

Invasive alien plant species in the Hindu Kush Himalaya

Status and management challenges



Background

Invasive alien species (IAS) are one of the five major drivers of global biodiversity loss. Globally, the growth of international trade and travel has led to a rapid increase in the dispersal and number of invasive species. The costs of managing these invasive species runs into billions of dollars each year.

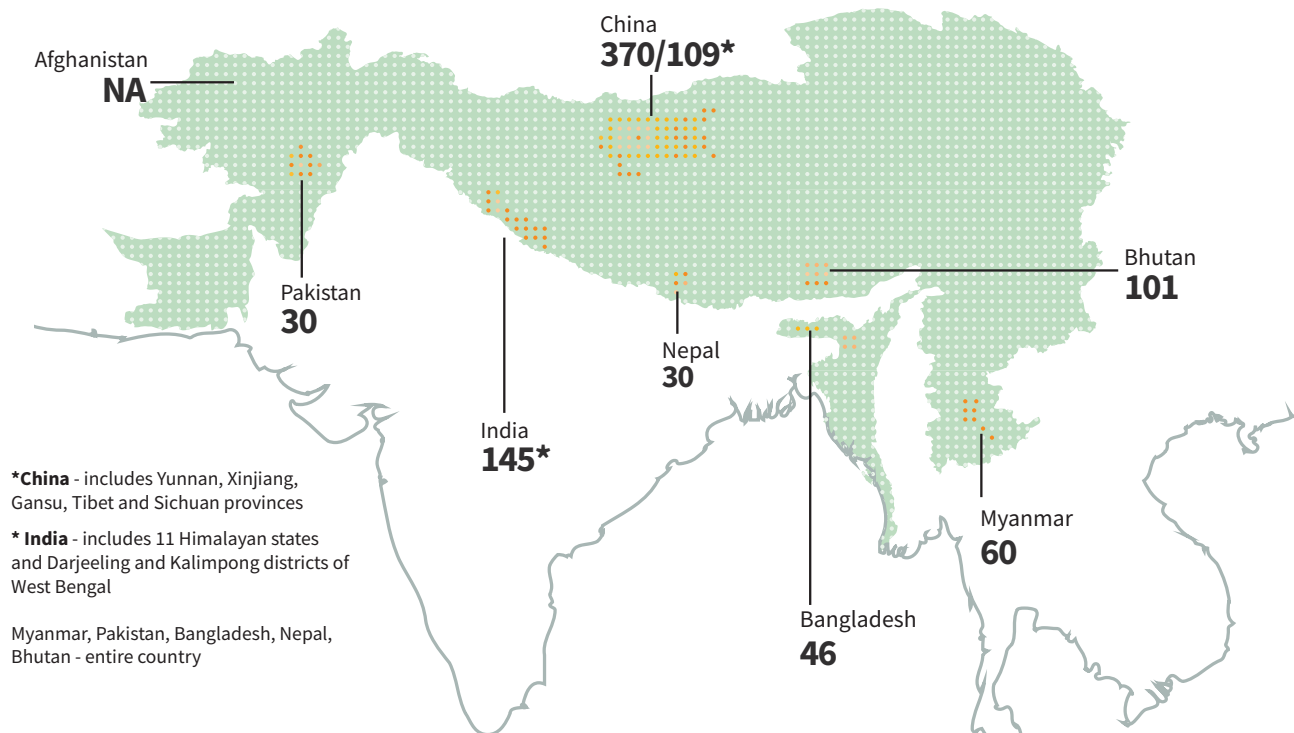
Mountains were generally considered to be less vulnerable to biological invasions. However, that has changed with greater connectivity, movement of goods and people, and more importantly, climate change.

The Hindu Kush Himalaya is widely infested by invasive species and the rate of invasion into mountain ecosystems is likely to increase into the future. Firstly, propagule pressure and habitat disturbance may increase in mountainous regions due to economic growth and infrastructure development. Second, future invasion risks are likely to increase in particular due to elevation dependent warming.

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Unfortunately, there are substantial gaps in our understanding of the dynamics and implications of biological invasions in the HKH. Our recent review of progress against the Aichi Biodiversity Targets revealed that despite the high ecological and economic implications, HKH countries assigned low priority to the IAS target from 2010 to 2020. IAS have now been identified as one of 21 targets in the post-2020 Global Biodiversity Framework.

Invasive alien plant species (IAPS) in HKH



Some of the highly problematic and most studied invasive species of the HKH



***Lantana camara* L.**
Family: Verbenaceae
Common name: Lantana
Native to tropical and Central South America and listed among the world's 100 worst invasive species.

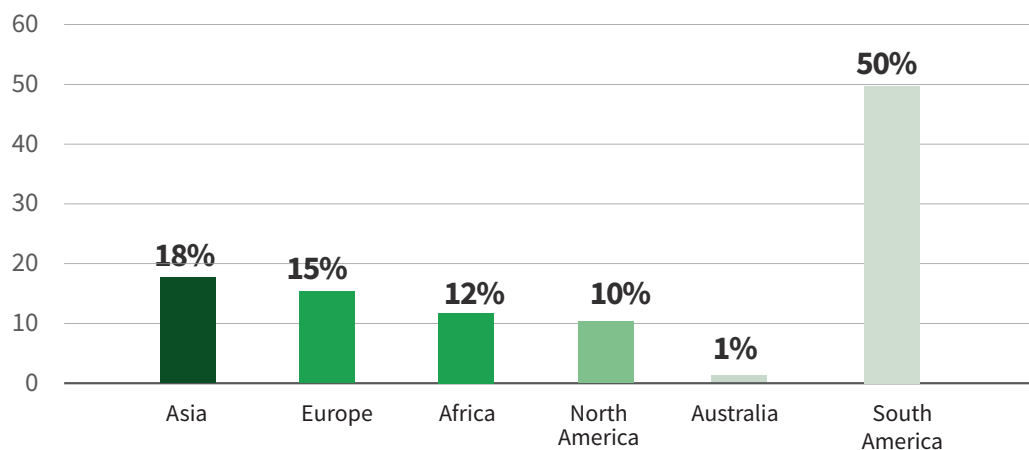


***Mikania micrantha* Kunth**
Family: Asteraceae
Common name: Mile-a-minute
Native to South and Central America and listed among the world's 100 worst invasive species.



***Chromolaena odorata* (L.) King & Robinson**
Family: Asteraceae
Common name: Siam weed
Native to South and Central America and listed among the world's 100 worst invasive species.

Origin of introduction



In the HKH, the main drivers for spread of invasive alien species are

Main drivers



International trade



Transport



Agricultural imports



Tourism-related activities

Local drivers



Deforestation



Infrastructure development



Agricultural land abandonment

Impact of IAPS

IAPS are a major threat to biodiversity, ecosystem services and human health. Invasions not only result in loss of species and ecosystem function but also have severe negative economic consequences for the agriculture, forestry, livestock and fishery sectors, including direct costs such as loss of productivity of agro-ecosystems and indirect costs for combating invasive species. This puts a significant financial burden on all levels of government that work to manage invasive species.

Studies on ecological and socioeconomic impact of IAPS are very limited in HKH. One estimate of economic losses caused by invasive species was \$14.45 billion/year in China in 2000. The ecological impacts are harder to evaluate. *Lantana camara* invasion has caused loss of species richness and diversity and altered soil properties. *Mikania micrantha* has caused habitat degradation of endangered wildlife (e.g., one-horned rhinoceros) in Nepal. *Parthenium hysterophorus* presents health risks to humans and livestock. The rapid spread of *Eichhornia crassipes* has severely degraded wetlands.

Management practices in the HKH

The HKH member countries are signatories to the Convention on Biological Diversity (CBD) and are obligated to manage IAPS. A combination of different physical, chemical, ecological, and biological control methods are used for the management of invasive species in HKH.

PHYSICAL METHODS

Physical methods, mainly manual uprooting and cutting and mechanical removal have been some of the most effective methods to reduce competitiveness and control small isolated populations of invasives such as *Mikania micrantha*. Another widely used approach resource substitution, by which local communities make use of the invasive species as a way of managing it – such as the use of *Chromolaena odorata*, and *Ageratina adenophora* for production of compost and bio-briquettes, use of *L. camara* to make furniture, bio-briquettes, biochar, farm hedges, and green manure. *A. adenophora* has been used as animal bedding and composting, extracting essential oils and as contact poison and repellent against herbivore pests in parts of China. *Eichhornia crassipes* is used to prepare handicrafts.

BIOLOGICAL CONTROL

Once established, biological control agents can be effective tools for controlling the spread of invasive plants. However, the costs associated with initial introduction of such control agents is high. Biological control agents have been used to control the spread of a few invasive species in the region. For example, stem galling insect (*Procecidochares utilis*) was introduced to manage *A. adenophora* and significantly reduced the stem density. Similarly, leaf feeding beetle (*Zygogramma bicolorata*) was introduced against *Parthenium hysterophorus* and was found to be an effective biological

control agent, but its population is relatively small and effectiveness may vary yearly. Rust species *Puccinia abrupta*, a potential biocontrol agent of *P. hysterophorus* was found to be effective in China and Pakistan.

Gaps in policy and legislation

Preventing the introduction and spread of IAPS requires strict surveillance, regulations and protocols. In most HKH countries, there is lack of clear national policy, strategy and action plans for the management of IAPS. There is lack of a more rigorous risk assessment of IAPS and implementation of national plant protection acts and strategies. In addition, there is lack of awareness and coordination among stakeholders and limited capacities for detecting potentially invasive species before they are introduced. Further, there is limited resource allocation by governments to manage IAPS.

Key recommendations

IAPS have not received due attention of governments in the HKH and there is limited regional collaboration on IAPS research among countries. There is a need for national legislation, and greater dialogue and coordination in science, policy and practice at the regional level. Biological invasions are often a transboundary conservation issue and this requires coordinated efforts and harmonization of approaches, especially for identifying pathways by which species are introduced and spread.

- Early Detection and Rapid Response (EDRR) is one of the most effective approaches to manage biological invasions, after prevention. Countries must prioritize careful vigilance and rapid response in areas where invasive plants are likely to occur and undertake observational and experimental studies that monitor invasive plants distribution and spread along elevation gradients. This information is key to prioritize management actions before invasions become too difficult to manage.
- There is an urgent need to compile and synthesize current information about the status and distribution of invasive species to inform policy and decision makers.
- Many HKH countries share the same invasive plants that are highly problematic in the region, thus there is a need to share experiences on failures, successes and management practices of these key prioritized species. There is a need to develop standardized approaches and guidelines to deal with invasive species in the region.
- Standardized approaches such as Environmental Impact Classification for Alien Taxa (EICAT) and Socio-economic Impact Classification of Alien Taxa (SEICAT) should be used for assessing impacts on livelihoods, biodiversity, and environment. Such information is crucial to inform policy makers and ensure adequate resource allocation for control and management.
- Awareness is a key tool to inform and support management and individual actions that prevent plant invasions. These programmes on the threats of invasive species must be targeted to various stakeholders – citizens, land managers and policy makers.



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