Invasive Alien Species:
Trends and patterns of invasion, global impacts, and possible responses

Piero Genovesi

ISPRA Italy

Chair IUCN Invasive Species Specialist Group

Seminar organized by IPPC
FAO, Rome 24 September 2015

International Union Conservation of Nature

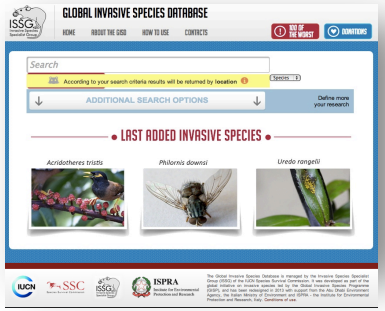
- World's oldest and largest global environmental organization, with almost 1,300 members (Governments, GOs and NGOs) and more than 15,000 volunteer scientists and experts in 185 countries.
- **Vision**:
  a just world that values and conserves nature

IUCN SSC Invasive Species Specialist Group

- **Mission:** is to reduce threats to biodiversity by increasing awareness of invasive alien species, and of ways to prevent, control or eradicate them
- ISSG core business is to:
  - ✓ bring credible knowledge and information to inform and influence policy at all levels
  - ✓ convene and build partnerships for action
  - ✓ bridge local and global policy and action
  - ✓ build capacity

IUCN SSC Invasive Species Specialist Group

- ISSG network
  - ✓~250 global core membership
  - ✓Aliens-L list membership ~1400
- Collaboration with the Convention on Biological Diversity, CMS, EEA, and other international *fora*
- Member of CBD Liaison Group on IAS with FAO, WTO, CITES, …
- Global Invasive Species Database, oldest and most authoritative db on IAS



MAJOR DRIVER OF BIODIVERSITY LOSS

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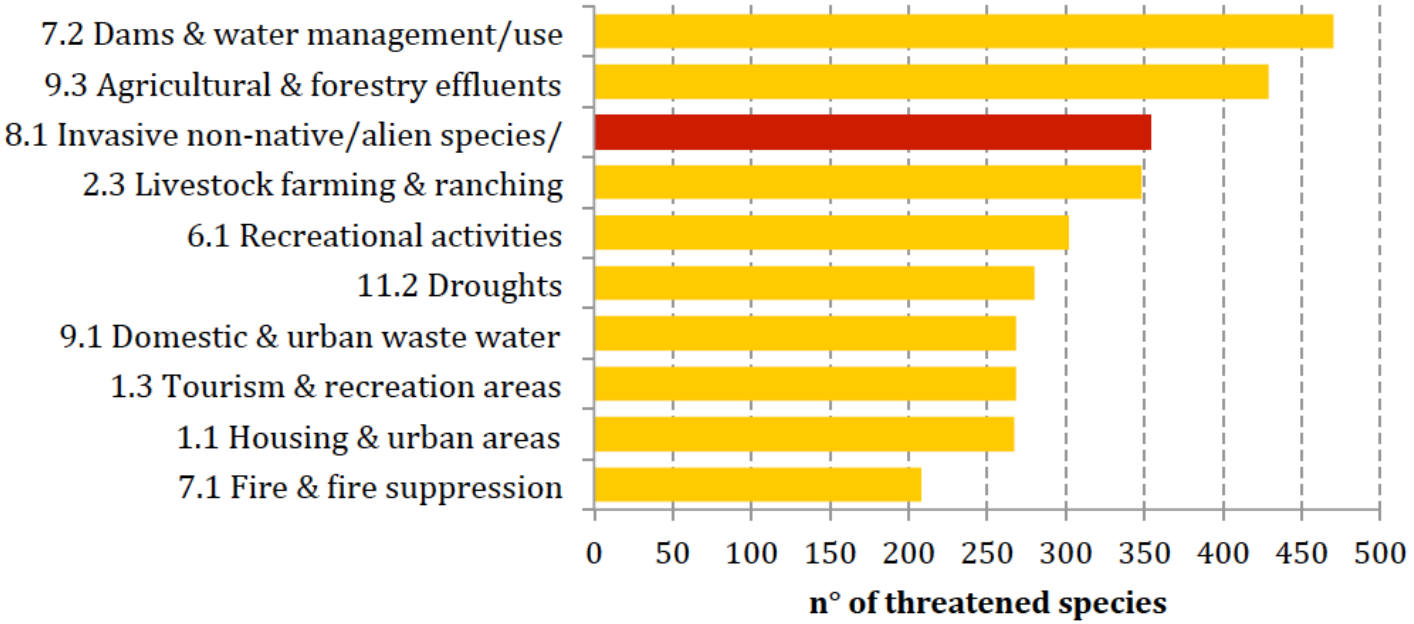
- Second driver of biodiversity loss after habitat destruction and fragmentation (Millenniun Ecosystem Assessment 2005)
- Invasives impact 33% of threatened amphibians, 25% of birds, 24% of mammals, 22% of reptiles, 20% of fish
- Key factor in 54% of known animals extinctions. Only factor of 20% of extinctions

MAJOR DRIVER OF BIODIVERSITY LOSS

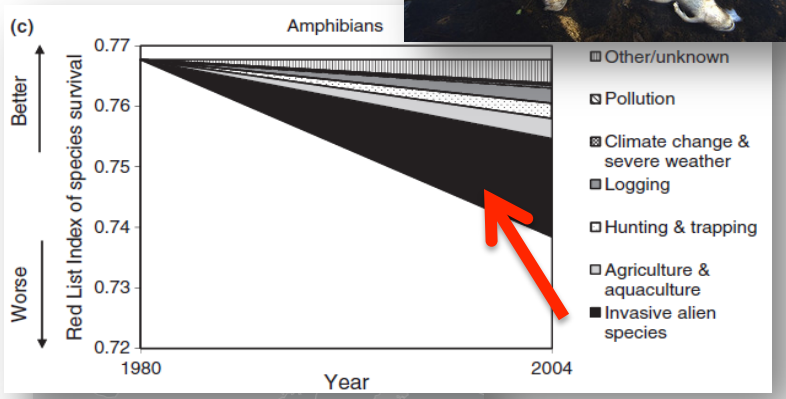
- IAS 3rd most severe impact on threatened species in Europe
- 1 out of 5 threatened species in Europe directly affected by IAS

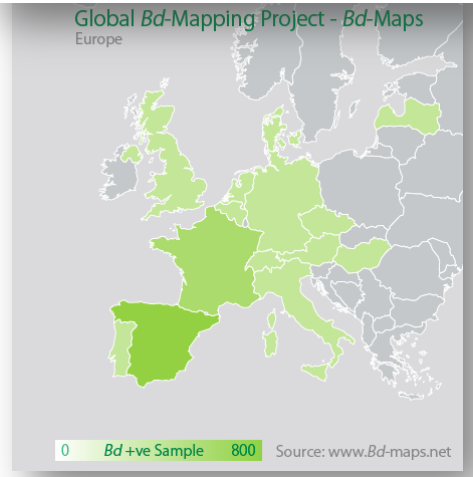


Genovesi et al. 2015. Mid-term review EU Biodiversity Strategy

CHYTDID FUNGUS IMPACT ON AMPHIBIANS

- Responsible for several extinctions of amphibians.
- Dramatic population and community declines on four continents.
- Detected in 17 EU countries, including Mediterranean islands.
- Europe hosts 88 amphibian species and 75% are endemic to it.



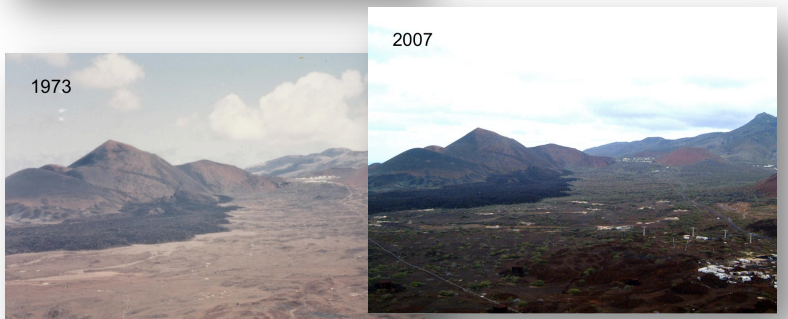


IMPACT ON ECOSYSTEMS

- Beaver introduced in Tierra del Fuego, established in over 7 Mln hectares

- *Prosopis* invading large areas of Africa, limiting access to land

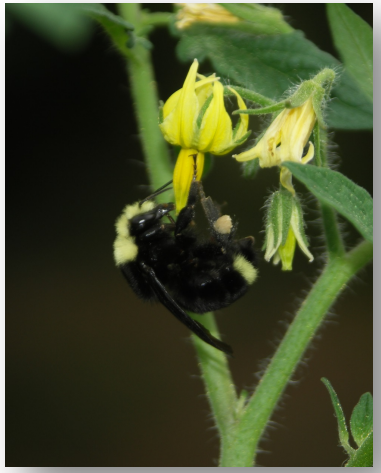
- Water hyacinth impacting access to water and transport, and spreading malaria



IMPACT ON ECOSYSTEM SERVICES

Bumble bees at risk

- More than 85% of flowering plants require an animal to move pollen, including 1/3 of all crop plants
- Pollinator dependent crops contain more than 90% of the vitamin C humans need
- Wild and managed bumble bees significant pollinators



IMPACT ON ECOSYSTEM SERVICES

Bumble bee trade

- European buff-tailed bumble used in at least 19 countries
- In 2004 total annual sales from ca 30 companies estimated at 1 million colonies. Today just one company boasts annual sales of 1 mln colonies
  (source: IUCN Bumble Bee Specialist Group)

IMPACT ON ECOSYSTEM SERVICES

Risk to wild bumble bees

- Spread of pathogens, competition, interbreeding
- *Bombus dahlbornii*, only native bumble bee of temperate forests of South America. Declined by 54% in the past 10 yrs due to pathogens from European bumble bees
- Similar declines of native bumble bees in Japan and USA

IMPACT ON ECOSYSTEM SERVICES

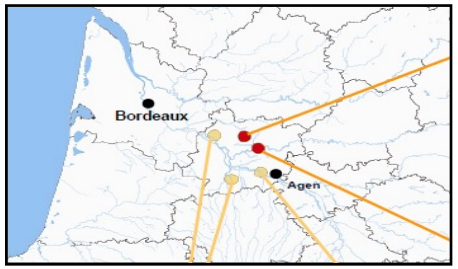
Yellow-legged hornet *Vespa velutina nigrithorax*

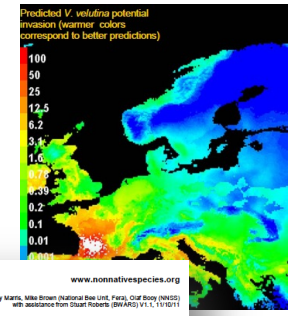
- Arrived in France 2004. 89% of diet bees, wasps and other pollinators

IMPACT ON ECOSYSTEM SERVICES

Yellow-legged hornet *Vespa velutina nigrithorax*

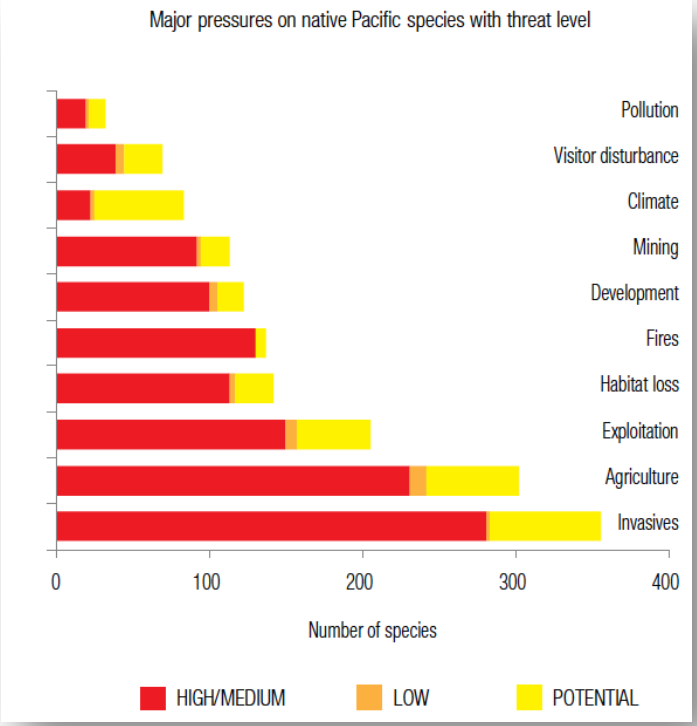
- Detected in France in 2004, but only reported in 2008
- Predicted to expand, especially towards South and East
- UK has an alert system in place, and a response strategy
- Arrived in Italy in November 2012, reported only in May 2013, no response yet

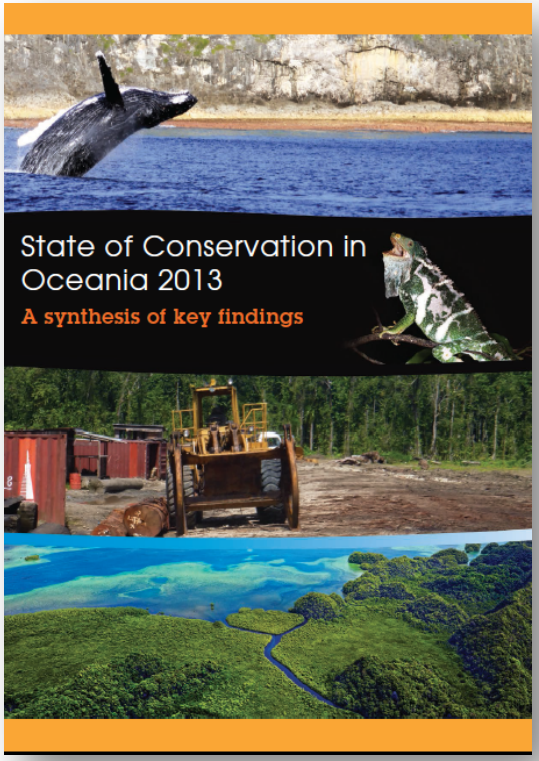




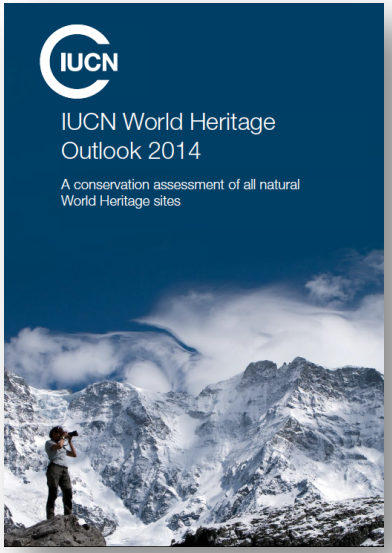
MAJOR IMPACTS

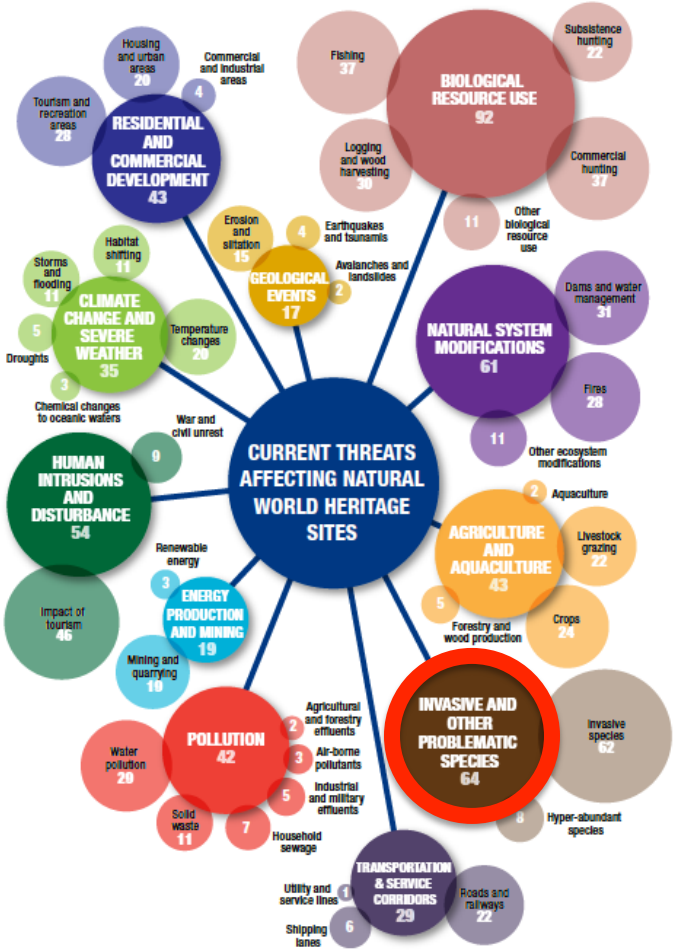
Affecting all regions and on all taxonomic groups





THREATENING GLOBAL PROTECTED AREAS





Current threats affecting WH sites (number of sites)

LOCAL PERCEPTION MAY BE MISLEADING

Hawaii hosted over 114 endemic species of birds.

At least 56 now globally extinct. 53 introduced species, almost all globally common and widespread

Local number of species not changed, global biodiversity significantly reduced.

AFFECT OUR HEALTH

- More than 100 known cases of invasive species with effects on health
- Pathogens, parasites, vectors of pathogens, producing toxins, allergenic, direct attacks or bites, indirect effects on other invasive species with impact on health, etc.

Tiger mosquito

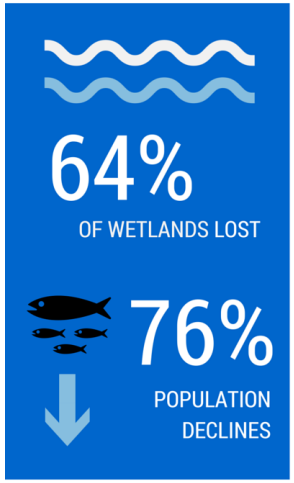
- transmits 20 pathogens, including Dengue, West Nile, Chikungunia

Mazza et al., Ethol. Ecol. Evol. 2013

ALL ENVIRONMENTS

Freshwater

- Invasives impact 33% of threatened amphibians, 20% of fish



ALL ENVIRONMENTS

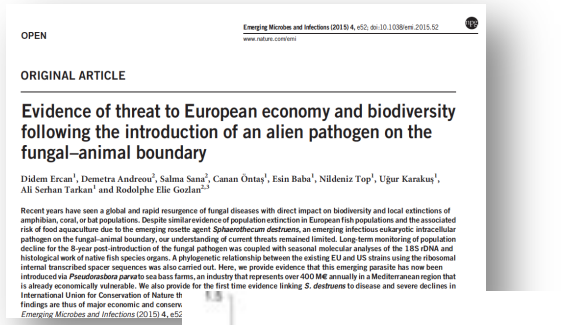
Freshwater

- Water hyacinth in Africa impacts on biodiversity, local livelihood, water stock and human health

ALL ENVIRONMENTS

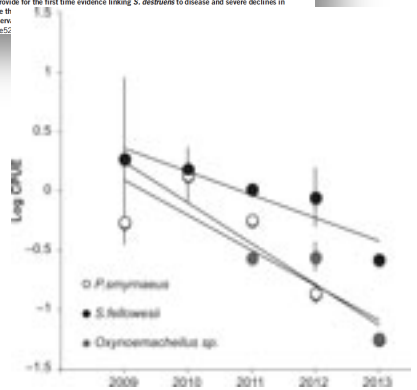
Freshwater

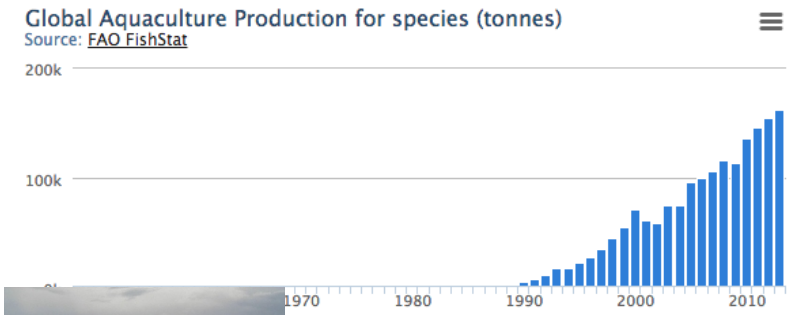
- Introduction of Stone moroko *Pseudorasbora parva* 50 yrs ago in the Black Sea region healthy carrier of a fungal disease, the rosette agent
- Associated with the dramatic decrease of several endemic species
- Likely to impact commercially important marine species as well such as the European sea bass


OPEN

ORIGINAL ARTICLE

Evidence of threat to European economy and biodiversity following the introduction of an alien pathogen on the fungal–animal boundary





ALL ENVIRONMENTS

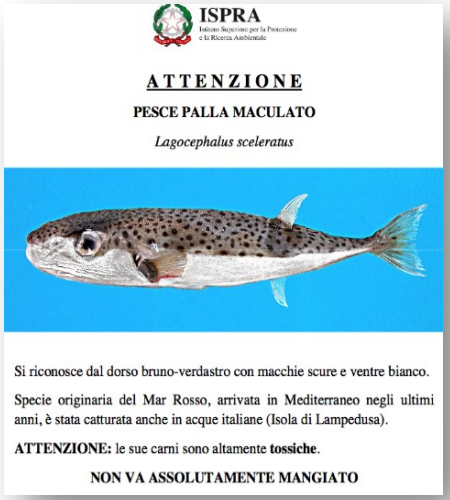
Marine

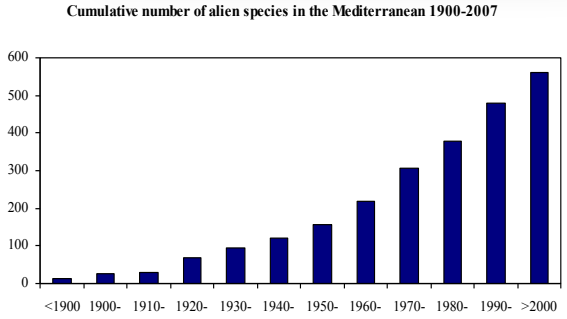
- Mediterranean invaded by hundreds of alien organisms. Suez Canal responsible for the arrival of 432 multicellular alien species, of which 117 invasive
- 45-mile parallel lane just opened, to allow many more ships to use the freight each day
- Increased traffic expected to have an immediate impact on the eastern, and in 20-30 yrs on the central Mediterranean

ALL ENVIRONMENTS

Marine

- Constant increase of new invasions
- E.g. Silver-cheeked toad fish *Lagocephalus sceleratus*; extremely toxic. Fatal intoxications in Egypt and Israel, recently recorded in Italy

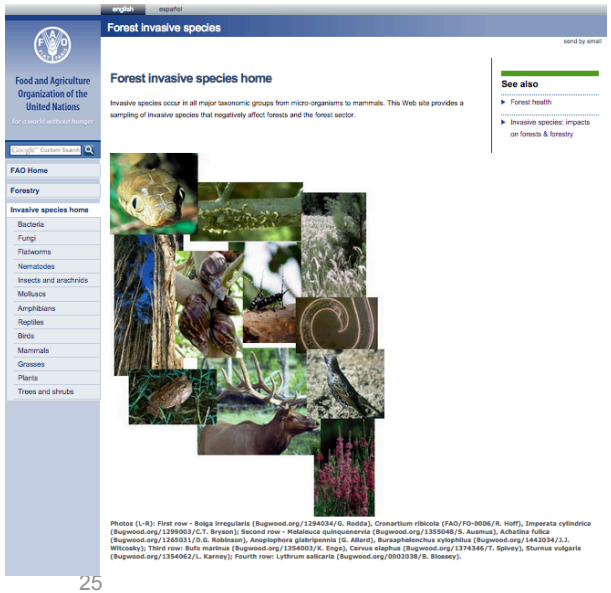




ALL ENVIRONMENTS

Forests

- Beaver introduced in Tierra del Fuego, established in over 7 Mln hectares



CAUSE HUGE ECONOMIC LOSSES

Europe

€ Eradication/control

€ Damage to infrastructure

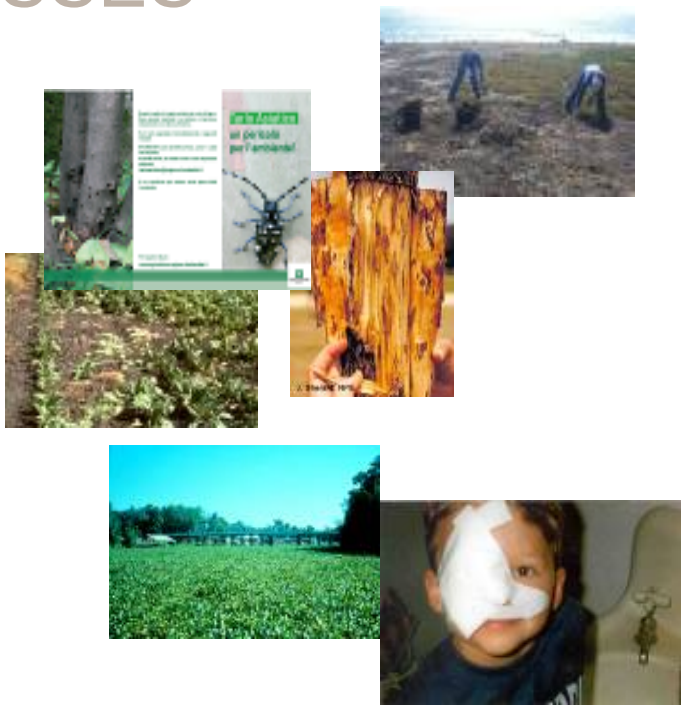
€ Damage to agriculture and forestry

€ Fishing

€ Human health

€ Research, prevention, monitoring, etc

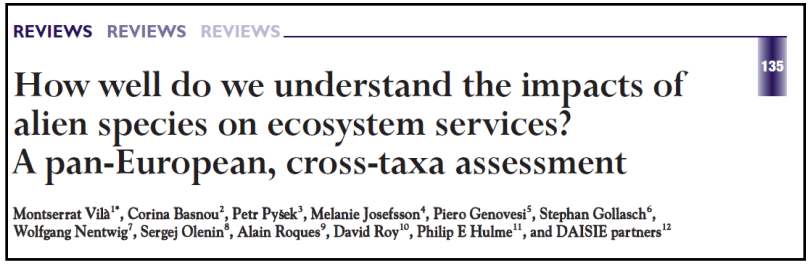
> € 12.5 billions/year



Source: **Kettunen, Genovesi, Gollasch, Pagad, Starfinger, ten Brink & Shine. 2008. Assessment of the impacts of IAS in Europe and the EU (Final module report for the European Commission). IEEP**

PROTECTING BIODIVERSITY SAFEGUARDS LIVELIHOOD

Invasive species impact on both ecosystems and livelihood



REVIEWS REVIEWS REVIEWS

135

How well do we understand the impacts of alien species on ecosystem services? A pan-European, cross-taxa assessment

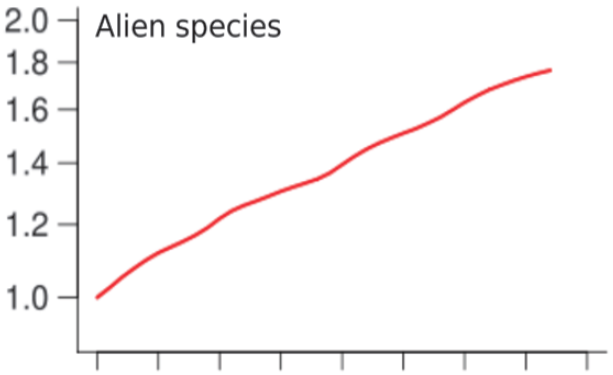
Montserrat Vilà[1*], Corina Basnou[2], Petr Pyšek[3], Melanie Josefsson[4], Piero Genovesi[5], Stephan Gollasch[6], Wolfgang Nentwig[7], Sergej Olenin[8], Alain Roques[9], David Roy[10], Philip E Hulme[11], and DAISIE partners[12]

	Total	Ecological impacts		Economic impacts	
Aquatic marine	1076	134	12.45%	114	10.59%
Aquatic inland	486	139	28.60%	107	22.02%
Birds	172	46	26.74%	78	45.35%
Terrestrial invertebrates	584	126	21.58%	180	30.82%
Terrestrial mammals	112	55	49.11%	67	59.82%
Terrestrial plants	6135	841	13.71%	745	12.14%

CONSTANTLY INCREASING

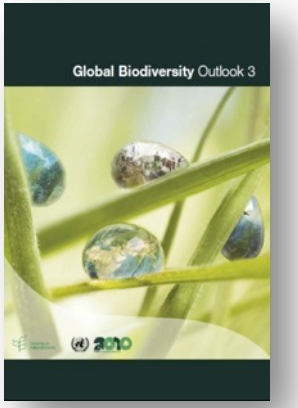
So far we failed to halt invasions

Number of alien species in Europe increased 76% in the 1970-2007 period

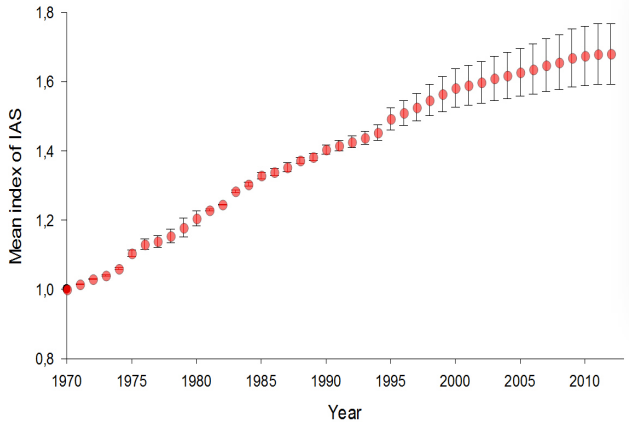


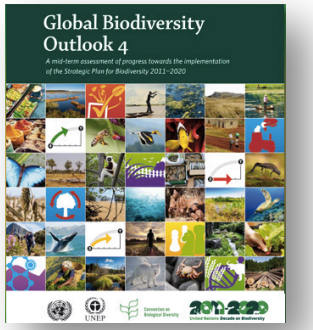
Global Biodiversity: Indicators of Recent Declines

28 MAY 2010 VOL 328 **SCIENCE** www.sciencemag.org



More recent analysis confirms this trend (1975-2012)





DRAMATIC PACE OF INCREASE

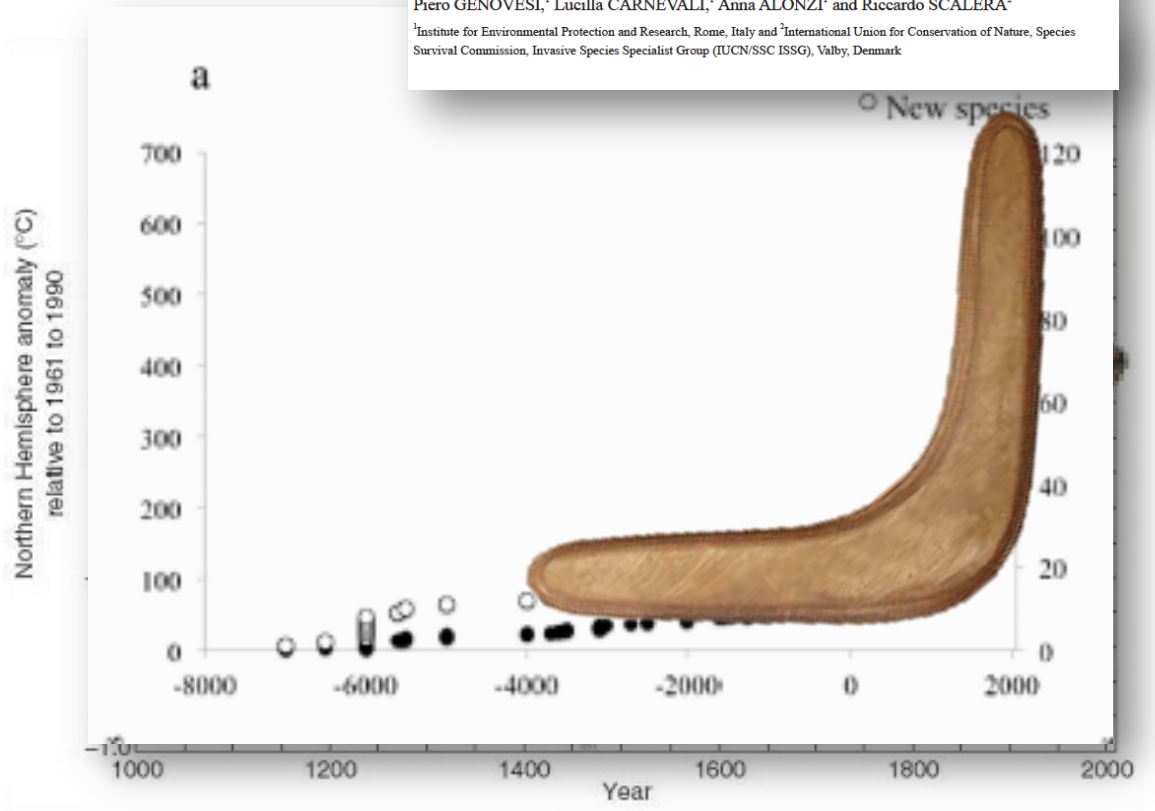
Integrative Zoology 2012; 7: 247–253 doi: 10.1111/j.1749-4877.2012.00309.x

ORIGINAL ARTICLE

Alien mammals in Europe: updated numbers and trends, and assessment of the effects on biodiversity

Piero GENOVESI,[1] Lucilla CARNEVALI,[1] Anna ALONZI[1] and Riccardo SCALERA[2]

[1]Institute for Environmental Protection and Research, Rome, Italy and [2]International Union for Conservation of Nature, Species Survival Commission, Invasive Species Specialist Group (IUCN/SSC ISSG), Valby, Denmark



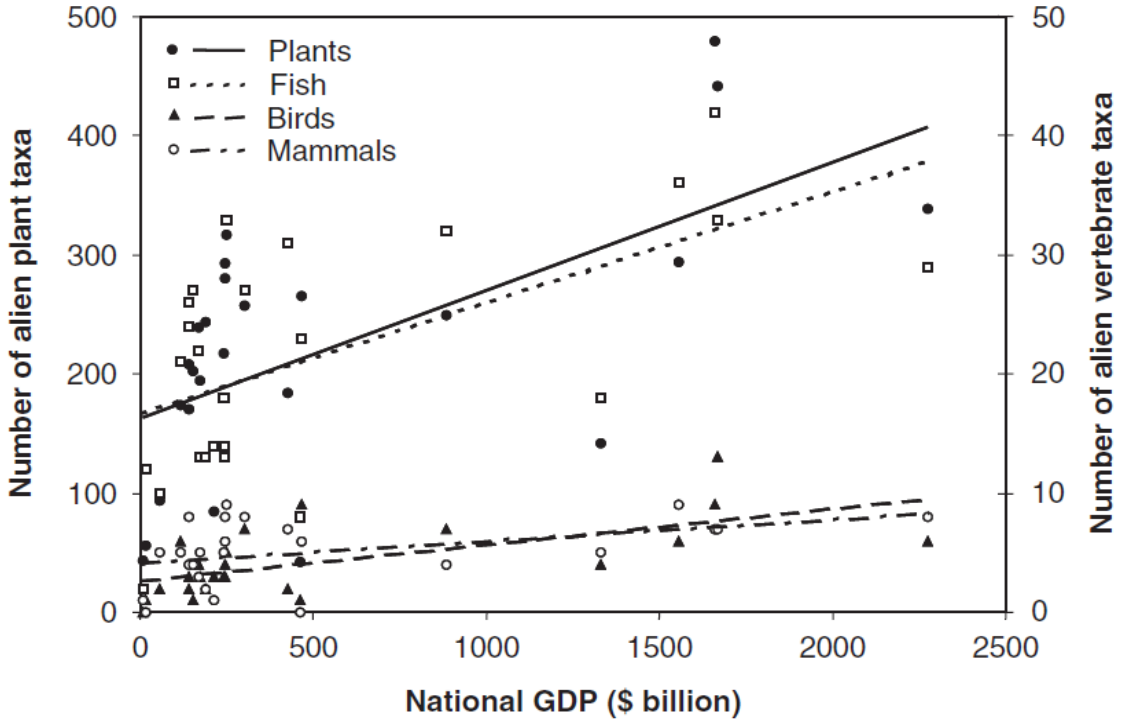
From ice hockey stick to boomerang?

Urgent to act!

IT'S THE ECONOMY, STUPID!

Correlates of invasions

- Economy is the most significant correlate of invasions



Hulme, 2007

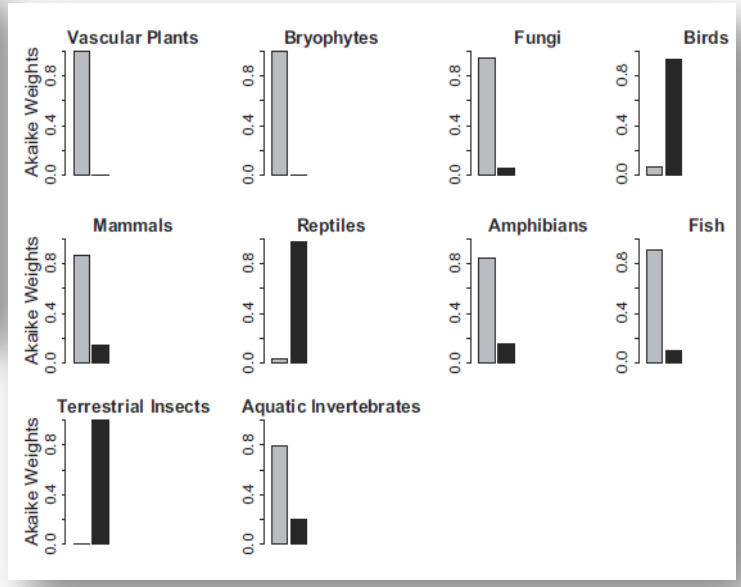
IT'S THE ECONOMY, STUPID!

"Invasion debt"

Socioeconomic legacy yields an invasion

Franz Essl[a,b,1], Stefan Dullinger[c,d,1,2], Wolfgang Rabitsch[a], Philip E. Hulme[b], Karl Hülber[c,d], Ingrid Kleinbauer[c], Fridolin Krausmann[g], Ingolf Kühn[h], Wolfgang Nentwig[i], Montserrat Vil Francesca Gherardi[l], Marie-Laure Desprez-Loustau[m], Alain Roques[n], and Petr Pyšek[e,f]

[a]Environment Agency Austria, 1090 Vienna, Austria; [b]Bio-Protection Research Centre, P.O. Box 84, Lincoln University



- «Invasion debt», implies delayed effects of species introductions
- This inertia implies that the consequences of invasions are completely realized only after many decades

Fig. 2. Alien-species richness of 10 different taxonomic groups in 28 European countries as explained by current and historic socioeconomic models. Bars represent Akaike weights for spatial autoregressive models explaining the current distribution of established alien species across 28 European countries by either current or historical socioeconomic conditions. The predictors in the models are scores on the three axes of a principal component analysis using human population density, standardized per capita GDP, and share of exports in 1900 (gray), and 2000 (black) as input variables.

SYNERGY WITH CLIMATE CHANGE

Increased impacts

- Europe, N America, Oceania
- Some taxonomic groups

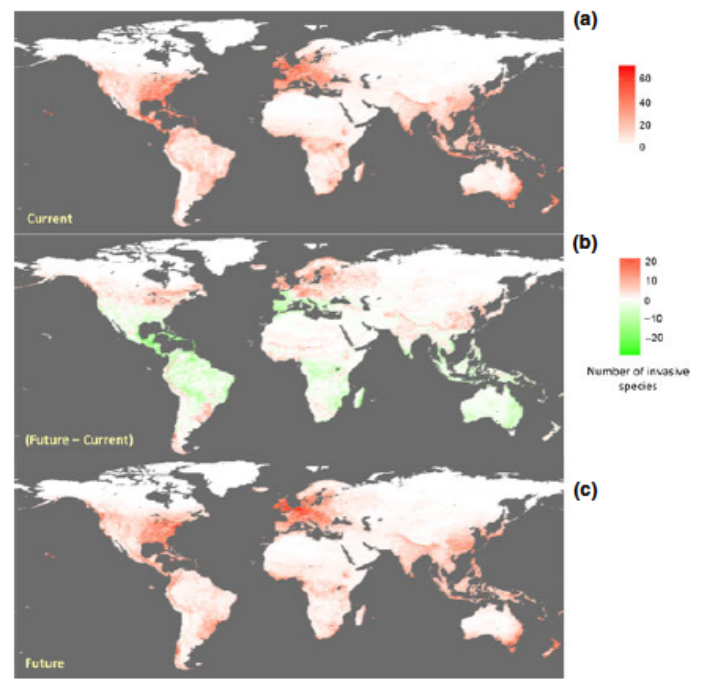
Global Change Biology

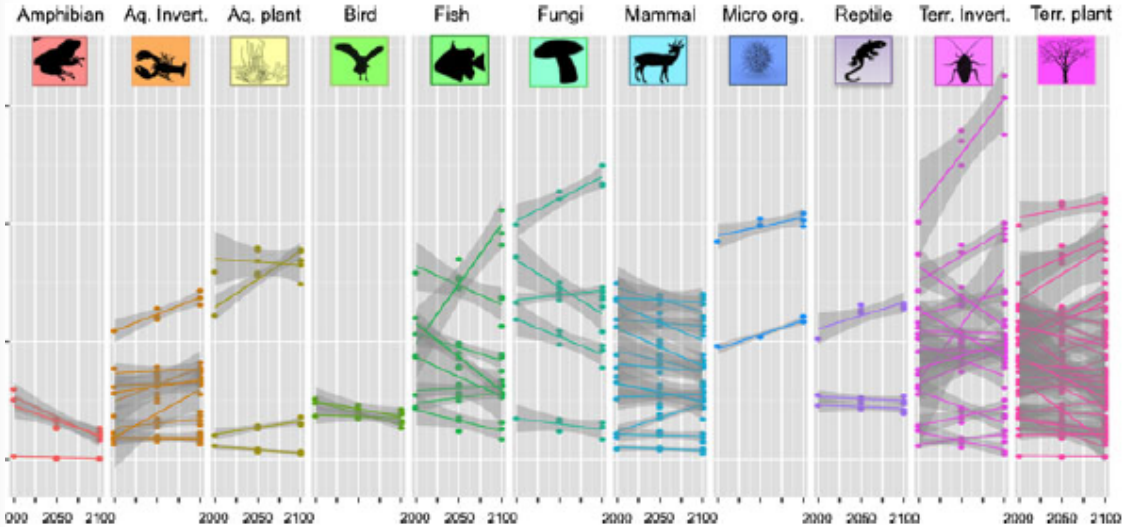
Global Change Biology (2013), doi: 10.1111/gcb.12344

Will climate change promote future invasions?

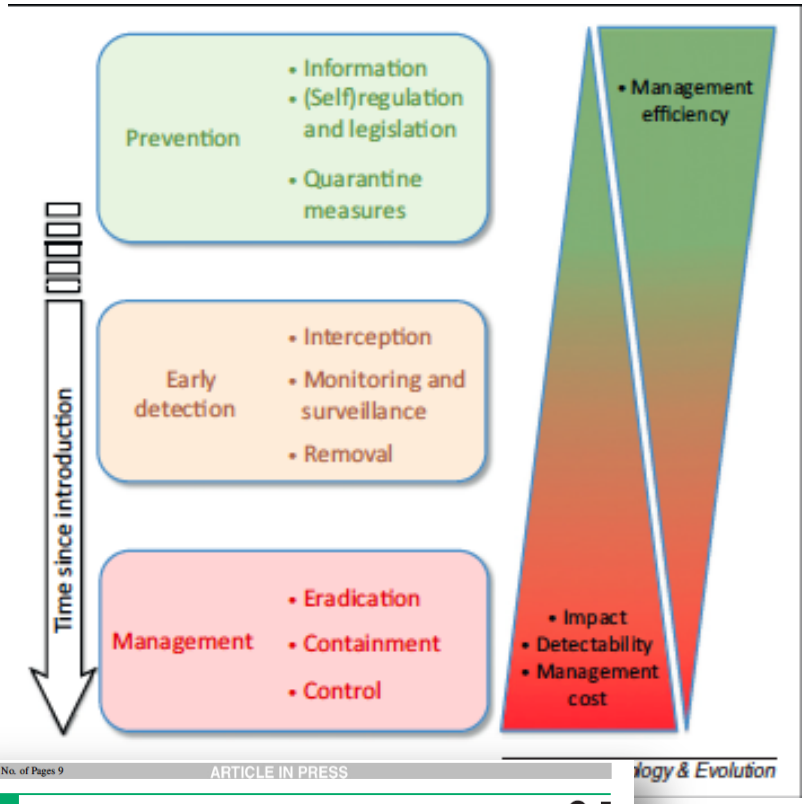
CELINE BELLARD*, WILFRIED THUILLER†, BORIS LEROY‡§, PIERO GENOVESI¶, MICHEL BAKKENES‖ and FRANCK COURCHAMP*

*Ecologie, Systématique & Evolution, UMR CNRS 8079, Univ. Paris-Sud, Orsay Cedex FR-91405, France, †Laboratoire d'Ecologie Alpine, UMR CNRS 5553 Université Joseph Fourier, Grenoble 1 BP 53, Grenoble Cedex 9 FR-38041, France, ‡URUEM 420 Biodiversité et Gestion des Territoires, Université de Rennes 1, Campus de Beaulieu, Rennes Cedex 35042, France, §Service du Patrimoine Naturel, MNHN, Paris, France, ¶Institute for Environmental Protection and Research, Rome, Italy, ‖Netherlands Environmental Assessment Agency (PBL), PO Box 303, Bilthoven 3720, The Netherlands





HOW TO RESPOND?




TREE-1578; No. of Pages 9 ARTICLE IN PRESS

Review

Cell PRESS

Impacts of biological invasions: what's what and the way forward

Daniel Simberloff[1], Jean-Louis Martin[2], Piero Genovesi[3], Virginie Maris[2], David A. Wardle[4], James Aronson[2,5], Franck Courchamp[6], Bella Galil[7], Emili García-Berthou[8], Michel Pascal[9], Petr Pyšek[10,11], Ronaldo Sousa[12,13], Eric Tabacchi[14] and Montserrat Vilà[15*]

CBD guiding principles

- Prevention as the first line of defence
- Early detection rapid response
- Eradication when feasible
- Permanent management when appropriate

Decision VI/23 on Alien Species that threaten ecosystems, habitats and species; COPVI, The Hague, April 2002

CBD STRATEGIC PLAN 2020

***Target 9*: By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment**

- Identify, prioritize, control species to mitigate impacts
- Identify, prioritize, manage pathways to enhance prevention

WHERE ARE WE

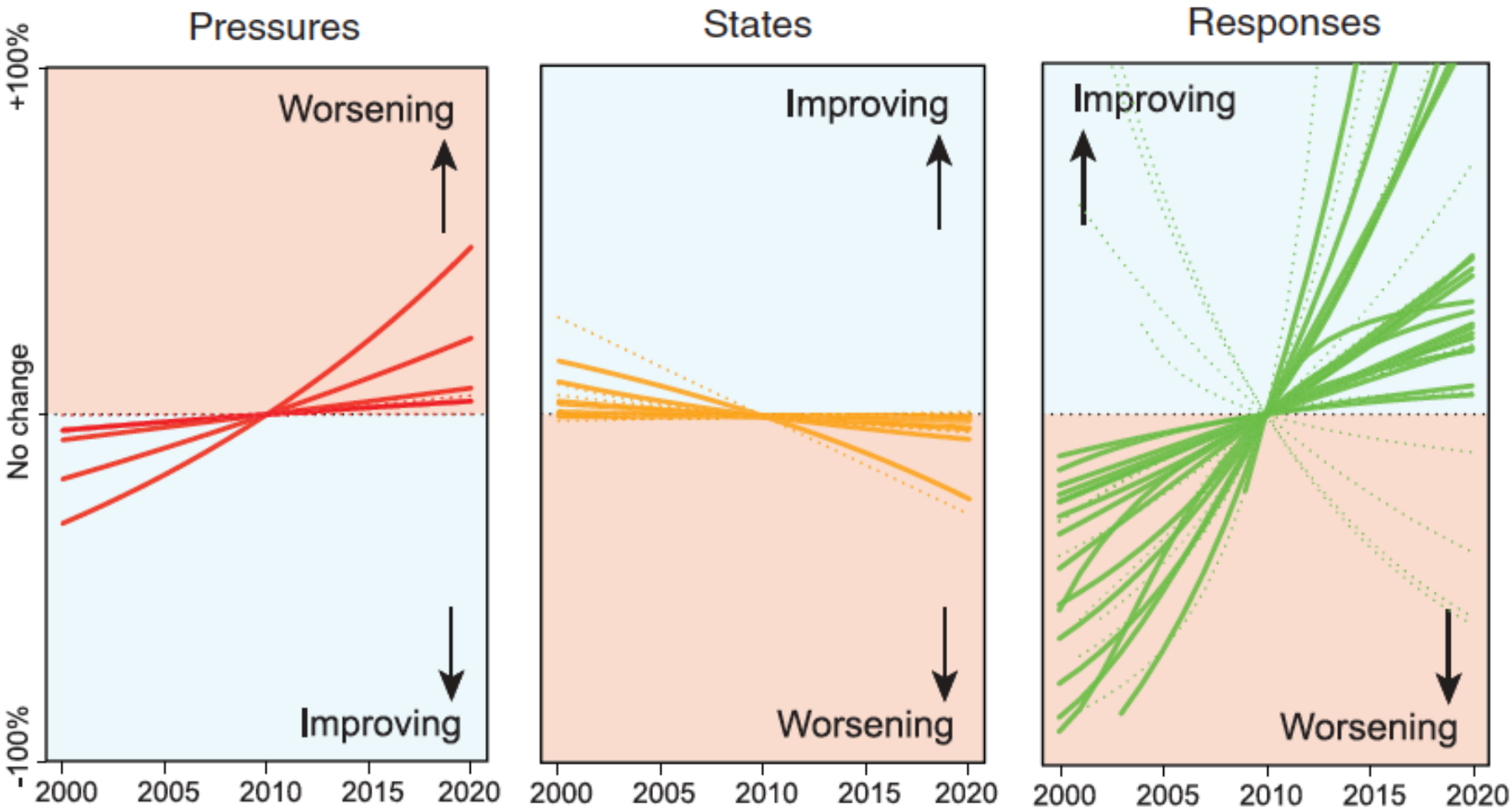
SCIENCE sciencemag.org 10 OCTOBER 2014 • VOL 346 ISSUE 6206

CONSERVATION TARGETS

A mid-term analysis of progress toward international biodiversity targets

Derek P. Tittensor,[1,2*] Matt Walpole,[1] Samantha L. L. Hill,[1] Daniel G. Boyce,[3,4] Gregory L. Britten,[2] Neil D. Burgess,[1,5] Stuart H. M. Butchart,[6] Paul W. Leadley,[7] Eugenie C. Regan,[1] Rob Alkemade,[8] Roswitha Baumung,[9] Céline Bellard,[7] Lex Bouwman,[8,10] Nadine J. Bowles-Newark,[1] Anna M. Chenery,[1] William W. L. Cheung,[11] Villy Christensen,[11] H. David Cooper,[12] Annabel R. Crowther,[1] Matthew J. R. Dixon,[1] Alessandro Galli,[13] Valérie Gaveau,[14] Richard D. Gregory,[15] Nicolas L. Gutierrez,[16] Tim L. Hirsch,[17] Robert Höft,[12] Stephanie R. Januchowski-Hartley,[18] Marion Karmann,[19] Cornelia B. Krug,[7,20] Fiona J. Leverington,[21] Jonathan Loh,[22] Rik Kutsch Lojenga,[23] Kelly Malsch,[1] Alexandra Marques,[24,25] David H. W. Morgan,[26] Peter J. Mumby,[27] Tim Newbold,[1] Kieran Noonan-Mooney,[12] Shyama N. Pagad,[28] Bradley C. Parks,[29] Henrique M. Pereira,[24,25] Tim Robertson,[17] Carlo Rondinini,[30] Luca Santini,[30] Jörn P. W. Scharlemann,[1,31] Stefan Schindler,[32,33] U. Rashid Sumaila,[11] Louise S.L. Teh,[11] Jennifer van Kolck,[8] Piero Visconti,[34] Yimin Ye[9]

WHERE ARE WE


Pressures
States
Responses
+100%
No change
-100%
Worsening
Improving
Improving
Worsening
Improving
Worsening
2000
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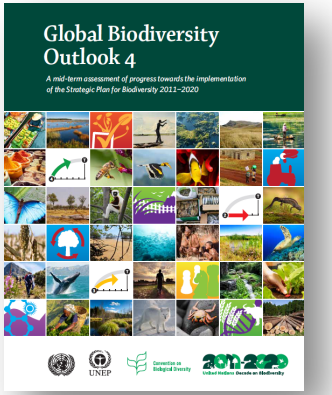
2020

WHERE ARE WE



TARGET 9

Invasive alien species identified and prioritized	★★★ T 3	Measures taken in many countries to develop lists of invasive alien species
Pathways identified and prioritized	★★★ T 3	Major pathways are identified, but not efficiently controlled at a global scale
Priority species controlled or eradicated	★☆☆ T 3	Some control and eradication, but data limited
Introduction and establishment of IAS prevented	★★☆ T 2	Some measures in place, but not sufficient to prevent continuing large increase in IAS

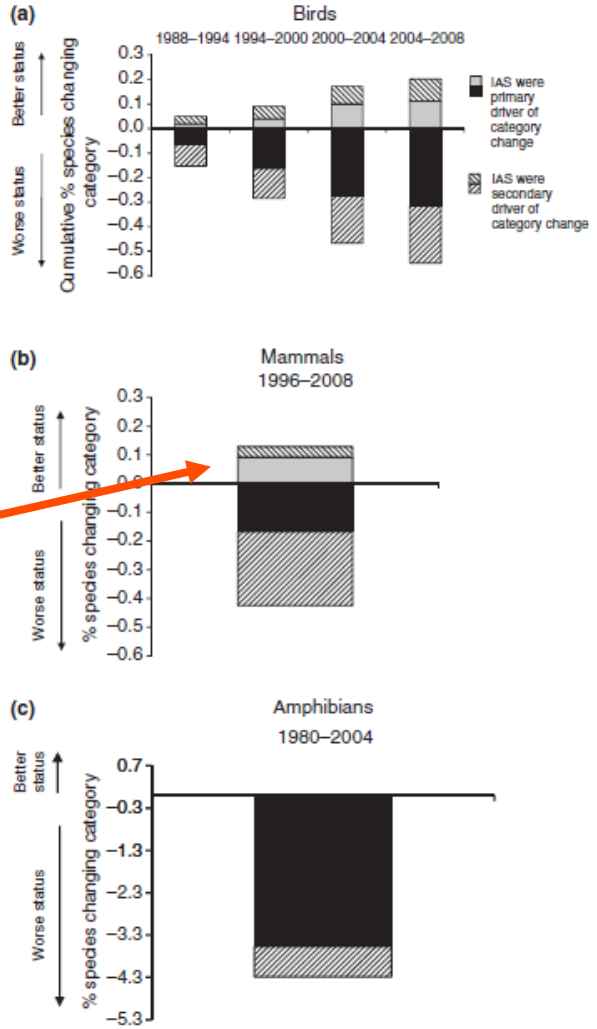
NEED TO MOVE TOWARD IMPLEMENTATION

Diversity and Distributions, (Diversity Distrib.) (2010) **16**, 95–108

BIODIVERSITY RESEARCH

Global indicators of biological invasion: species numbers, biodiversity impact and policy responses

Melodie A. McGeoch[1]*, Stuart H. M. Butchart[2], Dian Spear[3], Elrike Marais[3], Elizabeth J. Kleynhans[3], Andy Symes[2], Janice Chanson[4] and Michael Hoffmann[5,6]



genuine IUCN Red List category changes driven by the impacts of IAS:

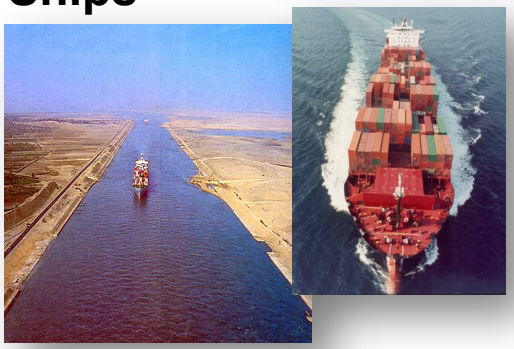
- conservation measures leading to improvements in status
- conservation status of 11 birds, 5 mammals and 1 amphibian improved because of eradication of IAS

PATHWAYS OF ARRIVAL

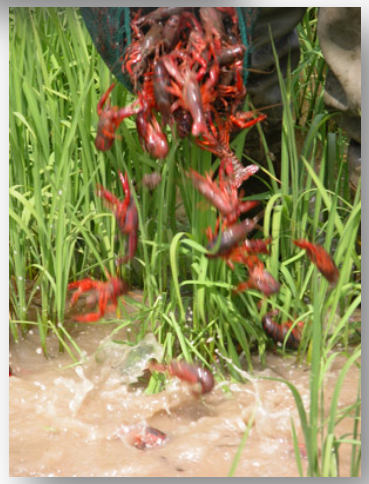
From physical vectors, to human activities, to e-commerce

Planting

Ships



Aquaculture



Horticulture

Accidental transport

Pet trade

Tourism

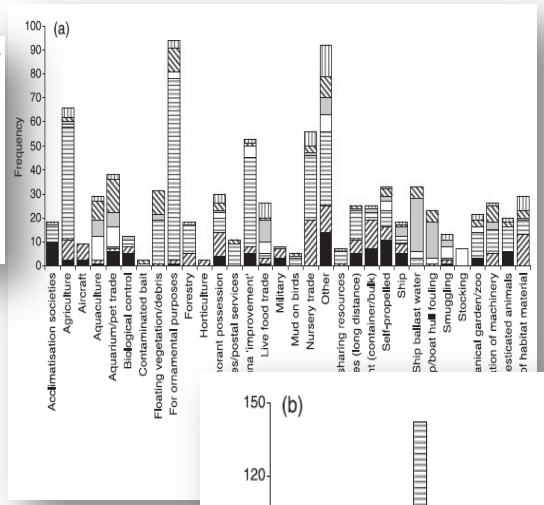
PATHWAYS OF ARRIVAL

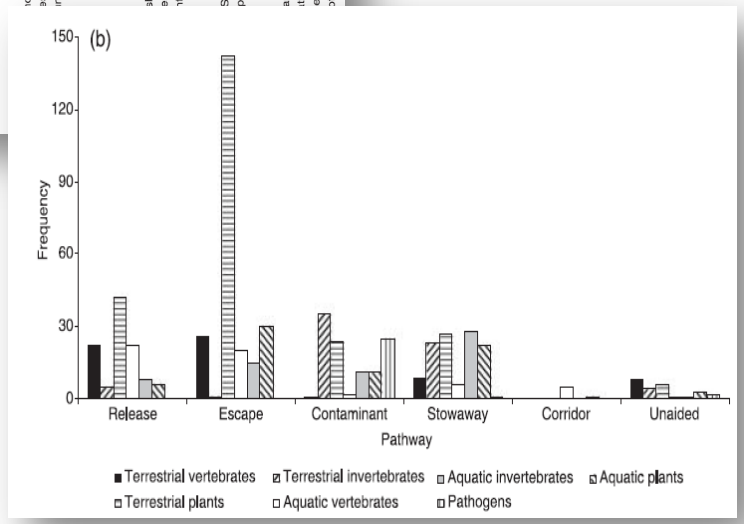
Improved understanding of pathways

Journal of Applied Ecology 2008, **45**, 403–414 doi: 10.1111/j.1365-2664.2007.01442.x

Grasping at the routes of biological invasions: a framework for integrating pathways into policy

P. E. Hulme[1,2*], S. Bacher[3], M. Kenis[4], S. Klotz[5], I. Kühn[5], D. Minchin[6], W. Nentwig[3], S. Olenin[7], V. Panov[8], J. Pergl[9], P. Pyšek[9,10], A. Roques[11], D. Sol[12], W. Solarz[13] and M. Vilà[14]

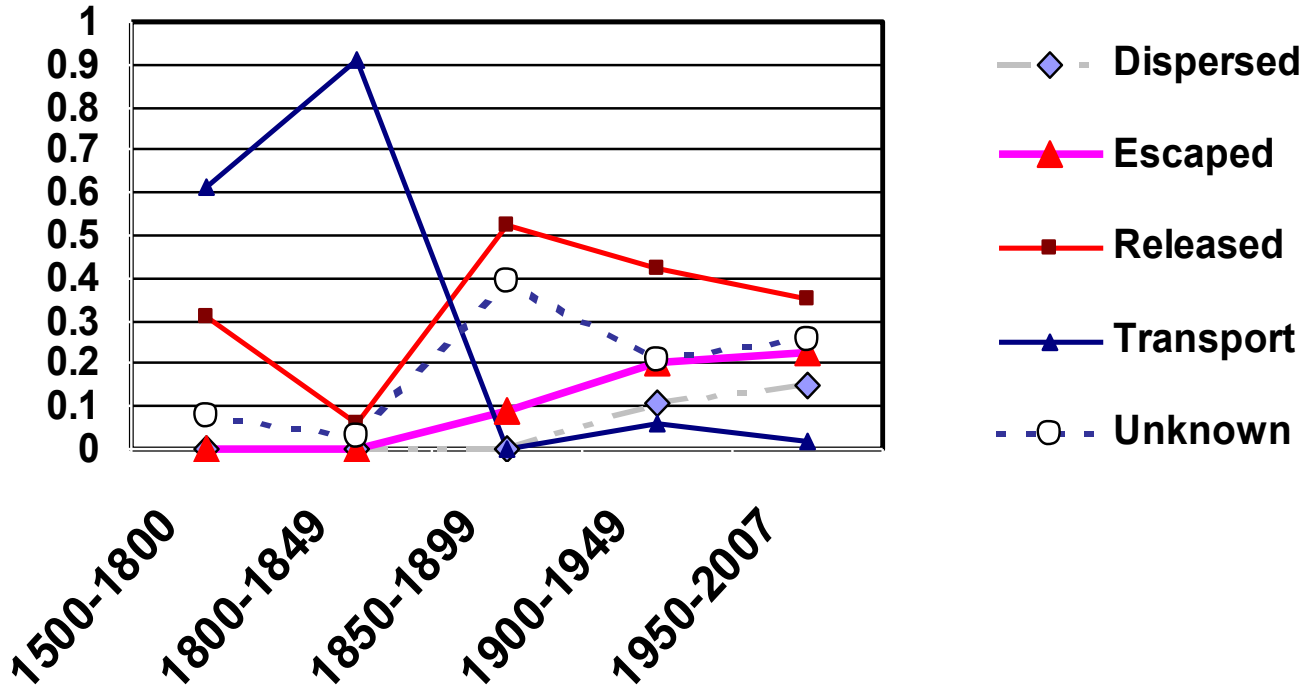




Hulme et al. 2008

PATHWAYS CHANGE OVER TIME

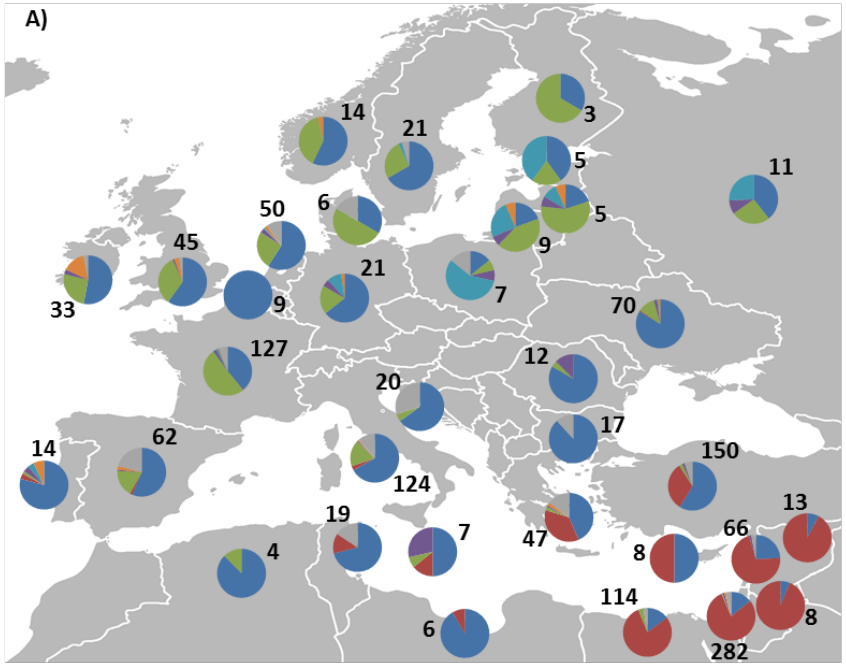
Mammals in Europe

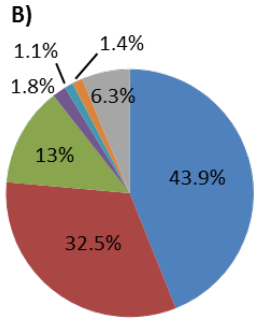


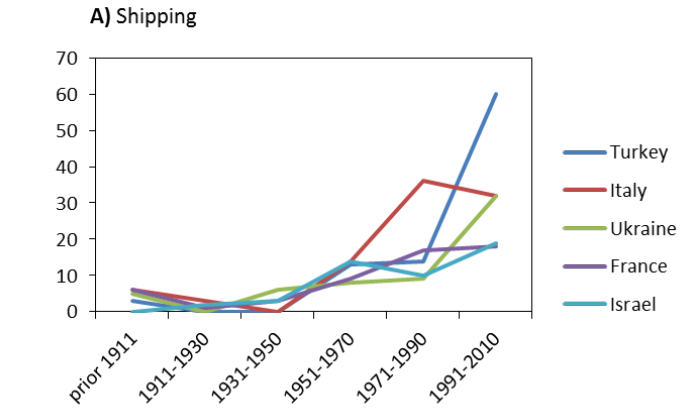
Genovesi et al., 2009. DAISIE handbook

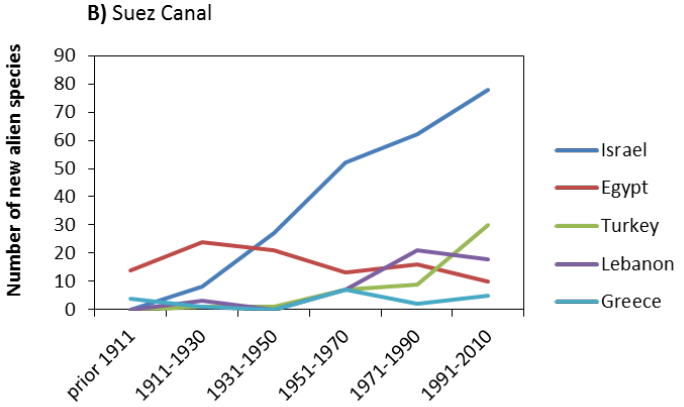
PATHWAYS VARY GEOGRAPHICALLY

The example of marine species in Europe









Nunes et al., 2014. Alien marine species in Europe. Aquatic Invasions

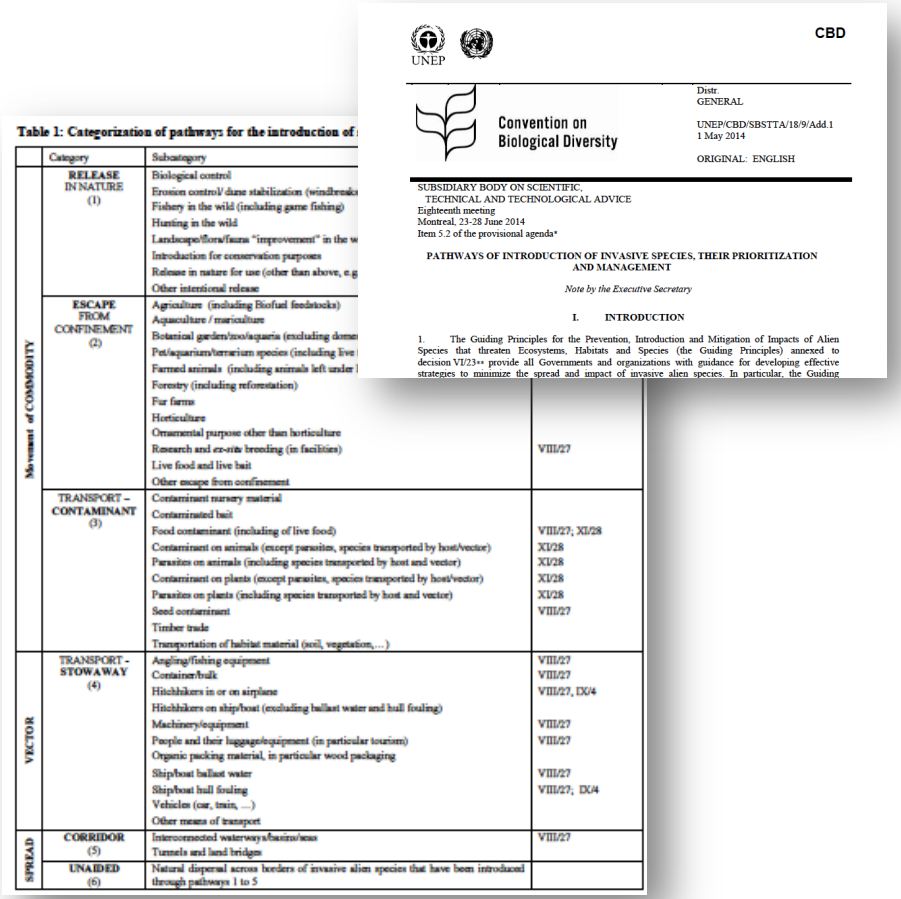
SPEAKING THE SAME LANGUAGE

Common definitions crucial to allow comparison of data

STANDARD CATEGORIZATION OF PATHWAYS

Developed by IUCN SSC ISSG within the GIASIPartnership, in collaboration with CEH and CABI, and inputs from the CBD Secretariat

- Presented in a note by the Executive Secretary of CBD
- Based on inputs from leading experts, and the most updated scientific literature
- Tested with the IUCN SSC Global Invasive Species Database (over 800 invasive species globally)
- Mapped toward CBD decisions



UNEP

CBD

Convention on Biological Diversity

Distr.
GENERAL

UNEP/CBD/SBSTTA/18/9/Add.1
1 May 2014

ORIGINAL: ENGLISH

SUBSIDIARY BODY ON SCIENTIFIC, TECHNICAL AND TECHNOLOGICAL ADVICE
Eighteenth meeting
Montreal, 23-28 June 2014
Item 5.2 of the provisional agenda*

PATHWAYS OF INTRODUCTION OF INVASIVE SPECIES, THEIR PRIORITIZATION AND MANAGEMENT

Note by the Executive Secretary

I. INTRODUCTION

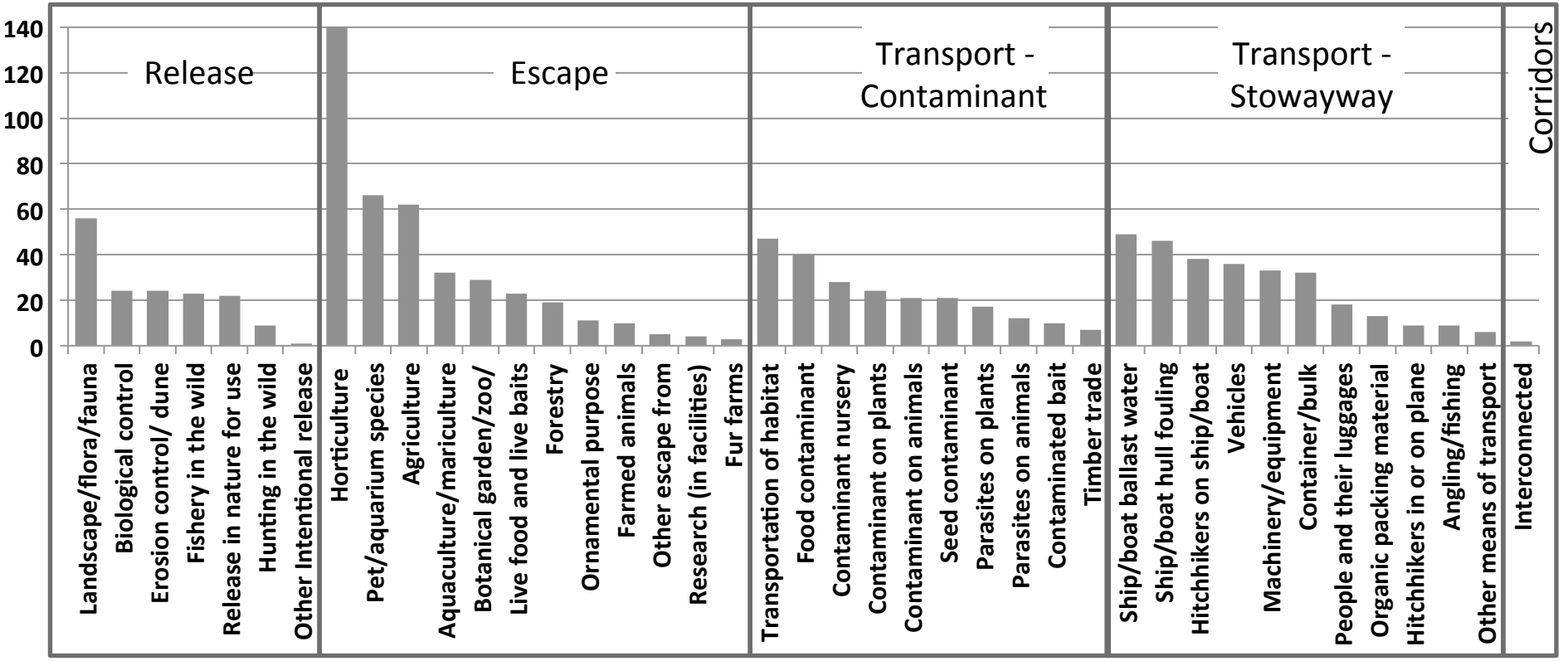
1. The Guiding Principles for the Prevention, Introduction and Mitigation of Impacts of Alien Species that threaten Ecosystems, Habitats and Species (the Guiding Principles) annexed to decision VI/23** provide all Governments and organizations with guidance for developing effective strategies to minimize the spread and impact of invasive alien species. In particular, the Guiding

Table 1: Categorization of pathways for the introduction of

	Category	Subcategory	
Movement of COMMODITY	RELEASE IN NATURE (1)	Biological control	
		Erosion control/ dune stabilization (windbreak	
		Fishery in the wild (including game fishing)	
		Hunting in the wild	
		Landscape/flora/fauna "improvement" in the w	
		Introduction for conservation purposes	
		Release in nature for use (other than above, e.g	
		Other intentional release	
	ESCAPE FROM CONFINEMENT (2)	Agriculture (including Biofuel feedstocks)	
		Aquaculture / mariculture	
		Botanical garden/zoo/aquaria (excluding dome	
		Pet/aquarium/terrarium species (including live	
		Farmed animals (including animals left under	
		Forestry (including reforestation)	
		Fur farms	
		Horticulture	
		Ornamental purpose other than horticulture	
		Research and *ex-situ* breeding (in facilities)	VIII/27
		Live food and live bait	
		Other escape from confinement	
	TRANSPORT – CONTAMINANT (3)	Contaminant nursery material	
		Contaminated bait	
		Food contaminant (including of live food)	VIII/27; XI/28
		Contaminant on animals (except parasites, species transported by host/vector)	XI/28
		Parasites on animals (including species transported by host and vector)	XI/28
		Contaminant on plants (except parasites, species transported by host/vector)	XI/28
		Parasites on plants (including species transported by host and vector)	XI/28
		Seed contaminant	VIII/27
		Timber trade	
		Transportation of habitat material (soil, vegetation, ...)	
VECTOR	TRANSPORT - STOWAWAY (4)	Angling/fishing equipment	VIII/27
		Container/bulk	VIII/27
		Hitchhikers in or on airplane	VIII/27, IX/4
		Hitchhikers on ship/boat (excluding ballast water and hull fouling)	
		Machinery/equipment	VIII/27
		People and their luggage/equipment (in particular tourism)	VIII/27
		Organic packing material, in particular wood packaging	
		Ship/boat ballast water	VIII/27
		Ship/boat hull fouling	VIII/27; IX/4
		Vehicles (car, train, ...)	
		Other means of transport	
SPREAD	CORRIDOR (5)	Interconnected waterways/basins/seas	VIII/27
		Tunnels and land bridges	
	UNAIDED (6)	Natural dispersal across borders of invasive alien species that have been introduced through pathways 1 to 5	

PATHWAYS OF ARRIVAL

Standard categorization of pathways

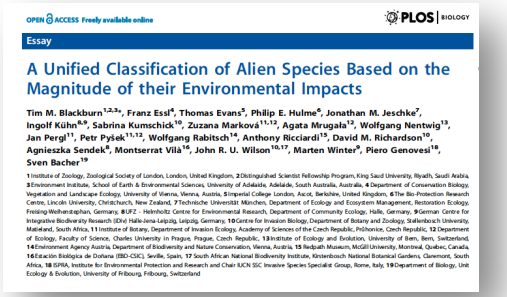


- In-depth analysis presented in Essl et al. 2015 BioScience

RANKING INVASIVE SPECIES BY THEIR IMPACT

Toward a standard method

- Presented in a paper by Blackburn et al. PLOS 2014
- Presented at SBSTTA 18, included in decision of the CBD COP: invitation to IUCN SSC ISSG to "*..continue to develop a system for classifying alien species based on the nature and magnitude of their impacts…*".


OPEN ACCESS Freely available online

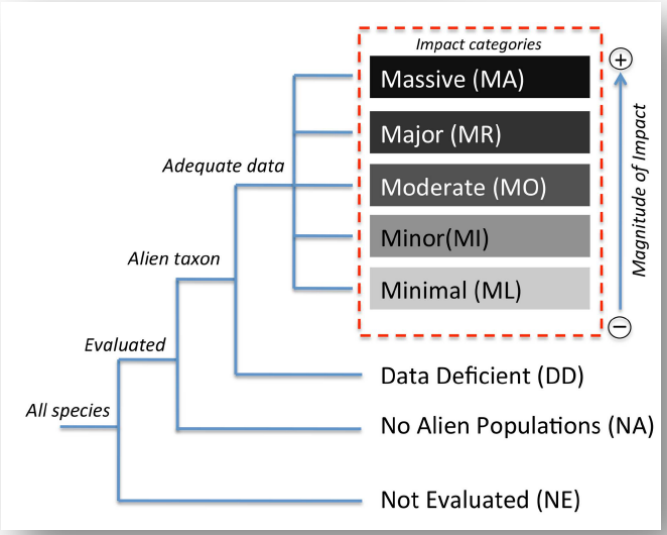
PLOS | BIOLOGY

Essay

A Unified Classification of Alien Species Based on the Magnitude of their Environmental Impacts

Tim M. Blackburn[1,2,3*], Franz Essl[4], Thomas Evans[5], Philip E. Hulme[6], Jonathan M. Jeschke[7], Ingolf Kühn[8,9], Sabrina Kumschick[10], Zuzana Marková[11,12], Agata Mrugała[13], Wolfgang Nentwig[13], Jan Pergl[11], Petr Pyšek[11,12], Wolfgang Rabitsch[14], Anthony Ricciardi[15], David M. Richardson[16], Agnieszka Sendek[8], Montserrat Vilà[10], John R. U. Wilson[16,17], Marten Winter[9], Piero Genovesi[18], Sven Bacher[19]

1 Institute of Zoology, Zoological Society of London, London, United Kingdom, 2 Distinguished Scientist Fellowship Program, King Saud University, Riyadh, Saudi Arabia, 3 Environment Institute, School of Earth & Environmental Sciences, University of Adelaide, Adelaide, South Australia, Australia, 4 Department of Conservation Biology, Vegetation and Landscape Ecology, University of Vienna, Vienna, Austria, 5 Imperial College London, Ascot, Berkshire, United Kingdom, 6 The Bio-Protection Research Centre, Lincoln University, Christchurch, New Zealand, 7 Technische Universität München, Department of Ecology and Ecosystem Management, Restoration Ecology, Freising-Weihenstephan, Germany, 8 UFZ - Helmholtz Centre for Environmental Research, Department of Community Ecology, Halle, Germany, 9 German Centre for Integrative Biodiversity Research (iDiv) Halle-Jena-Leipzig, Leipzig, Germany, 10 Centre for Invasion Biology, Department of Botany and Zoology, Stellenbosch University, Matieland, South Africa, 11 Institute of Botany, Department of Invasion Ecology, Academy of Sciences of the Czech Republic, Průhonice, Czech Republic, 12 Department of Ecology, Faculty of Science, Charles University in Prague, Prague, Czech Republic, 13 Institute of Ecology and Evolution, University of Bern, Bern, Switzerland, 14 Environment Agency Austria, Department of Biodiversity and Nature Conservation, Vienna, Austria, 15 Redpath Museum, McGill University, Montreal, Quebec, Canada, 16 Estación Biológica de Doñana (EBD-CSIC), Seville, Spain, 17 South African National Biodiversity Institute, Kirstenbosch National Botanical Gardens, Claremont, South Africa, 18 ISPRA, Institute for Environmental Protection and Research and Chair IUCN SSC Invasive Species Specialist Group, Rome, Italy, 19 Department of Biology, Unit Ecology & Evolution, University of Fribourg, Fribourg, Switzerland



RANKING INVASIVE SPECIES BY THEIR IMPACT

Discussed with key actors

- General approach approved by IUCN SSC Steering Committee
- Discussed with CBDS
- Workshop in March 2015 to discuss approach with leading experts, and CBDS, European Commission, IPPC, GBIF, Island Conservation, CABI
- Presented at CBD Liaison Group on IAS with WTO, FAO, IMO, CITES, etc

PRIORITIZATION TO ENHANCE BIOSECURITY

- Prioritizing pathways and species is essential for effective policy and management of biological invasions
- Key to achieve Aichi Target 9

McGeoch et al. submitted

BIOSECURITY POLICIES CAN WORK

Regulation of IAS can prevent the impacts of invasions

- Stringent prevention measures
- Effective early warning rapid response
- Advanced management for several key IAS
- Worldwide champions in eradication science

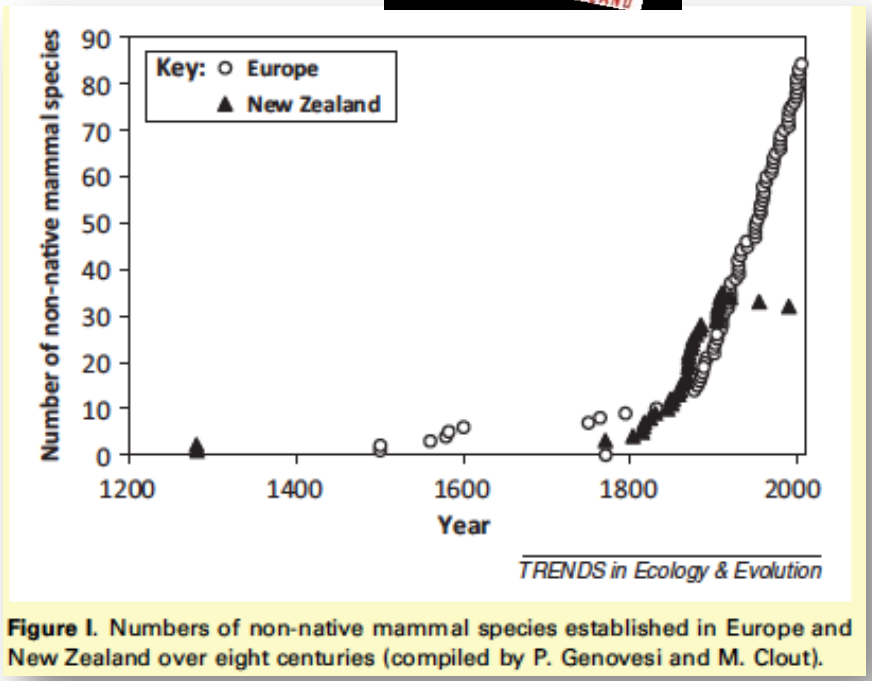


Figure I. Numbers of non-native mammal species established in Europe and New Zealand over eight centuries (compiled by P. Genovesi and M. Clout).

Simberloff et al. 2012. TREE

BIOSECURITY POLICIES CAN WORK

EU Aquaculture regulation

- Requires States to avoid adverse effects
- "**White list**" of permitted species
- Import requires a permit, based on Pest Risk Assessment
- Consultation with neighbouring States
- Possible regulation of containment facilities

L 156/6 EN Official Journal of the European Union 14.6.2008

COMMISSION REGULATION (EC) No 535/2008

of 13 June 2008

laying down detailed rules for the implementation of Council Regulation (EC) No 708/2007 concerning use of alien and locally absent species in aquaculture

THE COMMISSION OF THE EUROPEAN COMMUNITIES,

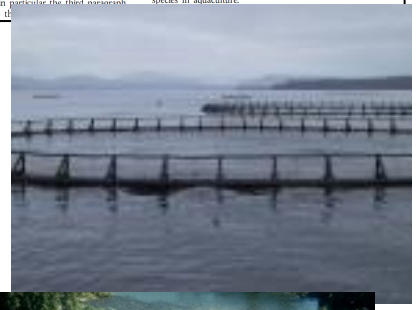
Having regard to the Treaty establishing the European Community,

Having regard to Council Regulation (EC) No 708/2007 of 11 June 2007 concerning use of alien and locally absent species in aquaculture (1), and in particular the third paragraph of Article 23 and Article 24(3) th

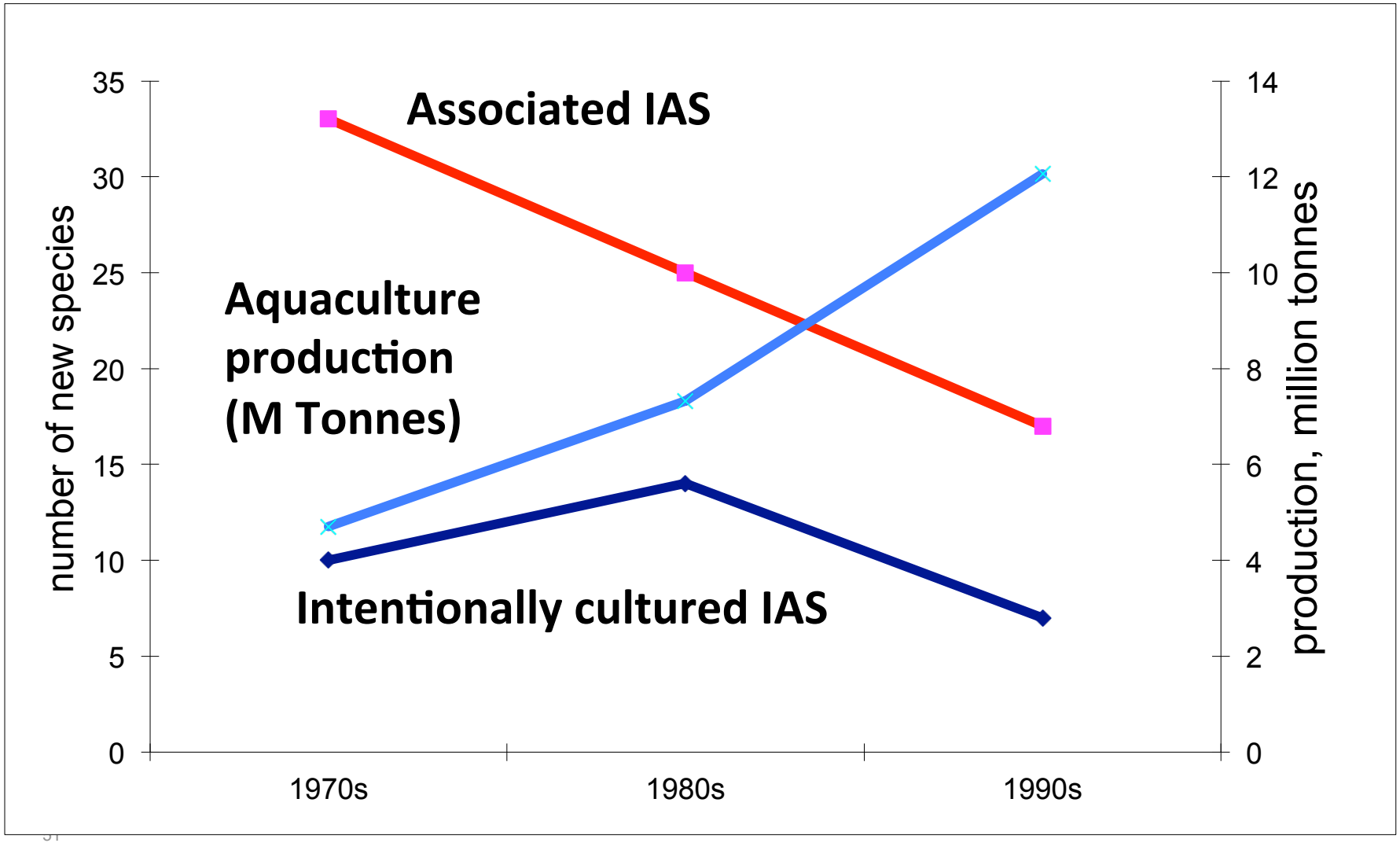
HAS ADOPTED THIS REGULATION:

Article 1

This Regulation lays down detailed rules implementing the conditions necessary for adding species to Annex IV to Regulation (EC) No 708/2007 and regarding the development of a specific information system concerning the permits for the introductions and translocations of alien and locally absent species in aquaculture.

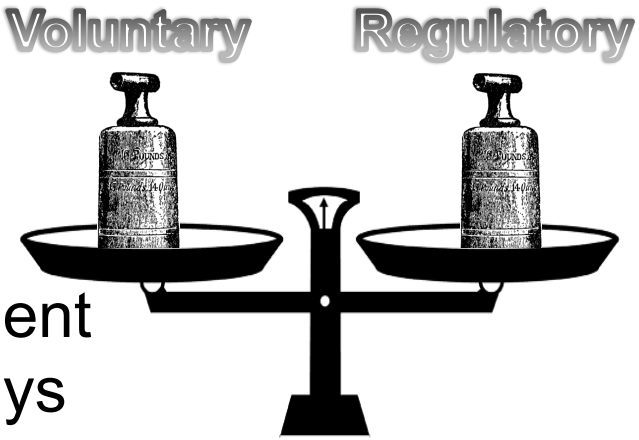


BIOSECURITY POLICIES CAN WORK

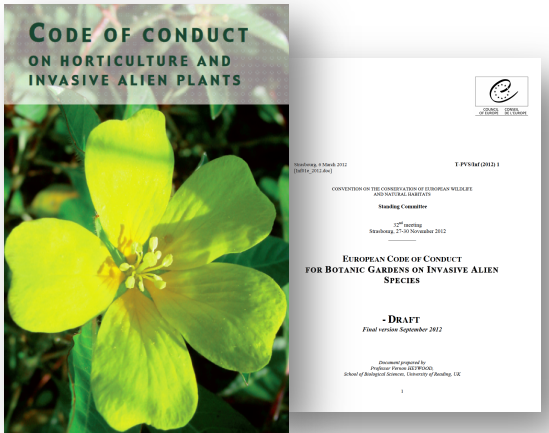


VOLUNTARY APPROACHES

Involving the society



- IUCN ISSG has supported the development of several Codes of Conducts on pathways of introduction of IAS:
  - Pet trade
  - Horticulture
  - Botanical gardens
  - Hunting
  - Angling

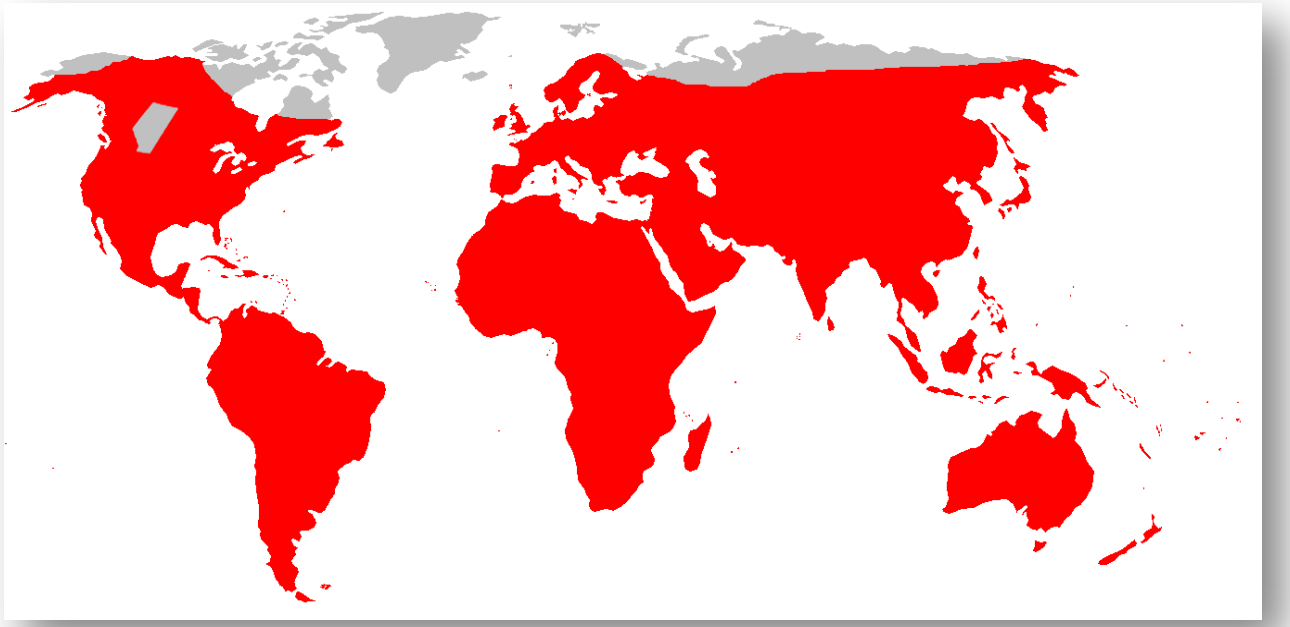


VOLUNTARY APPROACHES

Engaging with local communities

PUBLIC SUPPORT AND AWARENESS

Alberta, a rat free province



PUBLIC SUPPORT AND AWARENESS

Alberta, a rat free province

- Alberta started in the ‘50s a rat-free policy

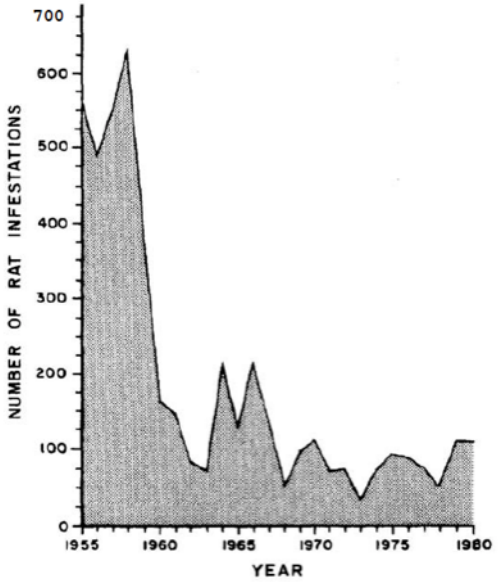
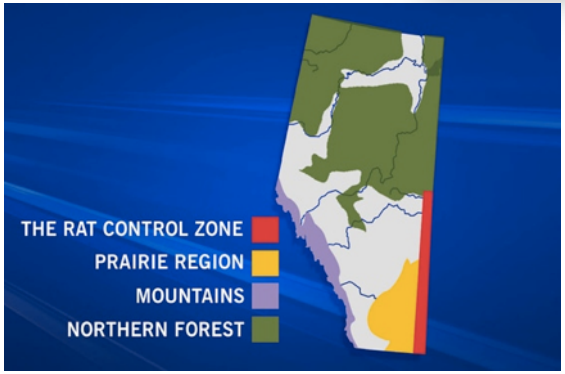


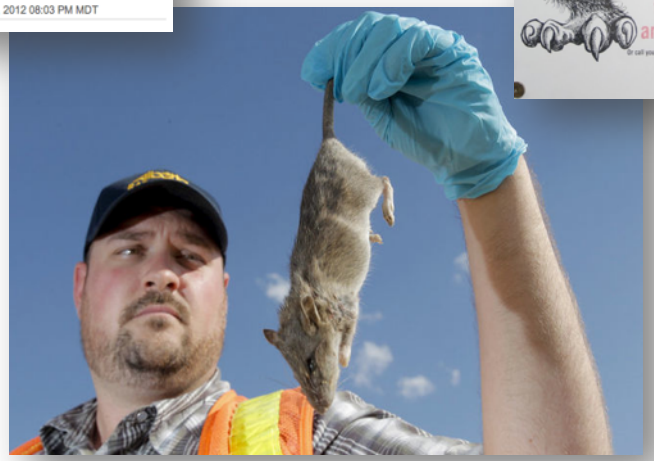
Fig. 3. Number of known infestations in the rat control zone, 1955-80.

(Dorrance 1984)

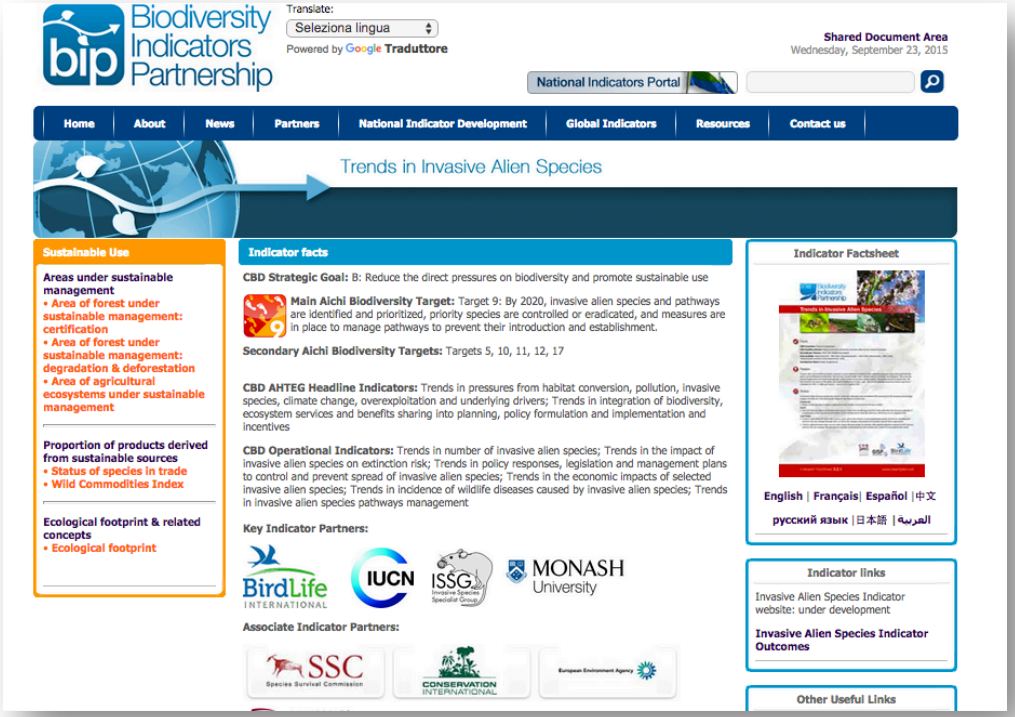
PUBLIC SUPPORT AND AWARENESS

Alberta, a rat free province



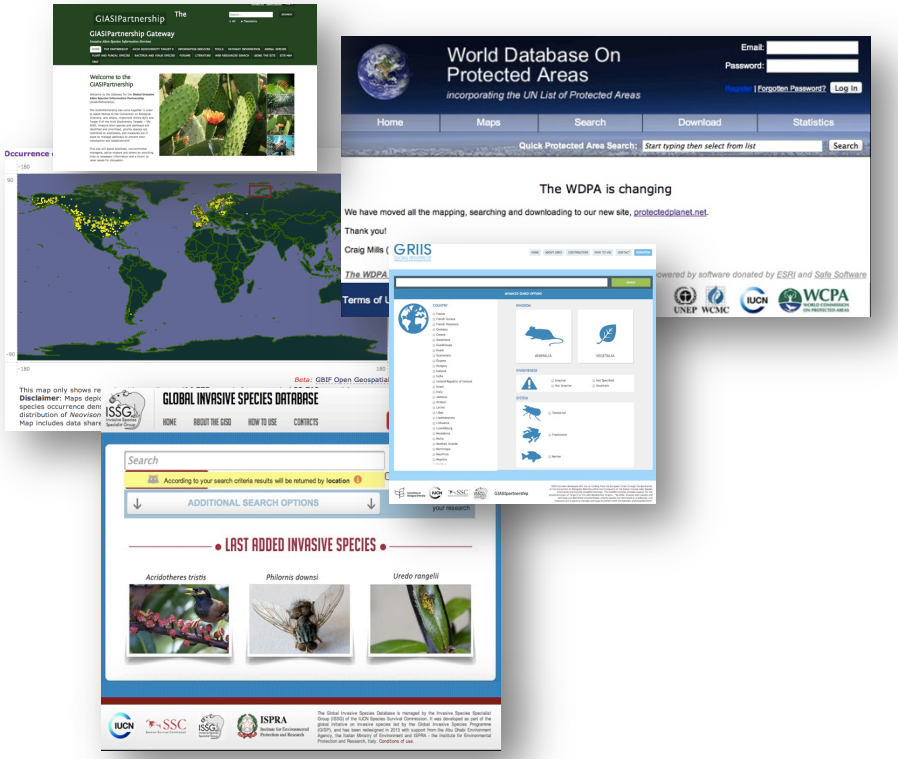


NEED TO TRACK PROGRESSES



TECHNOLOGICAL ADVANCES

Develop science-based solutions, improve information exchange

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Thank you!