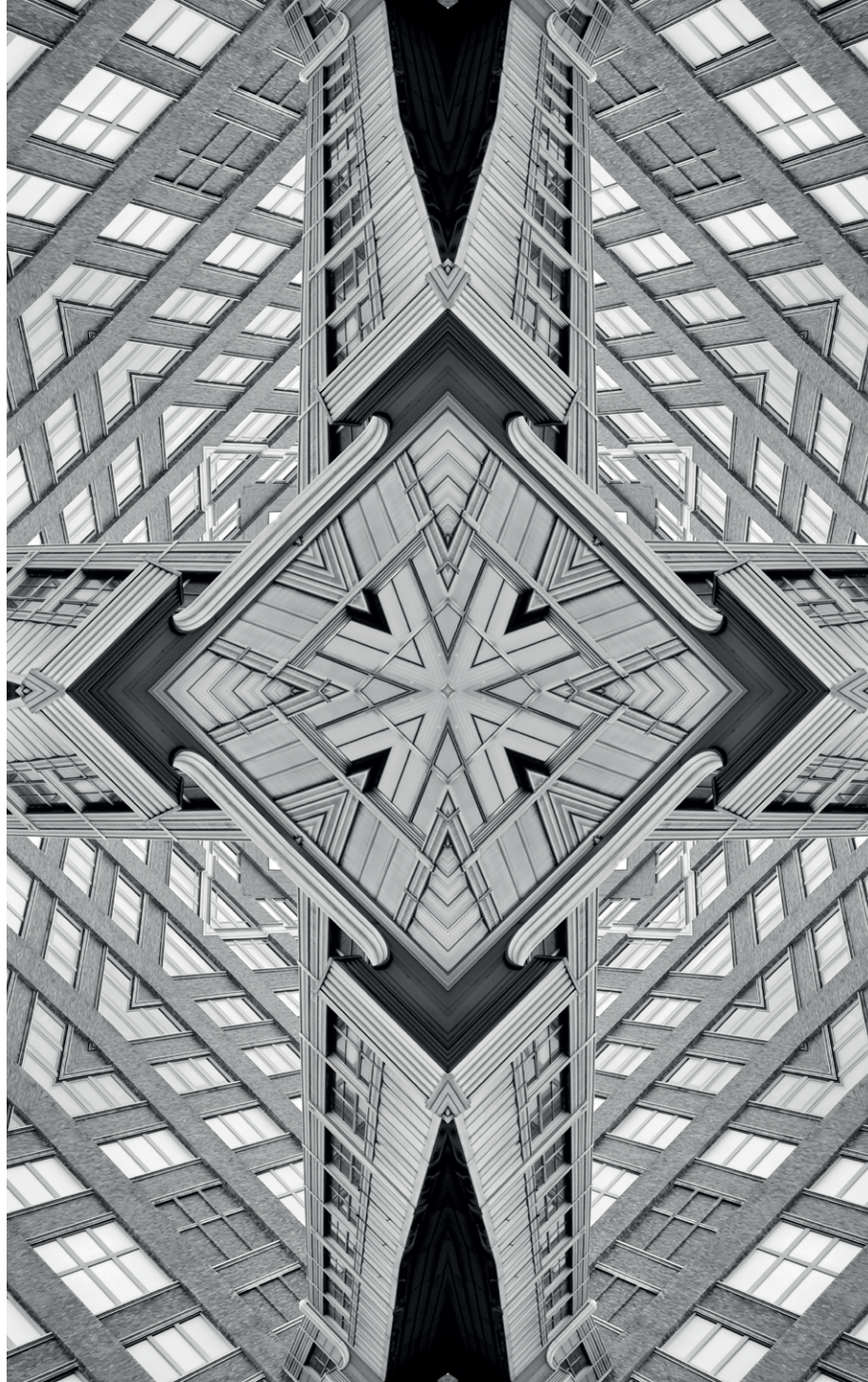




Issue Brief

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Introducing 'Mountain Characteristics' as a Conceptual Framework for the Well-Being of Mountain Communities

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Abstract

In recent years, mountain ecosystems have seen increasing investments from national and international donor agencies that support socio-economic and environmental initiatives in these areas. Such financing, however, is not based on any mountain-specific policy. Conceptual and theoretical analyses of such financing too, when compared with those in the plains, are inadequate. As a result, there are significant policy gaps in designing human interventions that are symbiotic with the natural environment and economic options in the mountains. This brief identifies the essential characteristic features of mountain regions to use as a basis for building a universal conceptual framework and holistic understanding of mountain ecosystems. Understanding these can serve a two-fold objective of ensuring both the environmental stability of mountain regions and the socio-economic well-being of the people who inhabit them.

Investment in sustainable mountain development is a key global priority, with mountain ecosystems “providing environmental services such as freshwater, biodiversity conservation, and hydropower to more than half of humanity.”¹ While investment opportunities in the mountains are available in plenty, however, what is missing is a policy framework for using these investments successfully. This essay aims to address the policy gap by strengthening understanding of the challenges facing the sustainable utilisation of mountain ecosystems.

A part of the problem stems from current perceptions of the socio-economic and environmental changes needed in the mountain regions being shaped by a traditional conception of economic growth. Based on reductionist ideas that have emerged from experiences gained in the plains, these notions are increasingly being met with fundamental challenges to their justifications and utility in the mountains. Globally accepted indices, like the Human Development Index and the Sustainable Development Goals, have been formulated through the inclusion of holistic parameters like health, education, equity, and environmental stability in human development. Similarly, the scope for assessing economic activities in the mountains must expand beyond the traditional parameters of economic growth. This must be accompanied by the identification and internalisation in policy of the unique factors that encourage or hinder socio-economic well-being and environmental sustainability in the mountains.

Complex, multifaceted links relate the diverse ecosystem services of the mountains and require developing a combined knowledge system of ‘montology’.² This brief identifies and addresses a few important features that distinguish the mountain regions from the plains, thus providing a knowledge base more in tune with the socio-economic and environmental dynamics in the mountains. It outlines the limitations of human interventions aimed at well-being and environmental sustainability in the mountains. Though such interventions are projected as ‘mountain development’, their long-term impacts on socio-economic well-being or stability of the natural environment are often ignored. This causes frequent conflicts over formally designed human interventions and their ground realities in the mountains. This brief thus lays the knowledge foundations for a new thought regime and conceptual framework for the development of mountain regions.

What Distinguishes Mountain Ecosystems?

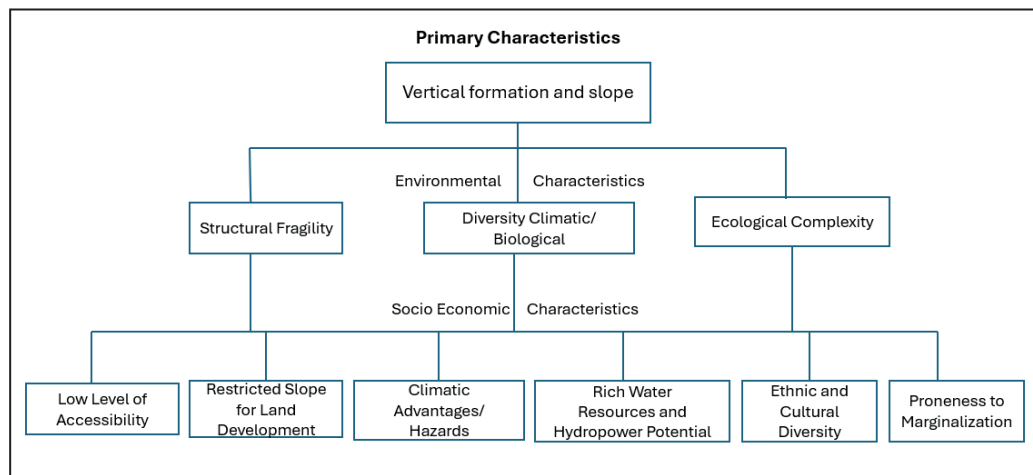
The world's mountain regions received a high level of attention in the 1992 Rio Earth Summit.³ Despite this, there has been a lack of interest among scientists in promoting conceptual alternatives in mountain research.⁴ Sustainable socio-economic transformations in the mountains require an integrated knowledge base that accounts for the differences in the prospects and constraints of economic development in the mountains and the plains. In more recent decades, certain mountain scholars have attempted to describe the distinguishing features of socio-economic transformations in the mountains.^{5,6} These initiatives are a starting point for the emergence of a new mountain science and related economic policy.

Human interventions in the mountains, whether centrally planned or market-based, continue to be guided by the old conceptual framework that equates economic growth priorities in the plains and those in the mountains. Such concepts are simply an extension of the principles of traditional economics that emerged from the experiences in the plains. This has resulted in a 'plains bias' in the design of human interventions in the mountains. New and creative thinking on mountains is the current imperative. A step in eliminating the 'plains bias' would be to focus attention on the distinguishing features of the mountains and use this understanding to take decisions on the desirability, or otherwise, of transformations in the mountains. Some scholars have attempted this in the past: for example, the environmental details and socio-economic descriptions of mountain systems were analysed and articulated in the Millennium Ecosystem Assessment in 2005.⁷ Attempts have also been made to list "mountain specificities" to build a socio-economic identity of the mountains.⁸

This brief draws on Jodha's ecosystemic analysis, which provides a set of distinguishing features of the mountains, giving them the term, 'mountain characteristics', to facilitate the growth of an integrated conceptual framework for identifying desirable human interventions in the mountains.⁹ These characteristics are shown in Fig. 1.

What Distinguishes Mountain Ecosystems?

Figure 1. Mountain Characteristics and Their Inter-relationships



Source: Author's own

Primary Characteristics

The primary characteristics of mountains pertain to their vertical formation (verticality) and sloping landscape. These need to exist together—if a landscape only has a vertical formation but no sloping surface, it is considered a plateau. Opinions among mountain scholars differ on the altitudinal cut-off point required for a landmass to be identified as a mountain. Nevertheless, an area with an altitude above 1,000 m is typically defined as a mountain. A combination of altitude and latitude are also often taken together to identify mountains, as high latitude areas at low altitudes have climatic conditions similar to those of areas at low latitudes and high altitudes. The framework used by the UN Environment Programme (UNEP), which classifies mountain areas into seven categories on the basis of their altitudes, is the most commonly accepted blueprint of these primary characteristics.¹⁰

Environmental Characteristics

The primary characteristics of mountains create the conditions for the generation and operation of secondary characteristics, which are divided into two categories in this analysis: environmental and socio-economic.

Environmental characteristics represent the state and functioning of mountain ecosystems and their related environmental processes. Of these, one is the instability of mountain landscapes. The very tectonic or volcanic processes that contribute to the vertical formation of mountains through the accumulation of lava on land, also create a great deal of structural fragility in the landmass. As a result, mountains are the site of frequent erosion events, like landslides, especially along with seismic events or after intense rainfall. Interventions like the construction of roads or dams, and expansion of farmlands over forests contribute to enhanced fragility in the mountains. This characteristic thus needs to be given due importance in the design of all human interventions in the mountains.

Closely linked with their vertical formation is the meteorological role of mountains as the maker of climatic divides at the macro-, meso- and micro-spatial levels. Atmospheric circulations interact with the height and slope of mountains to create areas with both scanty and high levels of precipitation. This precipitation is usually seen as rainfall but can also occur as snowfall in higher altitudes, feeding the glaciers. The altitudinal zones, aspect of slopes, sunlight hours, and rainfall direction, along with other meteorological factors, all generate a mosaic of micro-climates in the mountains, including extreme climatic conditions. Such climatic diversity at all spatial scales is the second

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environmental characteristic of mountains and generates conditions suitable for supporting a rich biological diversity. Deep knowledge of these diversities is essential for the design of human economic activities like forestry, agriculture, and pastoralism. These environmental characteristics create conditions for complex ecological relations, forming the third environmental characteristic of mountains.

Environmental characteristics exist and operate even when there is no human presence. However, they have significant implications when humans start to intervene in the mountain regions to satisfy their socio-economic needs and aspirations. Studying them can be useful in the design of human interventions in the mountains, particularly those aimed at promoting the well-being of the environment and the communities living in the mountains.

Socio-Economic Characteristics of the Mountains

To a great extent, the socio-economic characteristics of mountains are shaped by the environmental characteristics and often express themselves when human interventions are made in mountain areas, whether planned or market-based.

Inaccessibility—a result of vertical formation and fragility—is considered the first socio-economic characteristic of mountains. Humankind has, over the course of history, endeavoured to reduce this inaccessibility. Innovations like walking paths on mountain slopes, horse tracks, ropeways, rough roads for hardy vehicles, multi-lane highways for high-speed automobiles, and, above all, aircraft, have led to a considerable decline in the degree of inaccessibility of the mountains. In recent decades, the revolution in electronic communication has added to the rapidity with which the socio-economic and cultural isolation of the mountain villages has been reduced. This alteration in inaccessibility has been a profound process that has changed the socio-economic, cultural, and environmental status of mountains.

Yet, though such an array of technological advancements is considered an unquestionable instrument for ‘mountain development’, new technologies have not been the carriers of progress for all sections of human populations in the mountains. The numerous popular resistances to interventions, especially on issues of building roads, dams, and industries, exemplify that the question of who gains and who loses in the related transformations deserves serious consideration in project assessment. The two ends of a road or a railway line connect different interest groups who use the connectivity for promoting their interests. For the average mountain person, such human interventions can reduce the inaccessibility of remote villages, which are greater in number than in the plains.

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The interest of the people residing in the plains, however, is in the gradual takeover of the economies of these isolated villages and expanding the market system operated from and by interest groups in the plains. Constant lowering of the level of inaccessibility by technological interventions opens easier links for the plains to the natural resources of the mountains, whether water, minerals, timber, medicinal herbs, or cheap human labour. Further studies on this is essential as it relates to many other parameters of life in the mountains, including trade, tourism, cropping patterns, local consumption patterns, medical support, education, and migration.

Related to the inaccessibility of mountains is their second socio-economic characteristic—the resistance to the physical movement of materials in these regions. Materials and equipment for structural construction in the mountains have to be carried against gravity over long distances. This increases the cost of such projects, as opposed to similar efforts in the plains. The costliness of this undertaking is only complicated by the fragility of the landscape. At the community level, this entails people in the mountains having to use muscle power for long hours in a day for their livelihoods. All this needs a fundamental modification of the traditional economics of transportation and construction in the mountains.

The vertical formation and slope of the mountain generate another socio-economic characteristic: the restricted scope for converting sloping land to terraces for the production of irrigated agricultural crops like paddy. While in the plains about 80 to 90 percent of the geographical area may be flat, and can be used for agriculture, in the mountains that fraction can be as low as 10 to 20 percent, restricting per capita availability of farmlands, and thus, crop production. Moreover, land use and cropping patterns need to be adapted to the high spatial climatic variability of mountains, as opposed to the homogeneous farming practices over large areas in the plains. There are also the restrictions in crop choices. Most people in the mountains are traditional in their land management practices. As an isolated rural community not closely connected with the market economy, they need to grow food crops for food security and are not able to manage a cash-crop economy very efficiently.

The complex climatic processes in the mountains and their accompanying advantages and disadvantages form the next socio-economic characteristic of mountains. Mountain ecosystems outside developed countries, for example in the Himalayan region, often have insufficient databases on important parameters related to climate. This is especially true for water-related environmental processes, leading to mountain regions being described as a ‘hydrological black box’. This lack of understanding frequently leads to catastrophic extreme

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climate events, generating heavy losses to communities or structural projects. The Kedarnath disaster in June 2013 or the more recent flash floods in the Amarnath area in the Indian Himalaya, are two such instances that caused massive losses of lives and property.

On the flipside, the thinly populated forest areas and snow-covered slopes at higher altitudes in the mountains often provide rich natural capital for leisure and adventure tourism.¹¹ In the case of the Indian Himalayas, for instance, multiple small hill towns established by the British during the colonial era, from Darjeeling in the east to Mussoorie in the west, are centres of tourism. The climatic conditions of mountains thus lend themselves to significant potential for tourism-based economic growth.

The fourth socio-economic characteristic of mountains relates to their large potential for hydro-power generation, thanks to the high levels of precipitation on windward slopes. While much of this potential has been realised in industrialised countries, similar projects have been met with popular opposition in developing nations due to several factors, including the uncertain process of rehabilitation of the involuntarily displaced people, and global warming and climate change creating unsustainable pressure on the hydrological picture of mountains.¹² More recently, there has been increasing recognition of the need to adopt a payment for ecosystem services model for the water and storage capacities of mountains. This will bring in a new dimension to promoting the well-being of the environment and the communities of the mountains.

The final socio-economic characteristic of mountains are their ethnically and culturally diverse populations. At the same time, the environmental characteristics of mountain regions act as a barrier to rapid demographic movements and lead to cultural homogeneity. Pushed by their relative inaccessibility and the energy intensity required for movement, mountain landscapes encourage human settlements to be small and scattered. This, in turn, causes the marginalisation of mountain communities. Meanwhile, the plains generate strong economies and market forces, attracting migration from the mountains to the plains. Thus, an unequal economic link exists between mountain and plain geographies.

Conclusion

While the emergence of new and more holistic concepts in economics, it is hoped, will make development more inclusive, the process of assessing the impacts of human interventions in the mountains must go further. Building knowledge of a set of parameters that represent the diverse characteristics of the mountains is necessary to proceed in that direction.

Further study of the characteristics described in this brief is essential to shaping a mountain science that can guide the creation of a new conceptual framework for socio-economic, cultural, and environmental transitions that foreground the well-being and sustainability of mountain environments and people. 

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All views expressed in this publication are solely those of the author, and do not represent the Observer Research Foundation, either in its entirety or its officials and personnel.

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