Communities living in the Himalaya can share with the world a host of lessons on simple and sustainable living; Maharka valley, Ladakh.

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10. Developing People centric Climate Change Science

Climate change science needs to be made people-centric by including various groups and communities as stakeholders in the process of creating sustainable solutions. From Himalayan communities to women, students, academics and researchers and institutions, development of advanced intervention is necessary. Inclusion of sustainable lifestyle, customs, tourism, institutional development to address the emerging challenges of climate change can contribute towards the fight against it.

10.1 Introduction

Society shares an intricate relationship with climate change, not only because climate change is affecting communities, their livelihoods, habitation, customs and lifestyle in many ways but also because societal aspects influence the understanding and practices in addressing the issue of climate change. Whether it is communities, gender perspectives, involvement of institutions, research communities and academics, climate change science is influenced by people-led developments. When climate change science is people-centric; it focuses on the challenges faced by communities living in different areas, to provide a platform for better or advanced intervention. This is why it is necessary to understand the dynamics between climate change science and human society, especially in the context of India. In doing this, various aspects of livelihood including food, habitation, economy, community involvement and institutional developments around climate change should be discussed to promote an inclusive understanding of the problem.

10.2 Community Knowledge as Intervention in Climate Change Science

The Himalayas have a fragile ecosystem in which lives and livelihoods heavily depend on the surrounding environment. For instance, glaciers are a major life support as it provides

fresh drinking water to the local communities (Wangchuk, 2023). The glaciers are melting rapidly due to climate change and 'modernity causing destruction'. People in the Himalayas are not against modernity or science, but they rather believe in the 'science of healing' and this is why the local communities living in the difficult Himalayan terrains can contribute towards solving the problems of climate change (Ibid.). These communities can share with the world a host of lessons on simple and sustainable living. Ladakh is located in the high Himalayas, in a low precipitation, rain shadow region. In the winters, whatever snow and ice accumulates in the glaciers higher up, sustain the communities through the dry summer (Ibid.). There are five glaciers in Ladakh along with those located in the Hindukush Himalayan region, on which roughly two billion people in the Indian subcontinent and the Tibetan Chinese depend (Wangchuk, 2023).

climate change

Ladakh

Hindukush
Tibetan Chinese

People who lived in the region thousands of years ago, survived and thrived as a result of which a colourful civilisation with its own language, literature, music, dance, spirituality and a life in harmony with nature came into being. Such knowledge of life and sustainability that lies in the roots of local communities of the Himalayas and should serve as a lesson for humanity to fight climate change (Wangchuk, 2023). Glacier melts, cloud bursts, flooding and summer heat are some of the impacts of global warming in the Himalaya. In 2006, a flash flood in Pyang saw loss of several lives and the disruption of livelihoods. In the 2010 floods, more than 1,000 people lost their lives and another 1,000 people went missing (Ibid.). Melting of the glaciers and other conditions are causing devastation in human abodes in the Himalayas. Looking at this devastation, the local people of the Himalayas have attempted to adopt mitigation and adaptation in their own way. SECMOL, an alternative school, built sustainably with natural materials, was set-up in the mid 90s (Ibid.). Heated and powered by solar power, passive solar heating and possibly world's first carbon neutral off grid energy, the campus is one of the examples of how sustainable infrastructure can deal with climate change. Greenhouse farming and natural inventory are some of the other sustainable means that have been adopted by the local communities. The textbooks in the 9th and 10th grade are also designed to

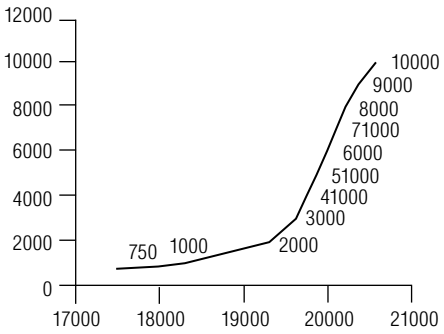
local communities

Pyang

SECMOL

Greenhouse farming

Fig. 10.1: Rising population has rising resource-based demands



Source: Das, 2023

energy for livelihood

alternative university

biodiversity loss
IARC
SCAR

teach about sustainable ways of using energy for livelihood. The clean and green energy technology is being extended to the Indian army campuses too. The Ladakh Indian Army is perhaps one of the most advanced armies in the world going green and adopting carbon neutral, solar heated shelters for their soldiers. Furthermore, an alternative university for mountain development is being set-up in Ladakh where young students learn through field experiences (Wangchuk, 2023). The artificial 'stupa' glacier was developed in the region corroboratively, with the help of local scholars and students. To incorporate socially relevant research in areas of critical biodiversity loss and climate change the IARC along with other international science communities such as SCAR and annual Arctic conferences such as the Arctic Frontiers need to discuss new ideas with the international community (Koc, 2023).

10.3 A Socio-cultural Inclusive and Sensitive Climate Change Science

gender equality

Emphasis has been given on sensitising climate change science by making it more inclusive. In the talk titled 'Gender equality in the Arctic', it is argued that the agenda for Sustainable Development Goals highlights gender equality as a necessary foundation for a peaceful and prosperous world (Agustsson, 2023). In fact, gender equality is a crucial contribution to progress across all the goals. In the sphere of Arctic studies and policy making, several steps have been taken. One of them is the inclusion of gender equality in the Arctic as part of the Arctic Council Sustainable Development Working Groups Project in 2013. In the Indian climate change science, gender representation is yet to be developed, although efforts are being made to ensure inclusion (Mendiratta, 2023).

geothermal energy

In Iceland, the geothermal energy sector is ensuring gender representation to a certain extent; there are about 25 per cent of women working in the boating industry in Iceland which is run with the help of geothermal energy (Dolma, 2023). Gender equality in Polar research and policy is an important concern where India and Iceland can cooperate since promoting gender equality is an essential component of Iceland's foreign policy; and, India shares similar values of human rights, gender equality, and women empowerment (Bragason, 2023).

Iceland's foreign policy

Meanwhile, sensitising climate change science towards vulnerable groups is also crucial. India considers its largest population as an economic asset; however, providing a minimum standard of living to each person is demanding and it is often left out from the mainstream discourse. Every Indian requires about 150 to 300 l of water daily. Hence, it is important to ask if India has the resources while talking about climate change and the anthropogenic factors (Das, 2023). Climate change is occurring even in the Alps but it is not a matter of discussion because population density in that area is low. India's population density, on the other hand, is high which can increase the suffering of a multitude of people (Fig. 10.1). In India's case, local communities are living in the margins and of the 90 districts that have more than 50 per cent tribal population, majority of them are based in the Himalayan region, mostly in the North-eastern region (Ibid.). The North-eastern region is an extremely vulnerable ecological zone. IPCC has also pointed out the role of climate change in temperature and rainfall variations

Alps

tribal population
North-eastern region

(Ramesh, 2023). The economic characteristics of this section of population was traditional as they instilled common property norms in their resource-based economy. However, now mainstreaming has caused them to adopt land rights, causing the majority of the tribal/indigenous population to lose their land (Das, 2023).

common property

Climate change science needs to deal with inequality in land holding. The emerging social characteristics of marginalisation is making the tribes less educated, suffering from poor health and eroding traditional knowledge, habitation and living conditions (Das, 2023). Tribes have their own political system of managing common property resources through which they survive by using the natural resources harmoniously. They treat every element of nature as their deity, practising totemism and their traditional houses are built from locally sourced materials. The current climate debate is missing a major link with population, their lifestyle and the challenges. For instance, the ecosystem of the Himalaya is becoming increasingly fragile due to modernisation and tourism (Ibid.). The infrastructure built across the Himalayan region is massive and in terms of planning and a majoritarian view is reflected. It does not take into account the plight of the local Himalayan tribes (Ibid.). In the high altitudes of Ladakh, Himachal Pradesh and Sikkim, agriculture, animal husbandry and lifestyle is deeply affected. The local communities do not have information, training and adaptation methods to cope with these changes (Ibid.). This is leading them to shift from their occupation and acquire new livelihoods that are environmentally unsustainable. Homogenization in planning

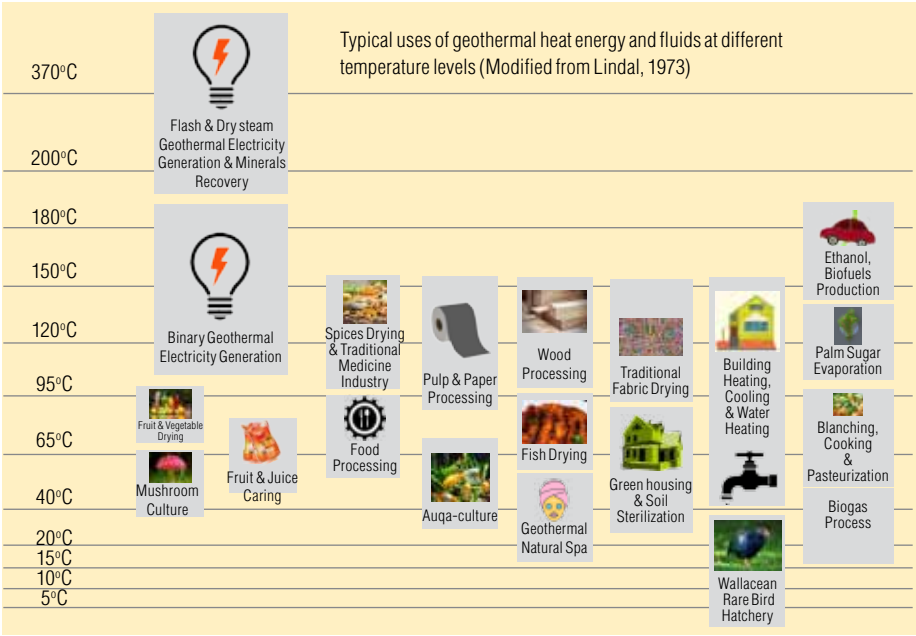
climate change science

political system

totemism

tourism

Fig. 10.2: Geothermal energy can be used across various sectors



Source: Dolma, 2023

is causing loss of valuable traditional knowledge which can help in the adaptation process with climate change (Ibid.). Exploring traditional knowledge bases is difficult as little funds are available for climate change and agricultural practices in high altitude Himalaya.

10.4 Institutional Support for Climate Change Science

NMSHE

Himalayan ecosystem

Various initiatives for Himalayan region have been taken up under the National Mission on Sustaining Himalayan Ecosystem (NMSHE), which is one of the eight missions launched by the Prime Minister Council on Climate Change in the year 2008 and 2009 (Mendiratta, 2023). To enhance the capacity in climate change, NMSHE is the only mission which is location specific. The broad theme or the aim of this Mission is to understand the vast Himalayan ecosystem and bring out certain strategies by mapping and formulating a comprehensive information system. Having data from all possible aspects which are affecting the growth and development of Himalayan ecosystem is also a goal of this Mission. Broadly, various programmes which have been launched so far under the Mission are catering to the different sectors such as glaciology. There are six areas—agriculture, biodiversity, water, snow, traditional knowledge systems and wildlife, where decision makers require information. About six thematic task forces centered around national agencies of the department have been developed.

Another important area of NMSHE is to have dedicated centres of climate change. Centres have been established in all the 12 states and UTs (Himachal Pradesh, Uttarakhand, Sikkim, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, Meghalaya, Assam, West Bengal, Jammu and Kashmir and Ladakh) of Himalaya and broadly given the task of mapping their states, working out the vulnerability (Mendiratta, 2023). A centre of excellence has also been developed in the areas of glaciology, social aspect and water hydrology in Sikkim University and Kashmir University (Ibid). Six states (Himachal Pradesh, Meghalaya, Manipur, Sikkim, Mizoram, Tripura and Jammu and Kashmir) have been already covered as various research institutions have been established and brought together in a coordinated manner. With regard to international experience, a programme with Swiss ADC has been started. This Mission is for 12 years and has three phases, two of which have been completed and the third phase is in progress. Through this bilateral programme, during the first phase a specialised programme on glaciology has been developed in which 55 young researchers were trained. In phase two, students and researchers were identified and taken to the glacier site for two months. Thus, institutional collaboration and inclusion of scientists, students and researchers has been intertwined to develop the framework for climate change science in India.

Swiss ADC

bilateral programme

10.5 Policy-intervention in Climate Change Science

In India, the studies for geothermal resources started way back in the late 1840s, when the British undertook surveys to locate different geothermal sources (Dolma, 2023). In

the 1970s, the GSI started taking geothermal sites seriously and put up a demonstration projects in Puga, Ladakh. The current utilization of geothermal energy in India is not much because most of them are marked as sacred, religious sites. Near these sites, religious ceremonies are performed, food and water are also distributed as part of such rituals. Several restaurants have been established that use the spring water for cooking, cleaning and other purposes. Due to this, the geothermal energy sites in India have become hubs of various economic activities. Examples include Sohna in Haryana, Tapovan in Uttarakhand, Demchok in Ladakh, Rajgir in Bihar, and Manikaran in Himachal Pradesh (Ibid.). Developing geothermal energy in these sacred places is a challenge for various reasons.

GSI
Puga

Iceland started utilizing its geothermal energy recently, when the oil crisis hit in 1973. Coal and oil prices increased by more than 70 per cent during the time and the Ministry of Industry in Iceland considered it necessary to combine both fossil fuel and geothermal energy (Dolma, 2023) (Fig. 10.2). New policies were developed that enabled a small country like Iceland to develop an impressive geothermal sector. Soon, this industry became global in terms of knowledge sharing. Switching to geothermal energy also helped Iceland in terms of a clean environment. Before the 1970s, Iceland was heavily polluted due to coal. However, after embracing geothermal energy, air pollution decreased in the country (Ibid.). Vegetables are also cultivated in Iceland with the help of geothermal energy, along with bread-making, fish farming, skin care industry, spas and other recreational places (Ibid.). Geothermal energy helps in running institutions, offices, schools and colleges even when there is no sunlight in the dark winter months. India is collaborating with Iceland on the utilization of its geothermal capabilities following a formal cooperation prompted by the Prime Ministers of both countries at the meeting in Copenhagen in 2022 whence a task force was established (Bragason, 2023).

clean environment

10.6 Recommendations

i. The vacuum in knowledge and technologies for the mountain region should be attempted to be filled with the help of native knowledge and skills of the Himalayan communities (Wangchuk, 2023).

ii. There is a need to recognize and appreciate the diversity and balanced participation in leadership and decision making towards gender inclusion (Augustsson, 2023).

iii. Geothermal energy utilization can reduce energy import and thus, the cost of energy. A more sensitive approach in India is necessary to develop geothermal energy in India because many sites with spring water are religious places (Dolma, 2023). Therefore, drilling and exploration has to be conducted, keeping in mind the religious sentiments of the people.

iv. Countries such as the USA and Australia and even China are focusing on developing sustainability and climate related courses, such as sustainable accounting (Singhania, 2023). Environment economic database compilation is another new area that needs to be developed in India as well to make climate change science more people-centric and robust.