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Trend and Pattern of Sustainable Development in the State of Uttarakhand: A Review of the Literature

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ABSTRACT:

Uttarakhand, created in 2000 from Uttar Pradesh, is a pioneer in the rankings for the Sustainable Development Goals (SDG) while being characterized by ghost towns, villages lost to landslides and a series of hydropower induced disasters. This review focuses on sustainable development in Uttarakhand since the 1970s and looks in particular at the post-statehood period. It draws on information from secondary data, namely the Census, the Forest Survey of India and the NITI Aayog to explore the post-statehood development in the region. This review illustrates the pattern that is the concentration of the development in the districts in the plains. Additionally, it brings out the trend that the mountain regions have become 'hollow' and public policies show an affinity for 'weak-sustainability'. Finally, the review identifies an increase in both the social and the economic risk associated with the climatic and geological factors.

Keywords: Sustainable development, Uttarakhand, Himalaya, SDG India Index, Migration, Hydropower, Carrying capacity, Hill states

A Note on Data: The figures in the tables below are derived from the sources listed under each table. The term 'approximate' means that figures were rounded from published reports and the original publications should be consulted prior to use.

1. Introduction:

The Himalaya and sustainable development are like two strangers stuck in the same room. Ever since the Brundtland Commission defined it as "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987), sustainable development has been twisted to encompass many things including community forestry and carbon accounting. Uttarakhand, as a mountain state, finds sustainable development a real challenge. In the same mountains that supply the water, forest, biodiversity and the pilgrimage economies of the Indo-Gangetic plain lie some young, active, and fragile mountains. In the cases of Chamoli, Tehri, and Joshimath, sustainable development has real world costs. In this context, it's necessary to question what should be sustained and by who, at the cost of whom?

The movement that led to the creation of Uttarakhand on November 9, 2000 was concerned about how the administration of Lucknow could not adequately plan for development in the hills. The newly created state inherited a geography with some rather contrasting features. Eighty-six percent of the new state is mountainous with about 45 percent under forest. While population and urban development concentrated in the districts of Dehradun, Haridwar, Udham Singh Nagar and Nainital that adjoin the plains, the state still manages to record some of the best sustainable development goal scores, along with above average income and high literacy. Uttarakhand is rapidly out-migrating and experiences frequent disasters. The state also continues to engage in a policy debate on whether or not the infrastructural investments of the showpiece economy of Uttarakhand is in harmony with the environment of the state.

This paper is a literature review, not a new data collection. It addresses three questions: (1) what have researchers found about development in the Uttarakhand Himalaya, (2) what secondary indicators suggest regarding the social, environmental and economic development of Uttarakhand, and (3) what do the research and indicators say differently, and why? Academic journals and government/policy documents from India, such as the Economic and Political Weekly, along with various other assessments are all drawn on for this review. The topics covered in the review are split across the section. Section 2 is the literature review that looks at the historical and conceptual frameworks and the economic, social and environmental aspects. The methodology is presented in Section 3. Section 4 explores trends, patterns, and gaps, and Section 5 presents a summary.

2. Literature Review:

The aim of this section is to provide a detailed overview of the relevant scholarship to sustainable development in the Uttarakhand Himalaya. Firstly, it outlines the debates between the concepts of strong and weak sustainability, the intellectual roots and key moments of the Chipko movement to statehood, and the socio-economic and environmental studies that provide a context for these concerns. This section then incorporates secondary sources that document each concern.

2.1 Conceptual Framework:

Weak and Strong Sustainability in the Mountains

Two analytical distinctions guide most of the scholarship. The first distinction concerns the difference between strong and weak sustainability. Weak sustainability is concerned with the sufficiency of capital stock (whether natural or human). It argues that society remains sustainable so long as there is an increase or, at worst, no decrease in the overall capital stock. It is closely related to the neoclassical economic growth theory. Unlike weak sustainability, strong sustainability rejects the notion that all forms of natural capital (like forests, soil and glaciers) can be substituted, particularly natural capital that is essential for life and natural resources. Instead, it asserts the necessity of biophysical limits. In the Himalaya, strong versus weak sustainability are both practically important. Can we say a hydropower project that creates revenue but leaves the river unable to support its natural processes and fisheries, as well as downstream settlements, is sustainable? The answer to that question relies heavily on whether or not you think we can replace these natural capital resources.

A second division exists between sustainability seen as a whole or as something having a spatial or distributive aspect. In both of these aspects, the capability approach (Sen, 1999) and the 'environmental justice' literature originating with the 'environmentalism of the poor' (Guha and Martinez-Alier, 1997), focuses on who gets the ecological rent and who takes the risk. In some areas, an ecological average does not work, for example in mountain regions, altitude and distance, for example, determine access to resources like income. Scholarship has developed concepts specific to mountain regions. There is the ICIMOD's 'mountain perspective' and Jodha's (1992) concept of 'niche goods' of mountain regions, and Rawat et al. (2012) concept of mountain regions providing services to downhill communities. This paper follows the 'three pillars of sustainable development' of the United Nations (UN) (2015), i.e. social, economic and environmental sustainability. Two additional aspects are added: first, spatial equity between hill and plain districts and second, the capacity to respond to disasters. Both of these themes are common in the literature on sustainable development.

2.2 From Chipko to Statehood: The Intellectual History

2.2.1 The Chipko Moment and the Ecology of Livelihood

Any study of sustainability in Uttarakhand must start with the Chipko movement. The 1970s movement where Chamoli villagers along with their neighbouring district villagers surrounded trees and saved them from commercial felling was the first Indian environmental movement. There are varied interpretations of the movement. Guha (1989) argued that it was the first peasant protest against the commercialization of the forests during the British Raj and subsequently in post-independence India. Shiva and Bandyopadhyay (1986), and Bandyopadhyay and Shiva (1988), defined it as an ecological protest against the commodification of nature. Rangan (2000) also challenged these readings by examining how the movement was formed in response to forest policies of the state and Gandhian ideas. It also examined how an ecological protest against state forest policies was shaped by the demand for a separate regional state. Mawdsley (1998) analysed the process by which Chipko's energy got channelled into a campaign for the creation of a new state, and observed the marginalization of ecology as the focus shifted to employment, infrastructure and regional control.

The long-term legacy of these debates is a persistent tension between two meanings of "hill development". In one, the hills should be developed through roads, hydropower, tourism and industry in the manner of the plains. Alternatively, development is better placed in local communities using and managing resources of forests, water and agro-biodiversity sustainably. With development being one of the major focus areas in the years after 2000, sustainability was a major point of conflict and continues to be today.

2.2.2 The pre-statehood critique of development:

Before 1999, the literature on the Kumaon and Garhwal hills documented the "MIRAB"- (is an economic model and acronym standing for Migration**)** like character of the economy: money orders, remittances and public employment financed the household economy while agriculture stagnated (Sati 2006; Tiwari and Joshi 2012). Studies of land and forest use pointed to shrinking common property, declining fodder availability and the growing drudgery of women's work (Agarwal 1997). The Planning Commission's (2001) Task Force on Hill Areas and Hill States summarised the case for differentiated policy: high costs of infrastructure per capita, limited scope for scale-based industry and a fiscal system that took little account of the ecological services that hills render. The Task Force's recommendation, that hill states be compensated for those services, remains unrealised and recurs in later fiscal debates, including the demand for a "green bonus".

2.3 Economic Dimension: Growth, Structure and Spatial Concentration:

2.3.1 The post-2000 growth surge

The economic focus in the early years post Uttarakhand formation has been on the fast-paced growth. As a result of various fiscal concessions, primarily an Excise Holiday, there has been a considerable concentration of industrial units, particularly, pharmaceutical units and some Fast-Moving Consumer Goods units, in the newly created integrated industrial estates in Haridwar, Pantnagar and Sitarganj. In fact, for a substantial part of the last decade, Uttarakhand's GDP has grown at a rate far in excess of the rest of India and, in fact, exceeds it by a considerable margin. Economic literature acknowledges this phenomenon as a result of fiscal incentives. However, it also recognizes that the benefits have been uneven, especially in terms of geography and job creation.

2.3.2 Structural Shift without agrarian

Transformation Agriculture, the most dominant sector in Uttarakhand's economy has transformed from a labour intensive one to a relatively more industrialized one. But labour in agriculture continues to be the dominant workforce. Farming in Uttarakhand has retained its small and rain fed characteristics. With holdings in agriculture on an average of less than a hectare, hill farming is marked by terraced cultivation. Multiple farm holdings have a tendency of being scattered, thus increasing farm operational costs. A combination of factors, such as declining farming land, abandoning of cultivation of terraces, and the encroachment of wildlife in farm areas have changed farming from traditional cropping systems that relied heavily on millets and pulses, to relatively less diverse cropping systems. Agriculture has retained its traditional and largely small-scale characteristics in the plain regions of Udham Singh Nagar and Haridwar with intensive cultivation of paddy, wheat and sugarcane which have resulted in unsustainable use of groundwater and soil. The literature thus describes two agrarian Uttarakhands that share a state boundary but little else.

2.3.3 Tourism, hydropower and the "resource-extractive" model:

Tourism and hydropower have been the two flagship routes to development in the hills. Pilgrim and tourist arrivals have grown rapidly, boosted by the Char Dham circuit and by the more recent all-weather road programme, and tourism is now a major source of revenue and informal employment. Research, however, links this growth to waste generation, road-building-related slope destabilisation, pressure on water and construction in hazard-prone zones (Nautiyal and Kaechele 2009; Kala 2014). Hydropower, projected by state planners as the "energy state" strategy, has attracted even sharper critique. Scholars note that dozens of projects are operational and many more are planned in the Alaknanda–Bhagirathi basins, creating cascades with limited environmental flows, impacts on fisheries and aquatic biodiversity and a heavy debris load during floods (Rawat et al. 2012; Dobhal et al. 2013). The Supreme Court's intervention after the 2013 floods, which asked for a review of the role of hydropower projects in aggravating the disaster, reflects the degree to which the economic and environmental logics have collided.

Table 1. Selected socio-economic indicators: Uttarakhand and India (Census 2011)

Indicator	Uttarakhand	India
Population (million)	10.09	1,210.8
Decadal growth rate 2001–11 (%)	18.8	17.7
Population density (persons per sq km)	189	382
Sex ratio (females per 1,000 males)	963	943
Literacy rate (%)	78.8	73.0
Urban population (%)	30.2	31.2

Source: Registrar General and Census Commissioner of India (2011).

Table 1 shows that, in aggregate, Uttarakhand outperforms the nation in literacy and sex ratio while growing slightly faster in population. These averages, as Section 4 shows, mask a sharp district-level divide: the decadal growth of Haridwar and Udham Singh Nagar was well above the state average, whereas Almora and Pauri Garhwal recorded small population declines in the same decade, a pattern widely cited as evidence of hill depopulation (Rural Development and Migration Commission 2018).

2.4 Social Dimension: Human Development, Migration and Gender

2.4.1 Human development gains

Uttarakhand is among the better performers among Indian states in education and health indicators. The literature credits the legacy of strong school networks in the hills and a tradition of male education connected to military and public-sector employment, as well as relatively favourable sex ratios and a high female participation rate in agricultural work (Mamgain and Reddy 2016). NITI Aayog has developed a series of indices to track the status of SDG implementation in the states of India. Over the last four years, the status of Uttarakhand has significantly improved as compared to other states.

Table 2. Composite SDG India Index score, Uttarakhand and India (approximate)

Edition	Uttarakhand	India
2018 (baseline)	60	57
2019–20	65	60
2020–21	72	66
2023–24	79	71

Source: NITI Aayog, SDG India Index reports (2018, 2019, 2021, 2024). Values rounded; consult the original reports for goal-wise scores and revisions in methodology across editions.

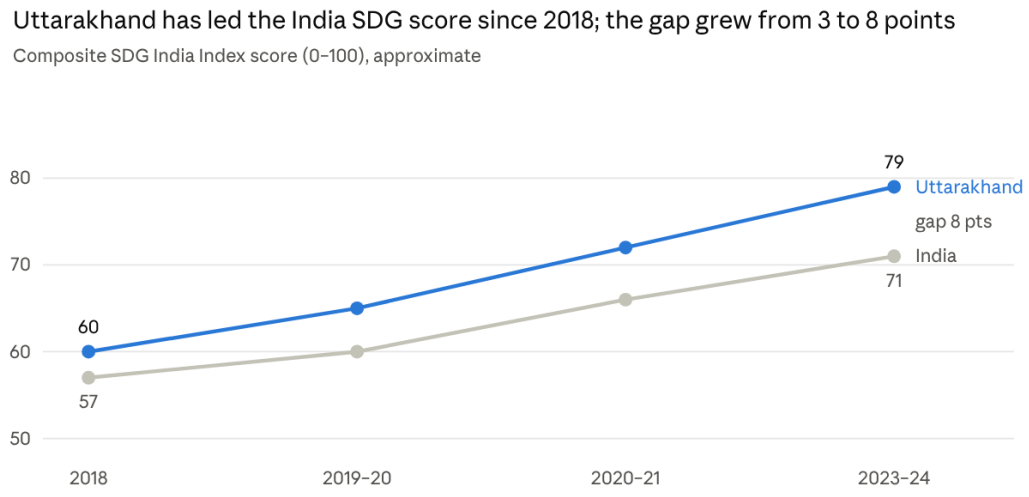


Figure 1. NITI Aayog, SDG India Index reports (2018, 2019, 2021, 2024); values approximate

Two observations follow. First, the upward trend is steady and consistent, and by the latest edition the state shares the top position among major states. Second, the Index is a state-level composite that blends goals on which the state does well, such as clean energy, health and education, with those on which it is weaker, including industry and infrastructure, gender equality and reduced inequalities. A rise in the composite does not tell us whether the hills and plains are improving at the same pace. Researchers have noted that the Index's weighting and indicator choice are sensitive to data availability, and that environmental goals, notably life on land and climate action, rely on indicators that do not capture hazard exposure or ecosystem degradation (Sachs et al. 2019; Sengupta 2020).

2.4.2 Migration and the hollowing-out of the hills

The most striking pattern in the social literature is out-migration. Studies have long noted that migration from the Kumaon and Garhwal hills is largely male, driven by a lack of non-farm employment, and, more recently, by the quest for better schooling and healthcare (Mamgain 2004; Tiwari and Joshi 2012). The Rural Development and Migration Commission (2018), set up by the state government, found that migration has accelerated since 2011, with a large number of gram panchayats recording population losses and several hundred villages reporting complete depopulation, the so-called ghost villages. Most migration is intra-state and short-distance, towards district headquarters, Dehradun and the plains districts, rather than to metropolitan India, which suggests that the hills are not so much losing population from the state as redistributing it towards the plains.

The literature identifies several mutually reinforcing causes. The reduction of return on farming caused by smaller and smaller farms and wildlife damage is matched by the decline of investment on farmland because of dependence on remittances. Facilities, schools, clinics, and health care in particular are understaffed in more remote communities. Families are forced to move away to address this. Additionally, transportation, as in the building of new roads, offers both entry and exit routes, and is therefore just as much an exit route (Mamgain 2004). Women are bearing the brunt of the burden on agriculture and household chores of caring, gathering fuel, fodder, and fetching water, resulting in the feminization of hill farming (Agarwal 1997; Shiva & Bandyopadhyay 1986). It is important to note that these observations were made by scholars prior to the region receiving its own statehood. Recent literature confirms that the issues of this structure are only becoming more entrenched.

2.4.3 Livelihood diversification and the limits of the "niche" strategy

Proposals to arrest migration usually rest on diversifying hill livelihoods: horticulture, medicinal and aromatic plants, organic farming, homestay tourism and handicrafts. Some micro-level studies document positive results, particularly where cooperatives, women's self-help groups and market linkages are strong (Maikhuri et al. 2001; Kala 2014). Others point to low scale, poor road-market connectivity, lack of cold-chain infrastructure and the absence of land consolidation, concluding that the niche strategy has yet to reach the scale needed to change aggregate trends (Mamgain and Reddy 2016). The state's recent attention to homestay policies and "reverse migration" after the COVID-19 lockdown has been studied, but the evidence suggests that much of the return was temporary.

2.5 Environmental Dimension: Forests, Water, Hazard and Climate

2.5.1 Forest cover: apparent stability, hidden change

Official data show a notable stability in forest cover. The India State of Forest Report series, published biennially by the Forest Survey of India (FSI), records forest cover for Uttarakhand at about 45 per cent of geographical area across successive assessments, with small fluctuations.

Table 3. Forest cover in Uttarakhand, selected ISFR assessments (approximate)

ISFR edition	Forest cover (sq km)	Per cent of geographical area
2011	24,240	45.3
2015	24,240	45.3
2017	24,295	45.4
2019	24,305	45.4
2021	24,305	45.4

Source: Forest Survey of India, India State of Forest Report (various years). Geographical area of the state is 53,483 sq km.

The apparent constancy has two caveats highlighted in the literature. First, the FSI's remote-sensing method defines forest cover by canopy density, not by species composition or ecological quality, and so it cannot register the replacement of oak-dominated broadleaf forests by chir pine, a transformation that ecologists consider a major threat to hill water security and village livelihoods (Singh and Singh 1992; Rawat et al. 2012). Second, forest fires have become more frequent and severe in recent years, particularly in the chir-pine belts during dry pre-monsoon months, with the 2016 fires being among the worst in the state's history (Kala 2014). Cover statistics do not tell us how the quality of the forest, its capacity to infiltrate water and its diversity, has changed.

2.5.2 Water, springs and glaciers

Uttarakhand is the source region of the Ganga and the Yamuna, and the literature on water emphasises two linked problems. One is the drying of mountain springs, which supply a large share of drinking and irrigation water in the hills; the NITI Aayog (2018b) report on Himalayan springs noted that a substantial proportion of springs in the Indian Himalayan Region were drying up or had declining discharge, attributing this to land-use change, deforestation, road construction and changing rainfall. The other is glacier retreat and changes in the cryosphere; the Hindu Kush Himalaya Assessment (Wester et al. 2019) concluded that the Himalaya is warming faster than the global average and that even optimistic scenarios foresee major glacier loss by the end of the century, with consequences for river flows, glacial lake outburst risk and hazard exposure.

2.5.3 Hazard exposure and the politics of risk

There is a strong bond that links both the disaster and sustainability literature. With respect to geology, Valdiya (2004) and others have long been pointing out the instability of the front of the Himalayas due to its tectonic activity. This is also evident by the location of a number of settlements. Additionally, unregulated development of the Himalayan front only makes matters worse, which the disasters that have occurred since 2000 serve to further illustrate.

Table 4. Selected major hazard events in Uttarakhand

Year	Event	Salient features
1991	Uttarkashi earthquake	Magnitude about 6.6; heavy damage in Garhwal
1999	Chamoli earthquake	Magnitude about 6.8; significant loss of life and housing
2013	Kedarnath flood	Extreme rainfall and glacial-lake breach; thousands dead or missing; widespread damage to roads, bridges and hydropower projects
2021	Chamoli (Rishiganga) flood	Rock-ice avalanche; damage to two hydropower projects; over 200 dead or missing
2023	Joshimath land subsidence	Cracks in hundreds of buildings; families relocated
2023	Silkyara tunnel collapse	41 workers trapped on the Char Dham road project, later rescued

Source: compiled from Valdiya (2004); Dobhal et al. (2013); Shugar et al. (2021); Government of Uttarakhand reports; press and expert committee accounts. Casualty figures vary across sources.

Construction on floodplains, construction of reservoirs and poor land-use policy execution all played a significant role in exacerbating the impact of the 2013 tragedy. The subsidence of Joshimath, in addition to the collapse at Silkyara, gave renewed attention to discussions around the design and engineering of infrastructure, as well as the need to define the environmental impact and ecological carrying capacity of projects. Construction of road projects in the area had been the subject of debate due to reports filed by an expert committee on the impact of road construction and infrastructure projects on the environment. In the literature's reading, hazard is not exogenous; it is partly produced by development choices.

2.5.4 Climate change and emerging vulnerability

The Indian Himalayan region was rated to be moderately or highly vulnerable to climate change by some of the most comprehensive climate change studies that have been conducted. Some of these studies considered the threat of excessive rainfall, forest fires, and periods that mimic drought conditions. (Department of Science and Technology 2018; Rautela 2013). There have been various studies in this area focusing on adaptation practices, such as the restoration of springs and forest fire management using a community-based approach. Also, different studies focused on the use of climate smart crops and agriculture. However, most of these studies were conducted in a very limited way, and there is no real data available to test how these adaptations will work if they were to be implemented at scale.

3. Methodology.

Research Design. This study is a narrative, thematic literature review, which also uses descriptive analyses of secondary data. It is not a systematic review in the strictest sense of the word. Since the scholarship in Uttarakhand is wide ranging across many disciplines, including development economics, disaster studies, environmental history, demography, and geology, among other disciplines, it was judged more appropriate to do a thematic review instead of a formal meta-analysis.

Sources and Selection. The review is comprised of peer-reviewed articles from journals and books. It includes official reports and analyses from the NITI Aayog, Planning Commission, Forest Survey of India, the Reserve Bank of India, and the Government of Uttarakhand, as well as policy commentary from the Economic and Political Weekly, and various census analyses. To be considered for this review, a study had to touch upon a sustainability topic, either in Uttarakhand, or in a larger portion of the Indian Himalayas. Both data sources and authors had to be verifiable. The time range of the materials for this study is from the beginning of the Chipko movement in the 1970s up to the most recent release of the 2023-24 SDG India Index.

Analytical Framework and Indicators. The material was sorted by three primary categories, i.e., Economic, Social and Environmental. Two more cross-cutting themes, i.e., spatial equality of districts with hill and plains and disaster resilience, were also used. For the economic pillar, data points were selected based on availability and ease of comparison, namely, per capita and sectoral growth data. The social pillar uses data on literacy, the sex ratio, migration and a composite of the SDG goal data. The environmental pillar uses data on the area covered by forest, glacier status and spring status, as well as data on hazard events.

Method of Analysis. The study employs a descriptive and comparative method of analysis. Comparisons between Uttarakhand and the country (India) are illustrated in tables. In addition, the tables illustrate trends and changes through a time series comparison (tables 2 and 3 and Figure 1). Further, data are contrasted across hill and plain districts and principal hazard events are shown in a table. In addition, an analysis is performed of the data using qualitative literature to determine trends.

Limitations. There are 4 caveats. First, due to variations between different editions of the SDG Index, data for the Index scores show direction, but should not be interpreted as directly comparable. Second, data on population and related statistics for demographic comparisons are for 2011 and are hence somewhat outdated. Third, most data points should be double-checked against original sources for accuracy. Fourth, due to a focus of most of the literature on the subject of disasters and migration, more data points related to outcomes for sustainability in daily life would lead to a bias for an overestimation of the severity of the situation.

4. Analysis: Trend and Pattern of Sustainable Development

4.1 Trends in the Aggregate Indicators

They have natural capital substitution with man-made capital, fitting with a weak sustainability viewpoint. Some natural capital can substitute with others. Examples include some natural capital loss from disaster management and forest management. Disaster and management related studies from 2012 and 2013 by Rawat et al. and Dobhal et al. point out that some substitution is going on. A third point is the feedback of natural resource use and the associated risks. Since 2013 natural disaster studies have again highlighted the use of natural resources in ways that increased risks. Many disaster risks are increased by natural resource management, often at the cost of the overall development goal. The risk of the economic benefits of a natural resource management project being wiped out by the increase in disaster risk is often overlooked by policymakers. The fourth point relates to the loss of natural capital due to abandonment and use changes. Changes of use often occur with the loss of use. For example, abandonment of natural capital results in use changes, which leads to changes that often cannot be substituted. Natural capital substitution includes changes in forest cover and land use.

4.2 Patterns across Dimensions

Reading the economic, social and environmental strands together, four patterns emerge from the literature.

Pattern 1: Improvement in aggregate, divergence in space. The state-level indicators, whether per capita income, literacy or the SDG composite score, have improved over two decades. But district-level evidence consistently shows that gains are concentrated in the four plains-linked districts, while the hill districts of Almora, Pauri, Tehri, Rudraprayag and Pithoragarh show slower growth, population loss and weaker access to services (Mamgain and Reddy 2016; Rural Development and Migration Commission 2018).

Table 5. District-level contrasts in decadal population growth, 2001–11 (approximate)

District group	Examples	Decadal growth (%)
Plains and plains-adjoining	Haridwar, Udham Singh Nagar	about 33 and 34
Mixed	Dehradun, Nainital	about 32 and 25
Hill	Almora, Pauri Garhwal	about –1 and –1.5

Source: Census of India 2011, rounded. Plains districts grew by more than thirty per cent, whereas Almora and Pauri recorded small declines.

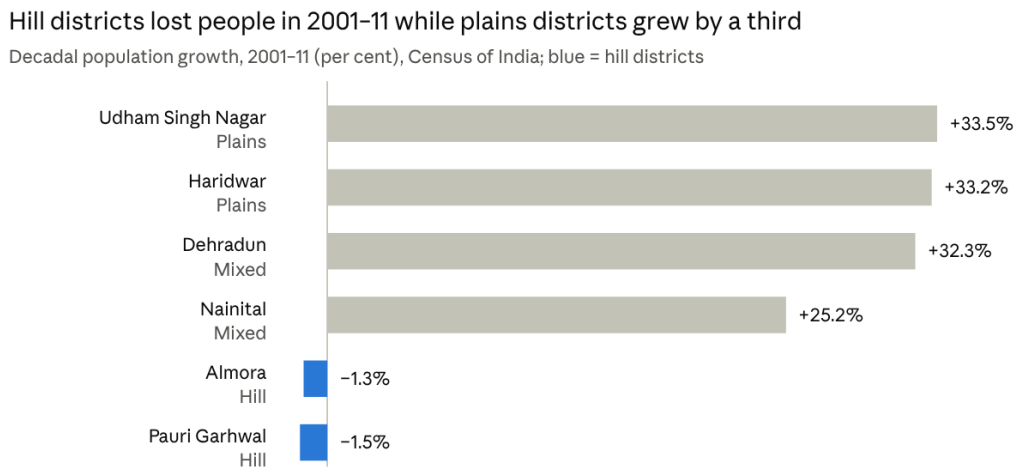


Figure 2. Census of India 2011, rounded; Table 5 groups the same districts

Pattern 2: A weak-sustainability bias in policy. State policy documents have prized investment, hydropower capacity, tourism arrivals and road length as measures of progress, and these are essentially capital-accumulation indicators. They sit comfortably within the weak-sustainability view, in which natural capital can be traded for man-made capital. The literature on disasters, springs and forest quality suggests that critical natural capital is being eroded in ways that are not captured in headline numbers (Rawat et al. 2012; Dobhal et al. 2013).

Pattern 3: Feedback between development and hazard. Each major hazard since 2013 has revealed the entanglement of infrastructural choices and risk. Roads cut through unstable slopes, reservoirs and tunnels alter hydrology and seismic loading, and urban growth occupies river terraces and old debris. As a result, development gains in the economic dimension carry a rising liability in the resilience dimension, and the literature suggests that this risk is not yet priced into state planning (Dobhal et al. 2013).

Pattern 4: Hollowing-out as a sustainability problem in its own right. Ghost villages are often discussed as a social or demographic issue, but the literature on terrace abandonment, forest succession and wildlife conflict indicates that depopulation is feeding into ecological change, as abandoned fields are colonised by scrub and invasive species and human-wildlife conflict intensifies (Maikhuri et al. 2001; Tiwari and Joshi 2012). Out-migration is therefore both a result and a cause of unsustainability.

The contrast between the first and the other three patterns explains the apparent paradox noted at the outset. Aggregate indicators reward the state; disaggregated and biophysical ones raise alarms. The two are not contradictory but measure different things.

4.3 Gaps in the Literature and a Research Agenda

Several gaps stand out. First, most index-based work is state-level, and there is almost no systematic SDG localisation at the block or district level in Uttarakhand, even though the state's heterogeneity is its defining feature.

Additionally, very few researchers are working to connect different parts of sustainability accounting, including the creation of green state GDP and adjusted net savings, that would allow for an empirical evaluation of a state's weak sustainability. Next, the literature surrounding migration has more studies to cite on migration than studies to cite on the interaction of migration and the evolution of the land, as well as the patterns of both fires and wildlife conflict. Lastly, hazard and development are viewed separately from economic planning and risk reduction, while hill roads and hydropower cost benefit studies rarely capture the costs of natural disasters. Fifth, gender is addressed in the context of drudgery but less in terms of women's control over land, forest governance and migration decisions. Sixth, the role of fiscal federalism, including whether the hill states are adequately compensated for ecosystem services, has received attention at the level of policy argument but seldom in empirical studies.

A research agenda follows. It should incorporate indicator systems that break down data at the block level; valuation of ecosystem services connected to fiscal transfers; assessments of project proposals that take risk of natural disasters into account; panel studies of the intersection of migration and land use; and collaborative efforts in community-managed forests and water sources that carry forward the Van Panchayats tradition.

5. Conclusion:

Uttarakhand's progress post 2000 has been varied and cannot be categorized as a simple success or failure story. There are impressive scores with regards to composite indicators; incomes and literacy have gone up, and the sex ratio has improved. However, scholars who analyze ecology, migration and disaster management speak of a development that is not balanced, has an overtaxed ecological base and is increasingly vulnerable to major catastrophes. This review's biggest contribution is methodological. Progress measurement instruments at the moment focus on capital creation, and completely overlook natural and social capital deterioration. For mountain states this is unacceptable. A key feature of the Uttarakhand state was that it promised to respect the mountains and implement a new kind of development. Whether that promise is still being honoured or broken completely depends on the interpretation of which composite indicator is being used. What's required is a new framework of indicators that considers both the natural and the social capital of a hill state, something that will combine hazard informed reports and local SDG dashboards. Planning and financial structures also need to be incentive-based in order to encourage states to be mountain resource conservators rather than mountain liquidators. Until that is done, the state's record will remain what the literature already says it is: a case of impressive averages and unsettled foundations.

Notes

1. The SDG India Index methodology changed between editions, with revisions to indicators and the number of goals covered; scores across editions are therefore indicative of direction rather than strictly comparable.

2. The Rural Development and Migration Commission's estimates of depopulated villages have been updated in later government statements; readers should consult the latest official figures. 3. Casualty and loss figures for disaster events differ across official, scientific and media sources and are given here as orders of magnitude. 4. All tabular figures are rounded and should be verified against the original publications before use in citation.

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