

STOP ALIEN SPECIES TO PROTECT BIODIVERSITY



*The invasion of
alien species*



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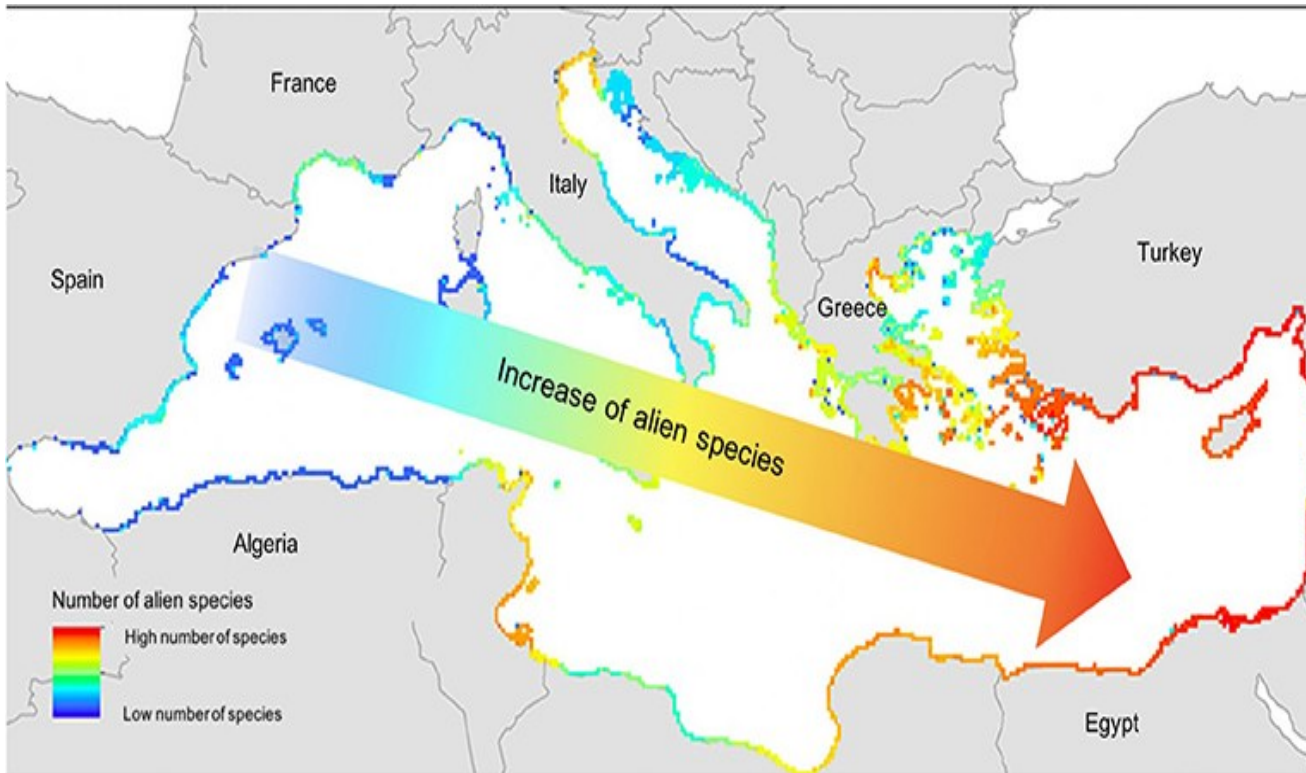
Invasive alien species are one of the main reasons for the loss of biodiversity in Europe and in the Middle East.

Commission Report on Regulation (EU) No 1143/2014 on the prevention and management of invasive alien species presented today, 13 October 2021, shows that acting at EU level has real added value.

The regulation itself is an essential tool to continue to tackle this threat and put biodiversity on the road to recovery as part of the EU Biodiversity Strategy 2030.

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Virginijus Sinkevičius
European Commissioner for the
Environment and Oceans



Definitions



Allochthonous (or alien, exotic) species

Species originating from a different geographical area than where it is currently found due to human introduction.



Reintroduction

Introduction of a taxon into a part of its range of documented natural occurrence in historical times, where it is extinct due to natural catastrophes or human activities (it is referred to as restocking or repopulation if it is not extinct).

Allochthonous, exotic, non-indigenous, non-native, introduced: these are synonyms for the same phenomenon.



Autochthonous (or indigenous) species

Species that occurs naturally in a given area in which it originated, evolved and arrived without human intervention (intentional or accidental).



Introduction

Man's introduction into nature of species originating from other geographical contexts, which have not evolved in the ecosystem environment in which they were introduced. It may be voluntary (hunting, fishing, ...) or involuntary (e.g. fouling, transport with goods)..

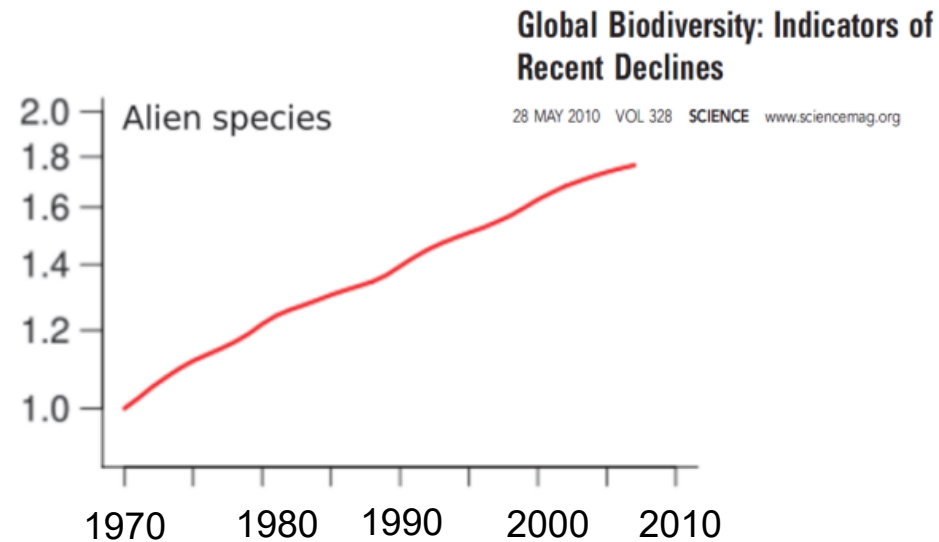
Introductions in human history



The first introductions of exotic animals from the East date back to Roman times (1st century AD). The fallow deer, rabbit, pheasant, carp are examples of imported species for food and ornamental purposes, first bred and then spread in the wild.

The introduction and acclimatization of vertebrates as a consequence of anthropogenic activities (hunting, fishing, breeding) is a phenomenon that began on a massive scale in the late 1800s and has been growing exponentially in recent decades.

Allochtonous, exotic, non-indigenous, non-native, introduced: these are synonyms for the same phenomenon.



The graph in Science shows that the number of invasive alien species worldwide increased by **76%** over the period 1970-2007.

Modalities of introduction



Alectoris rufa, invasive in Lebanon



Alectoris chukar (Chukar) native of Lebanon and the region

The alien species are species that are outside their natural range and have arrived there as a result of voluntary or accidental transport by humans.

Man can carry an individual (a whole plant, an animal) or part of it (a seed, an egg). The transport may be voluntary (e.g. a parrot sold as a pet) or accidental (e.g. seeds left inside a boot after an outdoor excursion during a stay abroad).

Then there are numerous pathways and vectors through which alien species can arrive in a new area as a direct or indirect effect of human action:

Intentional release: species introduced for biological control (e.g. the Asian ladybird, *Harmonia axyridis*), for hunting and fishing, to contain soil or dune erosion.

Accidental escape from confined environments (farms, nurseries, aquaria, zoos, botanical gardens, aquaculture) into which species have been voluntarily introduced.

Contaminants: species introduced together with freely traded species and products of plant or animal origin (as in the case of numerous phytophagous insects on ornamental plants).

Hitchhikers: species introduced by aircraft (e.g. mosquitoes), by ships (e.g. rats), by ships' ballast water or attached to the keels of boats and ships.

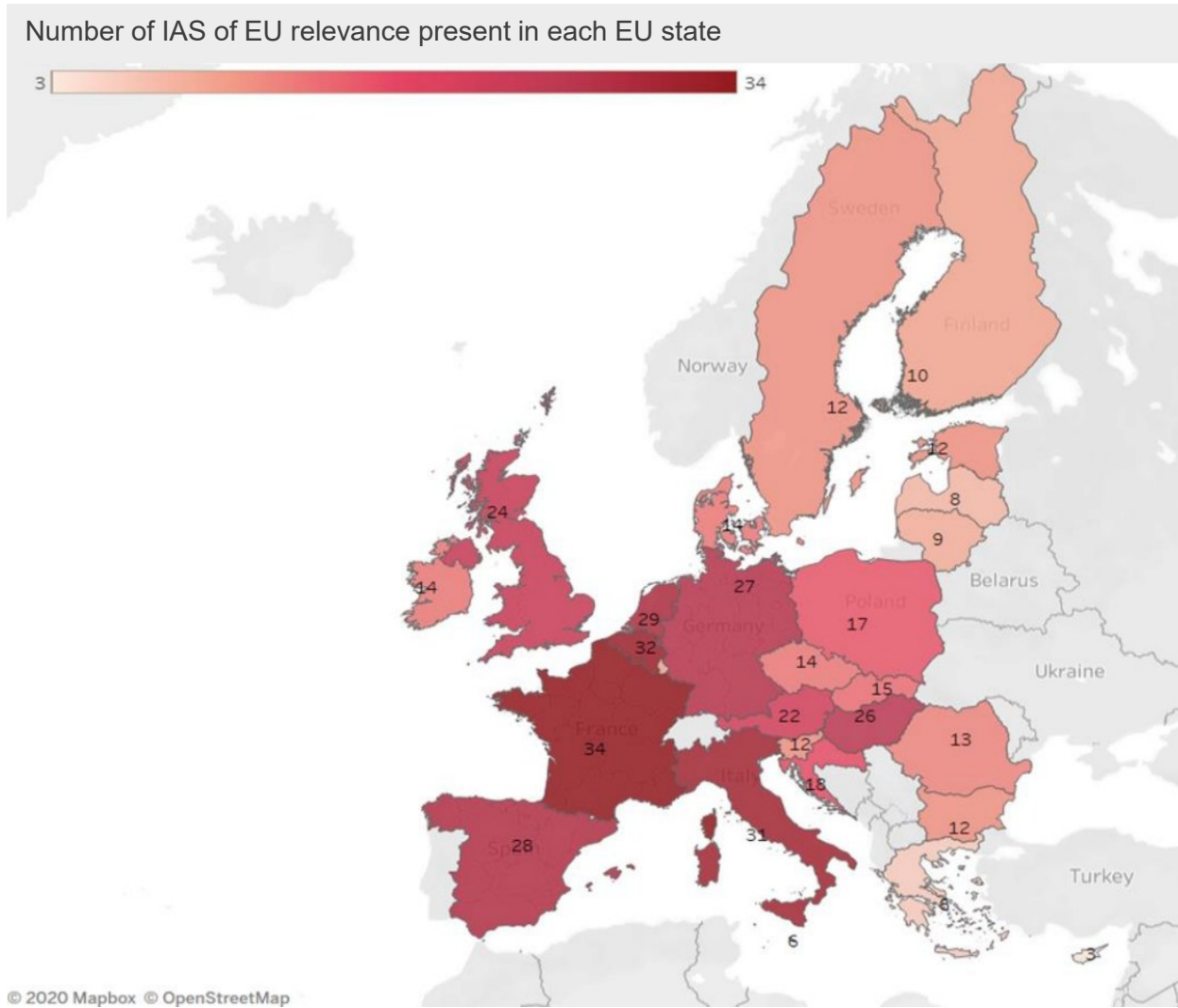
Artificial corridors: species coming from the Suez Canal or through canals that have been built to connect large rivers.

Even parts of a specimen such as seeds or cuttings of a plant, spores of a fungus, eggs of a bird, if not native to the territory and transported by man, are **alien**.

Invasive Alien Species (IAS)

IAS are one of the five main causes of biodiversity loss in Europe as well in the Middle East.

They can also lead to significant negative impacts on human health and the economy.



In **Lebanon** have been recorded **24 IAS**, same as in the United Kingdom

The invasion process



The possibility of an invasion happening depends on a few factors, which, according to *Life ASAP project* are: history of species introduction (the more times an alien species is transported to a new environment, the greater the likelihood that it will succeed in becoming established), intrinsic invasiveness of species (the ability of the species to rapidly conquer new spaces, spread and generate various impacts) and susceptibility of a given environment to being invaded (invasibility).

The intrinsic characteristics that an alien species may possess that will make it particularly likely to become invasive are:

1. resistance to pests and diseases
2. ability to adapt to different environmental conditions, including polluted and heavily man-made habitats
3. competitive superiority in gaining resources over native species
4. fast growth
5. early maturity
6. high reproductive potential
7. high ability to spread (e.g. possibility of asexual reproduction)
8. adaptation of the life cycle depending on the environments invaded
9. association with human activities
10. enfranchisement from predators/enemies in the new environment.

Life ASAP project (in English)
<https://www.lifeasap.eu/index.php/en/>



The impacts of invasive alien species



Often the effect of invasive alien species also changes the physical and chemical properties and structure of the habitat they invade.



Ecological impacts

Through mechanisms such as competition, predation, hybridisation, disease transmission, parasitism and burrowing activities, invasive species cause the extinction or reduction of native species populations and local diversity, interfere with their reproductive capacity, change the structure of the animal and plant community, often simplifying it and even coming to dominate it..



Impacts on ecosystem services

Invasive alien species are capable of profoundly altering all ecosystem services (such as flower pollination, slope stability, non-material benefits, etc.), with **often irreversible damage**.

The impacts of invasive alien species



Mosquito of the *Aedes* genus responsible of the transmission of the Zika virus

In the past, combating invasive alien species with inappropriate methods has involved the use of chemicals, with negative effects on human health.



Economic Impacts

Invasive alien species cause direct and indirect costs to productive activities and infrastructure and costs due to mitigation and control actions: in the last 30 years, the total reported invasion costs attributable to the damage caused by the invasive alien species in the Mediterranean basin amount to \$27.3 billion, of which only \$1.2 billion for their management (control).



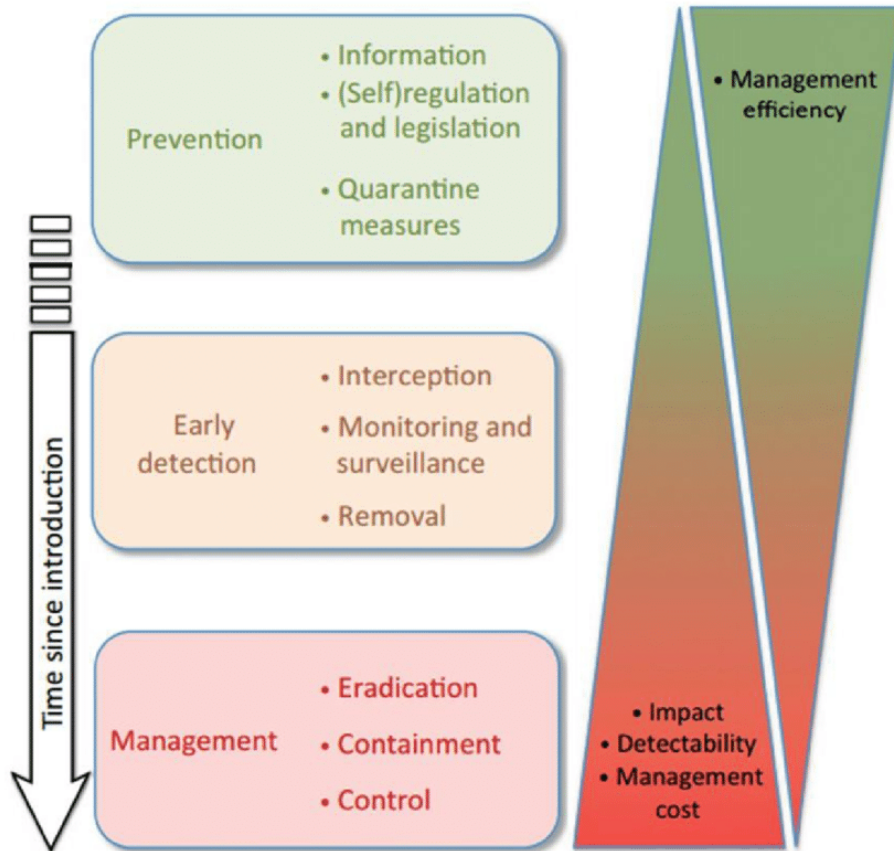
Health Impacts

There are also more or less serious direct impacts on human health, through the spread of viruses, bacteria and other parasites:

just think of the bubonic plague spread in the Middle Ages by the black rat or yellow fever, dengue and zika virus encephalitis transmitted by mosquitoes of the *Aedes* genus.

Some invasive allochthonous plants are also highly allergenic, such as *Ambrosia artemisiifolia*, while other species can cause contamination by heavy metals and toxins.

The management of invasive alien species



Strategy against invasive alien species. The optimal strategy evolves over time following introduction. The longer the time since introduction, the more the efficiency of management decreases and management costs increase (Simberloff et al., 2012).

** The lack of enforcement of regulations and control due to insufficient governmental infrastructure and knowledge, absence of proper control at the borders (such as genetic bar coding), and the need for technical expertise and researchers and more laboratories that are able to deliver the required outputs and accurate results. IAS regulations and control are currently limited to:

- MoA Decision 108/1 issued in September 1995 to ban the import and introduction of any Cedar seeds, seedlings and plants. This decision was issued in response to the uncontrolled introduction of trees from the Cedrus genus through the ornamental industry;

and

- MoA's regulation on the import and export of species through issuing of CITES permits. Knowing that Lebanon has ratified the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)11 through Law no. 223 dated 22/10/2012.

**Source *Lebanon's National Biodiversity Strategy and Action Plan 2016-2030*, Lebanese Ministry of Environment - MoE

The management of invasive alien species



Prevention

The most effective approach involves the development and application of **regulations governing trade, transport and possession of invasive alien species**, the adoption of an effective **surveillance system** and interception at points of possible entry of species (e.g. ports and airports), the spread of **“good practices” of conduct**, both by the citizen and by facilities such as ports and airports, correct information to as many people as possible.



Rapid identification and eradication

When prevention fails, we move on to the next stage. It entails the need to establish a **constant monitoring** system on the territory, leading to the rapid reporting to the competent bodies in the event of the interception of new species and their rapid response, i.e. the immediate **eradication**, to prevent individuals from spreading across the territory



Mitigation

Eradication is the most effective form of mitigation because it eliminates all impacts, but it is only feasible in the early stages of introduction or in particular contexts, islands. When eradication is not possible, **permanent control over time is implemented**, i.e. the removal of a portion of the individuals of a species from a territory in order to decrease or at least contain impacts.