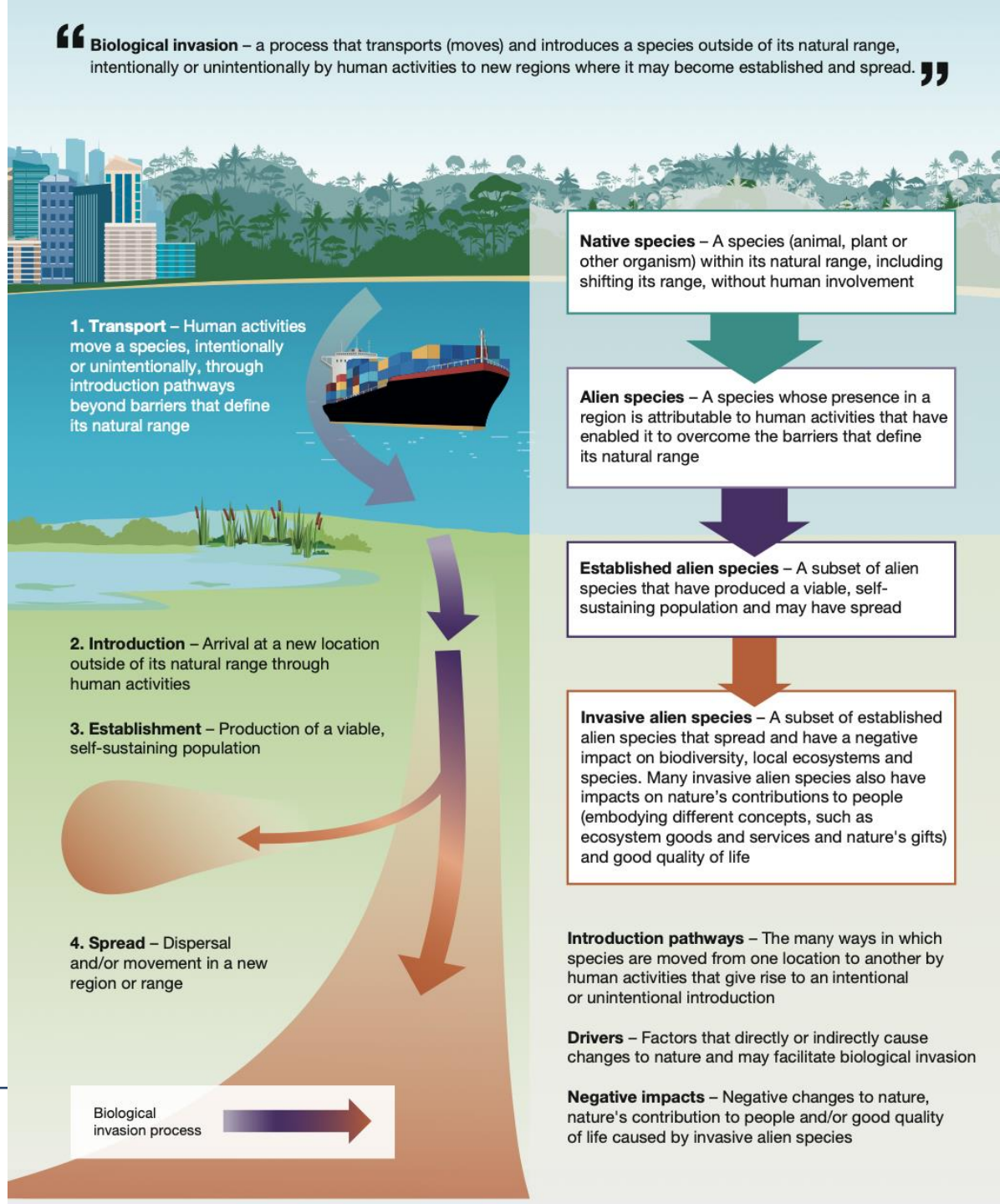
How to preserve natural capital
by recognizing its economic value

The threat of alien species to the Italian Biodiversity and Economy

Piero Genovesi
Head of Wildlife Service – ISPRA
Chair IUCN SSC Invasive Species Specialist Group

Biological invasions

- On of the 5 major drivers of biodiversity loss globally
- IPBES recently completed a thematic assessment on invasive alien species (IAS) and their control
- Adopted in Sept 2023 by 143 countries signatories of IPBES



Alien species vs. invasive alien species

37.000 alien species

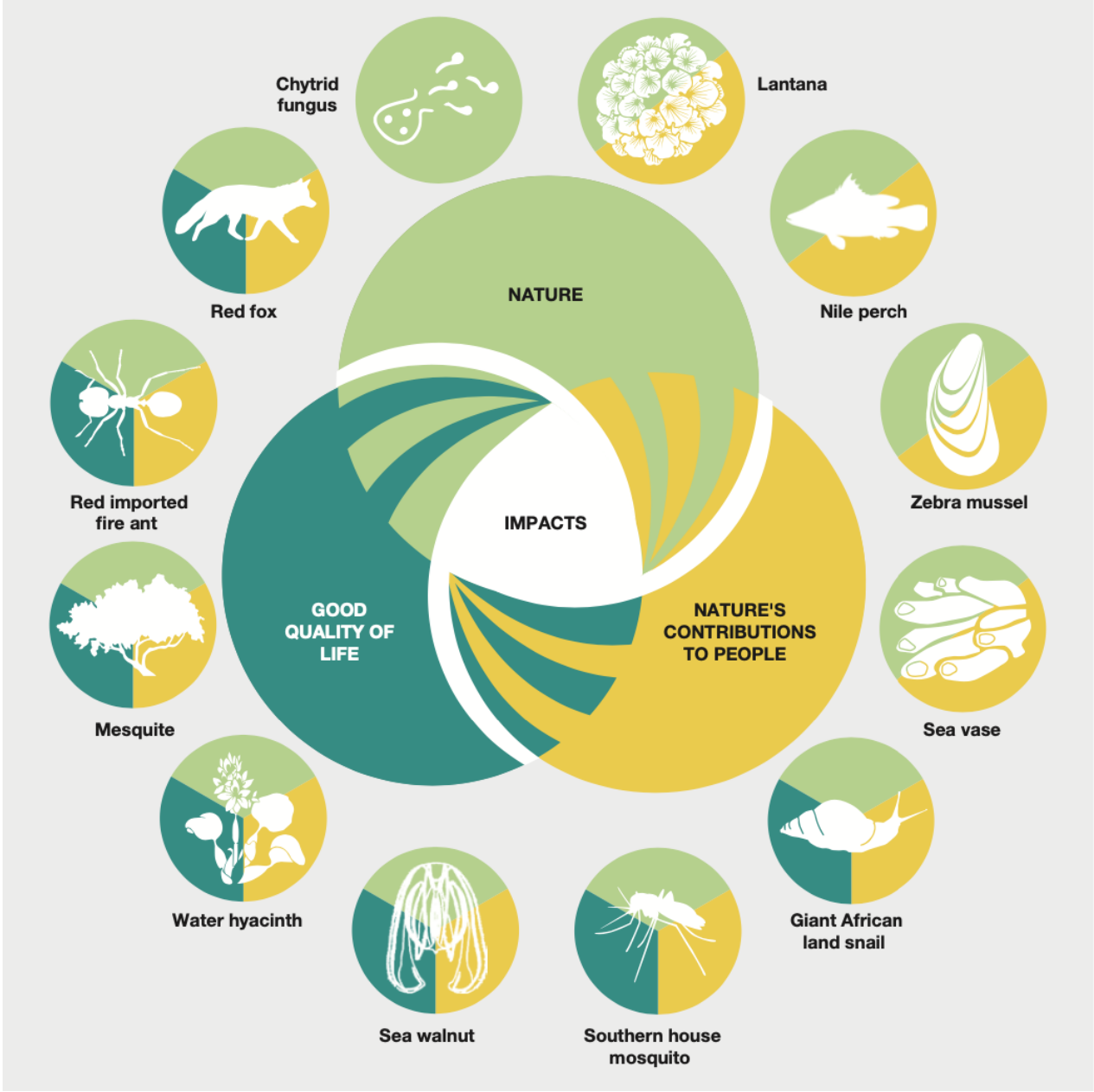
3.500 invasive alien species

Impact on biodiversity

- have contributed solely or alongside other drivers of change to 60% of recorded global extinctions, of which 90% occurred on islands
- Only factor for 16% of extictions
- Responsible of 1215 local extinctions

Biological invasions

- Impacting ecosystems as well as livelihood



Water hyacinth Kisumu Docks © Richard Portsmouth Flickr CC BY ND 2.0

Impacts on many human activities

Water hyacinth Kisumu Docks © Richard Portsmouth Flickr CC BY ND 2.0

CORRIERE DELLA SERA / CRONACHE

TRASMESSA DALLE ZANZARE TIGRE

Si allarga l'epidemia di chikungunya: un caso anche nelle Marche

...ne che è stato contagiato (già guarito e dimesso ...l Lazio dove sono stati registrati altri 47 casi

Disinfestazione notturna a Roma (Lapresse)

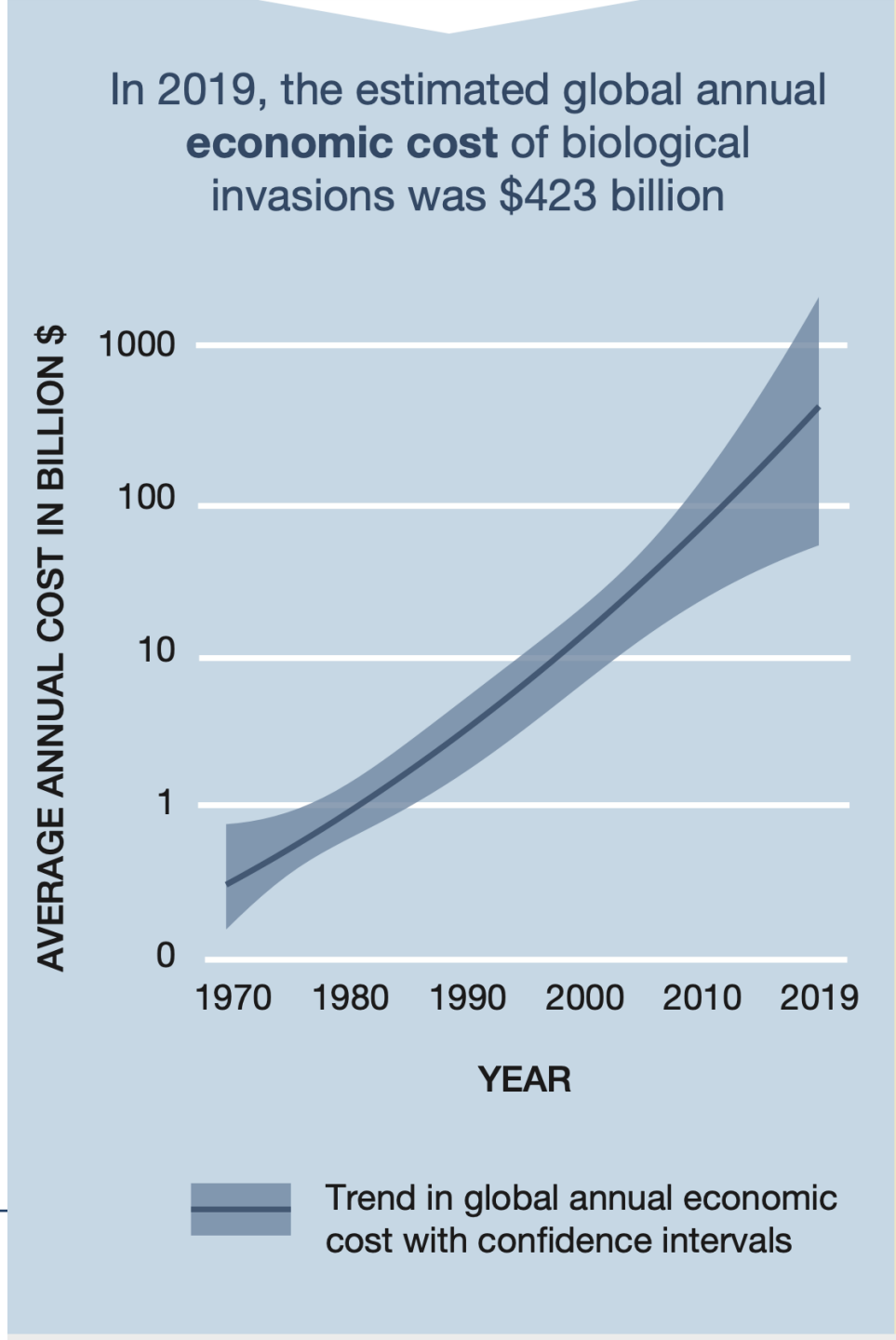
CORRIERE DELLA SERA / DERMATOLOGIA

Usa, tocca una pianta tossica e rimane ustionato al volto e al braccio

Un ragazzo di 17 ha subito gravi lesioni dopo il contatto con la Panace di Mantegazza, L'arbusto può causare ustioni, infiammazioni e cecità ed è molto diffuso anche in Italia

Global economic costs

- 423 USD billions/yr
- Costs increased fourfold every decade



Global economic costs

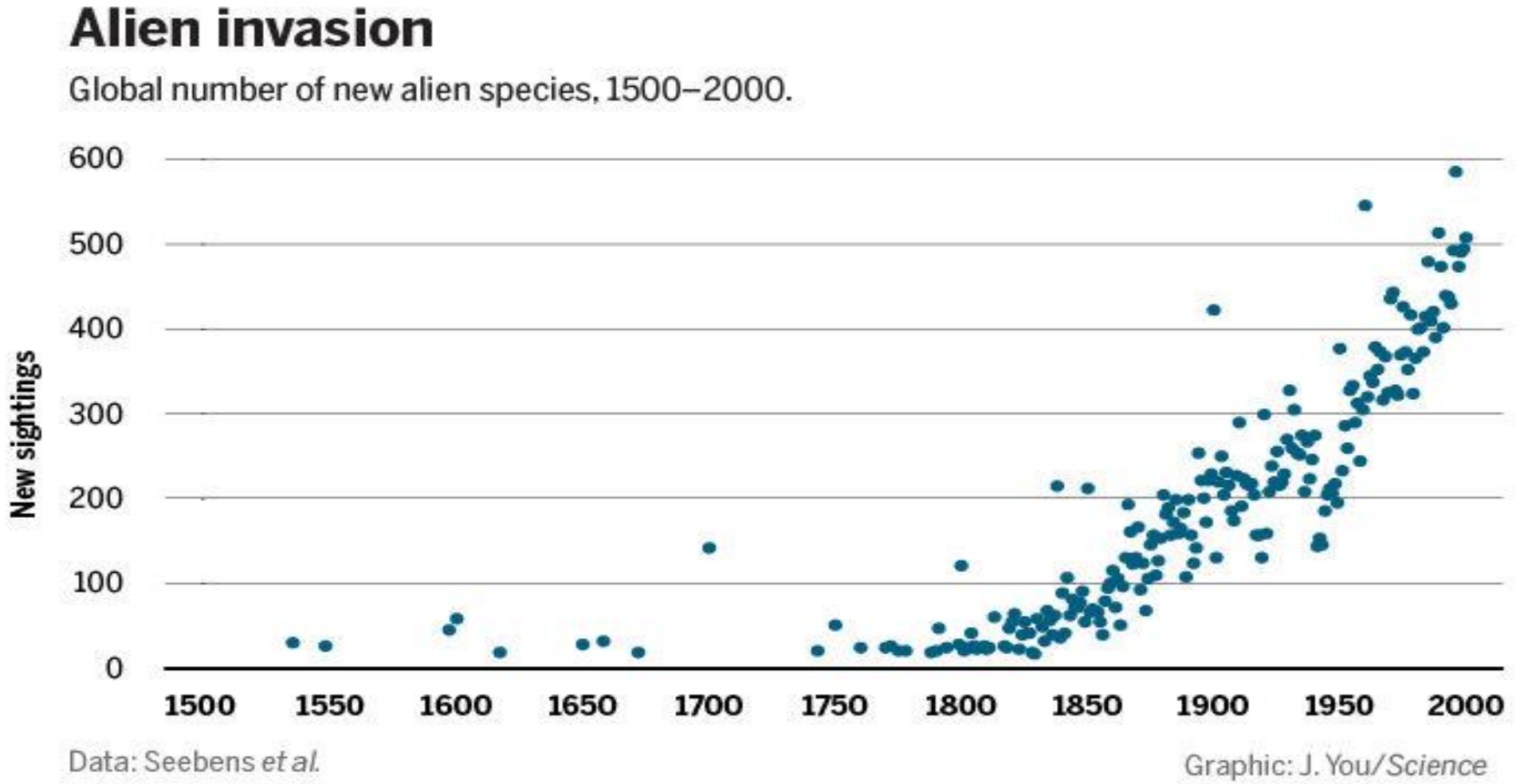
- 423 USD billions/yr
- Costs increased fourfold every decade
- Only the tip of the iceberg

Impact on local communities

Impacts on livelihood of indigenoous people:

85% negative, 15% positive

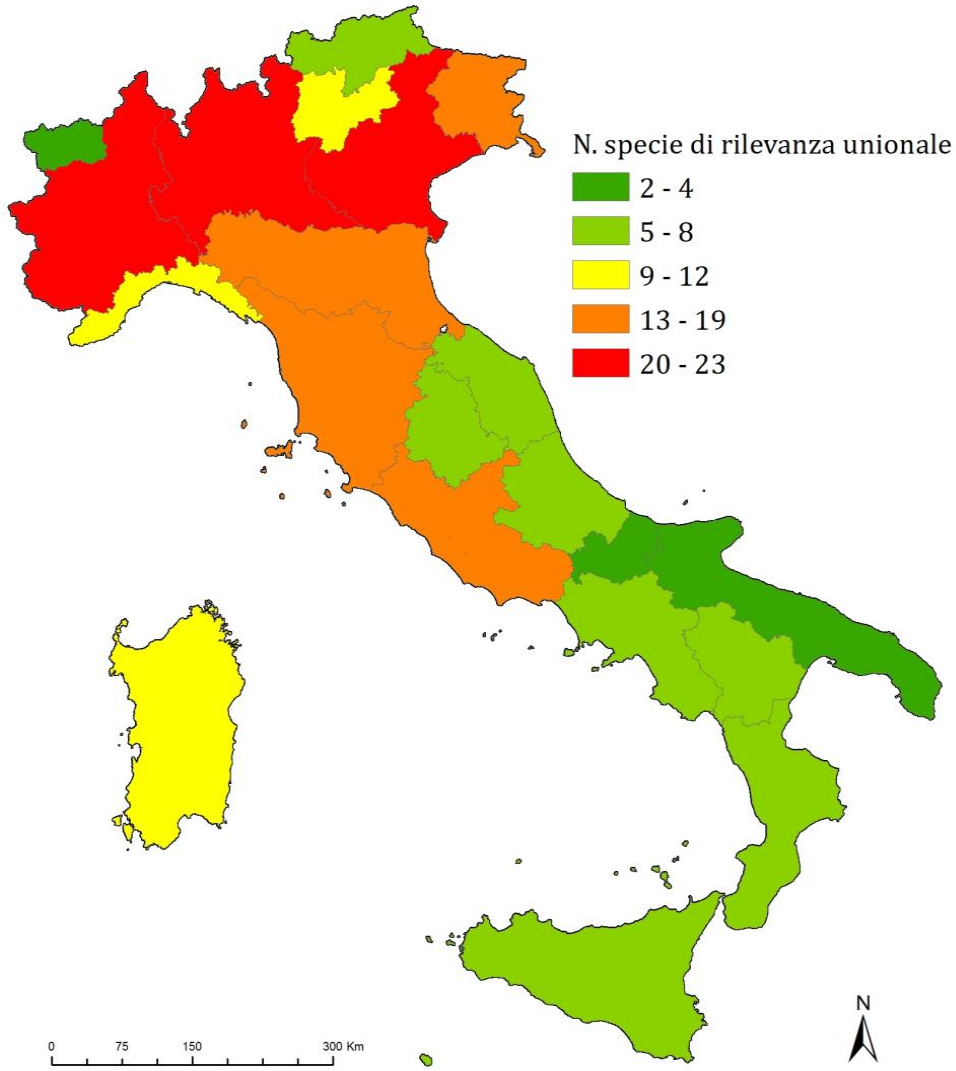
Trends in biological invasions

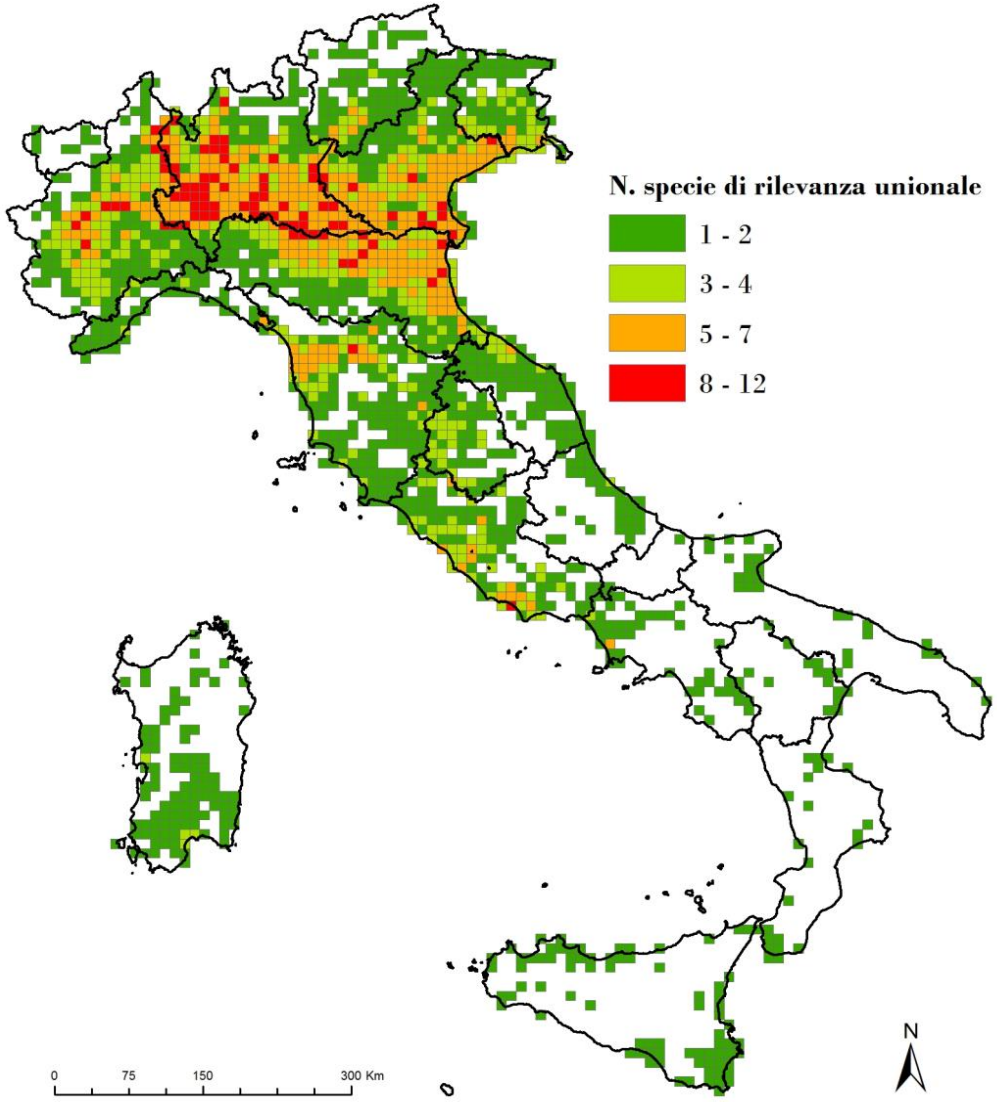


Seebens H, Blackburn TM, Dyer E, Genovesi P et al. (2017) No saturation in the accumulation of alien species worldwide. Nature Communications, 1–9.

Rate of invasion by region in Italy

Reporting 2019





https://www.specieinvasive.it/images/normativa-nazionale/Rapporto%20349_2021_direttive_Natura_def.pdf

Economic costs of IAS in Italy

NeoBiota 67: 247–266 (2021)
doi: 10.3897/neobiota.67.57747
https://neobiota.pensoft.net

RESEARCH ARTICLE

NeoBiota

The recorded economic costs of alien invasive species in Italy

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- Estimated cost of IAS in Italy 1990 - 2020 around 819.76 millions US$
- Dedicated fund by Min. Env. for the control of IAS 5 millions/yr until 2024.
- Life programs in last 10 yrs dedicated to IAS € 75.703.475 (tot budget), EU co-funding € 41.397.090

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Sistema Nazionale per la Protezione dell'Ambiente

National management plans

- According to art.22 legislative decree n.230/17
- 14 plans formally adopted by Italian Ministry of Environment in 2023.
- For 30 plans consultation ongoing
- At least additional 30 to be produced in the next 2 years
- 6 years' validity

Procambarus clarkii

National target: CONTROL

Regional targets:

Regions	Eradication (art.22)	Control/ containment (art.22)	Rapid Responce (eradication art.19)	Monitoring (art.18)
Abruzzo		x		x
Basilicata		x		x
Bolzano		x		x
Calabria		x		x
Campania		x		x
Emilia Romagna		x		x
Friuli Venezia Giulia		x		x
Lazio		x		x
Liguria		x		x
Lombardia		x		x
Marche		x		x
Molise			x	x
Piemonte		x		x
Puglia		x		x
Sardegna		x		x
Sicilia		x		x
Toscana		x		x
Trento		x		x
Umbria		x		x
Valle d'Aosta			x	x
Veneto		x		x

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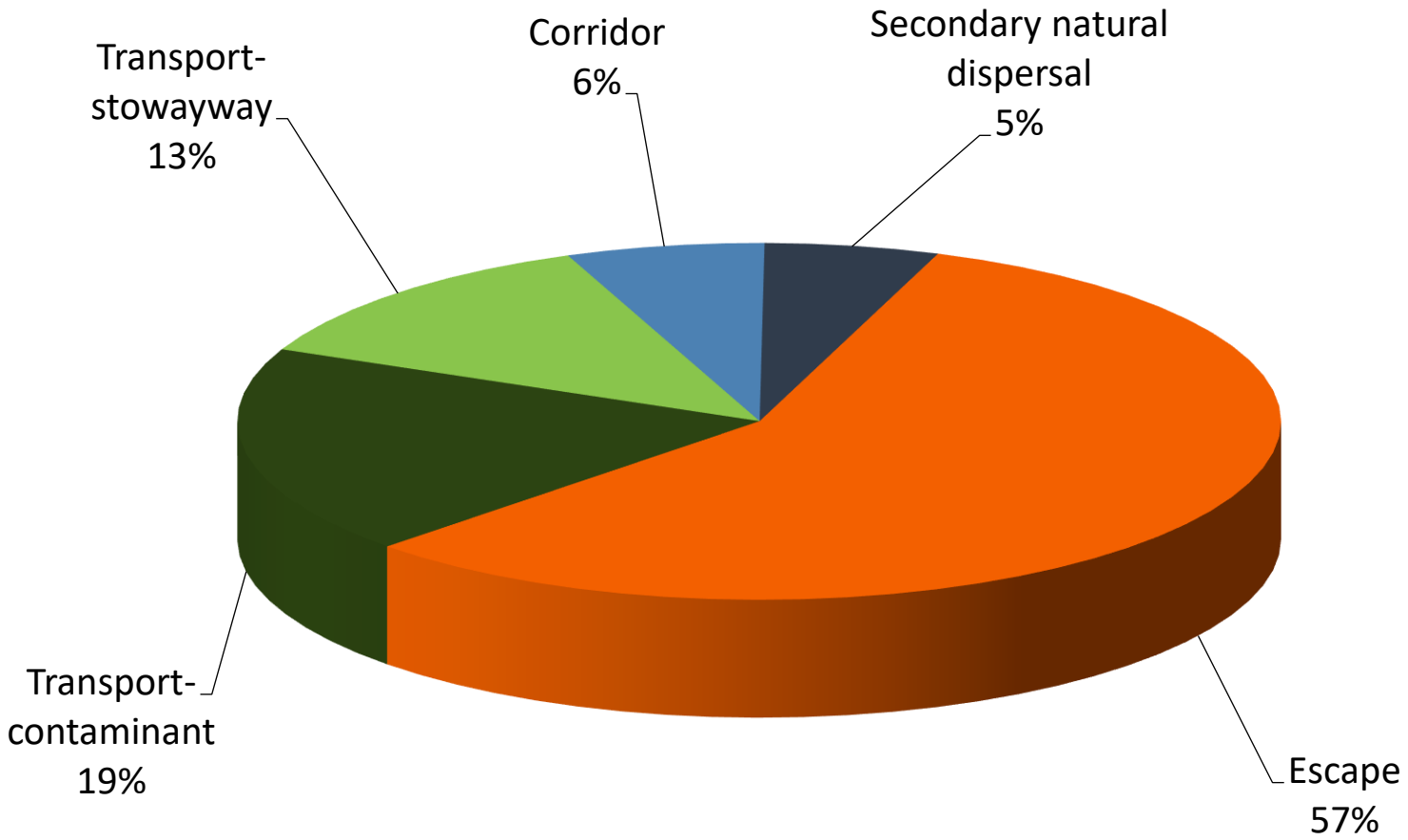
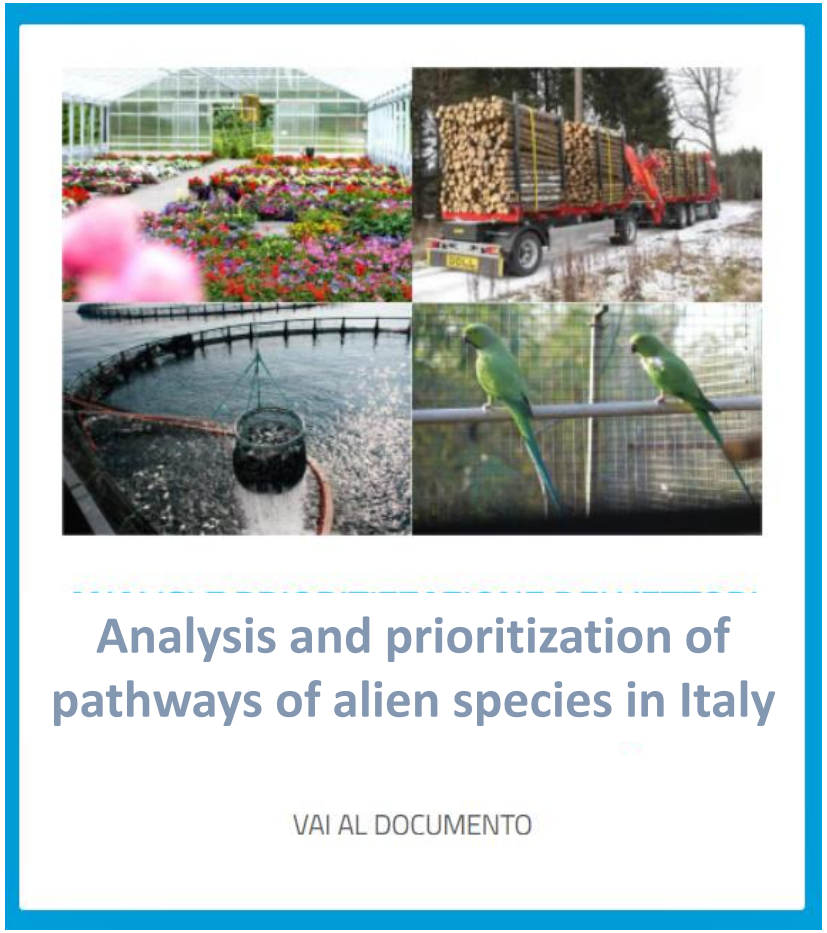
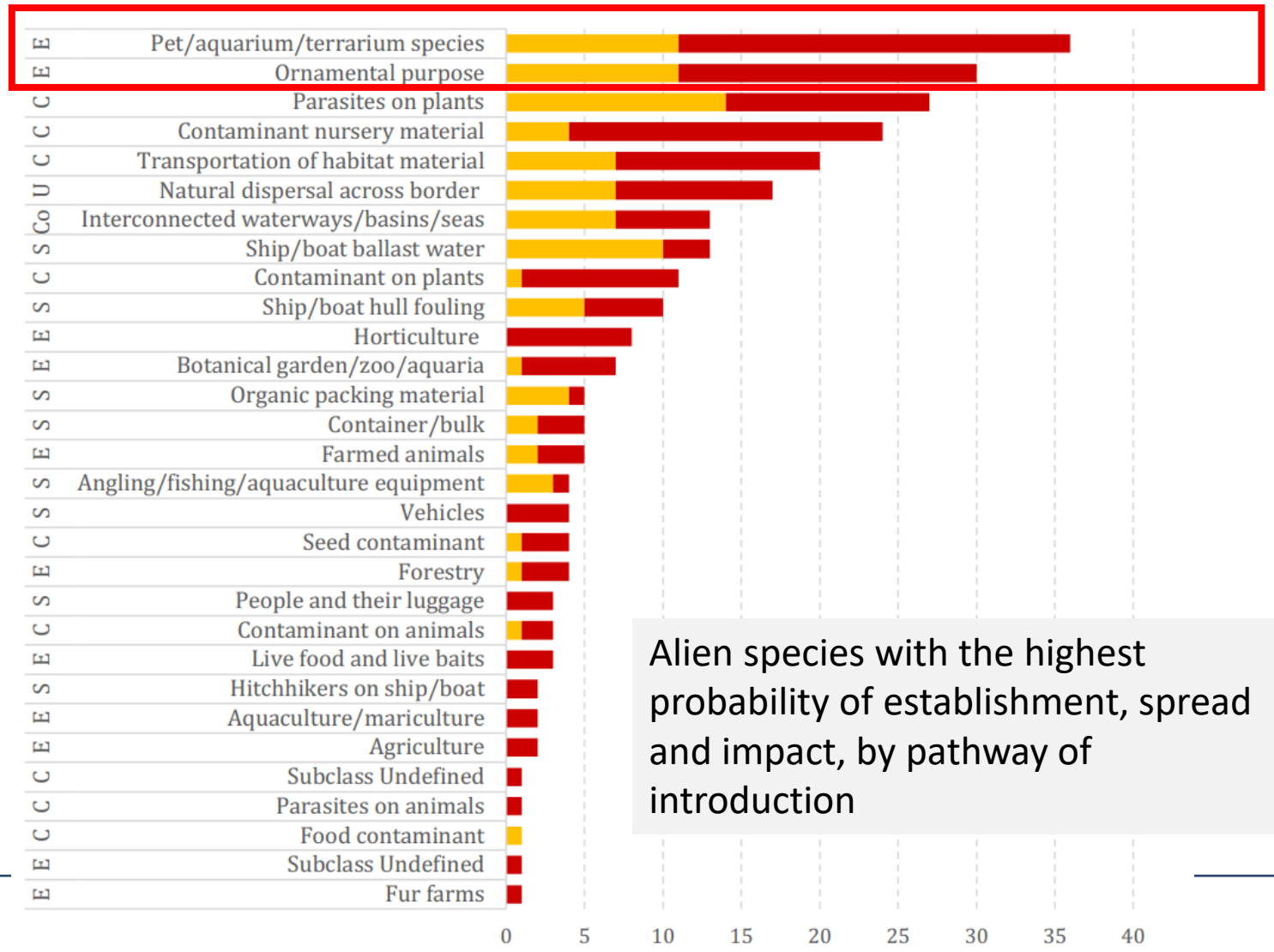
Analysis and prioritization of pathways



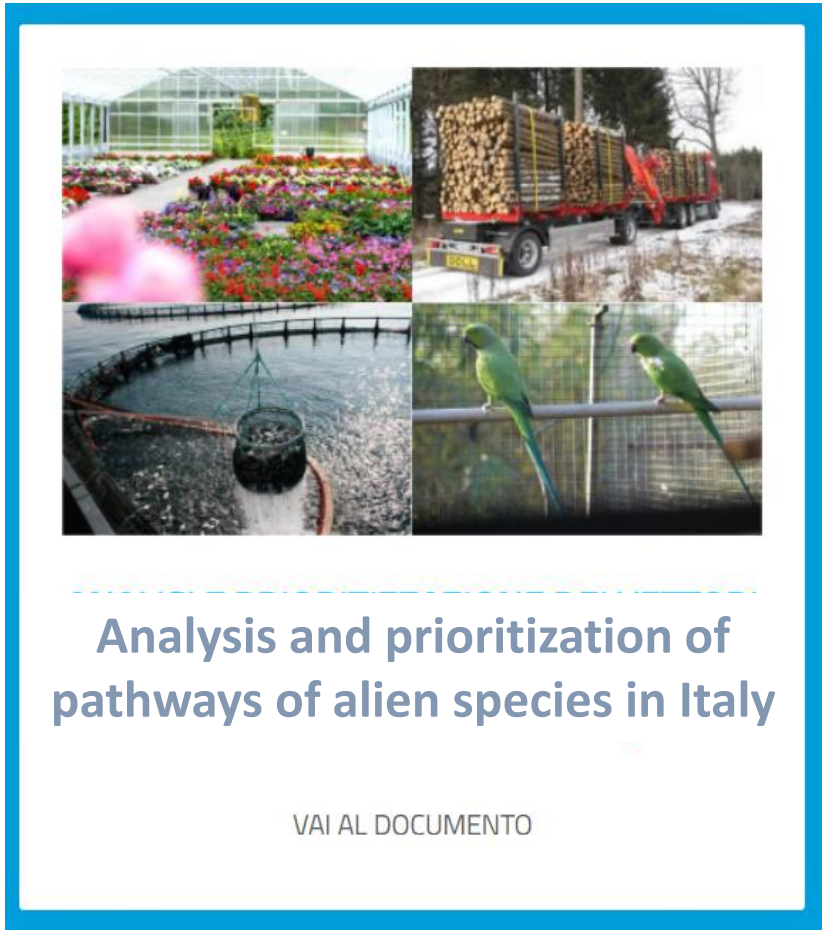


Carnevali et al., 2020, Download from www.specieinvasive.it

Analysis and prioritization of pathways



Alien species with the highest probability of establishment, spread and impact, by pathway of introduction



Carnevali et al., 2020, Download from www.specieinvasive.it

Pathways action plans (art. 7 EU Regulation 1143/2014)

DM n.241 21 June 2022

Action plan
on alien pets
adopted

DM n.123 3 April 2023

Action plan
on alien orticultural
species adopted

Downloadable from www.specieinvasive.it or Min Env. https://www.mase.gov.it/pagina/piani-di-gestione-nazionali-approvati

Surveillance system (art. 14 EU Reg. 1143/2014)

- Min. Decree, 12 22/3/2022,
- Roles and responsibilities of a national Surveillance system, including Guidelines for the establishment of regional systems and monitoring programs
- Competent authorities: Region, Autonomous provinces, supported by ISPRA

Guidelines for Surveillance of IAS of community interest

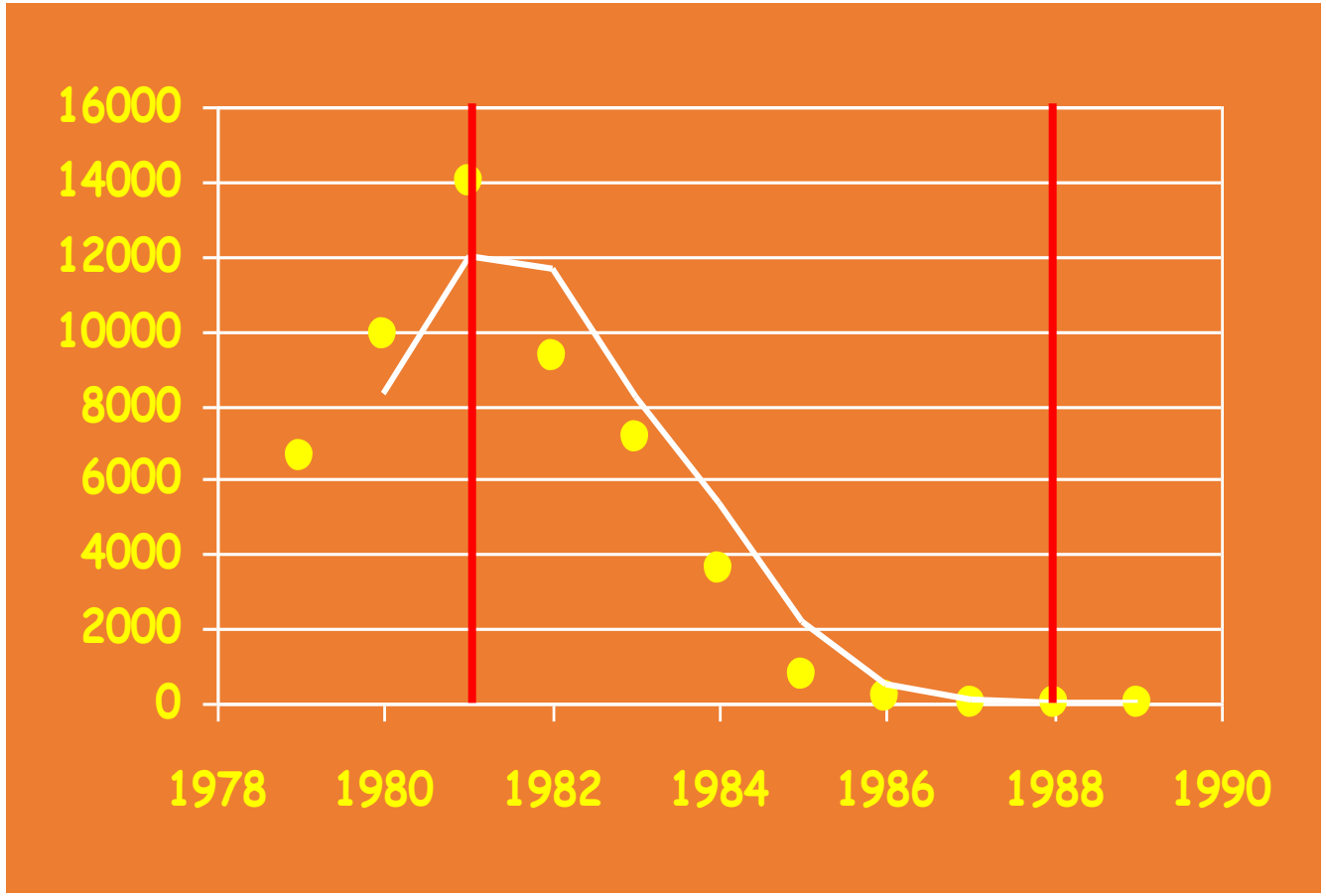
VAI AL DOCUMENTO

https://www.specieinvasive.it/documenti-utili/linee-guida-e-piani-d-azione

The case of the coypu, GB *vs* Italy

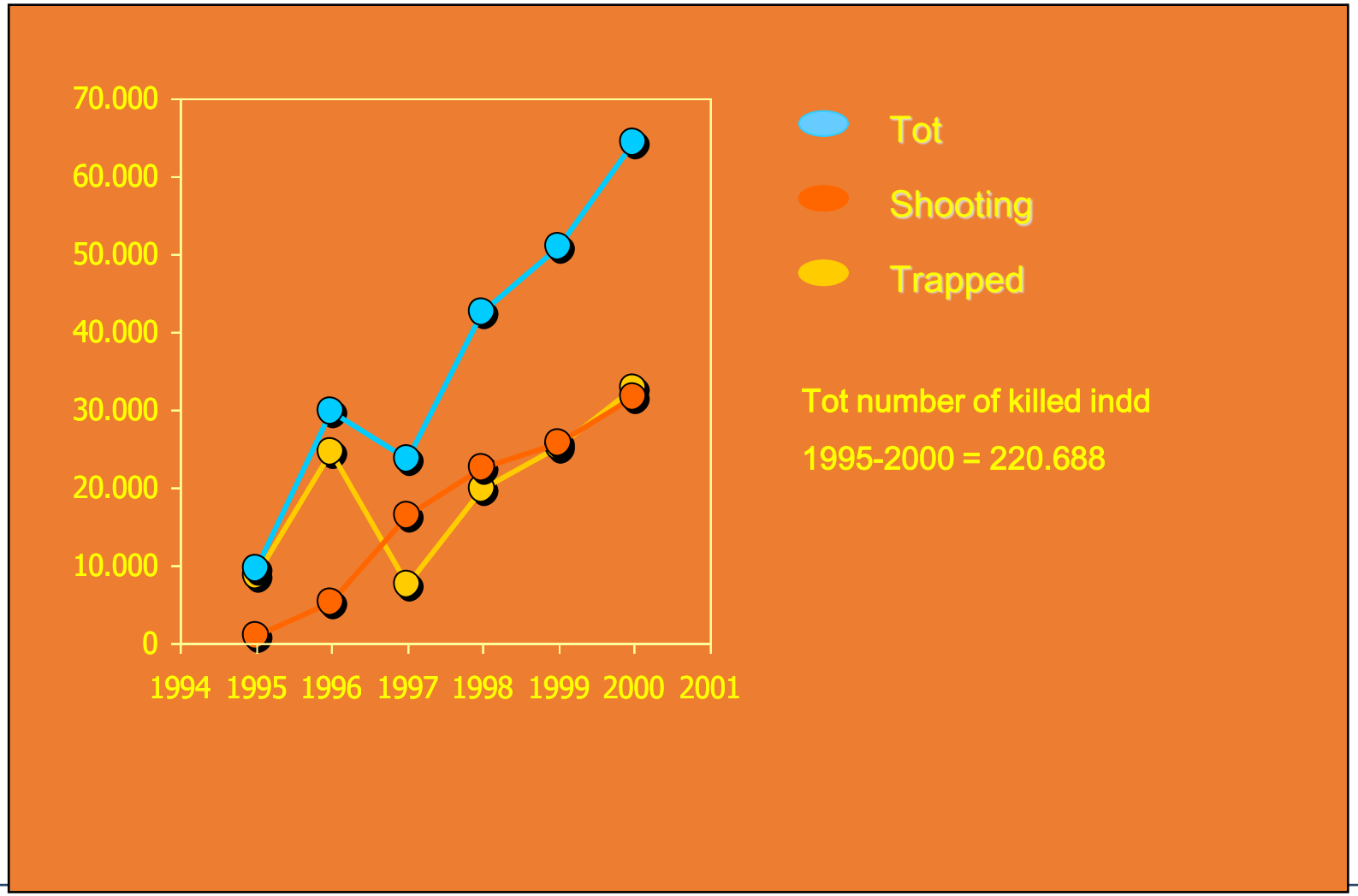
- Imported in GB in 1929, in the ‘50s spread in all East Anglia
- In 1960 estimated pop. 200.000, control with little effect
- Eradication started in 1981
- 1981-1989 31.406 indd removed by trapping

The case of the coypu, GB *vs* Italy



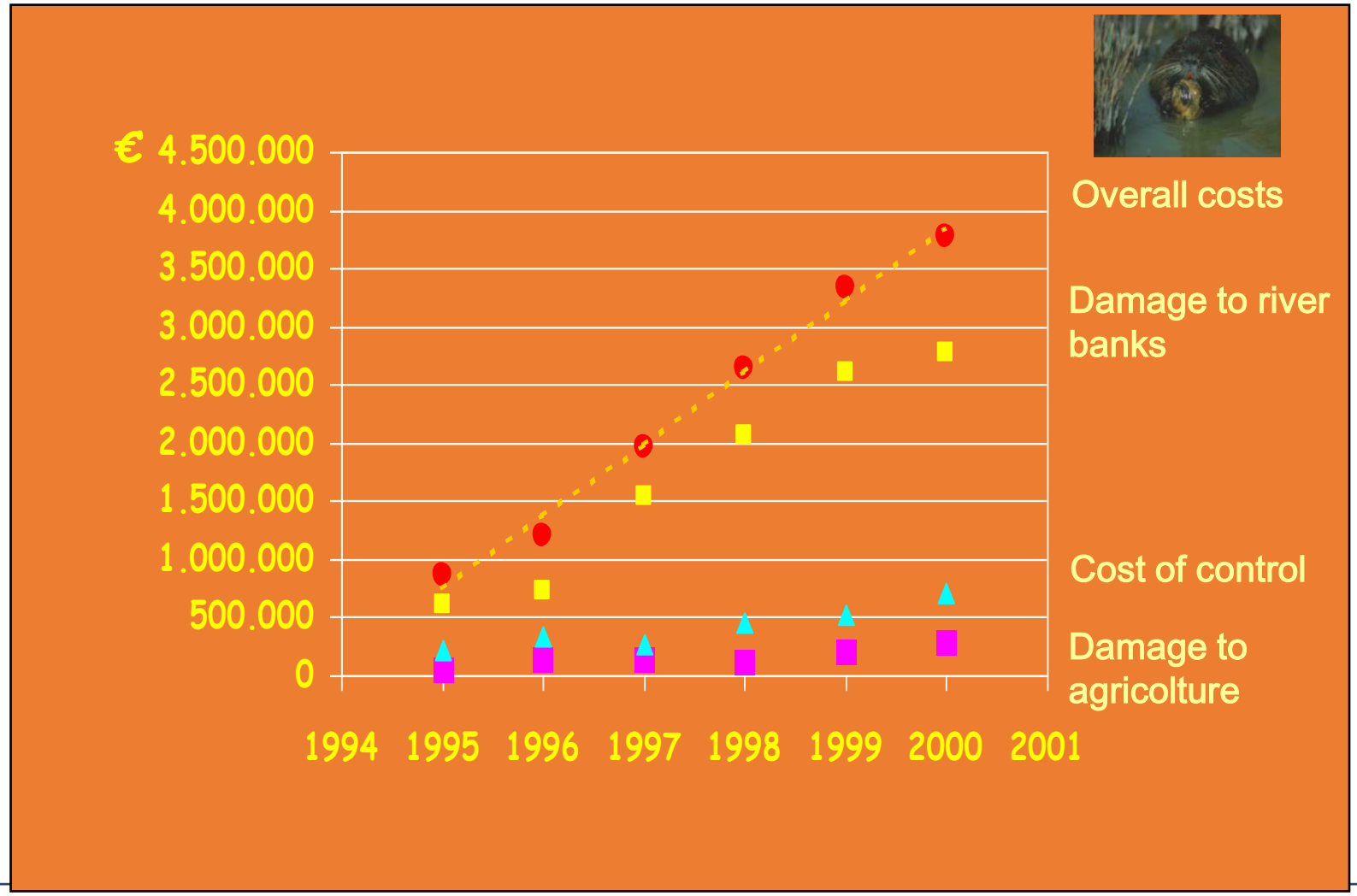
- Eradication completed in 1988 (no observations since 1989)
- Total cost ca 5 mln € (actualized yr 2000)

The case of the coypu, GB *vs* Italy



Panzacchi, Bertolino, Cocchi & Genovesi 2007 Wildlife Biology

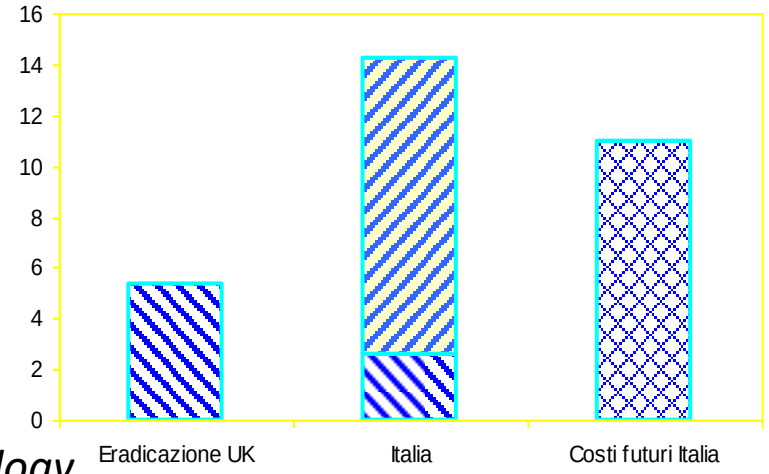
The case of the coypu, GB *vs* Italy



Panzacchi, Bertolino, Cocchi & Genovesi 2007 Wildlife Biology

The case of the coypu, GB *vs* Italy

Presence area	= 68,599 Kmq
spread	ca 330%
Cost/yr (2000)	= € 3.773.786
Tuture costs	> 12 mln €/yr



Panzacchi, Bertolino, Cocchi & Genovesi 2007 Wildlife Biology

Reactive rather than proactive response

Red imported fire ant

Red imported fire ant

CellPress

Current Biology
Magazine

Correspondence

The invasive ant *Solenopsis invicta* is established in Europe

Mattia Menchetti[1,2,3], Enrico Schifani[1,4], Antonio Alicata[1], Laura Cardador[1], Elisabetta Sbrega[1], Eric Toro-Delgado[1], and Roger Vila[1,2]

The red imported fire ant (*Solenopsis invicta*) is classified as one of the worst invasive alien species[1] and as the fifth costliest worldwide[1], impacting ecosystems, agriculture and human health[1]. We report the establishment of *S. invicta* in Europe for the first time, documenting a mature population in Sicily. We use genetic analyses to assess its putative origin, as well as wind tracking and species distribution modelling to predict its potential range on the continent. We show that half of cargo harbors of the island, the Augusta port (~13 km northward), may be relevant for its introduction.

Long-range dispersal of ant queens during nuptial flights tends to be aided by wind and follow its direction[1]. Locally prevailing wind directions at ground level indicate that, if arrived by flight, queens colonizing the invaded site may have come from the north-west, where further monitoring efforts should be prioritized (Figures 1A and S1). Likewise, swarming queens are likely to be directed south-east and therefore towards the sea, which may represent a limiting factor for further inland spread. Alarmingly, we observed nuptial flights even in winter (Figure 1B), well outside the spring-autumn seasonality typical of the northern hemisphere[1]. *S. invicta* colonies can be either monogynic or polygynic (hosting one or multiple queens, respectively), and the two social forms are characterized by specific alleles of the *Gp-9* gene[1]. Polygynic colonies, which have become prevalent across much of the invaded range, adopt a supplemental short-range dispersal strategy, and may as suitable. This is concerning because most suitable urban areas are coastal Mediterranean cities highly connected by seaports, potentially favoring the spread of the species. Worryingly, future projections depict a far worse scenario, in which the suitable range of *S. invicta* largely increases (Figures 1H,I and S2, and Data S1D).

Coordinated efforts for early detection and action in the region are key for successfully managing this new threat. Citizen science may play a key role in the detection of *S. invicta* considering that it is frequently encountered in urban and peri-urban areas, and due to its painful stings able to cause anaphylactic shocks[2] and the characteristic large nest mounds. Monitoring efforts should be extended to a larger geographic scale, given the species dispersal capability and the presumed existence of an unknown first site of introduction. The establishment of effective detection strategies for alien ant species appears particularly important considering their rising numbers at the European and global scales[4,5].

INVASIVENESS/IMPACT

PREVENTION MANAGENT	MEDIUM	MEDIUM-HIGH	HIGH	VERY HIGH	MAX
LOW	2 species	8 species	12 species	13 species	8 species
MEDIUM	6 species	5 species	31 species	27 species	63 species
HIGH	67 species	59 species	38 species	32 species	15 species

- Recorded in Italy in 2022, first established population in Europe
- Despite high risk of arrival, no dedicated prevention measures
- Late reporting
- Limited ability to manage
- No internal biosecurity measures for preventing spread

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Horizon scanning

82
experts

1619
Species evaluated

952
«door knockers»

Early warning rapid response

PLANTS AND ENVIRONMENT

National Invasive Ant Surveillance Programme Annual Report 2018

Introduction

The National Invasive Ant Surveillance programme (NIAS) detects newly established exotic ant species in New Zealand and provides information on range extensions of species already known to be established. Ants are widely dispersed through human activity and commonly intercepted in air and sea cargo including fresh produce, timber, sea containers and personal baggage. They are major urban pests, invading homes and businesses where food is readily available. They also threaten natural biodiversity by displacing native invertebrate species and encouraging horticultural pests.

High-risk sites for ant entry are determined by pathway and site risk analyses undertaken annually. High-risk sites include seaports, airports, sea container storage and repair sites and Transitional Facilities that receive international freight. Sites are then scheduled to be surveyed from mid-summer to early autumn each year.

Materials and methods

he identified risk sites are surveyed by ground teams co-rdinated by AsureQuality Ltd. Small plastic pottles, alternately ited with carbohydrate (sugar solution) (**Figure 1**) or otein (peanut butter, oil and sausage meat) are placed in grid rmation (**Figure 2**). Additional pottles are used to collect live ts found by visual inspection. Pottles are left out at each site about 2 hours under favourable environmental conditions maximise the number of foraging ants collected before the dries out and becomes less attractive.

a second year in a row, dome-type ant traps (a long-term ping system) were used on a trial basis at the Ports of kland. These traps consist of a base section containing a

Figure 1: NIAS carbohydrate pottle deployed at Ports of Auckland, with local *Iridomyrmex suchieri* workers foraging on bait

Structured response to IAS

- GB Non Native Species Secretariat
- Board involving all key agencies: agricolture, border control, wildlife management, etc
- Budget ca. £ 800,000/yr
- IAS Inspectorate

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Thank you!

www.isprambiente.gov.it/it