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Environmental Security Complex in the Hindu-Kush Himalayas: A Regional Perspective

Akriti Sharma and Neeraj Singh Manhas

Abstract: The Hindu-Kush Himalayas (HKH) mountains that sustain billions of livelihoods are facing transboundary environmental threats including climate change, natural disasters, air pollution, and food and water insecurity that transcend political borders. Environmental threats have, however, remained at the periphery of security discourse. By employing the 'Theory of Regional Security Complex' the article looks at the evolution of a security complex in the environmental sector and how it is projected to evolve further in the backdrop of increasing environmental insecurities. It argues for interdependence among States concerning transboundary environmental threats and situates the relevance of the environmental sector in the heavily politicized and militarized HKH.

Keywords: Hindu-Kush Himalayas; security complex; environmental security; climate change; disasters; water insecurity

Introduction

The Hindu-Kush Himalayas (HKH) geographically encompass Nepal and Bhutan and parts of India, Pakistan, China, Bangladesh, Myanmar, and Afghanistan. HKH is a geological and ecological asset that provides ecosystem services to the mountain as well as downstream populations in terms of food, energy, water, medicines, and tourism, among others. The region is instrumental as it is the origin of 10 major river basins, making it the water tower of the region sustaining around 1.9 billion people directly and indirectly (Sharma et al. 2019). Moreover, the mountains have been providing ecosystem services (water, food, energy) for both upstream and downstream populations. Being a fragile ecosystem, it is facing various environmental threats. The HKH mountains are rich in biodiversity and thus ecologically fragile (even without human interference), being the youngest mountain range acting as a regional asset (Sharma et al. 2019). However, with rising environmental change, it is increasingly becoming vulnerable to disasters including landslides, earthquakes, unbalanced river flows, glacier melt, and air pollution. Even though the HKH politically encompasses eight States, the environmental threats are transboundary that do not recognize political borders. The countries of the region are vulnerable to varied environmental security threats, making a regional approach imperative, to address them.

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Since the HKH is a heavily politicized and militarized region, with States embroiled in complex border and political disputes, the security perspective in the region has been dominated by the military and political aspects as traditional border disputes between the countries leading to mutual distrust. Non-traditional security threats, including environmental insecurities like climate change, and water-food-energy insecurities, have been recognized as a challenge but remain at the periphery of the security discourse. The region's environmental insecurities cannot be studied in isolation given the transboundary nature of the environmental threats. Therefore, the article studies environmental security threats in the HKH region resulting in a 'security complex' in the environmental sector using the Theory of Regional Security Complex (RSC) by Barry Buzan and Ole Wæver. Its relevance for the HKH region stems from the 'regional' level of analysis that the theory undertakes. The regionalizing logic of the RSC explains the geographical proximity of the States within the region, making environmental security threats being a common security threat for all the States, leading to security interdependence that is much larger within the region than outside it. The article situates the relevance of non-traditional security threats in the larger security discourse in the region, which has been military-centric. It further discusses how the 'environmental security complex' in HKH is emerging and is expected to emerge further against the backdrop of accelerated environmental threats. Lastly, it discusses the potential for regional cooperation to address the underlying environmental insecurities.

Conceptual framework

Before diving into the main theme, the article defines the key concepts. First, the concepts of securitization and its intersection with the environmental sector are discussed, followed by the RSC to identify an appropriate level of analysis (regional). The RSC is applied in the case of the HKH to analyse the emerging security complex in the region. Second, some other key concepts like environmental security, and the region of HKH are defined.

The security discourse widened and deepened in the post-Cold War period, leading to a departure from the neorealist conception of security, which stressed the physical safety of the State and its survival. This resulted in additional security threats such as societal, economic, and environmental by the Copenhagen School which considered both military and non-military security threats while framing an analysis of the security threats. Consequently, a wide array of other sectors, including economic, environmental, and social, emerged. The theory of securitization was devised by Barry Buzan, Ole Wæver, and Jaap De Wilde, to study the fundamentals of 'who securitises (securitising actor), for whom to securitise (referent object) and securitise from what (security threat)' mainly in the non-traditional security arena, marking a departure from the traditional security agenda (Buzan, Wæver, and De Wilde 1998). The idea of 'survival' or freedom from threats is the key logic of States, while defining the concept of security according to the securitization theory. The theory of securitization moves away from the traditionalist conception of States as the only referent object.

In the environmental sector, there is an interplay of diverse referent objects compared to traditional State-centric security sectors, that consider the State as the referent object of security. In the environmental sector, the environment/ecosystem

itself, and the interplay of the environment with human civilization exist as referent objects. Mostly both referent objects have co-existed in the environmental sector. Securitising actors in the sector range from States to non-State actors including non-governmental organizations, epistemic communities, and civil society. Mostly the threats in the sector include natural geological threats that are not caused by human activity like disasters but are caused by human activity including pollution of water, and air, climate change, soil erosion, and deforestation are increasing in frequency and magnitude, therefore, linking the environmental threats to anthropogenic causes. One striking feature of the environmental sector is that it is dominated by scientific and political agendas (both overlapping and interdependent), where the scientific agenda sets the base for securitization process and the political agenda looks at policymaking and institutionalization, by forwarding the process (Buzan, Wæver, and De Wilde 1998).

In securitization, after the sectoral widening has been discussed, the next step is to delve into the process of determining an appropriate level of analysis. The RSC embeds a fourth level of security analysis: region, based on the rationale that security threats travel short distances faster than longer ones. This logic of geographical proximity/adjacency is more at the regional level than global. Therefore, the security patterns inside the clusters are generally more intense than those outside. Thus, there exists a durable pattern of amity and enmity manifesting in the sub-global, geographically coherent patterns of security interdependence (Buzan and Wæver 2003.

The traditional theory of regional security complexes defines the complex as 'a set of states whose major security perceptions and concerns are so interlinked that their national security problems cannot reasonably be analysed or resolved apart from one another' (Buzan 1991). However, with the accommodation of more sectors of security, the State-centric assumption moved away, and security complex was defined as a 'set of units whose major processes of securitization, desecuritization, or both, are so interlinked that their security problems cannot reasonably be analysed or resolved apart from one another' (Buzan 2003). In the regional security complex, security is seen as socially constructed; thus, States might be the main units in the region but not necessarily in the environmental sector.

The logic of adjacency/geographical proximity generates greater security interaction among the States and is very prominent in the environmental sector specifically in the case of ecosystems including the seas, mountains, and river basins. This adjacency results in greater security interdependence within the complex than outside it. The environmental insecurities in the region are a common set of problems for the countries of the region, leading to security interdependence among the States, which depends on the scientific and political agendas around environmental issues and how they are constructed. The scientific agenda depends mainly on the scientific findings on environmental issues which can rarely be denied, but the political agenda is more focused on generating public awareness over the issue and taking political responsibility and managing it. For instance, the problem of glacier melt, air pollution, or deforestation in the HKH is more concerning to countries encompassing the region than outside it. This is a determining factor for security interdependence within the complex.

RSC is relevant for the HKH in various ways, first, it consists of States, which face similar environmental insecurities, are transboundary, and have regional implications and not just national implications. Second, the causes of

the environmental threats might be global (global warming), but they have greater regional impacts on fragile mountain ecosystems. HKH represents a geographically coherent group of actors that face a common set of environmental security threats. In the environmental sector, even though threats like climate change and ozone depletion are global, the degree of vulnerability to threats might vary in different regions. Ecologically vulnerable regions like the polar regions, including the Arctic and the HKH, are warming up much more than the global rise in temperature owing to some scientific phenomena such as elevation-dependent warming. In the case of the HKH, the environmental problems including climate change, and glacier melt are caused globally but their consequences have to be dealt with regionally within the States that encompass them and are at the immediate receiving end. This 'regionalising logic' appears in the security complex and forms a sector-specific regional complex where a common set of problems has to be addressed by a group of States. The regional-level significance is due to two factors—the threat perception in the group of States in the complex is much more than outside it and global cooperation may not be useful to address the threats, but regional cooperation is imperative to tackle the threats (Lee 1998).

With environmental security, a broader view is taken, that it is 'safety from environmental dangers caused by natural or human processes due to ignorance, accident, mismanagement or design and originating within or across national borders' (Zurlini and Muller 2008). In broad terms, environmental security is addressing the major challenge global environmental change poses to interactions between ecosystems and its effects on environmental degradation, resources, and ecosystem services. This includes water scarcity, its imbalance, climate change, food and agricultural scarcity, air pollution, and disasters. These challenges are first transboundary and have the potential to affect populations and need attention from States and non-State actors as they pose a significant threat or have the potential to pose a threat to the survival of ecosystems and human and animal lives. As a field, environmental security has evolved not as a homogenous, but rather a 'polysemous category', encompassing various debates (Floyd 2013). The notion of environmental security ranges from being referred to as the 'ultimate security' (Myers 1989) without which all other attempts at security would be worthless, to the accommodation of the environment into the security agenda will subvert the goal of the security agenda (Deudney 1990). The field of environmental security since then has evolved and has several debates within the discourse. It includes the environmental and conflict thesis that explains that resource scarcity (Homer-Dixon 1999) and abundance (Soysa 2013) lead to violent conflict. The second debate pertains to positive and negative notions of security as the 'absence of violent conflicts or war" or 'freedom from want'. Another debate regarding environmental issues leads to cooperation or conflict (Floyd 2013). Lastly, the Hindu Kush Himalaya (HKH) region is defined. There is considerable debate around defining the Himalayan mountain range. This article uses the International Centre for Integrated Mountain Development (ICIMOD)'s broad definition of the region 'The Hindu Kush Himalaya mountain range spans eight countries and stretches 3,500 km across Asia'. The eight countries encompass the mountain ranges of Nepal, Bhutan, India, Pakistan, China, Bangladesh, Myanmar, and Afghanistan (ICIMOD 2024).

Environmental security threats in the HKH

This section highlights a few environmental security threats in the HKH and others that have the potential to turn into security threats in the future, considering the regional implications of the issue. While there are many more environmental concerns in the region, not all issues are security threats; thus, the article restricts itself to a few of them to advocate for the underlying security complex in the environmental sector. It begins with the already existing issue of water insecurity in the region, one of the most contested and studied security threats of the HKH, followed by the disasters that have been wreaking havoc in the region and demand a regional effort. Another issue is climate change that has been and will potentially worsen the HKH ecosystem cross-cutting various sectors. Lastly, the article discusses air pollution and food insecurity, which are transboundary and can potentially cause disputes amongst States if not managed carefully. This section highlights the various sectoral threats taking into account that environmental threats are interconnected and the cause and effect may be overlapping.

Water insecurity

The HKH region serves as a crucial water source for two billion people, supplying water necessary for agriculture, energy generation, and sustaining ecosystems. Several major rivers including the Indus, Brahmaputra, Ganges, and Mekong provide various ecosystem services to billions (Scott et al. 2019). However, the region forms the source of most of the major river systems and among the countries upstream and downstream, there are numerous transboundary water conflicts.

Water insecurity in the region is one of the clear cases that reflects security interdependence amongst the countries. First, the sharing of Indus waters between India and Pakistan. Both countries have been bickering regardless of the Indus Water Treaty, primarily because Indian projects upstream have a bearing on the outflow of water into Pakistan. The two countries have remained hostile to each other since 1947 and relations have been shaped by border disputes. The Indus Basin is under severe environmental strain due to flooding, glacier melt, and water imbalance. Despite the Indus Water Treaty brokered by the World Bank on water sharing, both continue to have disputes over storage projects. Pakistan has attempted to construct its water scarcity politically and securitized it considering India as the aggressive upper riparian. Pakistan has questioned 27 Indian projects including Salal, Tulbul, Baglihar, and Kishanganga (Sinha 2021). With climate impacts on the rising population, water insecurity can be further exacerbated between the two over the Indus. Against the backdrop of rising population and climate change, the treaties can become a bone of contention at later stages when older conditions do not prevail (Kamran, Aijaz, and Shivakoti 2017). The second case is the distribution of water in the Ganges River Basin between India and Bangladesh. The Farakka Barrage has been a bone of contention between the two since India's unilateral move to construct the barrage aimed at diverting water for operating the Kolkata port. The Farakka Barrage agreement witnessed a ruptured phase, especially after the assassination of Mujibur Rahman when Bangladesh strongly internationalized the issue (Pandey 2012). The 1996 Ganges Treaty came into play for 30 years after the existing hostilities. However, since then, domestic policy-makers of both countries are not satisfied with the Treaty and often express their dissatisfaction. As the Treaty expires

in 2026, it faces many challenges for renewal. West Bengal's Chief Minister, Mamata Banerjee, has raised issues in sharing Teesta waters (Mitra 2024). Third, the Brahmaputra River Basin, affected by China's construction of large dams in the Tibet Autonomous Region (TAR), has been an area of considerable tension for downstream countries—especially India—who have voiced fears about the diversion of water flow and consequently, water availability downstream, which may result in corresponding scarcities—often critical—especially during the dry season . Insufficient data sharing from China exacerbates the issue further.

The status quo of water resources in the HKH region is marked by variability and reliance on glacial melt, snowmelt, climate change, and heat waves which are expected to significantly impact water flows, due to which the pre-monsoon flows decrease, affecting irrigation, hydropower, and ecosystem services. The groundwater, especially from mid-hill springs in the HKH, significantly contributes to the rivers' base flow. There is a pressing need for enhanced scientific understanding of groundwater, particularly as millions in the mountain regions rely on springs (ICIMOD 2010). Water insecurity in the region highlights security interdependence amongst the countries.

Disasters

The HKH region stands out as a particularly vulnerable area, facing myriad risks from natural disasters, compounded by climate change. Annually, the region suffers the loss of hundreds of lives, billions in property and infrastructure damage, and extensive destruction of valuable agricultural land due to natural disasters. Floods, often crossing national boundaries, inflict greater human and economic losses. The retreat of glaciers in the area has led to the emergence and expansion of numerous glacial lakes. The HKH region has suffered 56 flood outbursts or GLOFs within the last few decades and still many of these glacial lakes are situated upstream in areas where the feet of glaciers don't exist and there are buildings, roads, and hydropower development posing a risk of breaching and failing. For instance, the Dig Tsho GLOF, which took place in 1985, is located on the network of lateral moraines at the western part of the Rolwaling Himalayan range in Nepal and is a large glacial lake that brought forth a GLOF that swept away a new hydropower plant downstream with loss of lives and infrastructural damage. With the rising likelihood of such occurrences under climate change perspectives, better disaster management and coordination amongst the countries have been the order for the day (Vaidya et al. 2019). Disasters such as earthquakes, glacial bursts, and landslides adversely impact the HKH region. The consequences directly affect the water services that support agrifood production and hydropower due to socio-economic vulnerability and food crises (World Meteorological Organization 2024). Disasters have shown that there is a need for effective disaster management. This reflects the necessity of prioritizing regional integration and investing in sustainable systems with adaptive capacities to mitigate future conditions and risks (Vaidya et al. 2019).

Climate change

Even though the HKH is extremely susceptible to the negative consequences of climate change, there is still a huge knowledge gap regarding the extent of its

influence. Globally, it has been experiencing sharply fluctuating climatic conditions: increasing temperatures, irregular rainfall, and extreme weather conditions. A recent Report by ICIMOD published in October 2019 reveals that even as the world aims to limit temperature rise to 1.5 degree Celsius, the regional temperature increase could still range from zero degree Celsius to three degree Celsius in the HKH region. The climate variability impacts water resources, ecosystems, and agriculture are evident in the region (Krishnan et al. 2019). The HKH region's temperature has risen 1.5 degree Celsius in the last 100 years, which is much more than the world average. This warming has accelerated glacier melting, causing the area to lose about 16 per cent of its ice fields since the 1980s. Moreover, there has been a 25 per cent increase in severe weather conditions like flash floods and landslides during this time. The region experiences raw water availability only in certain seasons and an increasing danger of fatal Glacial Lake Outburst Floods (GLOF), which are the major threats to populations downstream (Mishra et al. 2019). India, Pakistan, and China are the world's most exposed populations to GLOFs (Taylor et al. 2023). Moreover, a weak climate information base and inadequate climate data and services are already hindering access to water, food, and energy. Pakistan's Baltistan province constitutes a zonal forecast; this has imposed alarming variations on the country's GDP and erased agriculture as a line of business. Likewise, there are changes in the monsoon system, and enhanced temperatures reduce the availability of systems for rain-fed agriculture. These variations create unpredictability in farm output and greater risk for farmers (Chaudhry 2017). Bhutan is witnessing extreme climate change events, including but not limited to excessive rainfall, floods, and drought impacting the farming communities and the country's growth. National policies and plans link adaptive activities to global paradigms, such as the UNFCCC, but they have been inadequate to address the vast scope of climate impacts. Closer regional cooperation and efforts towards joint research, data sharing, and disaster management planning are the key measures to address increasing climate change challenges in the HKH region (Agrawala et al. 2024).

Air pollution

The pollutants that are persistent in the air, are harmful to humans and ecosystems, and continue to prevail across the region, affecting climate change, water, agriculture, and the economy. The region is threatened by pollutants that are both imported into the region and generated from within, threatening to tip the scales of the region with significant implications affecting people. One of the major challenges to solving air pollution is that it is an activity that transcends borders, meaning that pollution in one country impacts the neighbours (Manisalidis et al. 2020). Hence, there is concern that environmental health in the HKH has worsened, with the proliferation of atmospheric pollutants such as particulate matter (PM 2.5) and (PM 10), nitrogen oxides (NOx), and sulphur dioxide (SO_2). Over the last two decades, emissions from vehicular traffic, crop burning, and industries are seen to have created such pollutants. The food security of this region has been compromised due to the high rates of pollution, and the Indo-Gangetic Plain has grown into one of the world's most polluted areas. This rise in air pollution extends the duration of the winter fog and haze in the plains, negatively impacting visibility, and poor air quality in the plains, besides the HKH (Talukdar et al. 2023). The extra use of biofuels for heating in the winter season and the open burning of biomass further add to the woes in

winter. This leads to a dense, persistent, and copious haze and fog, which in turn reduces the ability of the sun to warm the ground leading to continued observation of thermal inversion (Lau and Kim 2018). The darkening of the glaciers and snow is amplified by absorbing aerosols, black carbon, and particles of dust. The observational data emphasizes the important contributions of these aerosols in regulating the monsoon circulation with a huge impact on the monsoon rainfall of South Asia (Li et al. 2023).

These issues include a conclusion or discussion of a mitigation measure for air pollution; the latter is an essential requisite since the region experiences high levels of air pollution with direct effects on health, climate, and economy. Moreover, cooperation is evident between different countries of the region to engage the other participants and stakeholders in the process of proper pollution management and minimization (Verma et al. 2022). Some of the collaborations in the HKH region in this programme include cooperation with the governments of Nepal, Bhutan, and Afghanistan to instal optical air quality monitoring stations for better decision-making and coordination (ICIMOD 2021). Consequently, intense efforts and well-coordinated regional action plans are needed now to address air pollution effectively in the HKH.

Food insecurity

The HKH region is also susceptible to acute food insecurity. The food insecurity in the mountainous areas of HKH is distinct from those in the plains, attributed to the tough terrain, restricted transportation, infrastructure, geographical remoteness, and seasonal variations. Over 30 per cent of the population is experiencing food insecurity, and about 50 per cent of the people are dealing with various forms of malnutrition, especially among women and children (Rasul et al. 2017). Agriculture, a primary livelihood in the HKH, is under strain, with traditional farming systems unable to sufficiently support food needs or generate adequate income. Consequently, about one-third of the population is bearing the brunt of food insecurity, with a significant portion of children under five being underweight, stunted, or wasted (ICIMOD 2010).

The factors contributing to this are diverse and complex. However, climate change aggravates food insecurity by altering weather patterns, causing natural disasters like drought and affecting crop yields, which often leads to environmental degradation. Some seasonal changes, particularly during monsoon and winter, significantly affect food security, with natural disasters and heavy snowfall further limiting access to food. Despite these challenges, the HKH region also influences urbanization and migration, which also impacts food insecurity. There is a shift from traditional crops like millet and barley to maize and rice, buckwheat to wheat, and amaranth to soybean to high-yielding crops, impacting the diversity of agricultural ecosystems and dietary patterns. Some traditional grains, rich in micronutrients and fibre, have been discarded in favour of refined grains, diminishing their cultural value. As climate change exacerbates food insecurity by intensifying climatic shifts, triggering natural disasters, and altering crop production, all of these contribute to environmental degradation. Another regional threat is posed by the transboundary locust attacks in the HKH. Additionally, Spotted Wing Drosophila (SWD), negatively impacts food production by depleting crops, thereby exacerbating food

insecurity, particularly as food systems remain fragile due to locust invasions (Nischalke 2015).

Environmental regional security complex in the HKH

Air pollution, climate change, disasters, food insecurity, and water insecurity are a few of the challenges that the region faces amongst others. It is well established that the environmental insecurities in the region are transboundary making it a regional issue. Floods have become frequent in both India and Pakistan. In 2023, the cyclone caused heavy flooding in both India and Pakistan, which demanded enhanced preparedness and management from both countries. With the projected impacts of climate change getting worse, floods will increasingly wreak havoc in both countries. Moreover, locust attacks in India and Pakistan have put the food security of the region at risk. This led to the Government of Pakistan declaring an Emergency in February 2020. Locust attacks have become more frequent due to high cyclonic activity demanding more data collection to predict and control the attacks (Dohadwala and Nachiappan 2020). The problem of air pollution is increasing leading to the deterioration of regional air quality, with the Indo-Gangetic plains being the hotspot. Winter fog and haze have been increasing and the pollutants amplify the melting of the cryosphere due to black carbon depositions (Saikawa et al. 2019.). The Indus Water Treaty between India and Pakistan, the Ganges River between India and Bangladesh, the issue of climate-related displacement between India and Bangladesh, and the diversion of Brahmaputra waters between China and India are transboundary issues that result in complex security interdependence between the States (Jayaram 2016).

This deep-rooted security interdependence among the states in the HKH is evolving into a security complex in the environmental sector. The environmental security complex in the region is expected to evolve as environmental insecurities are projected to rise. This will result in a complex security interdependence in the region concerning environmental issues. While we discussed the emergence of the security complex in the HKH, there are some distinct features of the complex. First, it is not a static but dynamic complex, which can possibly change, depending on the environmental insecurities and how they impact the region in the wake of the changing climate. Consequently, how States interact within the complex (conflicts or cooperation) will define the evolution of the security complex. Second, the security complex is heterogeneous rather than homogenous in nature. It has spillover in other sectors as well, it is impossible to carve out a neat security complex in one particular sector. This is evident in the environmental sector where there is a natural spillover due to strong linkages of environmental threats to social, developmental, and economic factors. Poverty is directly linked to environmental insecurity, which is higher in developing countries. Poverty acts as both a cause and an effect of environmental insecurity (Upreti 2013). In HKH, due to weaker economic status and governance, environmental insecurities are high. Simultaneously, poor socio-economic status is also reflected in the rising environmental insecurities. However, the article confined the discussion to the environmental sector.

Conclusion

Securitising the environment in HKH: prospects for advancing regional cooperation

Political and military issues have largely dominated the security discourse of the HKH region. Environment insecurities have derived less attention in the security agenda of the countries as they continue to exist and worsen further. The region's response to environmental insecurities has depended on the capability to address them within the complex. The regions' complex political fissures and fractured regional security consensus pose a challenge to regional cooperation efforts. Institutions such as the South Asian Association for Regional Cooperation (SAARC) have acknowledged the environmental threats but have done little to address them, apart from having declarations and policies. The Thimpu Declaration mentions the SAARC Intergovernmental Mountain Initiative for the mountain ecosystems, particularly for the glaciers, reflecting that the countries acknowledge the environmental threats and have the intent to cooperate on the same but the cooperation does not materialize in tangible terms (Ministry of External Affairs 2008). Moreover, SAARC has faced major setbacks in the past few years that have led to its non-functionality and have questioned its relevance as an effective regional institution. SAARC Summits have been suspended for an indefinite period since 2016, as member countries declined to participate due to heightened bilateral conflicts. Additionally, whether SAARC is fit enough to address the larger HKH issue is questionable, as HKH includes a subset of SAARC but encompasses other States as well (Matthew 2012). This presents us with a challenge to look for new institutions that catalyse regional cooperation.

In HKH, so far, the driving factor of securitization is the epistemic community (as part of the scientific agenda), which has investigated the urgency of the environmental insecurities, constructed and communicated it to the society as well as policy-makers. Despite having a scientific consensus over the same, environmental security threats have remained at the periphery of the security discourse in the HKH. The other actors include those with political agendas, including non-governmental organizations. Securitizing moves from the States have remained local and domestic, as compared to regional. India, for instance, has a National Mission for Sustaining the Himalayan Ecosystem at the national level to manage the Indian Himalayan region.

Given the political and socio-economic complexion of the HKH region, intergovernmental organizations like the International Centre for Integrated Mountain Development (ICIMOD) have played an instrumental role in fostering scientific collaboration across the region. Its eight member countries are represented by the secretaries of relevant ministries, under whose auspices it has been able to foster regional collaboration in transboundary issues including water resource management, landscape management, and disaster risk reduction. ICIMOD has enhanced regional cooperation through various regional efforts including the transboundary river basin initiatives (Indus Basin and Koshi Basin), and transboundary landscapes (Kanchenjunga, Kailash, Hindu Kush Karakoram Pamir, Far-Eastern Himalayas). Its contribution to regional cooperation in the HKH has mostly been in the form of scientific and knowledge dissemination (ICIMOD, 2024). There is a need for more robust scientific exchange and knowledge exchange amongst the countries in the backdrop of diverse and complex political and socio-economic realities.

Another push towards advancing regional cooperation has been from the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) that proposed a Himalayan Science Council for enhanced engagement of the scientific community across the HKH region but is yet to be functional. It aims to study the health of

the Himalayan ecological system and promote scientific cooperation in the region (BIMSTEC 2024). Such a scientific exchange at the regional level would be effective. India has an opportunity to lead the Council and promote scientific exchange in the region through BIMSTEC as an alternative institution to push regional cooperation on HKH in the environmental sector. However, HKH is highly susceptible to various environmental security threats due to its fragile ecological system, which faces escalating threats from climate change and human activities that demand more regional efforts (ICIMOD 2010). But in comparison to other mountain regions like the Alps and the Carpathian Mountains which have a functional institution (Alpine Convention and the Carpathian Convention) to address the regional environmental threats, HKH needs a regional effort to securitize the environment. As billions continue to sustain livelihood from the HKH, transboundary environmental threats demand regional cooperation. Climate change, water-food insecurity, air pollution, and disasters can disrupt the balance and have security implications for the States and the HKH ecosystem. Even though institutions like ICIMOD have provided opportunities for issue-based regional cooperation in river basins and transboundary landscapes, more needs to be done by the governments, the epistemic community, and civil society towards securing the HKH environment.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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