Reversing the climatic clock – a case for adapting healthy measures of public health, sanitation and hygiene

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Abstract

The mountains supply much-needed food, shelter, and other resources to humans, and as such are an essential economic and ecological resource. Those that depend solely on mountain ecosystems, such as farmers, have an immediate need to address the issue of climate change and unpredictability since it threatens the long-term supply of ecosystem products and services.

Farmers adapt to climate change after first noting changes and then selecting ones that are helpful (Maddison, 2006). Several levels of government, non-governmental organisations, and private businesses are all involved in agricultural adaptation strategies (farmers, firms, government). Adapting to a changing climate may be accomplished on a micro level by modifying practises like planting different types of crops or shifting when certain tasks are performed, while on a macro level by implementing policies like new credit systems and rearranging government agencies. In addition, a variety of alterations in behaviour and the introduction of adaptive behaviour are required.

Keywords: ecological, resources, variability, threatening, climate change, operations

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Introduction

There is a rising awareness that growth has been hampered by climatic fluctuation and change. The current research aimed to evaluate the techniques for adaptation that farmers have used on their farms, as well as the reasons that are driving this process. Farmers' responses in terms of health and hygiene were documented, as were their levels of knowledge and views of climatic variability and change, as well as the many adaptation techniques and variables impacting adaption.

The adaptations brought on by perceived changes in rainfall patterns appear to be different from those brought on by changes in temperature. Building water-harvesting systems is a well-known adaptation approach for those dealing with the effects of decreased precipitation, whereas switching to a new crop variety is the primary method used to adjust to rising temperatures. The sharp increase in temperature at higher elevations can be used to explain the high proportion of farmers who have switched to different crops as a means of coping with temperature variations Vedwan (2006).

Strong inter-seasonal and annual monsoon rainfall variability, as stated by Singh and Kandari (2012) and Mall et al., has led to the widespread use of collecting water structures as a means of adaptation in the face of declining precipitation (2006). Farmers' low socioeconomic status, the region's steep and mountainous slopes, the insufficient area for water harvesting due to the hilly terrain, and a lack of knowledge about climate change's effects and obtainable adaptation alternative solutions may all contribute to the region's low adoption rate for adaptation techniques. The findings of several studies on the challenges of adapting to climate change have been consistent. Research on how farmers feel about climate change shows that the mid-Himalayas of Himachal have become warmer and drier as a result of decreased rainfall. The alarming effects of rising temperatures and decreasing rainfall on agriculture in the area are a major cause for concern. The shifting weather patterns have brought up new problems.

Response of Local Communities to Climate Change

Local communities have a reputation for working closely together, having a deeper grasp of their surroundings, and acting as a watchdog for any changes that may have occurred to the local ecosystem over time. Their views of the climate are based on local problems and responses, and they are crucial for making decisions, creating development strategies that are appropriate for the local environment, and building adaptive capabilities to lessen risks related to the climate. Native knowledge and practises for managing natural resources sustainably in high-risk areas have been developed and maintained by local people.

Low and unpredictable rainfall, a lack of moisture/irrigation water, a reduction in soil fertility, and the abundance of insect-pests and disease were all cited by respondents as causes of the decline in agricultural productivity. These shifts worsened already precarious

socioeconomic conditions and placed people in the mountains at greater risk of losing their precious natural resources. Findings similar to these also were reported from other nations, including India. When more land in the valley is devoted to growing fruits, veggies, and medicinal crops, more possibilities arise for farmers to boost their revenue. Increasing the value of crops grown in the valley, such as Taxus baccata, would help farmers there earn more money (Himalyan Yew). The full economic advantages of current agrotechnologies may be realised if they were employed in a complete set of practises that included local knowledge adapted to the circumstances in the area.

Bioindicators are naturally existing living animals or species that are "particularly sensitive to climatic and biogeographic changes and are used as a quick indicator to evaluate the status of biodiversity, habitat, ecological systems, and environmental sustainability." They quickly adjust their biology, habitat, population size, and behaviour to their new surroundings.

As a bio-indicator, the number of bees, butterflies, mosquitoes, migrating birds, diverse bird species, wild bears, and monkeys is measured.

Ingenious Alternatives to Livelihoods and Lifestyle

The population of honey bees has reportedly declined over time, according to more than three-fourths of respondents. More than half of those surveyed reported a decline in the butterfly population. The majority of responders (72.5%) reported that they have noticed an increase in mosquito activity in the valley. Climate change may be to blame for the decline in honeybee populations, the rise in butterflies, and the appearance of more mosquitoes. Bird species are staying longer because they are arriving earlier and leaving later in their natural environment. Climate change, construction projects like blasting, the use of medications to treat animal diseases, and the usage of agrochemicals in apple farming could all be contributing factors. Human behaviours, lives, and even livelihoods are changing as a result of altered habitats and habits, as well as movements of some insect, bird, and animal species in higher altitudes.

Native American communities have adapted to climate change via measures such as increased use of hybrids, agricultural diversification, farming, crop rotation, agroforestry, and horticulture. "To deal with the effects of climate change, Native American communities used strategies such crop rotation, mixed farming, mixed cropping, agroforestry, agro-horticulture, and improved varieties."

Ladakh, a high-altitude, icy desert, has long relied on water conservation techniques like artificial glaciers and glacier grafting to deal with the region's severe water constraint, which has serious consequences for the local economy and food supply. Reduced risks in agroproduction may result from a more comprehensive integration of local agricultural traditions with contemporary techniques. Because of the unpredictability of the weather, "it is

important to use better management practises such agroforestry & agrohorticulture (the integration of crops varieties, fruit, fodder trees, or medicinal crops). Soil and water conservation methods, multiple stress-tolerant variety creation, timely access to agricultural inputs, communal seed and fodder bank, integrated pest control", and better agroforestry and agrohorticulture management are all examples of such practises.

Better animal breeds plus feeding practises are advocated for. Incentives to feed animals in individual stalls, reduced cattle grazing pressure, and higher livestock output: these are the results. To take advantage of new opportunities brought about by climate change, like the prospect of new crops and the possibility of longer growing seasons, "the creation and expansion of necessary infrastructure, such as roads, water management, processing of agricultural goods, eco-labeling of products, crop/animal insurance, and market access, is required (vegetable seed production, off-season vegetable cultivation, medicinal crops, and nuts)." In addition, natural resource management and conservation must account for the development of indigenous person's knowledge and competence.

World Trends Brought About by Climate Change

Native American tribes have a limited capacity for climate adaptation and readiness, such as "crop rotation, mixed cropping, agroforestry/agro-horticulture, and mixed farming. The problem is made more concerning by economic backwardness and a lack of familiarity with contemporary climate-smart practises like mulching, zero tillage, and the harvesting of snow water and glacier runoff." It is necessary to reposition the economically advantageous and environmentally responsible conventional methods by incorporating contemporary farming practises. "To take advantage of the newer opportunities and challenges posed by climate change, timely access to agri-inputs, the development and expansion of infrastructure (road and irrigation), measures to conserve soil and water, crop/animal insurance, eco-labeling of farm products, and market access are all necessary." In order to limit the loss of biodiversity and natural resources in the delicate high mountain ecosystem, scientific livestock husbandry must also be taken into account at the planning stages of development.

The majority of the locals claim that between 2000 and 2015, as opposed to 1985–2000, they have been significantly more affected by climate change. Climate change is affecting them in the form of reduced snowfall, increased temperatures, a later start to the monsoon, etc.

Before to 2000, the annual snowfall ranged from 5 to 15 feet, but it is now only 2 to 8 feet. Despite longer and more intense dry spells, fewer gloomy days, and an increase in strong winds, the majority of people believe that rainfall has reduced significantly. The time of snowfall and the monsoon's early withdrawal are two more issues that many people have reported. As time goes on, people also believe that

climatic occurrences are becoming more and more unpredictable.

Changes in biodiversity and Ecological Health

Many individuals have noticed that both the summer and winter seasons are getting warmer, with the winter season drastically diminishing and contributing to droughts due to decreased and unpredictable precipitation (rainfall and snowfall). Avalanches in the valley have also been seen to be less frequent, as well as the flow of snow-melted water and glacier runoff. Because of the less snowfall, there have been fewer avalanches this winter, less runoff from glaciers and snowmelt, and less water flowing into springs and nalas. In the mountains as well as the plains, this will have detrimental impacts on the availability of water for drinking, irrigation, and hydropower production. Some claim that while landslides have become less common in the area, cloudbursts have become more frequent.

Reports indicate that in response to climate change, new crops of fruits and vegetables have been developed. "There are growing orchards of apples and meetha tilla in several parts of the valley. In addition to the traditional staple crops of barley, wheat, pulses, and millets, the valley has witnessed a growth of high-value cash crops such as pea, apple, potato, cole crops, tomato, etc. The rise in temperature and reduction in snowfall make it feasible for these crops to flourish, thus this is done to encourage their growth."

There have been reports of changes to crops, such as reduced yields, shorter growing seasons, delayed flowering, early maturation stages, and shorter periods of development. Several individuals have also seen "an increase in agricultural diseases and pests, such as woolly aphid, scab, and wilt, in recently imported crops like apple and potato". The loss in agricultural productivity has been widely attributed to a number of factors, including unreliable precipitation, insufficient moisture/irrigation water, depleted soil fertility, and the proliferation of insect pests and diseases.

A decline in vultures, chakor, pigeon, monal, and crows as well as an increase in the number of monkeys. A decline in honeybees, butterflies, and mosquitoes. Scientists have also seen changes in the behaviour of various invertebrates and birds, with birds arriving earlier and departing later in their natural habitats.

To increase resistance against climate change, the area uses enhanced varieties, crop diversification, mixed cropping, crop rotation, agroforestry, and agrohorticulture. "Some farmers have also begun raising Jersey cows or enhanced variety cows in the valley, employing farm manure, farm animal urine, and wood ash as indigenous traditional knowledge-based goods for maintaining soil fertility and enhancing output."

Indigenous People and Climate Change

India's overall climate has gotten more unpredictable over the past few decades as a result of ongoing climate change. This risky pattern is anticipated to persist. Climate change, which once had a

negative impact on India's rural indigenous population, is shown by extreme weather occurrences like floods and droughts. They are particularly vulnerable to the consequences of global warming since some indigenous peoples and minorities have intimate relationships to their natural habitats. In certain circumstances, climate change threatens people's way of life and even their existence (Baird 2008). India can use it just as well.

The forest environment is these tribes' primary means of support. Their economy is agro-forestry based, with skilled labour and cattle being substituted. Tribal populations in India rely heavily on local natural resources like forests, making them much more vulnerable to the effects of climate change than areas of the nation that are more urbanised (Bhattacharya & Prasad 2009). The frequency, severity, duration, and timing of fires, droughts, insect outbreaks, and pathogen outbreaks are all factors that climate change can influence, which can have an impact on forests. While these factors define the ecological niches that various animals can fill and the quantity of primary productivity that the ecosystem can support, “changes in the climate and atmospheric carbon dioxide concentration also have an impact on forest architecture and species composition” (Sushant 2013).

The collection and sale of non-timber forest products (NTFPs) provides a living for almost 100 million people, the majority of whom are tribal and live in or near forests in India (Saxena 2003). The customary means of subsistence for this indigenous group may be significantly impacted by changes in forests brought on by climate change.

The primitive cultures of this continent are fully aware of historical global warming. Many traditions that are still part of tribal culture show that ancient tribal peoples were well familiar with this natural phenomena. Global warming in particular, as well as climate change in general, are not new phenomena. According to geological data, our world has undergone multiple warming episodes. Warm intervals have followed periods of glaciation on earth, and both the length of the warm and cold intervals of years have varied by several orders of magnitude.

Priyadarshi adds a new perspective and states, "Other than scientific evidences, some of the Indian Tribes of Jharkhand State indicate in their folk stories warming as a major factor of disaster in ancient times...They expressed global warming in the form of Fire Rain, which God showered from Heaven to destroy the evil people" (Priyadarshi, 2007). These tales of global warming are found in the mythologies and folklore of the Munda, Asura, Santhal, and Ho tribes of Eastern India. “The core of these myths tells us that Sing Bonga, the Sun and Supreme God of the aforementioned tribes, once became so enraged against mankind that he unleashed a horrible rain of fire to destroy them.” Here, the "rain of fire" can be translated as the oppressive heat that plagued human civilization at the time (during the period of global warming) (Priyadarshi 2007).

The Indian tribes have a wealth of practical knowledge based on their interactions with the forest, its resources,

and the surrounding environment. 'The traditional knowledge is based on the intrinsic realisation that man and nature form a part of an inseparable whole and therefore should live in cooperation with each other,' it is asserted strongly. Tribal communities' attitudes towards plants, animals, the soil, and water are mostly reflective of this ecocentric perspective. The entire body of information pertaining to the economic worth of plant and animal species is a component of ethnobiology and may be useful to the people who live in this country's forests (Subramanyam & Bhadrudu 2013).

Conclusions

Both the ecosystem and the aboriginal population are in jeopardy as a result of the current climate change. The United Nations High Commissioner for Refugees in Geneva has established via their research that environmental and climate change are among the many variables that impact human migration and displacement across the world (Warner 2011). Furthermore, social connections between different ethnic clans and groupings might aid in resolving this issue. When one group is hit by bad luck, another group that isn't facing the same problems may help by donating resources (Salick & Byg 2007). We urgently need better democratic institutions, a more democratic and open platform, and aid for community resilience to the impacts of climate change on livelihoods (Sushant. 2013).

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