

2/ The role of businesses in the management and governance of biological invasions³



Overview

People and nature are threatened by invasive alien species in all regions of Earth {KM-A1}⁴. Economies, food security, water security and human health are all threatened by biological invasions {KM-A3}.

The number and impacts of invasive alien species can be reduced through management of biological invasions {KM-C1}. Preventing the introduction of invasive alien species can be achieved through pathway management, including strictly enforced import controls, pre-border, border and post-border biosecurity, and measures to address escape from confinement {KM-C2}.

Engagement by all stakeholders, governments and the private sector, helps to optimize management of biological invasions in terms of economic, environmental and social outcomes, particularly when resources are limited (*well established*) {C23}.

With sufficient resources and long-term commitment, preventing and controlling invasive alien species are attainable goals that will yield significant long-term benefits for people and nature {KM-D7}.

1. This factsheet is part of a series of factsheets, which highlight a selection of key elements on specific themes from the Summary for Policymakers of the IPBES Assessment Report on Invasive Alien Species and their Control. For further information and context, please consult the Summary for Policymakers and Chapters of that Assessment Report.
2. IPBES (2023). Summary for Policymakers of the Thematic Assessment of Invasive Alien Species and their Control of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Roy, H.E., Pauchard, A., Stoett, P., Renard Truong, T., Bacher, S., Galil, B.S., Hulme, P.E., Ikeda, T., Kavileveetil, S., McGeoch, M.A., Meyerson, L.A., Nuñez, M.A., Ordóñez, A., Rahlao, S.J., Schwindt, E., Seebens, H., Sheppard, A.W., Vandvik, V. (eds.). IPBES secretariat, Bonn, Germany. <https://doi.org/10.5281/zenodo.7430692>
3. <https://zenodo.org/doi/10.5281/zenodo.10057025>
4. The references enclosed in curly brackets (e.g., {KM-C1, B11}) are traceable accounts and refer to sections of the Summary for Policymakers of the IPBES Assessment of Invasive Alien Species and their Control. A traceable account is a guide to the section in the summary for policymakers and the chapters that contains the evidence supporting a given message and reflecting the evaluation of the type, amount, quality, and consistency of evidence and the degree of agreement for that statement or key finding.

Biological invasions: definitions and drivers

➤ **Definition:** The term “biological invasion” is used to describe the process involving the intentional or unintentional transport or movement of a species outside its natural range by human activities and its introduction to new regions, where it may become established and spread {Introduction}. Invasive alien species represent a subset of alien species, known to have established and spread, with negative impacts on biodiversity, local ecosystems and species {Introduction}. Many invasive alien species also have impacts on people {Introduction}.

➤ **Global economic cost:** The documented global economic cost of biological invasions has increased fourfold every 10 years since 1970 and is anticipated to continue rising (*established but incomplete*) {B10}. In 2019, global annual costs of biological invasions were estimated to exceed \$423 billion, with variations across regions, but this is likely a gross underestimation (*established but incomplete*) {A4}.

➤ **Many human activities facilitate biological invasions:**

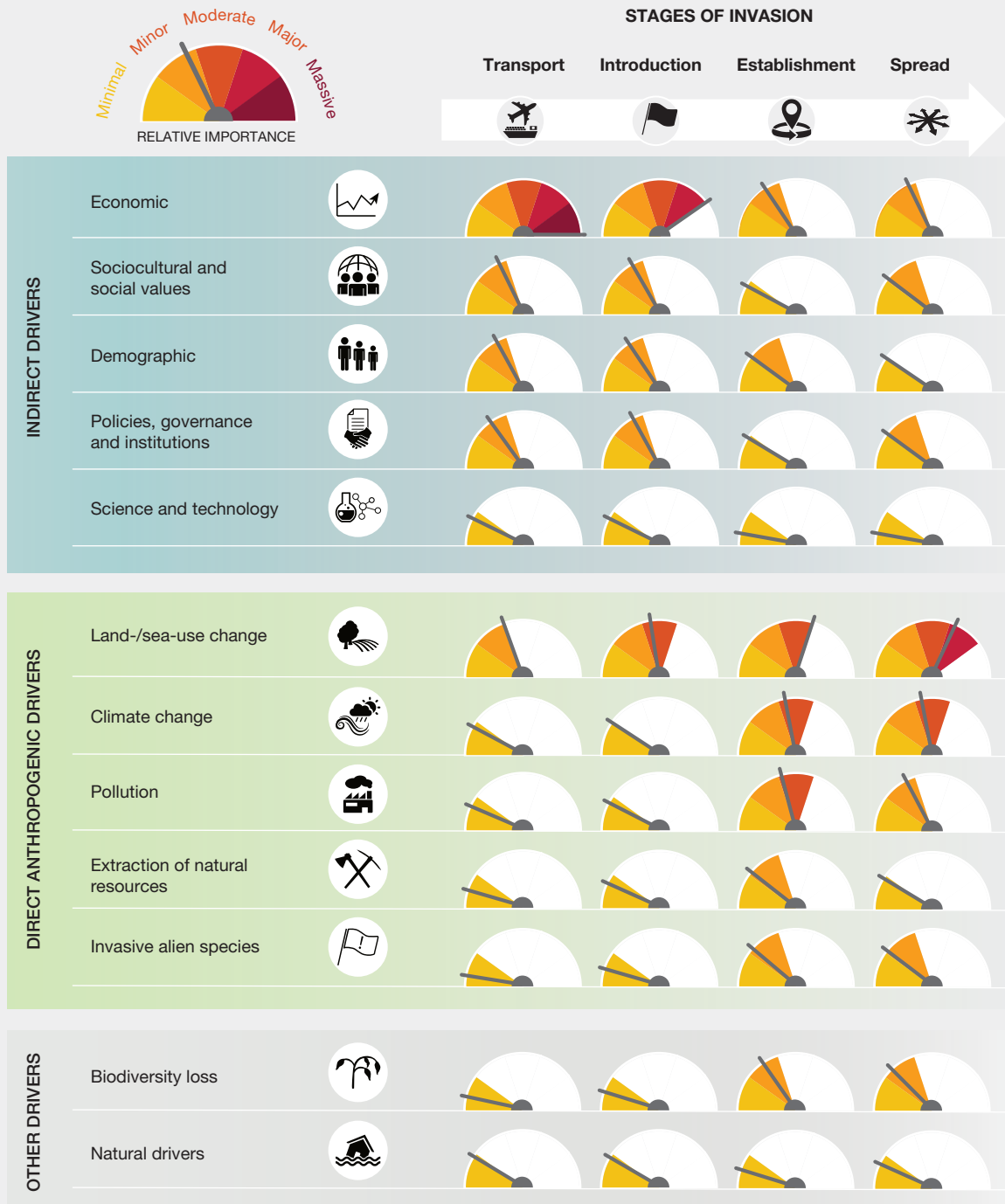
- **Trends:** Global exploration and colonialism beginning in 1500, with the associated movement of people and goods, and industrialization from 1850 were historically important. Increases in global trade since 1950 have resulted in unparalleled high and increasing rates of alien species introduction (*well established*) {B10}. In the last 50 years, the number of people in the world has more than doubled, consumption has tripled, and global trade has grown nearly ten-fold, with shifting patterns across regions (*well established*), influencing the rate and magnitude of direct and indirect drivers, particularly those related to trade, travel and land- and sea-use change, leading to further biological invasions (*well established*) {B9}. There has been a fivefold increase in the size of the global economy over the last 50 years (*well established*) {B11}, and international trade, which has increased nearly tenfold over the same period, represents the most important pathway through which invasive alien species are transported worldwide (*well established*) {B11}. Biosecurity measures at international borders have not kept pace with the growing volume, diversity and origins of global trade (including e-trade) and travel (*well established*) {B11}. Projected growth in international trade and movement of people, including tourism, will lead to further pressure on border inspection regimes and could soon overwhelm the biosecurity capability of most countries (*well established*) {B11}.

- **Transport and introduction:** The increase in the transport and introduction of invasive alien species worldwide is primarily influenced by economic drivers, especially the expansion of global trade and human travel (*well established*) {B11}. There is a strong link between the volume of commodity imports and the number of invasive alien species in a region, and patterns in the global spread of species mirror shipping and air

traffic networks (*well established*) {B11}. Many invasive alien species have been introduced unintentionally, including as contaminants of soils and traded goods, stowaways in shipments, or as stowaways in ballast water and sediments or as biofouling organisms that attach themselves to ships' hulls and other surfaces on vessels (*well established*) {B9}. For example, invasive alien species are often used in forestry, agriculture, horticulture, aquaculture and as pets (*well established*), and have also been introduced for recreation and amenity (*well established*) and for soil stabilization (*well established*) {B9}. In the Mediterranean basin alone, more than 35 per cent of alien freshwater fish have arisen from aquaculture (*well established*) {B9}. The construction of shipping canals (e.g., Suez, Panama) has connected previously separated marine and freshwater regions, facilitating the spread of invasive alien species through species migration, ballast water transfers and biofouling (*well established*) {B11}. For example, 150 years after the opening of the Suez Canal, marine alien species are still being newly recorded in the Mediterranean Sea (*well established*) {B11}.

- **Establishment and spread:** Accelerated establishment and spread of invasive alien species within countries are primarily driven by direct drivers, notably changes in land- and sea-use (*well established*) {B12}. Land- and sea-use changes may increase the vulnerability of natural ecosystems to the establishment and spread of invasive alien species through increasing fragmentation and habitat disturbance (*well established*) {B12}. More generally, land-use change can facilitate biological invasions through alteration of processes that cause natural disturbance of landscapes, such as wildfire or grazing regimes (*established but incomplete*) {B12}.

- **Interacting drivers:** No driver acts in isolation, and interactions among drivers are amplifying biological invasions, leading to outcomes that can be difficult to predict (*well established*) {B13}. Extraction of natural resources is closely linked with major economic and demographic drivers and can lead to a range of wider ecosystem impacts, including habitat degradation and loss, which facilitates invasive alien species (*well established*) {B13}.



Relative importance of different drivers of change in nature in facilitating biological invasions across biomes per different stages of the biological invasion process (transport, introduction, establishment and spread), as determined through expert assessment.

Management options relevant for businesses: the way forward

- **Biosecurity:** Pathway management, based on the analysis of pre-border, border, and post-border risks, can prevent the movement and spread of invasive alien species through surveillance and implementation of biosecurity response measures (*well established*) {C15}. Effective prevention measures depend on adequate and sustained funding, capacity-building, technical and scientific cooperation and transfer of technology, monitoring, relevant and appropriate biosecurity legislation and enforcement, which is supported by strong infrastructure, quarantine and inspection facilities, including diagnostic support services (*well established*) {C17}.
- **Managing risks:** Risk assessment could be used by businesses to engage different sectors in the prevention and management of biological invasions (*established but incomplete*) {C17}. In some cases the business sector has developed voluntary codes of conduct in tandem with government regulations (*well established*) {A8} to provide practical and concise guidance in establishing common standards of good practice and responsible attitudes and behaviours for managing the risks of transport and the introduction of invasive alien species through trade. The adoption of voluntary codes of conduct can encourage e-commerce platforms to adopt better practices by screening their lists for invasive alien species, complying with relevant legislation and providing information on the species, including taxonomy, potential invasiveness and appropriate measures that a buyer could use to prevent escape. Codes of conduct have also been developed for other activities that can facilitate the introduction of invasive alien species, including boating, botanic gardens, horticulture, hunting, international travel, plantation forestry, pets, protected areas, e-commerce, recreational fishing, zoological gardens and aquaria {Box SPM.1}.
- **Coordination:** One of the most effective ways to manage biological invasions is to develop coherent policy instruments that reinforce strategic actions across sectors and scales (*established but incomplete*) {D26}. Enhanced coordination and collaboration across international and regional mechanisms could help international, national and local agencies that implement policies for the environment, agriculture, aquaculture, fishing, forestry, horticulture, border control, tourism, and trade (e.g., in wildlife, but also including online trade in other animals, plants and other organisms), community and regional development (including infrastructure), transportation, and health sectors (*well established*) {D26}. Such coordination and collaboration efforts would consider the trade-offs across sectors, stakeholders and the interdependence between invasive alien species and other drivers (*established but incomplete*) {D26}. Collaborative, multisectoral and transdisciplinary approaches (such as One Health) provide frameworks to prevent and control invasive alien species by strengthening the interconnections between the human, animal, plant and environmental health sectors, including biosecurity (e.g., as outlined in the One Biosecurity framework among others) (*established but incomplete*) {D26}.
- **Tools and technologies:** There are many sources of accessible literature and information, tools and novel and emerging technologies, including biotechnology, bioinformatics, eDNA, remote sensing, and data analytics, for supporting the management of biological invasions {KM-C1}. A risk assessment and a risk management framework in line with a precautionary approach, as appropriate, can be effective to guide management actions, including the use of novel and emerging and environmentally sound technologies {KM-C1}. The success of any management programme depends on the availability of adequate, sustained resources, including for building capacity, which is sometimes lacking, especially in some developing countries {KM-C1}. The success of eradication programmes depends on the support and engagement of relevant stakeholders and Indigenous Peoples and local communities (*well established*) {C19}.
- **Information systems:** Open and interoperable information systems, supported by international cooperation, play a critical role in tackling biological invasions (*established but incomplete*) {D31}. Strengthening existing open information systems can facilitate the management of biological invasions, including prioritization of actions, early detection and rapid response, and improve the effectiveness of regulations (*established but incomplete*) {D31}. Open information systems can substantially reduce the costs of management by ensuring targeted and appropriate responses, avoiding duplication of effort and facilitating the evaluation of the effectiveness of policy instruments through indicators (*well established*) {D31}.
- **Engagement and citizen science:** Increased understanding of possible biological invasions and the negative impacts of invasive alien species can be achieved through public awareness campaigns, education across all age groups and citizen science (*established but incomplete*) {D29}. Engaging broadly across governmental sectors, industry, the scientific community, Indigenous Peoples and local communities and the wider public is one of the strategic actions to bring about the progress needed to meet national and international goals and targets for biological invasions {Figure SPM.7}. Through citizen science, information systems have the potential to engage people, raise awareness and increase the availability of data (*established but incomplete*) {D31}.