, with no change in temperature, causes a 40%-50% reduction in recharge. Notably, rainfall, especially in South Africa, is highly variable and indicates changes in both aerial distribution and intensity of the climate, especially when the change is sustained for decades or longer than other climate change indicators like temperature, which show evidence of change by either decreasing or increasing trends.

CONCLUSION

In conclusion, since forests and other vegetative sinks lower greenhouse gas emissions, it is critical to protect them. If not, the unexpected repercussions can worsen the situation. In Sri Lanka, deforestation increased surface water runoff, which decreased recharge and, in turn, reduced base flow or the groundwater input to streams, during dry seasons.

These studies show that the idea that climate change has no effect on groundwater is not totally true; rather, even though groundwater is protected from direct effects, the climate may still have an indirect effect by affecting water quality, discharge or even recharge.