



Military-Induced Threat to The Himalayan Ecosystem: From Defilement to Possible Amelioration

Ranjana Dey^{1*} • Arindam Basu¹

¹Rajiv Gandhi School of Intellectual Property Law, Indian Institute of Technology-Kharagpur, West Bengal, India.

*Corresponding Author Email: ranjana_16pisces@iitkgp.ac.in

Received: 22.04.2023; Revised: 22.05.2023; Accepted: 24.5.2023

©Society for Himalayan Action Research and Development

Abstract: The present research article examines the military sector's contribution to environmental degradation. It contends that nations' attitude on giving a nearly total exemption to emissions by the defence wing is incorrect. The study is concerned on the pollution of the natural environment caused by this sector in general, and specifically by its contamination of the delicate Himalayan ecology. It highlights the problems through numerous aspects for comprehension, beginning with a description of how the mountains became the chosen choice as a battleground. The deployment of armed forces at international boundaries across mountain ranges has become the norm in the Himalayan region, sadly leading to the ecologically sensitive zone's demise. The paper brings out the dilemma embedded in these inherent trade-offs, arguing that the natural environment is a source of security for nations that must not be sacrificed for fanciful war games.

Keywords: Himalayan region • Military Activities • Environment • International Humanitarian Law • Pollution • International Law.

Introduction

Environmental pollution is a phenomenon that is real, tangible, and perilous. Over the time, we have identified pollution from multiple anthropogenic sources. In response, national and international laws are adopted to address the ill effects produced by many of those activities on our natural environment. However, the pollution triggered by armed forces have been immune to and exempted from the rigours of environmental laws. Though public international law and a good number of domestic laws acknowledge the destruction of the environment during wars, there is almost no recognition or disciplining of the harm that takes place during the peacetime activities of the armed forces.

In its attempt to protect ordinary civilians during armed conflicts, the branch of International Humanitarian Law offers protection to the natural environment, approving it as essential to human life. (ICRC website 2010), but the wide range of environmental protection laws does not recognize the pollution caused by the armed forces from their round-the-year peacetime activities. Instead, several laws have exempted the use of polluting composites for military use, describing the use as one for 'essential pursuit'.

This paper aims to lay bare the damage done to the environment through the routine activities of the forces. It will attempt to bring together the wide range of such activities that impair every component of the natural ecosystem. The paper recognizes that



irreversible harm has been done to countless critical habitats worldwide. It aims to make an effort to advance a few deterrents that may facilitate safeguarding of biomes from further loss while also arriving at findings that may aid in boosting native habitats.

The paper is divided into five parts. It commences with an introduction to the brief history of warfare and its progression with superior, more deleterious and devastating arms and ammunition. The second segment describes the Himalayan ecosystem. It summarizes the peculiarities of this biosphere that are of incalculable value. The third portion will emphasize the case of the Himalayas as an ecological hotspot that has also been a hotspot of conventional military activities. It recounts the adverse effects of such activities that are messing up the whole arrangement of ecosystem services. The fourth part analyzes the laws in place that cover the subject. The focus here is towards the lacunae in law at perceiving the military as a significant contributor to Himalayan defilement. Thereafter, the paper closes with workable suggestions. This segment notes the ongoing activities being carried out for the well-being of the physical state of the Himalayan landscape. It also lists a few other systems that show signs of promising results in recovering and restoring the mountains.

Himalayas: The Indian Experience

The Himalayan region is one of the thirty-six globally determined biodiversity hotspots (BSI 2021). It is a crucial biome that houses thousands of endemic species and genera of plants, animals, fishes, insects and microbes. It is also an ecosphere that protects rock, snow, ice and an abundance of eco-regions of global value. Moreover, the Himalayas have been found to be amongst

the most fragile and vulnerable mountains in the world (Pandey et al. 2017). They are a critical ecosystem that is vital for sheltering planetary biodiversity. The intricate ecosystem services, like carbon sequestration, water storage, and the region's biodiversity maintenance, make it mandatory to conserve and protect the biome (Kattel 2022). But anthropological exercises and developmental projects that directly hamper biodiversity and induce the reduction of natural habitats also speedily cause a loss in these and several other ecosystem services. It is so because the components of an ecosystem are interwoven; as a result, a bump on one component can mutate the working of allied and symbiotic components (Lang and Benbow 2013). Then there is a loss of 'resilience' in the natural environment caused by humankind's actions, which adds to the adversities. Resilience refers to the ability of the network to absorb external disturbances and maintain its ability to regenerate itself (Adger et al. 2005). So long as an ecosystem is resilient, it should be able to restore itself within a favorable time limit so that the extensive scheme of components does not get deranged. But, faced with the effects of global warming and climate change, the fragile Himalayas' biodiversity is already under stress. Consequently, direct human interference in the Himalayas is compounding its resilience through the meddling with biodiversity and ecosystem services of the region. For example, the warming of these mountain regions is already creating difficulty for species that are accustomed to a lower temperature and is, therefore, facing loss in maintaining their ecological functioning.



How Military presence is tipping the ecological balance in the Himalayas

The Himalayas, the mountain range embracing India in the north to its northeast, have experienced war and armed conflicts. Ever since, the military has a strong presence in the mountain region, sharing international borders with multiple nations like Afghanistan, Pakistan, China, Bhutan and Nepal. With border disputes that have lasted decades and have been one of the world's most unyielding geopolitical strife, military presence across the Indian Himalayas has remained constant.

The Indian Himalayas have become home to the armed forces of the nation. Their continued presence in the region has, undeniably, warranted the peace and harmony that we experience throughout the country. However, this troop presence also has its consequences, and here we signify the harmful effects that the natural environment of the region endures. Increasing troop presence calls for necessary infrastructure development, leading to rapid management of native habitats, rise in human presence and allied activities creating anthropogenic interference to pristine habitats, and ensuing pressure on biodiversity and loss of conservation of ecosystem.

Initial Site Development Effect

The expected and prevalent change to human intrusion into the forested area is through the felling of trees. When trees are felled in the Himalayan province, it most often than not, will result in the chopping and uprooting of endemic species that tantamount to biodiversity loss. Pine forests, to name one, that marks the Himalayan region, are recognized for their ability to store biomass for carbon sink. Losing them

hinders a range of ecosystem functioning in the Himalayan region (Haque et al. 2020). The felling of trees causes an immediate release of stored greenhouse gases from the trees back into the atmosphere, which compounds climate change (IPCC 2008). The clearance of forests also leads to the loss of animal and bird species. Forest clearance correlates with local climate changes in the form of changes in rainfall patterns and temperature variability (Bradshaw 2012). Mountain forest reduces erosion and also protects topsoil from splash erosion (Hamilton 1992). Mountain soil rich in vegetation regulates hydrological cycles at mammoth scales that reciprocally limit the fury of flooding and avalanches (Martin et al. 2011).

Infrastructure Development

Once land is cleared, it gives way to critical infrastructure development. These may range from building temporary-makeshift barracks for troop housing to elaborate cantonments to constructing highways for strategic communication, raising enclosures for ammunition storage, redesigning location for training ranges, etc. These developmental efforts often involve materials adverse to the ecology of mountains. For instance, in India, asphalt and concrete cement are the main ingredients used for road construction. The environmental consequence of both these building materials is high, ranging from the stage of construction to that of maintenance and use. Asphalt roads produce GHG emissions at the construction stage, and throughout their life, they produce dust and other eco-toxics that acidify air and water and prompt eutrophication (Mazumder et al. 2016). In addition, asphalt surfaces absorb, store, and release high-temperature heat into



the atmosphere (Aletba Salam et al. 2021). This heat released in the mountains can potentially upset the natural functioning of the ecosystem through the 'urban heat island' phenomenon (Siti Halipah et al. 2018).

Effects of Troop Housing

The military presence brings with it all kinds of waste related to civilian presence, ranging from biodegradable garbage to plastic-polythene refuse and other toxic waste of irregular forms. Their decomposition, removal or treatment in higher altitudes of mountains has been almost nil. As disclosed in a Ministry of Defence report in 2019, the total quantity of waste generated by the armed forces in Siachen Glacier is 236.75 tons per year (Ministry of Defence 2019). Owing to this finding, and supported by knowledge of the quantity of accumulated trash there could be since 1984 (the year the army began being stationed there), the Indian Army, in 2018 launched the Swachh Siachen Abhiyan (SSA) aimed at reducing overall waste production and the phasing out of waste accumulated in the eco-fragile glacier region. By September 2019, the army discarded 130 tons of waste under this project (Dutta 2019).

Training and testing ranges

Regular training and testing practices of armed forces, equipment and vehicles come with additional pressure exerted on the local environment. Gun firing ranges get laden with mercuric compounds and the higher organic matter of mountain soil retains them in greater concentration (Gebka et al. 2016). The manoeuvre practice of defence vehicles alters soil's physical properties, compromising soil functions. There also are the 'wargames' or the war drills that nations organize. The Himalayas offer tough

conditions for the forces, so it has become a place for routine military practice. For example, Indian troops hold regular practice sessions, including joint-military exercises between nations. The housing of soldiers for the weeks that such drills usually last, with hundreds of uniformed personnel, on the face of it, exerts pressure on resources like freshwater sources and mountain lakes, vegetal growth and the whole gamut of the complex ecosystem of the high ranges. Then there are impacts of the activities carried towards reviewing combat readiness and honing troops' skills. For instance, there occurs compaction of soil through the heavy vehicles that traverse the region, thereby altering native soil structure which then disrupts the whole process of drainage and vegetation (Sidhu and Surya 2014). In addition, there is emission from fighter aircrafts practicing around strategic bases along the Himalayan ranges from those in Jammu and Kashmir, Uttarakhand, West Bengal, Sikkim, Assam, Arunachal Pradesh and so on.

Laws that Matter

This part tries to capture briefly the laws and regulations that deal with the pollution emanating from military activities. Surprisingly, the legislative framework fails to address the problems described above, directly. It then makes sense to evaluate the effectiveness of those laws scattered in various forms dealing with environmental concerns in the Himalayan region.

Article 48 A of the Constitution of India, 1950 lays down a duty on the state to protect forests and enhance the country's natural environment (The Constitution of India, 1950a). Article 51A (g), mandates to preserve and enhance the natural environment by safeguarding forests, lakes



and rivers; it imposes a duty on its citizens (The Constitution of India, 1950b). These provisions have been used by the Apex Court to uniquely bolster the country's environmental jurisprudence. India is one of the few countries in the world that has dedicated environmental provisions in its Constitution. Yet, Indian Constitution at its inception lacked entrenched environmental responsiveness. It was only via the Seventy-Sixth Amendment that these two provisions were introduced, which the Supreme Court used quite innovatively to enlarge the scope of the right to the environment under Article 21 of the Constitution.

Apart from these important constitutional provisions Indian parliament has enacted some important legislation that can be relevant in the Himalayan ecosystem conservation context. For example, the Forest (Conservation) Act 1980 recognises "conservation of forests" as one of its primary objectives. It proclaims itself to be a law that protects forest land from being cleared or converted to non-forest purposes. However, what the statute only does is that it prohibits any such conversion without the prior acquiescence of the Central Government. It leaves a fissure in the law, thereby allowing the diversion of forest land for non-forest uses where the Central Government deems fit and permits such conversion. The grant of forest land to the military has been a thread where the government has been generous on the grounds of defence exigencies. As mentioned earlier, with the Indian Himalayas sharing international borders with several countries, these forest-land grants have been deemed appropriate and of the essence. As such, the aforementioned land-use changes have been consistent. A visit to the Government of India's 'Parivesh'

website facilitated sketchy statistics on forest clearance. It draws details on proposals seeking forest clearance in over three thousand projects. While fifty percent of all proposals had cleared Stage I clearance, a majority of them were pending under the Essential Detail Sought (EDS) by the Divisional Forest Officer (DFO); none had reached the stage of rejection yet.

The diversion of forest land for non-forest use however little it maybe, goes against the key aspiration of the Biological Diversity Act, 2002, to conserve the biological diversity of the country. The mountain ecosystems of the Himalayas are known for their extensive biodiversity and significant biological resources that have evolved organically over centuries. Such forest ecosystems comprising native species of all forms forming a complex ecosystem cannot be substituted through man-made forests of any scale.

Ironically, an evident conflict of interests arises with the Central Government as guardian of biological diversity under one law and the final authority as granter of forest land for non-forest use under another. The Compensatory Afforestation Fund Act of 2016 was the result of a Supreme Court of India judgment from 1995 (T.N. Godavarman Thirumulpad vs. Union of India and Others: Writ Petition (Civil) No. 202 of 1995). The court made an observation highlighting the need to create the fund as part of its continuing mandamus towards forest conservation. This approach of the court has been lauded as a tool 'to ensure that the state agencies report back to the court on a periodic basis' (Menon and Kohli 2021). The Court gave the fund a wider scope in its direction, which said, "besides artificial regeneration (Plantations), the Fund shall also be utilized for



undertaking assisted natural regeneration, protection of forests, infrastructure development, wildlife protection and other related activities”. However, in practice, the work towards compensatory afforestation has been marred by duplicity, resulting in pseudo-forestation.

The Forest (Conservation) Rules, 2022, have endorsed the concept of ‘compensatory afforestation’, and have adopted the definition from the Act of 2016 as the afforestation done in exchange for the forests cleared for non-forest purposes (Forest conservation rules 2022). In principle, it follows a land-for-land and tree-for-tree principle. Consequently, the India State of Forest Report 2021 has reported an increase in the country’s total forest and tree cover by 2,261 sq. km. However, non-governmental and independent research-based findings have vastly reported the mass failures of such compensatory afforestation projects (Rakshita 2019) and unused funds (Sinha 2023). These findings are supplemented by the recent findings published in the Synthesis Report of the Intergovernmental Panel on Climate Change that highlights the ability of existent-matured ecosystems at lowering impacts of climate extremities over new forests that are promised to be raised as a replacement to the former being cleared (IPCC Report 2023).

Conclusion

The Indian armed forces form a critical stakeholder in the nature reserves of the nation and the vast Himalayas in particular. With the ever-increasing troop presence in guarding the borders set against the Himalayas, the region has become a second home to the infantry. Their continued presence there is necessitated by the persistent skirmishes at the borders. While

protecting the nation from external aggression is paramount, it is equally indispensable to safeguard the natural environment since natural resources are the ultimate security source for every need of a state and its people (Parthemore and Rogers 2010). Under these circumstances, the only solution is to find a balance between border security and securing our environment. Therefore, it is reasonable for the armed forces itself to take up environmental protection activities in such areas. Over and above, preserving the snowcapped peaks of the Himalayas and conserving the dense forests of its mountains are vital to maintaining its enormous height and effective barrier against strained neighbours. By doing this, the army can heighten its ongoing greening activities and diversify it to include more areas needing immediate intervention.

The ongoing intervention of the Army under Swachh Siachen Abhiyan in cleaning the Siachen is a laudable action that covers every aspect of waste reduction and removal. The act of transparency in data (Ministry of Defence 2019) related to waste amassed in thirty-five years and recognizing the region's consequent ecological damage proves the project's legitimacy towards a constructive clean-up. The action plan to adopt eco-friendly ways to dispose of waste and essentially reduce waste from entering the glacier appears realistic with the help of the chain of command designed for its execution. The mission has executed steps towards segregating degradable and non-degradable wastes, making compost out of degradable waste, introducing bio-degradable packing materials, arranging helicopters flying in the region with supplies to fly out with wastes, and eradicating open defecation, among others. The army is also



planting trees in the region to increase the green cover by ensuring that trees and bushes of local-native variety are planted, which appears to be a conscious decision at not introducing alien species that tend to negatively affect native biodiversity.

In similar lines, the assistance of the Ecological Task Force (ETF) could be utilized towards preserving and restoring the ecology of the Himalayan region. The ETF are a battalion of ex-servicemen who are inducted for working specifically in ecology-related programs. They have been working on different ecology-related projects across the country since 1982. Their experience of traversing through challenging terrain and fighting harsh weather conditions makes them an ideal choice for working in the Himalayas. Their success in greening and recovering similar regions in high altitudes verifies their ability to restore nature in areas damaged by the defence sector. Their accomplishment in regenerating the Bhati Sanctuary is an exemplary performance too. On this account, the ETF can be commissioned to reconstruct and revitalize the Himalayan ecosystem. Tasking them with this will also give the project the required commitment of the military culture and can thereby involve the military in securing environmental security for the nation (Jayaram 2016). A step towards this will also advance India's achievement of Land Degradation Neutrality by 2030, and towards creating an additional carbon sink by augmenting its tree and forest cover.

Considering the theme of this paper, it is appropriate to note the World Commission of Environment and Development report, *Our Common Future* that underlines the significance of caution about the peacetime arms race being a destroyer of scarce

resources. Also, it emphasizes the pollution this industry creates while exploiting natural resources as raw materials in a range of polluting practices of the forces. Several observations made in this report about the perfunctory character of defence activities in disregard to its contribution towards climate change hold true to this date. The report also draws attention towards the worldwide expenditure for weapons research and the lack of such investment for pollution control and related technologies. These observations are also applicable in the case of India; however, improvements are seen to be being made. The World Charter for Nature, 1982, also pledges to safeguard nature from warfare and hostile activities and avoid military activities that can damage nature. While upholding the need for humans to prudently use natural resources, it also emphasizes on environment impact studies of activities that stand a chance of disturbing nature. India having voted in favor of this resolution's adoption, is obligated to work towards fulfilling its objectives. With ongoing efforts and a few other small but steady steps, the adverse impact of routine defence activities on the natural environment can be reduced constructively. Therefore, while steps are being taken to promote pollution reduction by the sector, it has to also undo the harm caused by the years of vigorous military undertakings. Even though the realization of set targets exceeds the time foreseen, every step taken towards it can be stimulating. What is crucial here is that the steps taken towards attaining such targets are built on research tested by evidence (Mitchell and Graham 2017).



References

- Aletba Salam et al. (2021) Thermal performance of cooling strategies for asphalt pavement: A state-of-the-art review, *Journal of Traffic and Transportation Engineering (English Edition)*, vol. 8(3):356-373. Also available at <https://doi.org/10.1016/j.jtte.2021.02.001>
- Bradshaw C. (2012) Little left to lose: deforestation and forest degradation in Australia since European colonization, *Journal of Plant Ecology*, volume 5(1):109–120. Also Available at <https://doi.org/10.1093/jpe/rtr038>.
- BSI (2021). Botanical Survey of India, Biodiversity Hotspots in India: Global Biodiversity Hotspots with Special emphasis on Indian Hotspots, 7 October 2021. Available at http://www.bsienvi.nic.in/database/biodiversity-hotspots-in-india_20500.aspx
- Dutta N. A, In massive Siachen clean-up, Army plans to rid glacier of 100 tonnes of trash a year, 24 September, 2019, *The Print*. Also available at <https://theprint.in/india/in-massive-siachen-clean-up-army-plans-to-rid-glacier-of-100-tonnes-of-trash-a-year/296334/> accessed on 3 April 2013.
- Forest (Conservation) Rules, 2022. Rule 2 (e). It provides that “Compensatory Afforestation means afforestation done in lieu of the diversion of forest land for non-forest purpose under the Act”. Also available at https://parivesh.nic.in/writereaddata/FCRule_2022_Notificationdated28062022.pdf
- Hamilton L. (1992) The Protective Role of Mountain Forests, *GeoJournal*, vol. 27(1):13-22, Springer. Also available at <https://www.jstor.org/stable/41145532>
- Haque M. S, et al. (2020) Assessing Biodiversity and Productivity over a Small-scale Gradient in the Protected Forests of Indian Western Himalayas, *Journal of Sustainable Forestry*, vol. 40(7):675-694. Also available at <https://doi.org/10.1080/10549811.2020.1803918>
- ICRC website (2010). Environment and International Humanitarian Law, 29 October 2010. Available at <https://www.icrc.org/en/war-and-law/conduct-hostilities/environment-warfare>
- IPCC (2008) Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104 pp. Also available at <https://www.ipcc.ch/report/ar4/syr/>
- Jayaram D (2016) Environmental Security, Land Restoration, and the Military: A Case Study of the Ecological Task Force in India. In Chabay I (edited) *Land Restoration*, Academic Press. Also available at <https://doi.org/10.1016/B978-0-12-801231-4.00015-X>



- Kattel R. G (2022) Climate warming in the Himalayas threatens biodiversity, ecosystem functioning and ecosystem services in the 21st century: is there a better solution?, *Biodiversity Conservation*, vol. 31:2017–2044. Also available at <https://doi.org/10.1007/s10531-022-02417-6>
- Lang J. and Benbow M. (2013) Special Interaction and Competition, *Nature Education Knowledge* 4(4):8. Also available at <https://www.nature.com/scitable/knowledge/library/species-interactions-and-competition-102131429/>
- Martin P. et al (ed.) (2011) *Mountain Forests in a Changing World - Realizing Values, addressing challenges*. Published by FAO/MPS and SDC, Rome. Also available at <https://www.fao.org/3/i2481e/i2481e.pdf>
- Mazumder M. et al. (2016), Quantifying the environmental burdens of the hot mix asphalt (HMA) pavements and the production of warm mix asphalt (WMA), *International Journal of Pavement Research and Technology*, vol. 9(3): 190-201. Also available at <https://doi.org/10.1016/j.ijprt.2016.06.001>
- Menon M. and Kohli K. (2021) The Judicial Fix for Forest Loss: The Godavarman Case and the Financialization of India's Forests, *Journal of South Asian Development*, vol. 16(3). Also available at <https://doi.org/10.1177/09731741211061968> accessed on 28 April 2023.
- Ministry of Defence (2019) *Siachen Glacier Ecological Issues: Swachh Siachen Abhiyan (SSA)*, Report by Ministry of Defence on Siachen Glacier in OA No. 415. Also available at https://greentribunal.gov.in/sites/default/files/news_updates/REPORT%20BY%20MIN%20OF%20DEFENCE%20ON%20SIACHEN%20GLACIER%20IN%20OA%20No.%20415%20of%202019.pdf
- Mitchell L. C and Graham A (2017) Evidence-Based Advocacy for Municipal Climate Change Action, *Journal of Planning Education and Research*, vol. 40(1). Also available at <https://doi.org/10.1177/0739456X17740939>
- Pandey R. et al. (2017) Sustainable livelihood framework-based indicators for assessing climate change vulnerability and adaptation for Himalayan communities, *Ecological Indicators*, vol. 79:338–346. Also available at <https://www.cabdirect.org/cabdirect/abstract/20173222939>
- Parthemore C. and Rogers W. (2010) *Sustaining Security: How Natural Resources Influence National Security*, Center for a New American Security. Also available at <http://www.jstor.com/stable/resrep06384>
- Rakshita R., Compensatory afforestation a failure, *Deccan Herald* (January 25, 2019). Also available at <https://www.deccanherald.com/city/compensatory-afforestation-714800.html>



Sidhu G and Surya J. (2014) Oils of North-Western Himalayan eco-system and their land use, constraints, productivity potentials and future strategies, *Agropedology* 2014, 24 (01), 1-19. Also available on <<http://isslup.in/wp-content/uploads/2018/09/Agropedology-1-1.pdf>

Sinha A., Unused funds, unsuitable land: The problems with Compensatory Afforestation in India, *The Indian Express* (March 6, 2023) *The Indian Express*. Also Available at <<https://indianexpress.com/article/explained/explained-climate/unused-funds-unsuitable-land-act-as-red-light-before-green-shoots-8479659/>

Siti Halipah S et al. (2018) The Impact of Road Pavement on Urban Heat Island (UHI) Phenomenon, *International Journal of Technology*, vol. 9(8). Also available at <https://ijtech.eng.ui.ac.id/article/view/2755>

The Constitution of India (1950a) Art. 48A. It lays provisions for the protection and improvement of environment and safeguarding of forests and wild life. It also mandates that the State shall endeavor to protect and improve the environment and to safeguard the forests and wild life of the country.

The Constitution of India (1950b) Art.51A (g). It lays provisions relating to the fundamental duties. It provides that it shall be the duty of every citizen of India— o protect and improve the natural environment including

forests, lakes, rivers and wild life, and to have compassion for living creatures.

World Charter for Nature, 1982, A/RES/37/7, New York : UN, 9 November 1982. Also available at <<https://digitallibrary.un.org/record/39295?ln=en>