

UNIVERSITÀ  
DEGLI STUDI  
DI PADOVA

General Course 2024

## Ambasciatori di sostenibilità

conoscere, promuovere, praticare la sostenibilità

*Venerdì 15 marzo 2024, Sala Anziani, Palazzo Moroni, Padova*

# La biodiversità e l'impatto antropico

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NATIONAL  
BIODIVERSITY  
FUTURE  
CENTER 



Con **BIODIVERSITÀ** si intende il numero, la varietà e la variabilità genetica degli organismi viventi e come questi varino in ambienti diversi nel corso del tempo.

La biodiversità è riassumibile come diversità tra:

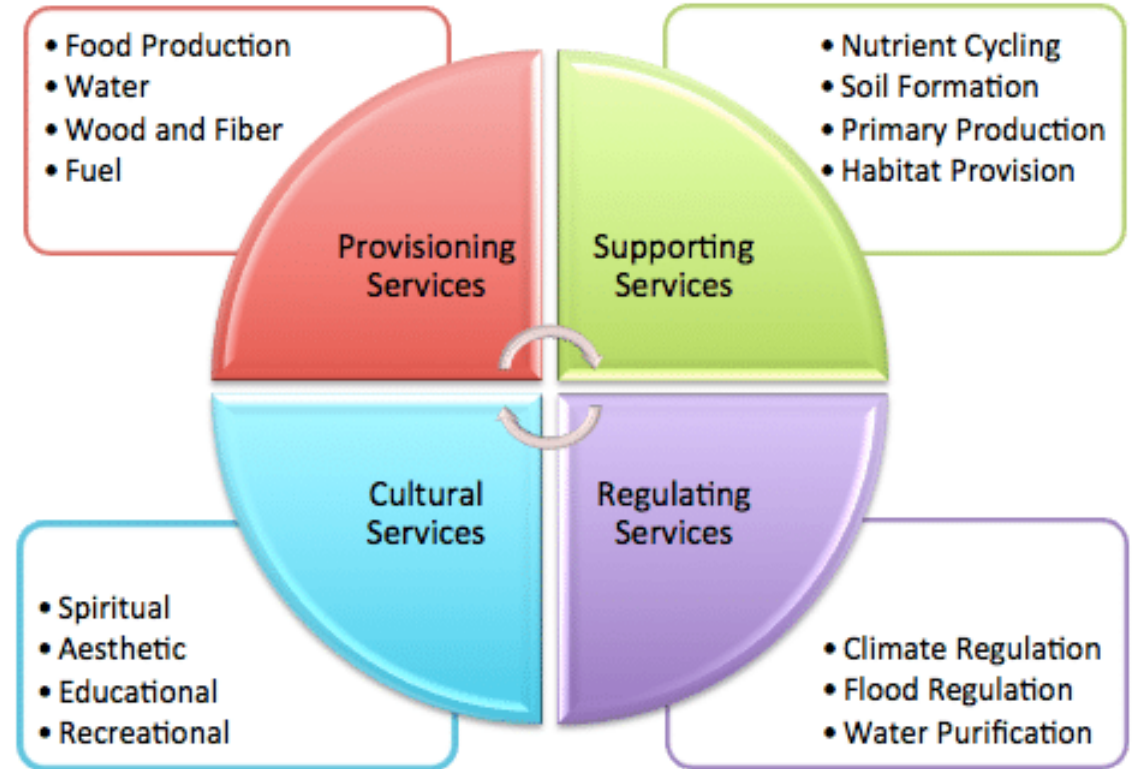
- **specie** (animali vegetali, funghi, microrganismi)
- **popolazioni/individui** della stessa specie
- **ecosistemi**, cioè insiemi naturali formati da una comunità di organismi viventi e dall'ambiente fisico nel quale essi vivono

Nel caso dell'uomo, la biodiversità comprende anche la diversità culturale, che peraltro subisce gli effetti negativi degli stessi fattori che impattano sulla biodiversità.

## Biodiversità e servizi ecosistemici

secondo la definizione proposta dal MEA - Millennium Ecosystem Assessment (NU), i servizi ecosistemici sono i «*..molteplici benefici forniti dagli ecosistemi al genere umano*» (MEA, 2005).

L'importanza dei servizi ecosistemici è quindi molto alta in quanto essi, **direttamente o indirettamente, influenzano e sostengono la vita ed il benessere umano** in termini di, accesso alle risorse primarie, sostentamento, salute...etc....

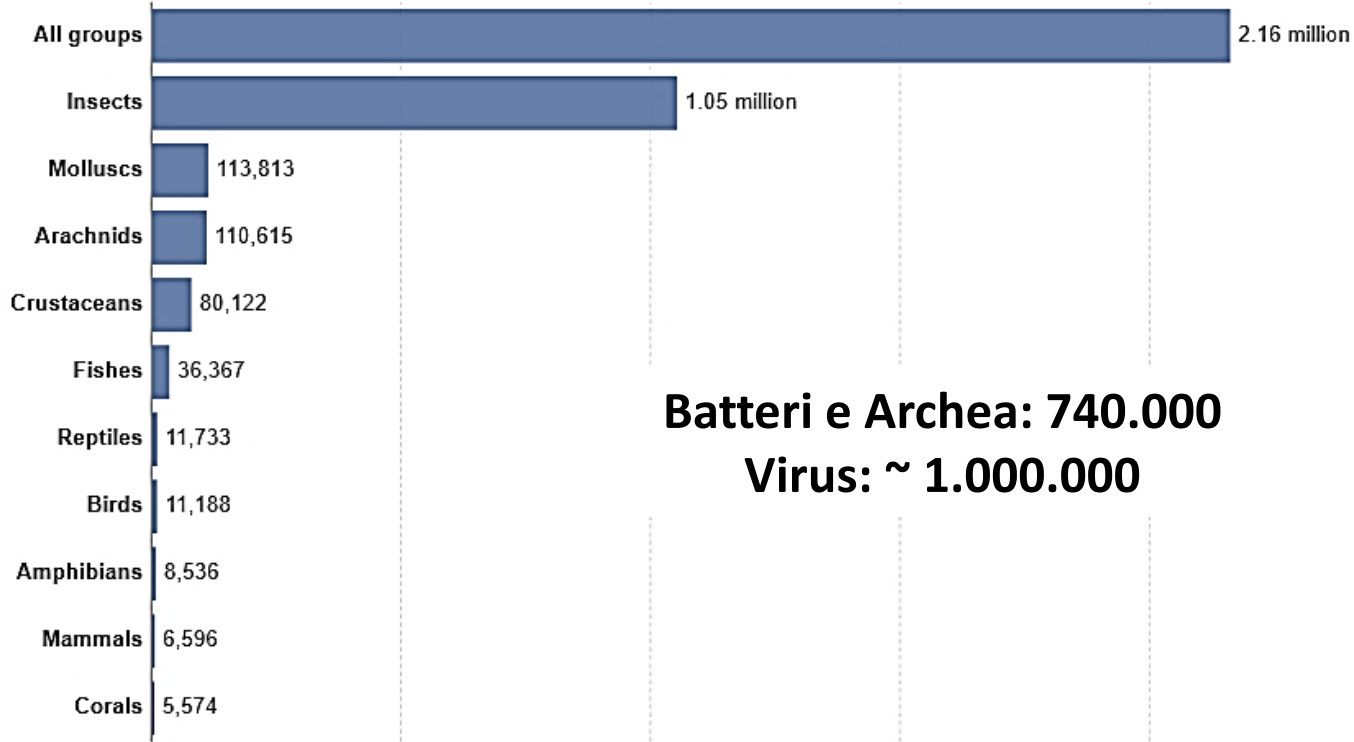


Source: Millenium Ecosystem Assessment, 2005.

# Di quante specie parliamo??

## Number of described species

The number of identified and named species in each taxonomic group, as of 2022. Since many species have not yet been described, this is a large underestimate of the total number of species in the world.



**Batteri e Archea: 740.000**  
**Virus: ~ 1.000.000**

Data source: IUCN Red List (2022)

[OurWorldInData.org/biodiversity](https://ourworldindata.org/biodiversity) | CC BY

## Previsioni

8.750.000 specie terrestri

2.200.000 specie marine

1.600.000 batteri e archea

oltre 100.000.000 virus ??

# Every day we delay action, another 150 species are lost to earth for ever

## Environment

### John Gibbons

Biodiversity loss is as much a threat as climate change but political action to deal with this crisis has been as lacking here as globally



### Saving Forests To Save Biodiversity

A hot spot for undiscovered flora and fauna, Indonesia begins to take steps to preserve its forests and its biological heritage



**On guard.** Patrols to thwart illegal logging support efforts to restore an ecologically precious forest.

with Norway earlier this year to set aside large amounts of forest. And there is a new attitude among the public and Indonesia's political leaders. "The importance of these natural forests is being recognized more than before," says Agus Utomo, executive director of the conservation organization Buring Indonesia.

These developments are winning plaudits from conservationists, but although "there is progress, we cannot say it is sufficient," Utomo cautions. Meeting last month on Indonesia's Bali island, the Association for Tropical Biology and Conservation (ATBC) commended Indonesian President Susilo Bambang Yudhoyono for his conservation efforts but also urged him to do more to protect forests. The resolution's praise and constructive criticism "are both important to encourage attention and action from the national government," says Mochamad Indrawan, a conservation biologist at the University of Indonesia in Depok, who chairs ATBC's Asia-Pacific chapter.

#### Biodiversity hot spot

Indonesia's 17,000 islands straddle the equator and stretch over three time zones. The western islands were once connected to the Asian mainland; the eastern, to Australia, giving the country a double dose of flora and fauna. Indonesia contains 10% of the world's flowering plants, 12% of the world's mammals, and 17% of the world's reptiles, amphibians, and birds. And it hosts the largest populations



DANIEL ABONE  
RESEARCHER AT ACODE

The Uganda National Roads Authority (UNRA) has prioritised the construction of critical oil roads, about 700km in total, which are required to facilitate the production of petroleum in the biodiverse Albertine Graben.

Over the last five years, road works to upgrade, pave and construct these roads have remained on course. The oil roads are intended to facilitate movement of construction materials, workers and consumables from within the oil region and other parts of the country.

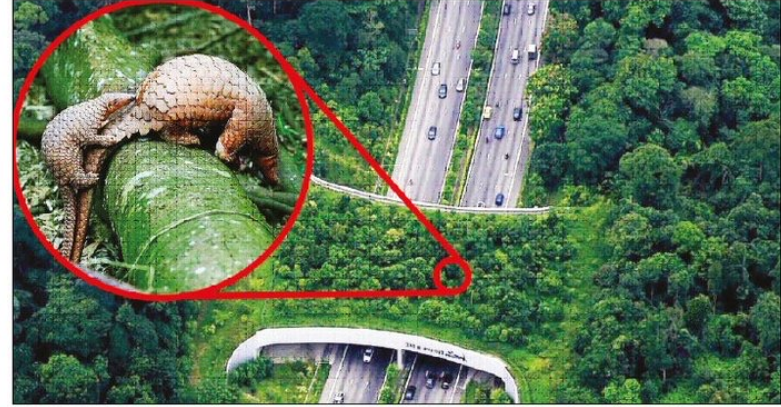
# CONSTRUCTION OF OIL ROADS SHOULD NOT COME AT THE EXPENSE OF ENVIRONMENT

communication to the socio-economic benefit of the people in the region.

Notwithstanding the positive progress and outcomes of these oil roads, their construction poses conservation threats for the Albertine Graben through which they are being constructed.

The Albertine Graben is one of the most ecologically sensitive regions, not just in Uganda but in the entire Africa. It has 52% of all bird species, 39% of all mammalian species, and 19% of all amphibian species in Africa, making it an exceptionally bio-diverse landscape which is critical to biodiversity conservation, climate modification and provision of livelihoods to many households both today and in the future.

Given the rich biodiversity in the region, any infrastructure



## Changing the tides on biodiversity loss

### Shawn Graham Commentary

The federal government has set the ambitious goal of conserving 30 per cent of Canada's land and water by 2030 to halt and reverse the decline in biodiversity and improve climate resilience. This month, Atlantic Canada was well represented at the United Nations Conference on Biodiversity (COP15) in Montreal and New Brunswick seized the occasion to announce that it would be protecting an additional 277,900 hectares to reach its goal of protecting 10 per cent of the province's land and freshwater. Nova Scotia announced it would be protecting an additional 9,300 hectares, topping the province up to 13 per cent towards its 20 per cent goal by 2030. These are important steps

considering the magnitude of what's at stake. The dual crises of climate change and biodiversity loss are threatening our health, our economy and our future. Wetlands can provide powerful solutions, but only if we commit to "go beyond." Beyond the numbers tagged to current conservation targets. Beyond provincial and national borders that dictate conservation investments. And beyond what we believe can be achieved in order to ensure their protection.

This may sound like wishful thinking, but the critical, complex role wetlands play in our lives makes them worthy of bold, future-focused commitments to conservation. Here's why. Wetlands are among the most diverse habitats on Earth. Unfortunately, they're also some of the most threatened. Wetland degradation has far-reaching impacts on wildlife populations, water quality, food production and exacerbates the effects of floods and droughts. Simply put, wetlands are

some of the most valuable ecosystems in the world. Atlantic provinces have progressively identified the unique values of wetlands and acted to protect them with the first wetland conservation policies in Canada. These policies commit to no net loss of wetlands, but more work is needed to ensure they are understood, upheld and respected.

The Wolastoq (St. John River) is a great example of the opportunity we have here in Atlantic Canada to bolster biodiversity—and to build a brighter future alongside others who depend on the nature we all share. At 673 kilometres, the Wolastoq is one of the longest rivers in eastern North America. Its river basin covers 55,000 square kilometres that stretch across parts of New Brunswick, Quebec and Maine. The wetlands along its floodplain are not only an important stop for migratory species on the Atlantic flyway, they also provide homes for 45 species at risk.

This includes many iconic and treasured species like the Atlantic salmon, wood turtle and least bittern. In addition to wildlife habitat, the Wolastoq is critical to the provision of clean water for communities, food production and provides recreational opportunities. It is also a vital resource for Wolastoqiyik, Passamaquoddy, Mi'kmaq, and other First Nations who have relied on these waters, including its wetlands, for the essential role in their Nations' culture, spirituality and



Shawn Graham addresses a crowd at COP15 in Montreal. PHOTO: SUBMITTED

sustenance for millennia. The conservation and restoration of the Wolastoq shoreline also helps protect communities from extreme weather events. Given that more than 500,000 people now live along the river's basin, mitigating the effects of flooding is more important than ever.

That's why Ducks Unlimited Canada has pledged to work in collaboration with communities, government and industry in both Canada and the United States to make sure that the

important, biodiverse and beautiful wetlands on the Wolastoq floodplain—and the many communities it supports—remain for generations to come. Our ambitious 10-year, \$3-million conservation project aims to renew and restore 1,900 hectares of vital freshwater wetland habitat.

Ducks Unlimited Canada, alongside our Ducks Unlimited partners from the United States and Mexico, joined world leaders at COP15 in Montreal and were proud to share our conservation knowledge and expertise on the international stage. Nature doesn't know borders or organizational entities, and conservation success demands that we look past them as well. The community of partners and supporters required to conserve our habitats is just as complex as the ecosystems we are working to protect.

As Ducks Unlimited Canada enters our 85th year of leading cross-border conservation in North America, we are calling on all groups to act with urgency to conserve and restore our treasured wetlands. Together, we can achieve the conservation goals for 2030—and beyond.

**Shawn Graham** is secretary of Ducks Unlimited Canada's board of directors. The former premier of New Brunswick is a lifelong conservationist and has been volunteering with the organization for nearly 30 years.

**1. Il declino della biodiversità**

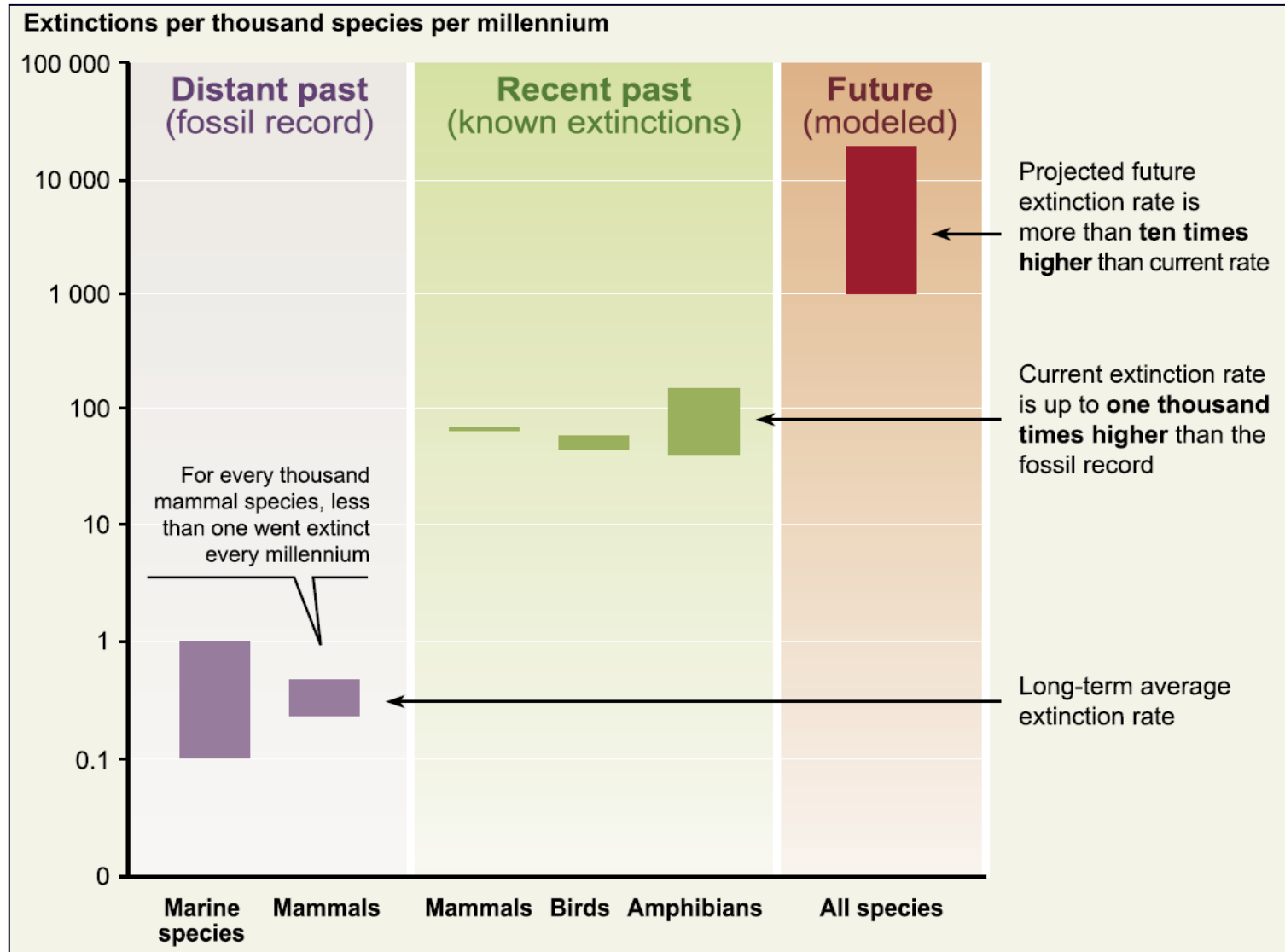
**2. Biodiversità e attività umane**

**3. Esempi di impatti antropici su alcuni ecosistemi terrestri e marini**

**4. Alterazione ambientale, biodiversità e salute umana**

**5. Azioni di controllo/mitigazione: responsabilità collettiva e individuale**

## Il primo allarme istituzionalizzato: il MILLENNIUM ECOSYSTEM ASSESSMENT



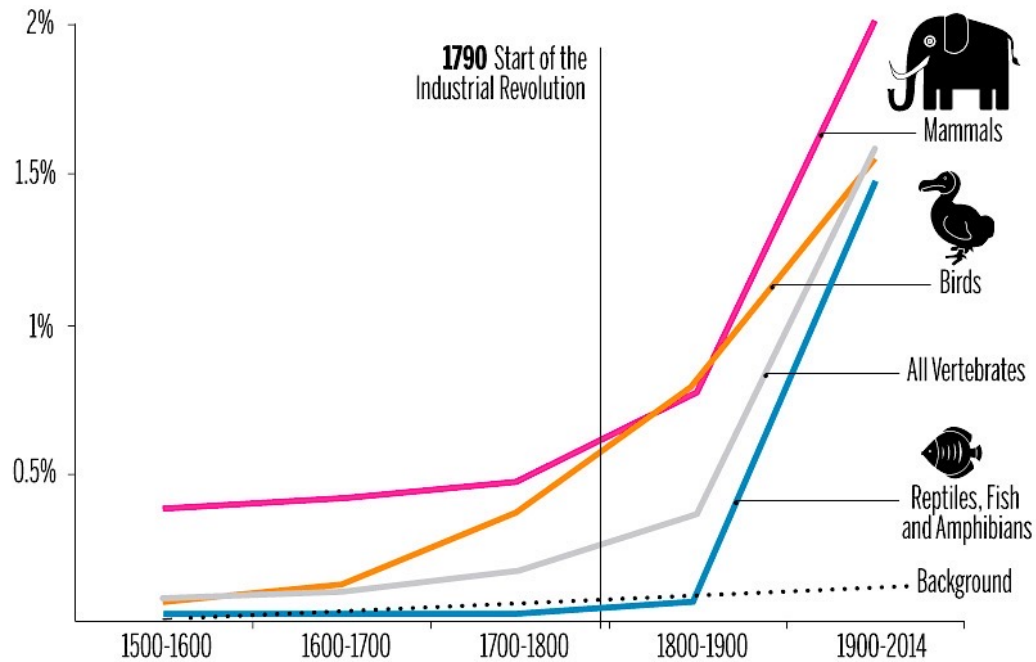
Source: Millenium Ecosystem Assessment, 2005.

I risultati indicano che, al di là delle estinzioni globali di specie, la Terra sta vivendo un episodio di enorme declino delle popolazioni che avrà conseguenze (negative) a cascata sul funzionamento e sui servizi degli ecosistemi, vitali per le nostre società.

Si parla di "annientamento biologico" per evidenziare le dimensioni del grande evento di estinzione che sta avvenendo

## VERTEBRATE SPECIES EXTINCTION RATES

Cumulative, recorded as “extinct” or “extinct in the wild”



background: 2 specie estinte ogni  
10.000specie/100 anni (2E/MSY)

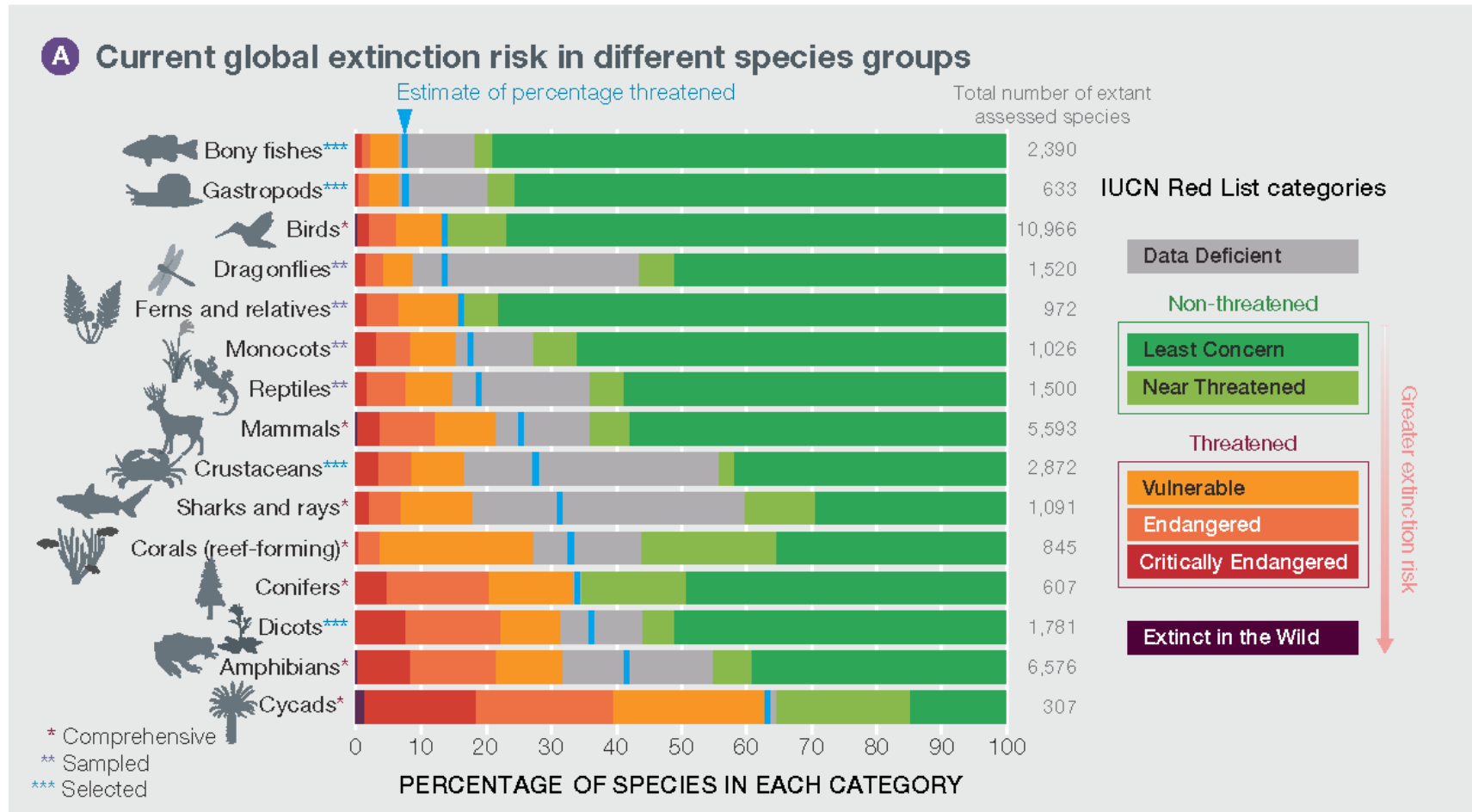
Vertebrate taxon	Conservative rates (EX + EW + PE)		No. of species evaluated by IUCN
	Since 1500	Since 1900	
Vertebrates	617	477	59% (39,223)
Mammals	111	69	100% (5,513)
Birds	163	80	100% (10,425)
Reptiles	37	24	44% (4,414)
Amphibians	148	146	88% (6,414)
Fishes	158	158	38% (12,457)





# IUCN CONSERVATION CRITERIA OF BIODIVERSITY

Ad oggi, la RED LIST è in grado di valutare adeguatamente circa **157.100** specie. Più di 44.000 di queste sono minacciate di estinzione, tra cui il **41%** di anfibi, il **37%** di squali e razze, il **36%** di coralli che costruiscono barriere coralline, il **34%** di conifere, il **26%** dei mammiferi e il **12%** degli uccelli.



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		Habitat change	Climate change	Invasive species	Over-exploitation	Pollution (nitrogen, phosphorus)
Forest	Boreal	↗	↑	↗	→	↑
	Temperate	↘	↑	↑	→	↑
	Tropical	↑	↑	↑	↗	↑
Dryland	Temperate grassland	↗	↑	→	→	↑
	Mediterranean	↗	↑	↑	→	↑
	Tropical grassland and savanna	↗	↑	↑	→	↑
	Desert	→	↑	→	→	↑
Inland water		↑	↑	↑	→	↑
Coastal		↗	↑	↗	↗	↑
Marine		↑	↑	→	↗	↑
Island		→	↑	→	→	↑
Mountain		→	↑	→	→	↑
Polar		↗	↑	→	↗	↑

Source: Millenium Ecosystem Assessment, 2005.

Alterazione habitat

Prelievo

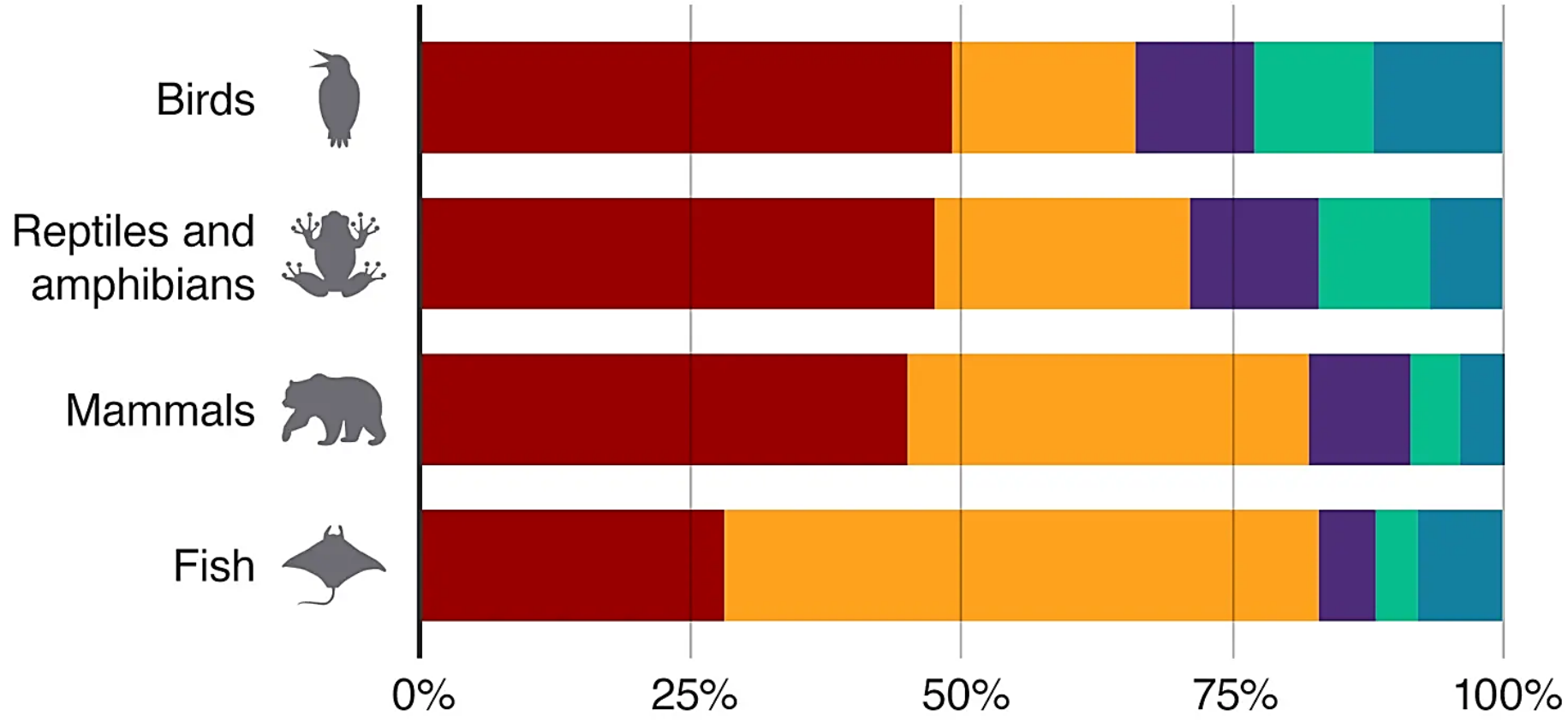
Inquinamento

Specie aliene

Cambiamento climatico

# The Living Planet Report assesses key drivers of species decline

- Habitat degradation
- Exploitation
- Invasive species and disease
- Pollution
- Climate change



# In Europa

## With 21 %, agriculture is

the most frequently reported pressure for habitats and species.

Abandonment of grasslands and intensification is particularly impacting pollinator species, farmland birds and semi-natural habitats.

## Invasive alien species

such as the False Indigo-bush, particularly affect dunes and sclerophyllous scrubs as well as species such as breeding seabirds.

## Forestry activities represent 11 % of all

pressures, particularly affecting forest habitats, and woodland species.

## Climate change

is reported as a rising threat, particularly due to ongoing changes in the temperature and decrease of precipitation.



Urbanisation and leisure activities account for 13 % of all reported pressures, representing

**48 % of all marine pressures.**

The modification on water regimes, physical alterations of water bodies and removal of sediments predominantly affect

**freshwater habitats and fish.**

**13 % of all pressures**

for birds stem from the exploitation of species, mainly relating to illegal killing and hunting.

In Europe, the annual hunting bag amounts to at least **52 million birds.**

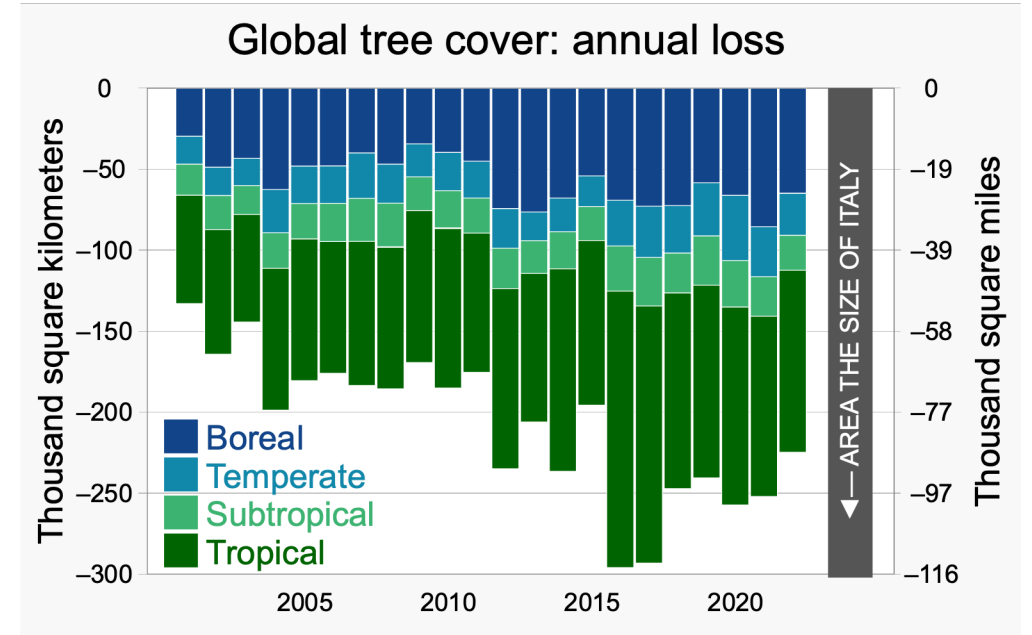
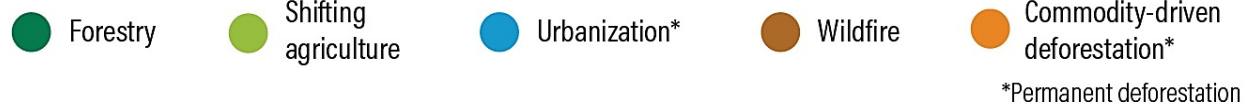
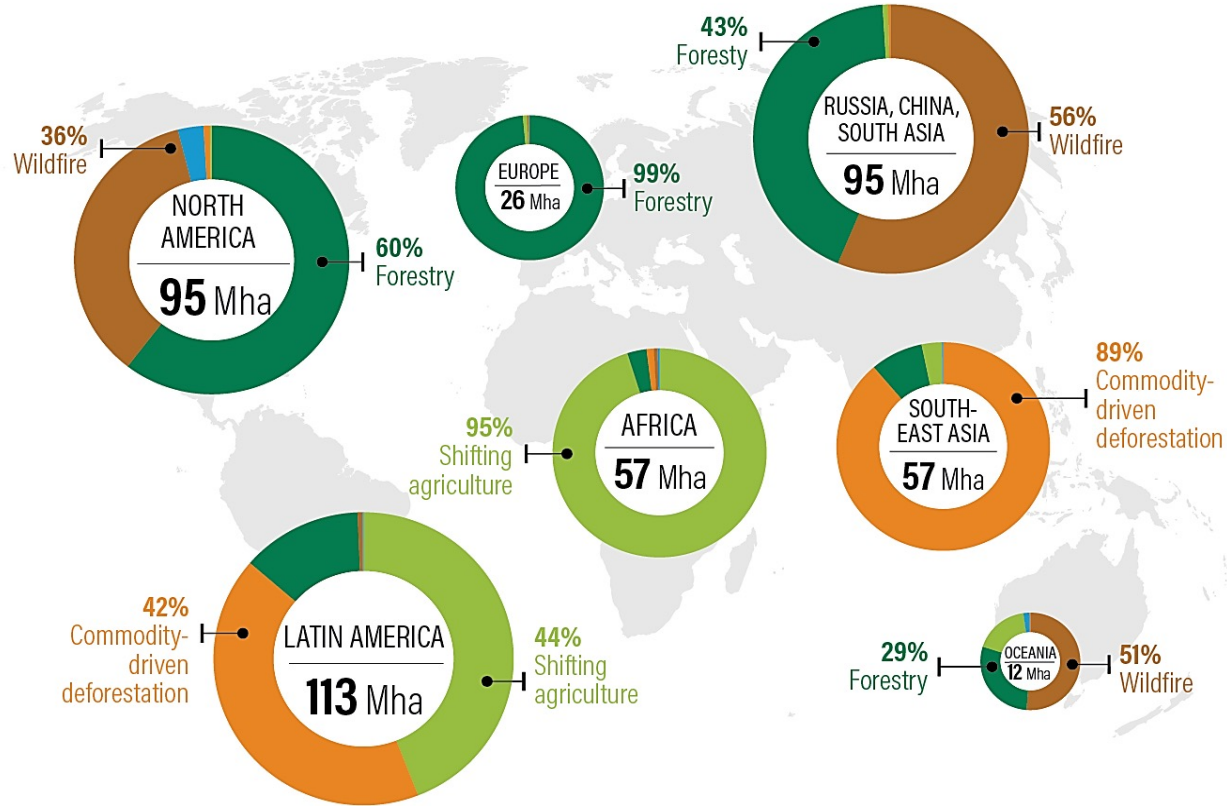
**Almost 50 % of all pressures related to pollution**

can be attributed to air, water and soil pollution caused by agriculture.

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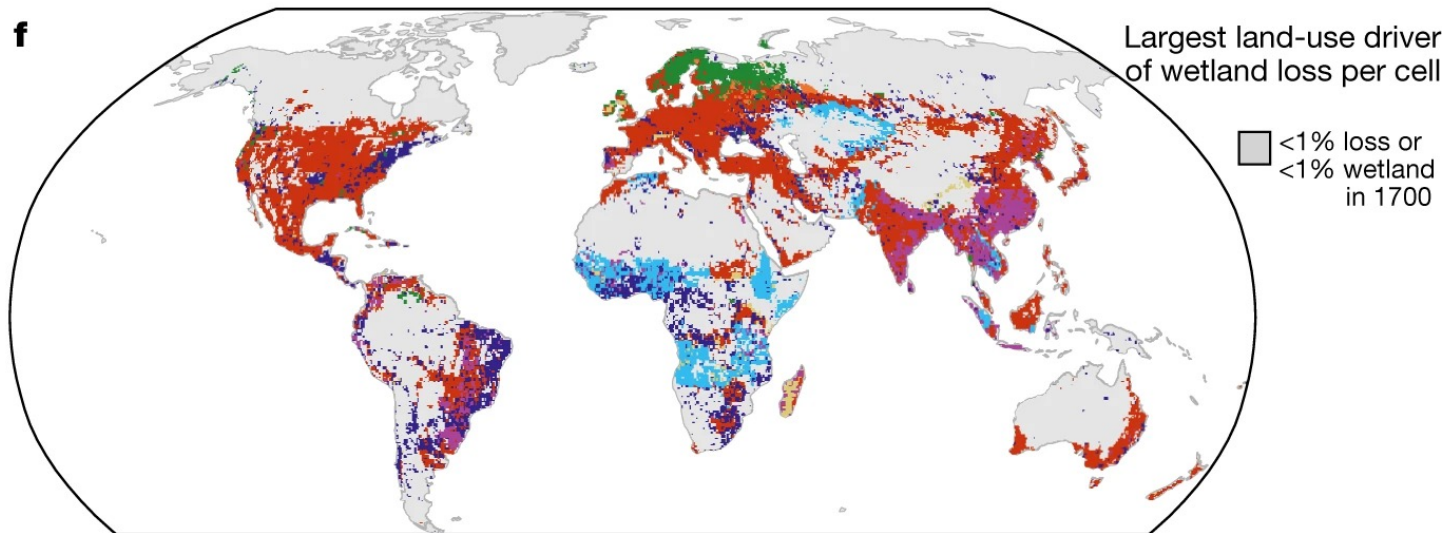
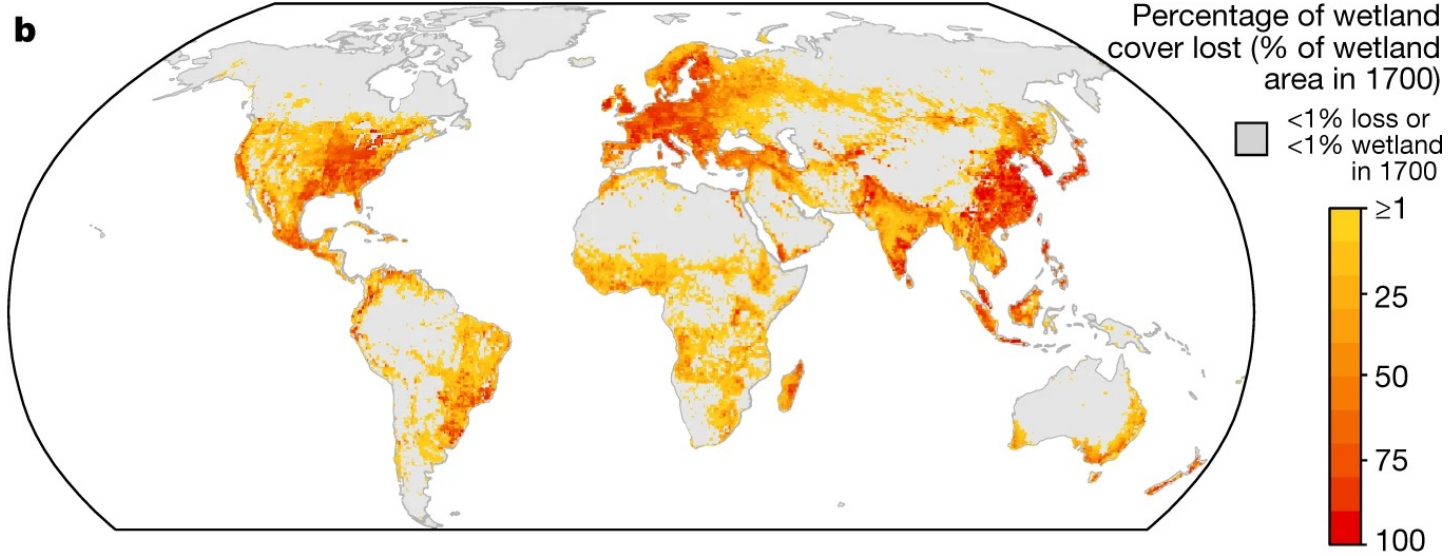
# FORESTE

Drivers of tree cover loss by region, 2001-2022

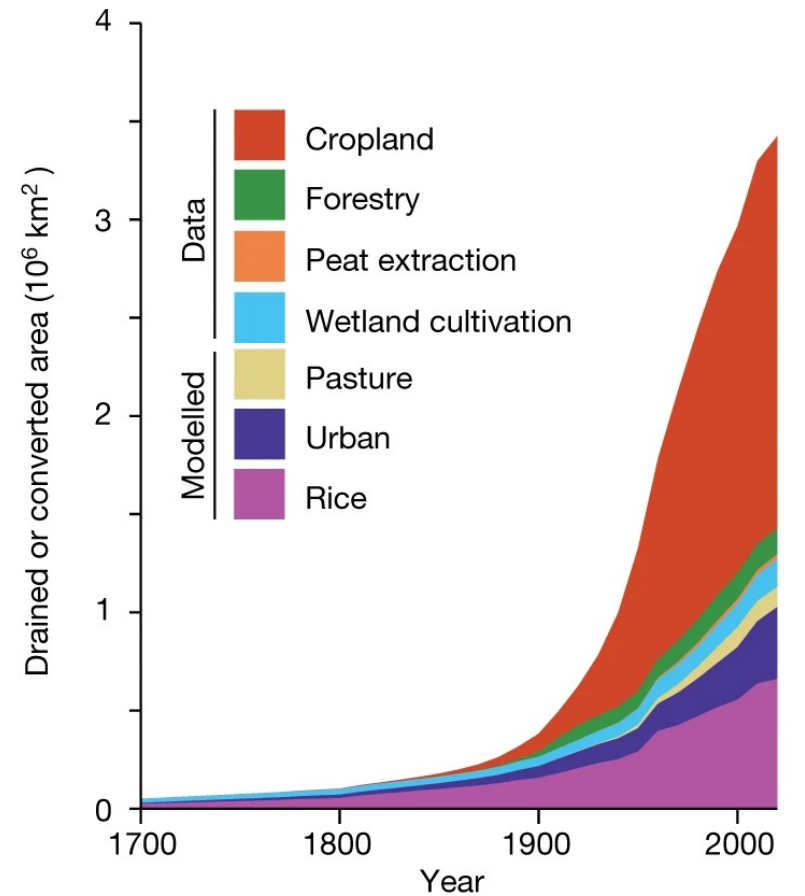


Dal 2015, ogni anno l'estensione delle foreste abbattute corrisponde all'incirca alla superficie del Portogallo

# ZOME UMIDE

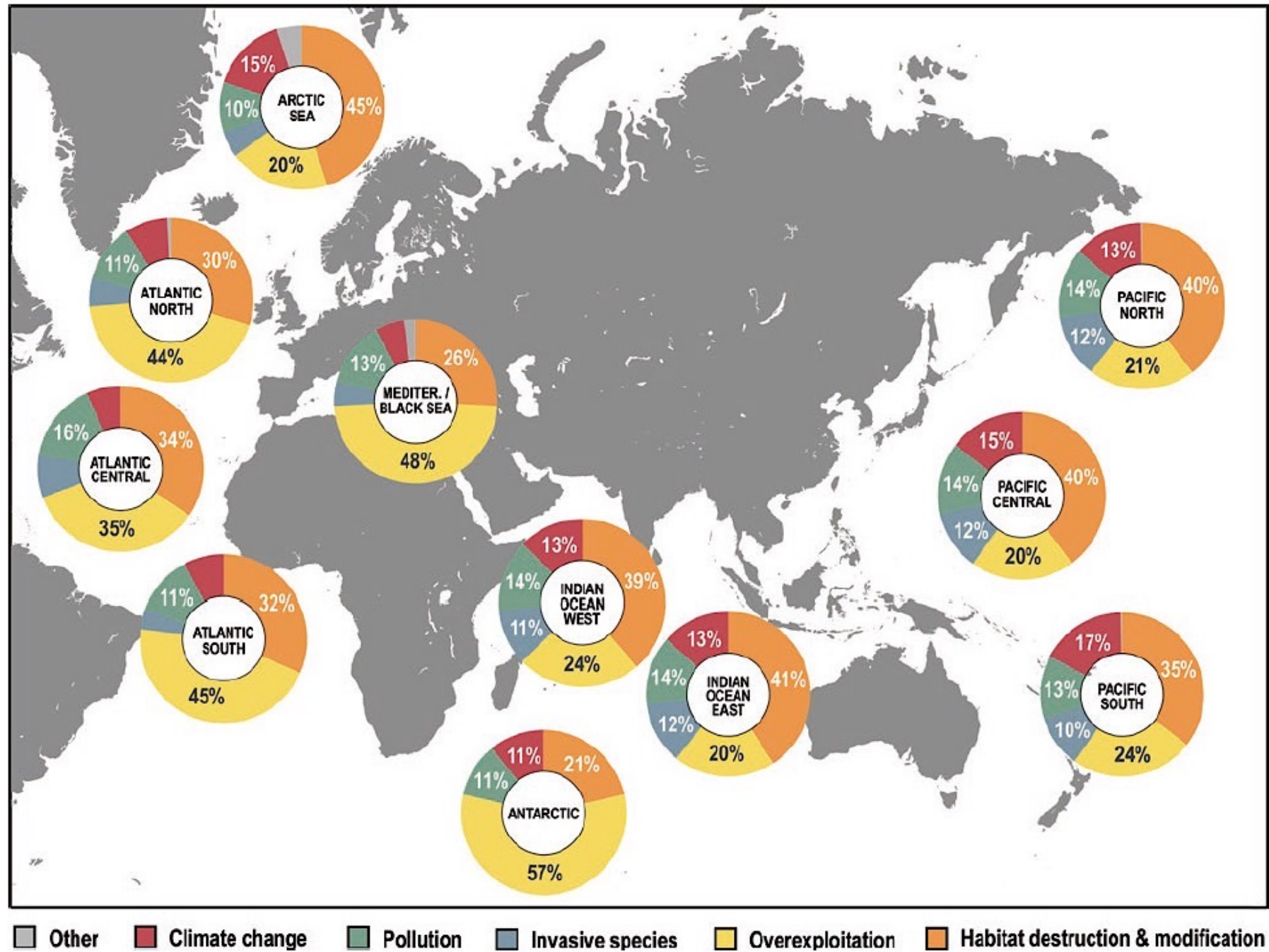


In Italia negli ultimi 50 anni le zone umide si sono ridotte del 66%





# MARI





Food and Agriculture  
Organization of the  
United Nations

2022

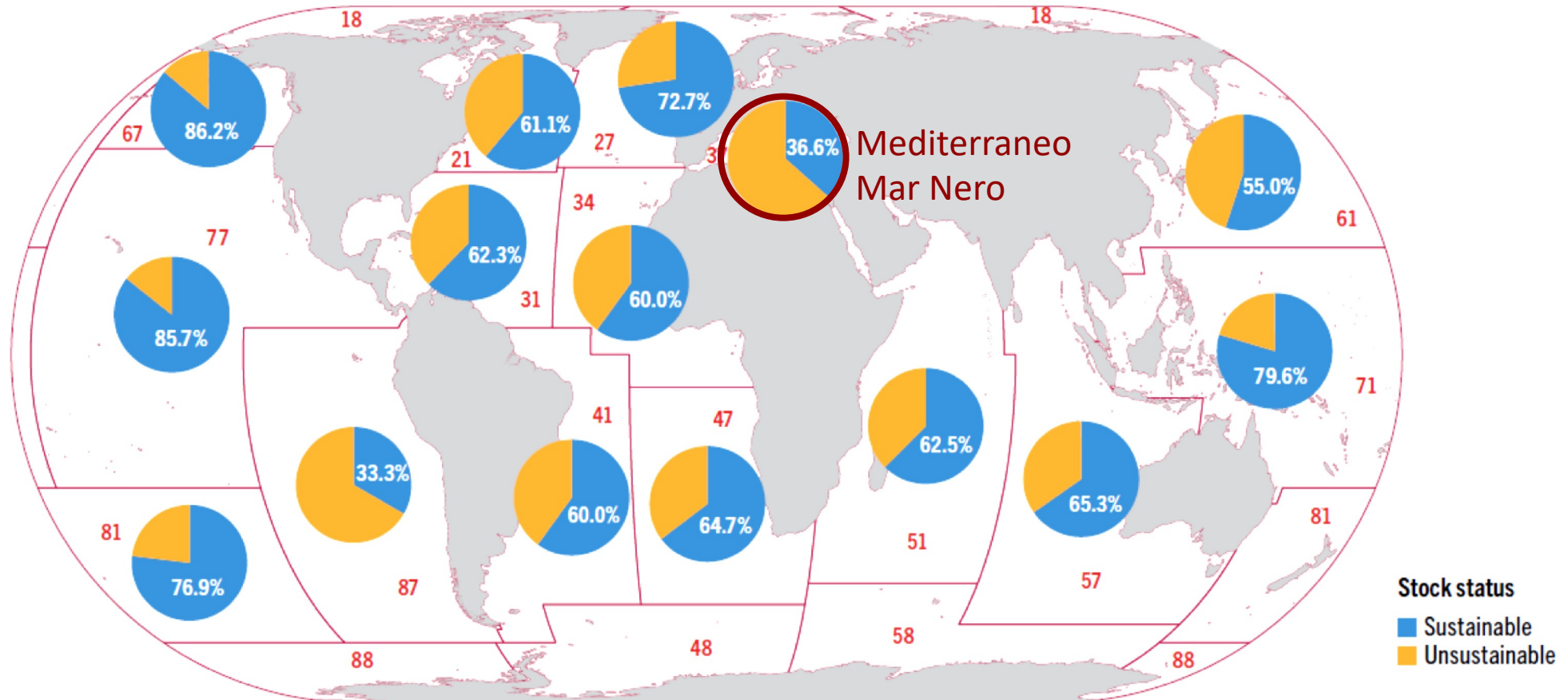
# THE STATE OF WORLD FISHERIES AND AQUACULTURE

## PESCA

- **78,8 mil/ton/anno organismi marini (alghe escluse)**
- **85% pesci; ~15% molluschi, crostacei**
- **35,4% degli stock è sovrasfruttato**
- **Valore economico: 140 miliardi €**
- **Pesca illegale/non-regolata: 11-26 mil/ton/anno**
- **Consumo medio: 20,5 kg/persona/anno**
- **% proteine dieta: media 17% (fino al 50% in Asia e Africa)**

**Danni alle specie target  
Danni specie non-target/ambiente**

**FIGURE 24** PERCENTAGES OF BIOLOGICALLY SUSTAINABLE AND UNSUSTAINABLE FISHERY STOCKS BY FAO MAJOR FISHING AREA, 2019

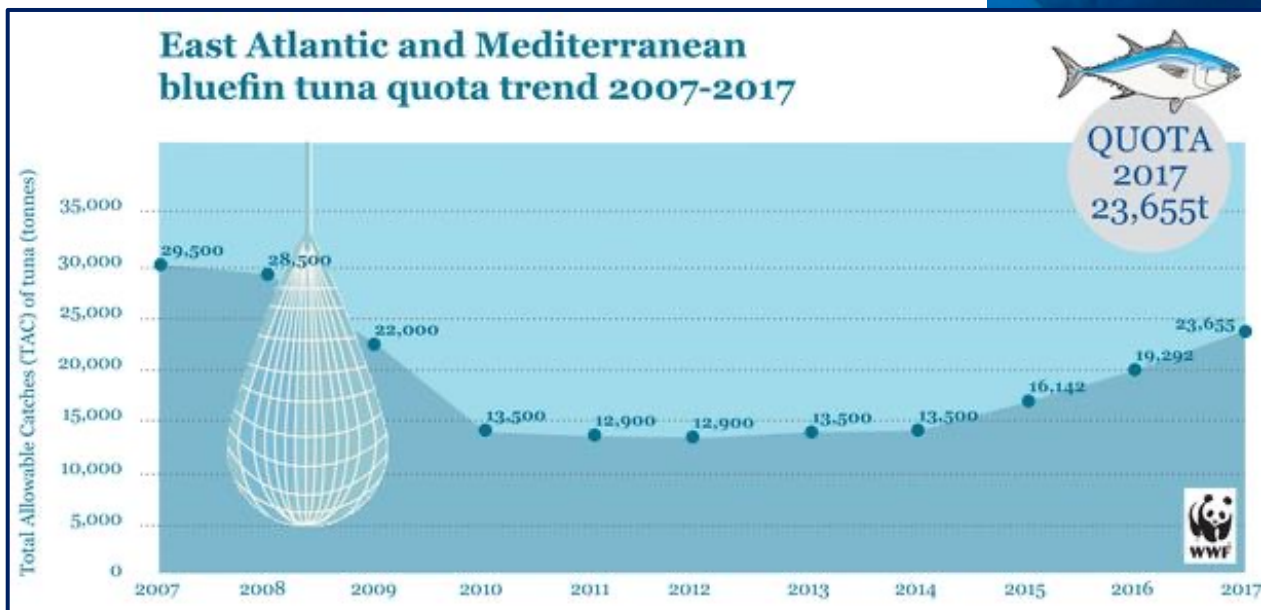


NOTE: The digital percentages represent the proportion of sustainable stocks.  
SOURCE: FAO.

## CONTRASTO AL COLLASSO DELLE POPOLAZIONI: IL TONNO ROSSO

dal 2010 misure di restrizione della pesca:

- Forte riduzione delle quote di prelievo
- Rialzo della taglia minima di pesca
- Lotta alla pesca illegale
- Controllo costante degli stock





### Danni «collaterali» : il BYCATCH/DISCARDS

- specie che non hanno valore commerciale
- individui non commercializzabili di specie di valore commerciale (sotto taglia)
- specie delle quali vengono tenute solo alcune parti (finning degli squali)

**Stima FAO: media 9,1 mil/t/anno (range 7-16 mil/t/anno)**

# INQUINAMENTO

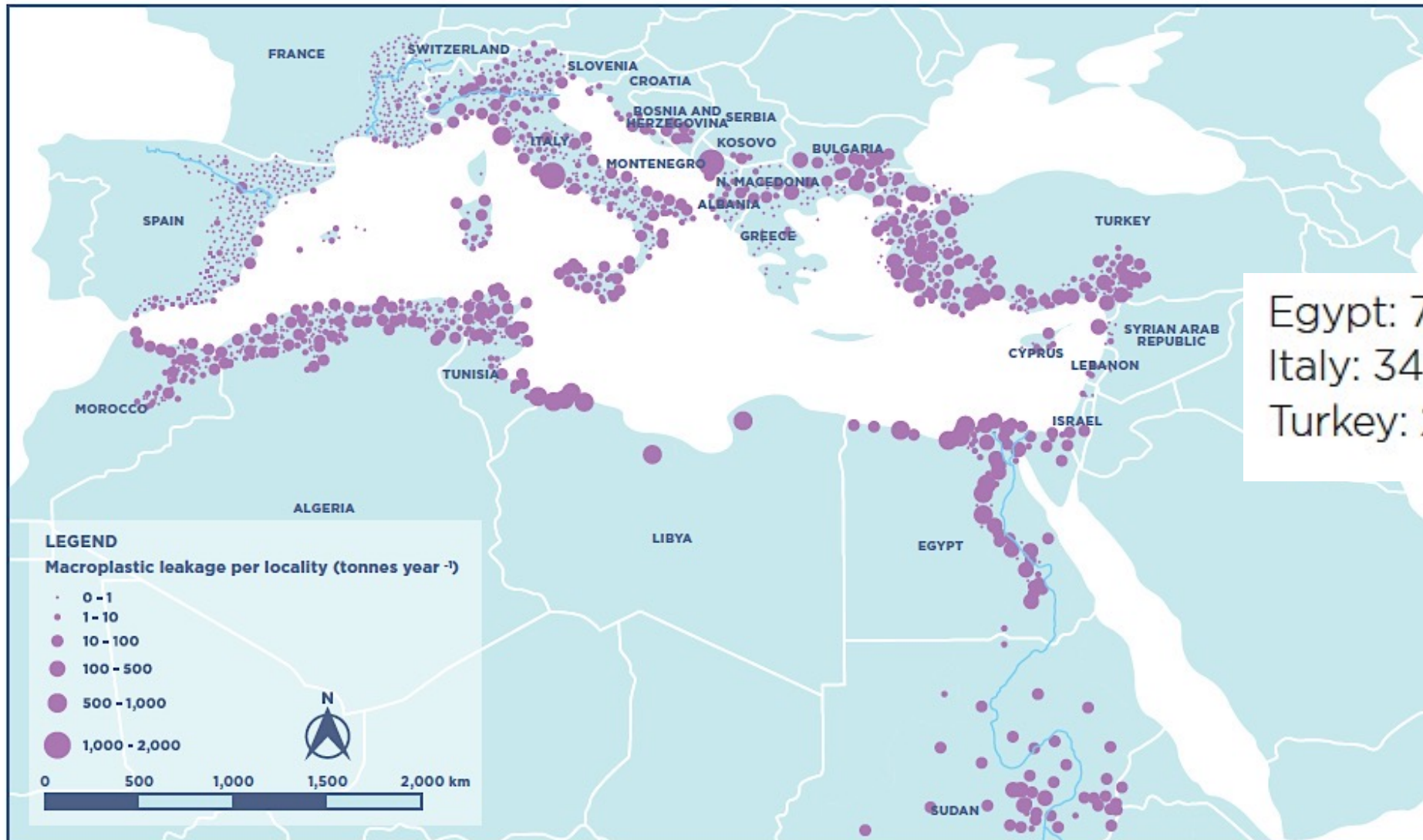


The Mediterranean:  
Mare plasticum  
**2020**



**Complessivamente ogni anno finiscono nel Mediterraneo 229 mila tonnellate di plastiche: è come se ogni giorno 500 container scaricassero in acqua il proprio contenuto.**

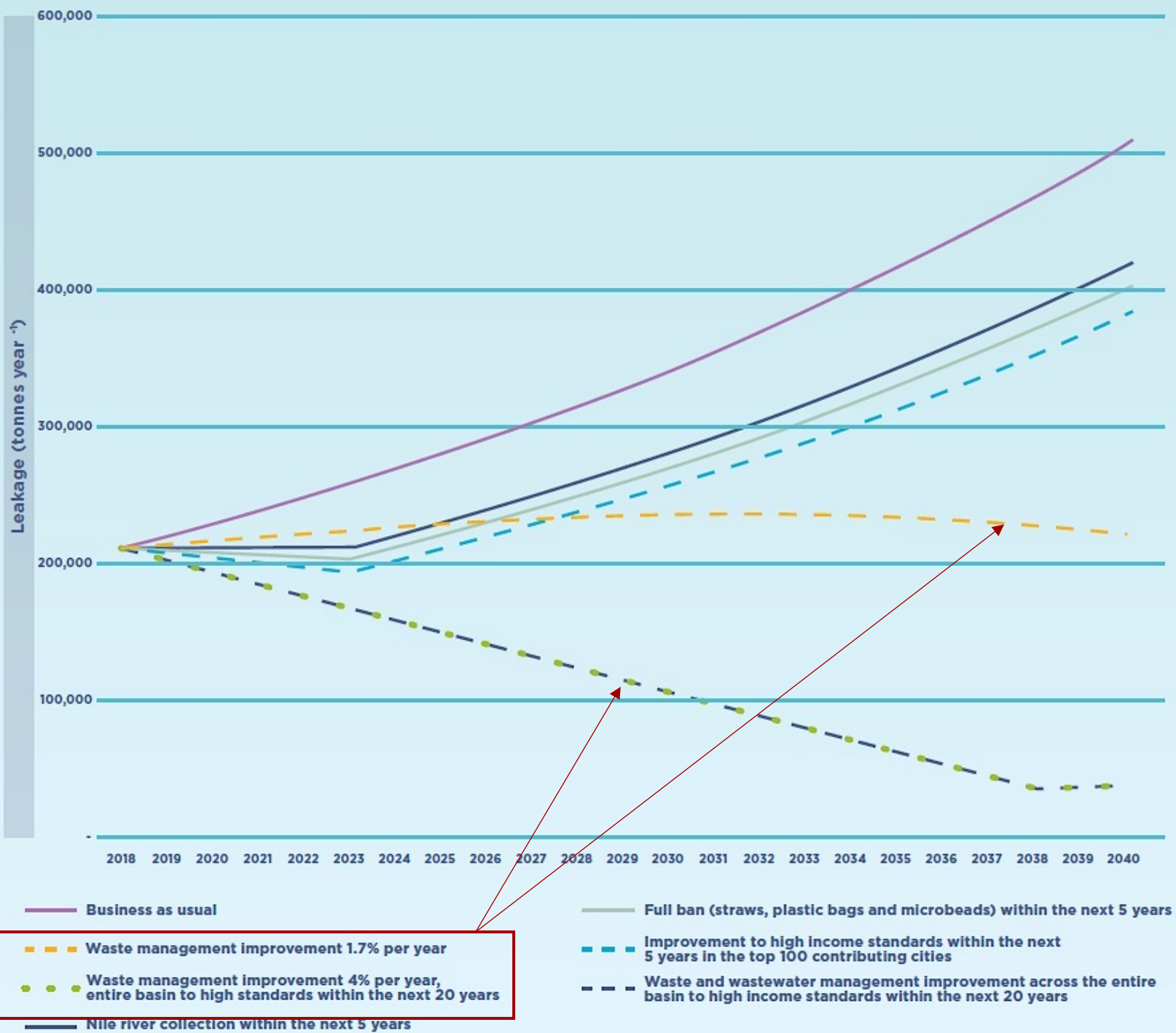
**Più della metà della plastica mediterranea proviene da soli 3 Paesi: il 32% dall'Egitto, il 15% dall'Italia e 10% alla Turchia. Francia e Spagna assieme contribuiscono a meno del 3%**



Egypt: 74,031 tonnes year<sup>-1</sup>  
Italy: 34,309 tonnes year<sup>-1</sup>  
Turkey: 23,966 tonnes year<sup>-1</sup>

Figure 4.6: Leakage of macroplastic from mismanaged waste into the Mediterranean Sea, per locality view.

# Quale futuro??

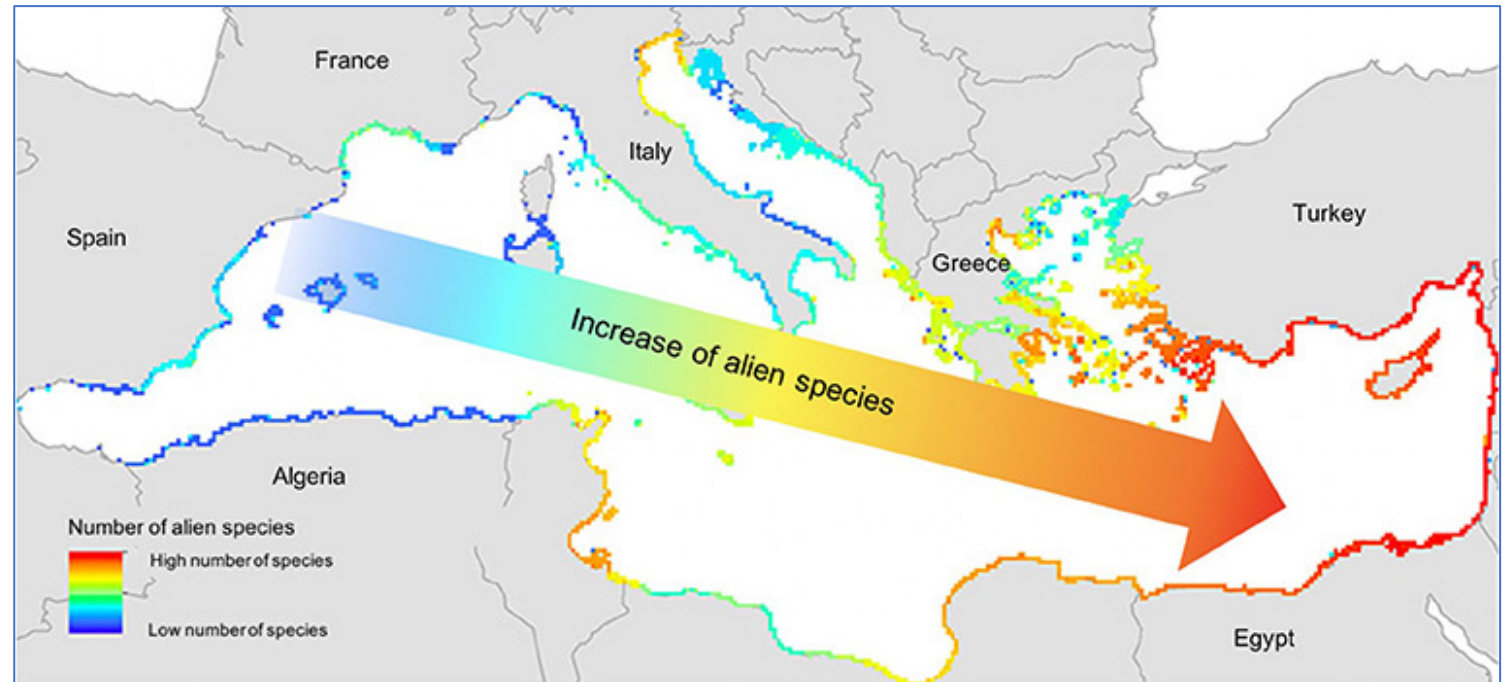
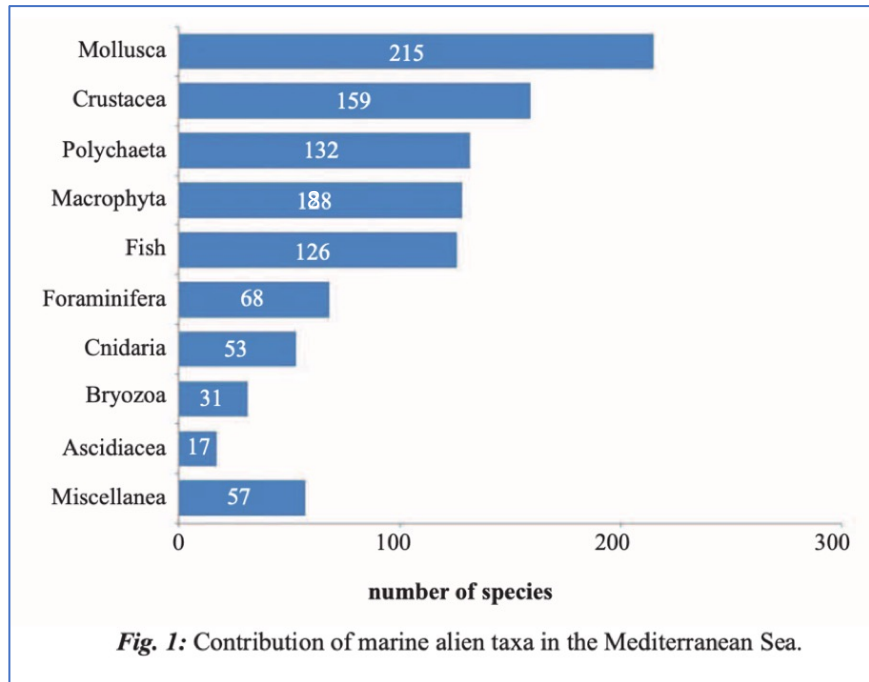




# SPECIE ALIENE

**Specie che, a causa dell'azione dell'uomo, si trova ad abitare e colonizzare un territorio diverso dal loro areale storico, riproducendosi nel nuovo areale.**

- trasporto navale (acque di zavorra) e rilascio da acquari
- canali di comunicazione artificiali e naturali (Suez, Gibilterra)

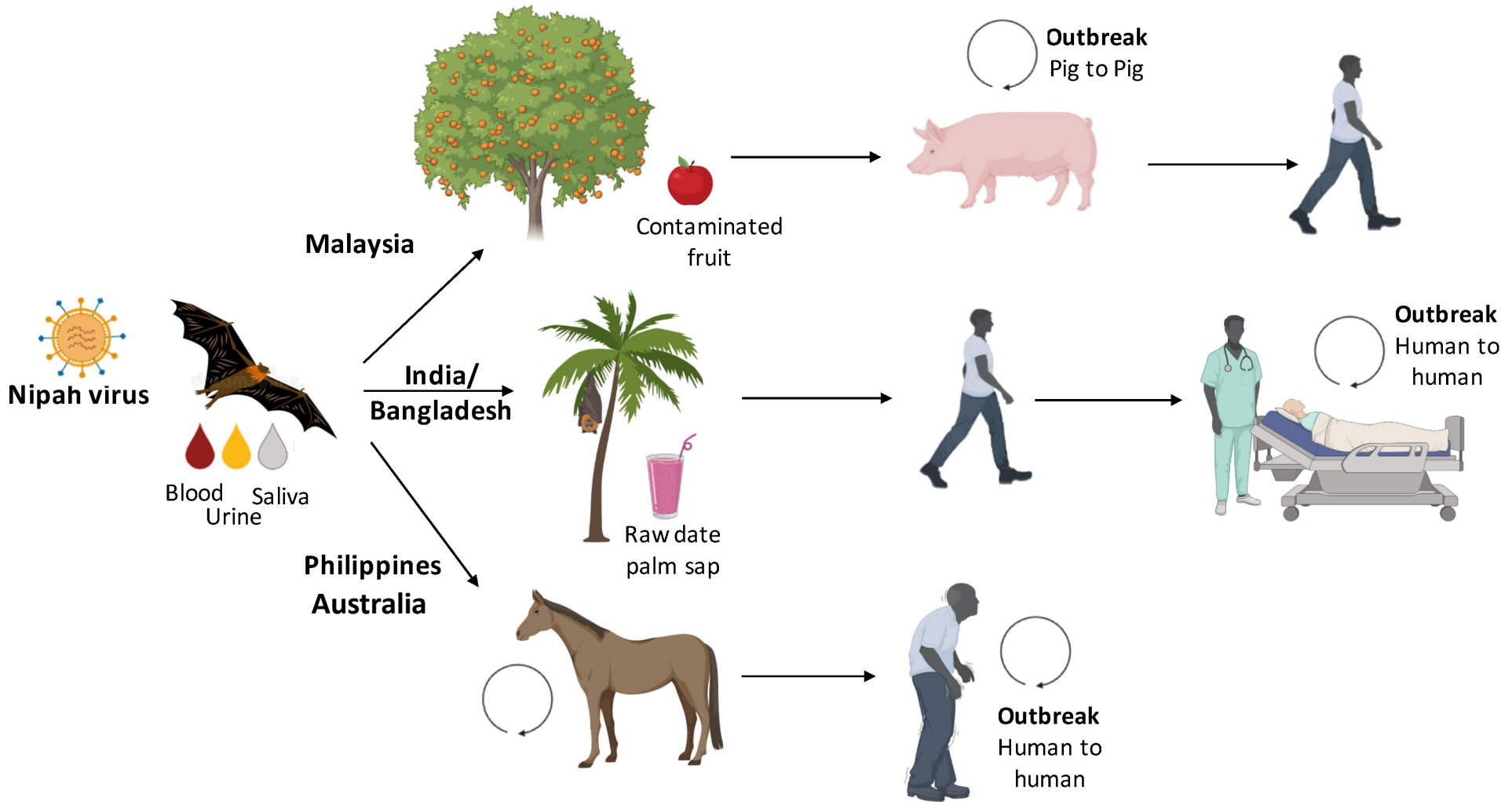


**In molti casi provocano il deterioramento degli habitat naturali, riducendo drasticamente la biodiversità locale ed entrando in competizione con specie native, endemiche e più vulnerabili**  
Il ritmo della colonizzazione è così rapido da aver già cambiato l'identità faunistica del Mediterraneo

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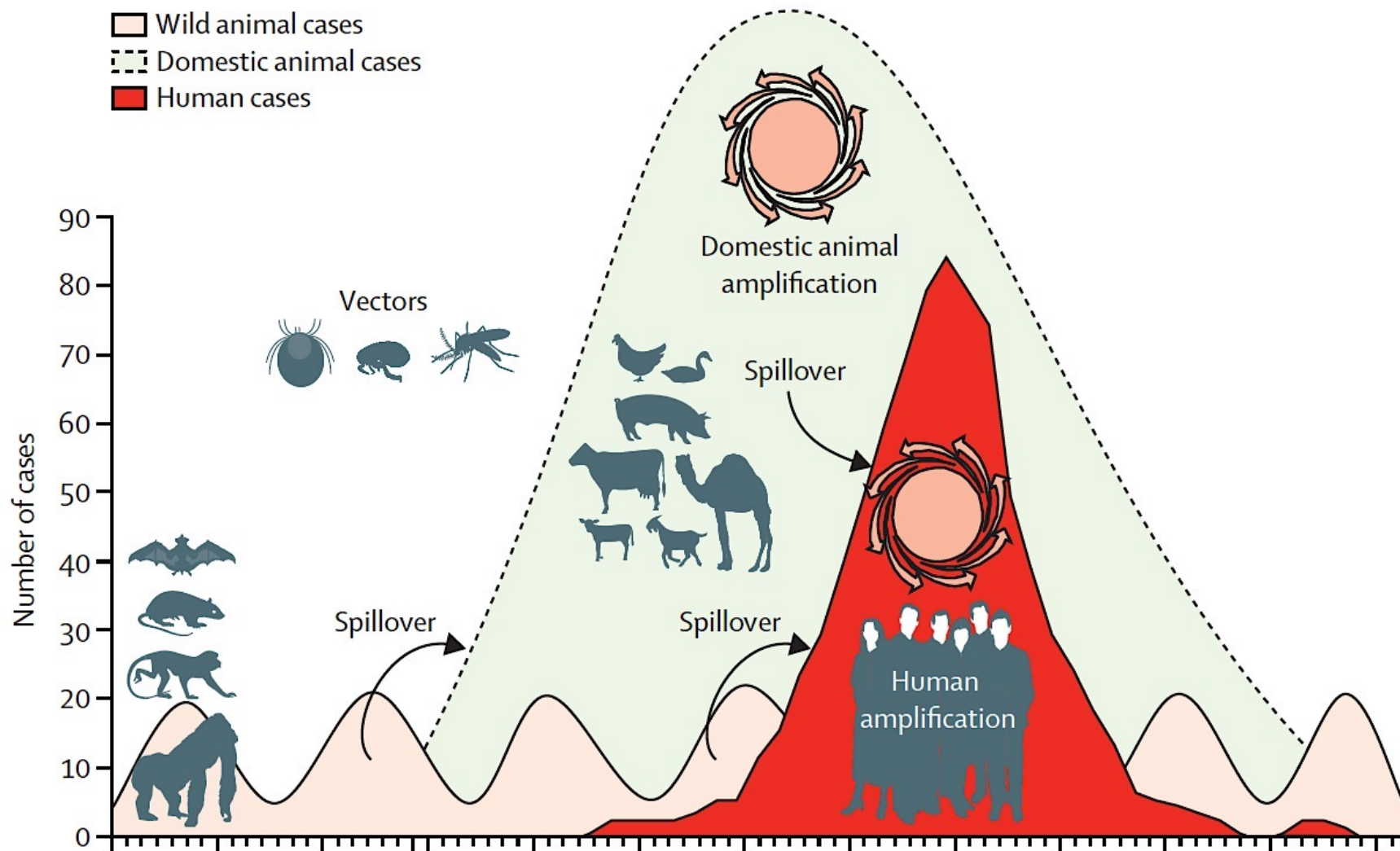
1994. Hendra, Australia





**Fattore scatenante: riduzione dell'habitat (deforestazione) e aumentata frequenza di contatto con animali domestici/uomo**

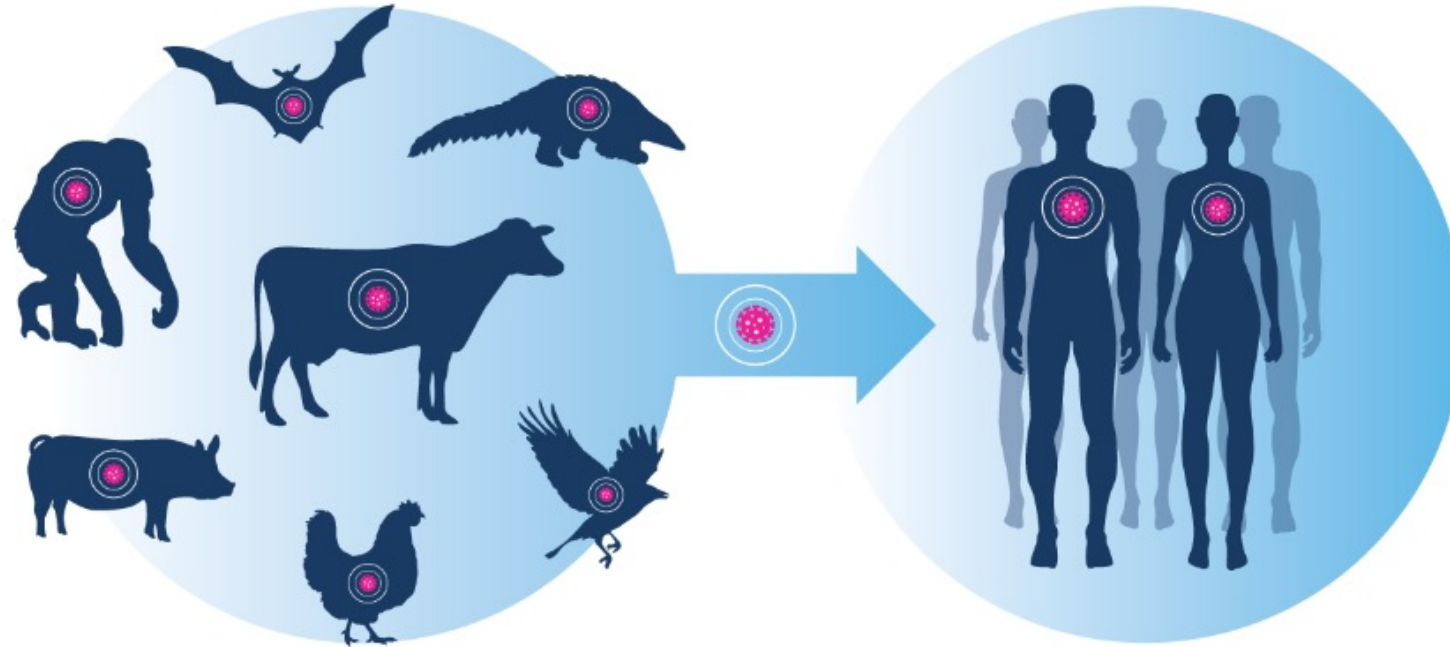
# Spillover



Lo **spillover** (“tracimazione”) è il passaggio di un patogeno da una specie ospite a un’altra. Può portare alla comparsa di nuovi agenti patogeni per l’uomo (virus, batteri, ecc), precedentemente circolanti solo nel mondo animale

# ZOONOSI

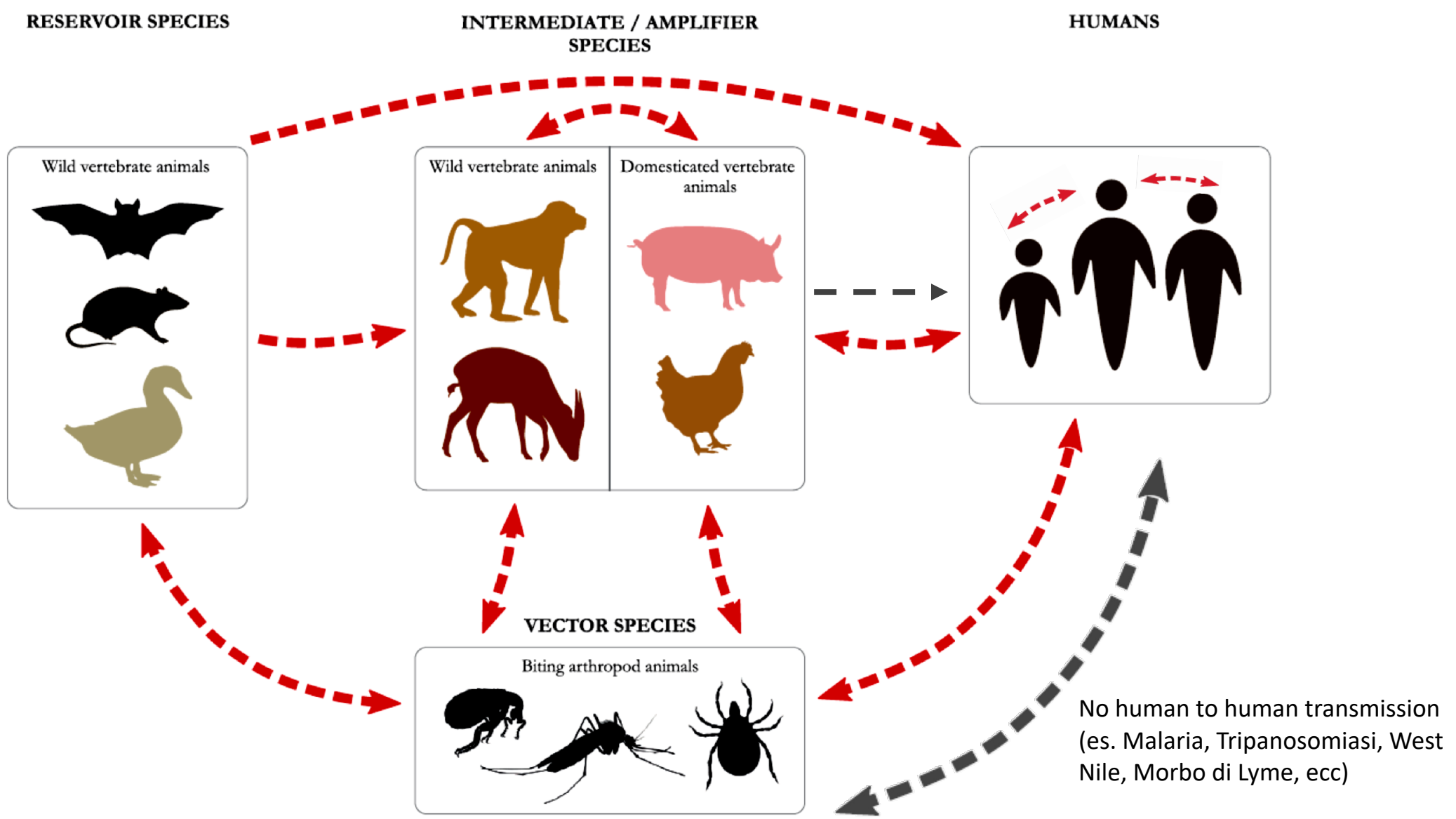
- malattie causate da agenti trasmessi dagli animali all'uomo
- gli agenti responsabili comprendono batteri, virus, parassiti, funghi, ecc.







**60%** of infectious diseases in humans are spread from animals

**75%** of newly emerging infectious diseases are zoonoses

Zoonotic diseases are responsible for an estimated **2.5 billion cases of illness** and **2.7 million deaths** worldwide, each year



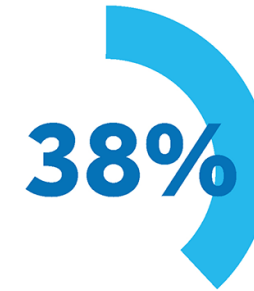
# Intensity and frequency of extreme novel epidemics

Marco Marani<sup>a,b,c,1</sup> , Gabriel G. Katul<sup>b,c</sup> , William K. Pan<sup>b</sup> , and Anthony J. Parolari<sup>d</sup> 

<sup>a</sup>Department of Civil and Environmental Engineering, University of Padova, 35122 Padova, Italy; <sup>b</sup>Nicholas School of the Environment, Duke University, Durham, NC 27710; <sup>c</sup>Department of Civil and Environmental Engineering, Duke University, Durham, NC 27708; and <sup>d</sup>Department of Civil, Construction, and Environmental Engineering, Marquette University, Milwaukee, WI 53233

PNAS 2021 Vol. 118 No. 35 e2105482118

Analisi basate sui dati delle epidemie mondiali degli ultimi 400 anni



38%

The probability of experiencing a **pandemic similar to COVID-19 in one's lifetime** is about 38%

nature  
climate change

ANALYSIS

<https://doi.org/10.1038/s41558-022-01426-1>

NATURE CLIMATE CHANGE | VOL 12 | SEPTEMBER 2022 | 869–875 [Check for updates](#)

## Over half of known human pathogenic diseases can be aggravated by climate change

Camilo Mora<sup>1</sup> , Tristan McKenzie<sup>2,3</sup> , Isabella M. Gaw<sup>4</sup> , Jacqueline M. Dean<sup>1</sup> , Hannah von Hammerstein<sup>1</sup>, Tabatha A. Knudson<sup>1</sup> , Renee O. Setter<sup>1</sup> , Charlotte Z. Smith<sup>5</sup> , Kira M. Webster<sup>1</sup>, Jonathan A. Patz<sup>6</sup> and Erik C. Franklin<sup>1,7</sup> 

It is relatively well accepted that climate change can affect human pathogenic diseases; however, the full extent of this risk remains poorly quantified. Here we carried out a systematic search for empirical examples about the impacts of ten climatic hazards sensitive to greenhouse gas (GHG) emissions on each known human pathogenic disease. We found that 58% (that is, 218 out of 375) of infectious diseases confronted by humanity worldwide have been at some point aggravated by climatic hazards; 16% were at times diminished. Empirical cases revealed 1,006 unique pathways in which climatic hazards, via different transmission types, led to pathogenic diseases.



# Climate Change and Vectorborne Diseases

Madeleine C. Thomson, Ph.D., and Lawrence R. Stanberry, M.D., Ph.D.

**Cambiamento climatico  
(Aumento T; Siccità- Piovosità estreme)**

**Commerci internazionali**

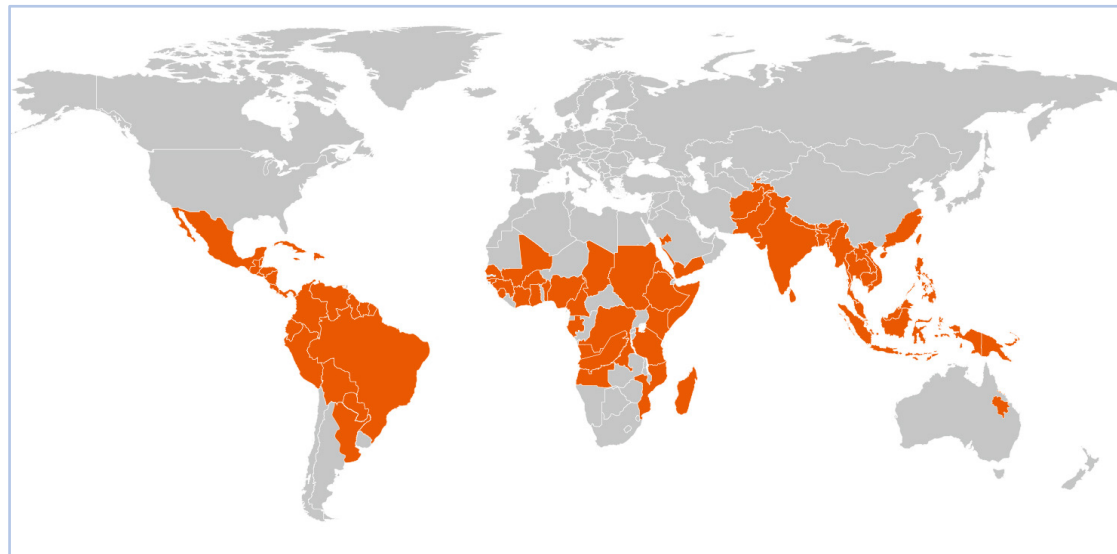
**Table 1. Observed and Predicted Effects of Climate Change on Representative Arthropod-Borne Diseases.**

Disease and Pathogen	Vectors and Transmission Pathway	Climate Drivers of Disease	Examples of Observed or Predicted Effects
Malaria Plasmodium protozoan parasite	Anopheles mosquito Direct transmission	In the absence of disease control and socioeconomic development, the spatial and temporal risk of malaria is largely governed by rainfall (temporary water bodies), temperature, and humidity. Although malaria is widely considered to be a tropical disease, it should be noted that it was previously common in temperate regions (e.g., Europe and North America). It has been eliminated in temperate regions mainly because of socioeconomic development and land-use changes.	In the Ethiopian highlands, a temperature increase of 0.2°C per decade has exposed a growing population of nonimmune persons to the risk of malaria during the past three decades. <sup>9</sup> Malaria is reemerging in temperate regions in response to public health infrastructure decline, migration, and higher temperatures. <sup>10</sup>
Dengue and Zika virus infection Flavivirus	<i>Aedes aegypti</i> and <i>A. albopictus</i> mosquitoes dominate Mostly direct transmission but zoonotic component in some contexts	Arboviral diseases are common in tropical and subtropical regions. <sup>11</sup> In drought conditions, households without access to secure piped water may store water in open containers in and around the home, which creates ideal domestic breeding sites for <i>A. aegypti</i> . After extreme rainfall events, outdoor natural and artificial containers provide ideal sites for <i>A. albopictus</i> mosquito egg and larvae development in urban and periurban areas.	<i>Aedes</i> vectors are increasingly emerging in temperate regions such as North America and Europe, <sup>12,13</sup> as evidenced by the occurrence of autochthonous dengue infections in Croatia and France in 2010. <sup>14</sup> The extreme flooding in Pakistan in 2022, which was attributed in part to climate change, <sup>15</sup> has resulted in a surge of dengue cases. <sup>16</sup> The emergence of Zika virus infection in Brazil in 2015 occurred during a period of severe drought and unusually high temperatures caused by El Niño, as well as short- and long-term warming trends. <sup>17</sup>
Lyme disease <i>Borrelia spirochete</i> bacterium	Ixodes tick Zoonosis involving mice, small mammals, birds, and deer	The range expansion of Lyme disease is associated with a warming atmosphere and the effect of such warming on deer, mice, and tick populations. In the Sudano-Saharan region of West Africa, tickborne disease may be associated with drought rather than with higher temperatures. <sup>18</sup>	Lyme disease and other tickborne diseases have started to emerge in Canada <sup>19</sup> and more recently in the Arctic. <sup>20</sup> In 2015, sea birds in the arctic region of Norway were discovered to be carrying <i>Ixodes uriae</i> ticks infected with Lyme disease <i>Borrelia garinii</i> spirochetes.
West Nile virus infection Flavivirus	Culex mosquito Zoonosis involving birds, horses, and other mammals	The range expansion of West Nile virus infection is associated with a warming atmosphere, changing weather conditions, land-use changes (and their independent effect on bird migration), mosquito population dynamics, and flavivirus survival, replication, and virulence.	Heat waves are associated with the emergence or reemergence of West Nile virus infection. The unprecedented upsurge in the number of human cases in Europe and Eurasia in 2010 was associated with an extreme summer heat wave. More recently, West Nile virus has been found to be overwintering in mosquitoes in Germany. <sup>21</sup> As a result of climate change, heat waves in Europe and Eurasia are expected to be more frequent and more intense, with milder winters in these regions.
River blindness <i>Onchocerca volvulus</i> nematode (helminth)	Simulium black fly Direct transmission	<i>Simulium damnosum</i> breeding sites are common in the white-water river systems of West Africa, where the long-distance movement of adult black flies is governed by the intertropical convergence zone — a band of thunderstorms that moves across West Africa, bringing monsoon rains.	Climate change is expected to weaken the powerful annual cycle of the intertropical convergence zone and move it southward. This may cause savannah black flies, which carry the most dangerous form of blinding onchocerciasis, to move from the savannah region to the forested areas of West Africa. <sup>22</sup>
Plague <i>Yersinia pestis</i> bacterium	Flea Zoonosis involving small mammals (including rats)	Climate-related factors influence localized outbreaks and worldwide pandemics. <sup>23</sup> Certain rainfall patterns favor large increases in rodent populations that support the flea population. Worldwide, 90% of cases of plague occur in Africa <sup>24</sup> in cooler highland environments, where temperatures below 27°C favor the transmission of <i>Y. pestis</i> from the most common vector, the <i>Xenopsylla cheopis</i> flea.	Warming in the African highlands may reduce, rather than enhance, the transmission of bubonic plague because transmission is prevented when blood meals consumed by the flea coagulate and block pathogen transmission.
Human sleeping sickness <i>Trypanosoma brucei</i> protozoan parasite	Tsetse fly Direct transmission	Tsetse flies are pervasive in the Zambezi valley of southern Africa. Populations of tsetse flies plummet during the hot, dry season; this decline has been exacerbated in recent decades by the observed warming in the Zambezi valley.	Climate change may lead to extinction of the vector (and therefore the human- and animal-associated diseases) in regions where temperatures are already close to the upper thermal limit of juvenile tsetse fly survival. <sup>25</sup>

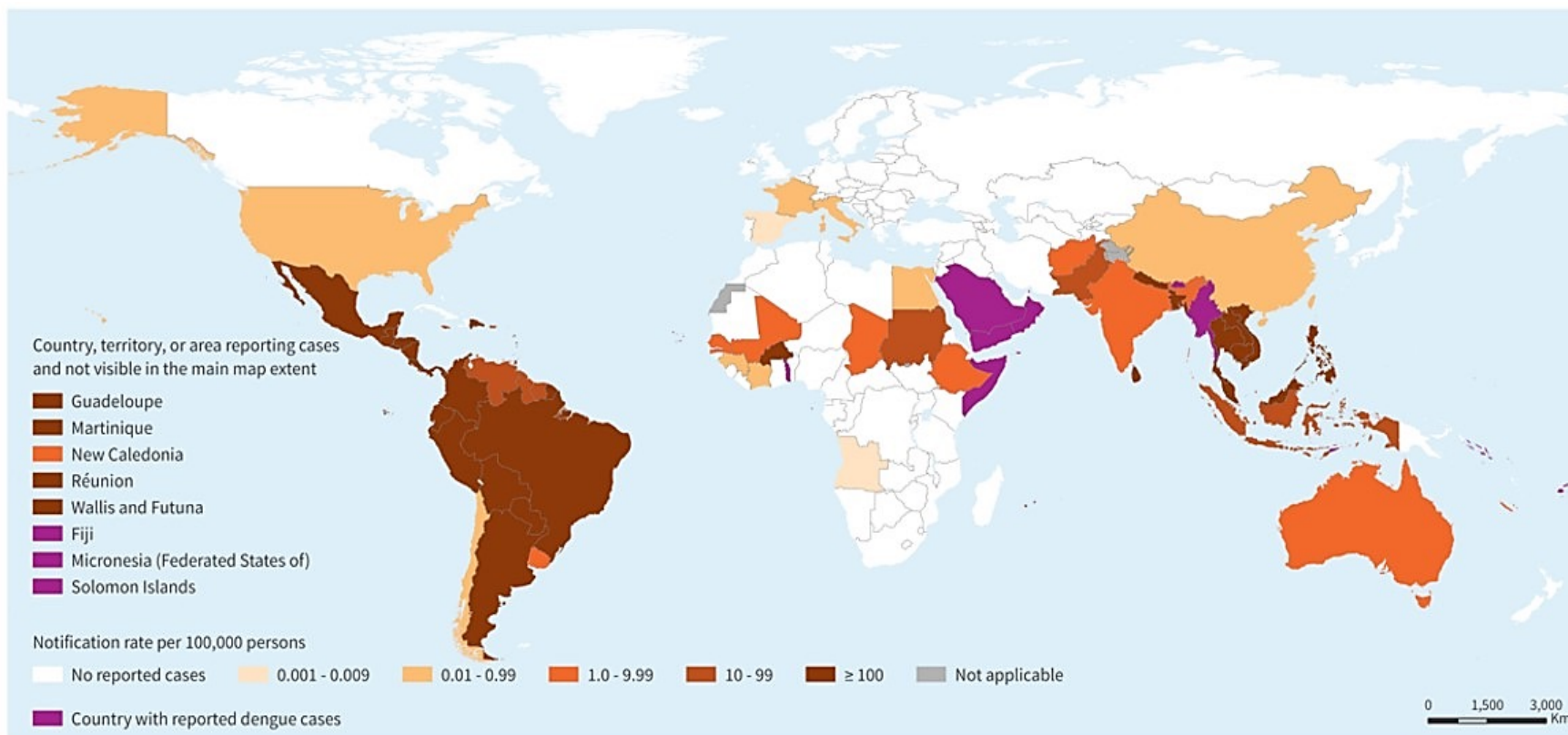
# Dengue



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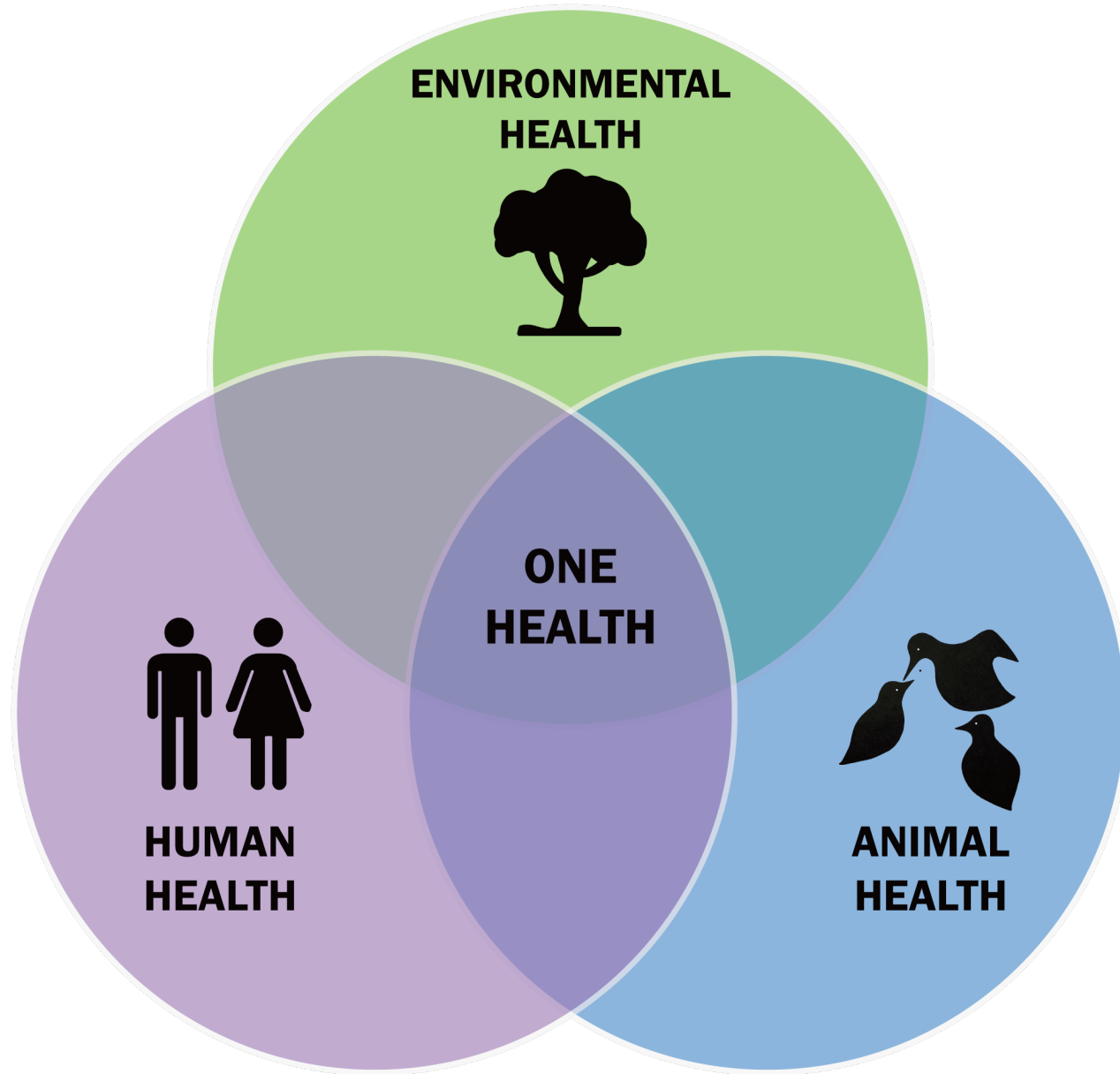


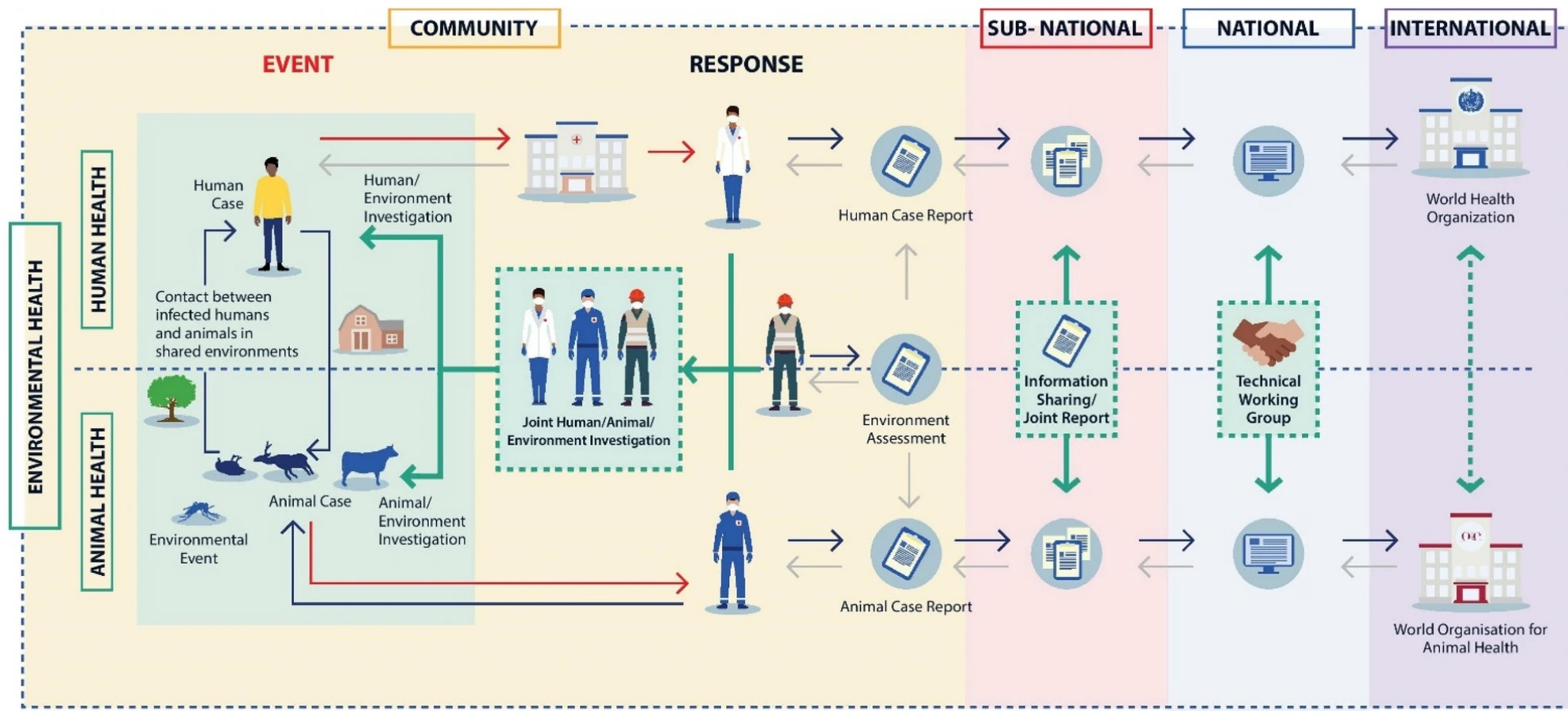
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2023

- 1. Il declino della biodiversità**
- 2. Biodiversità e attività umane**
- 3. Esempi di impatti antropici su alcuni ecosistemi marini e terrestri**
- 4. Alterazione ambientale, biodiversità e salute umana**
- 5. Azioni di controllo/mitigazione: responsabilità collettiva e individuale**

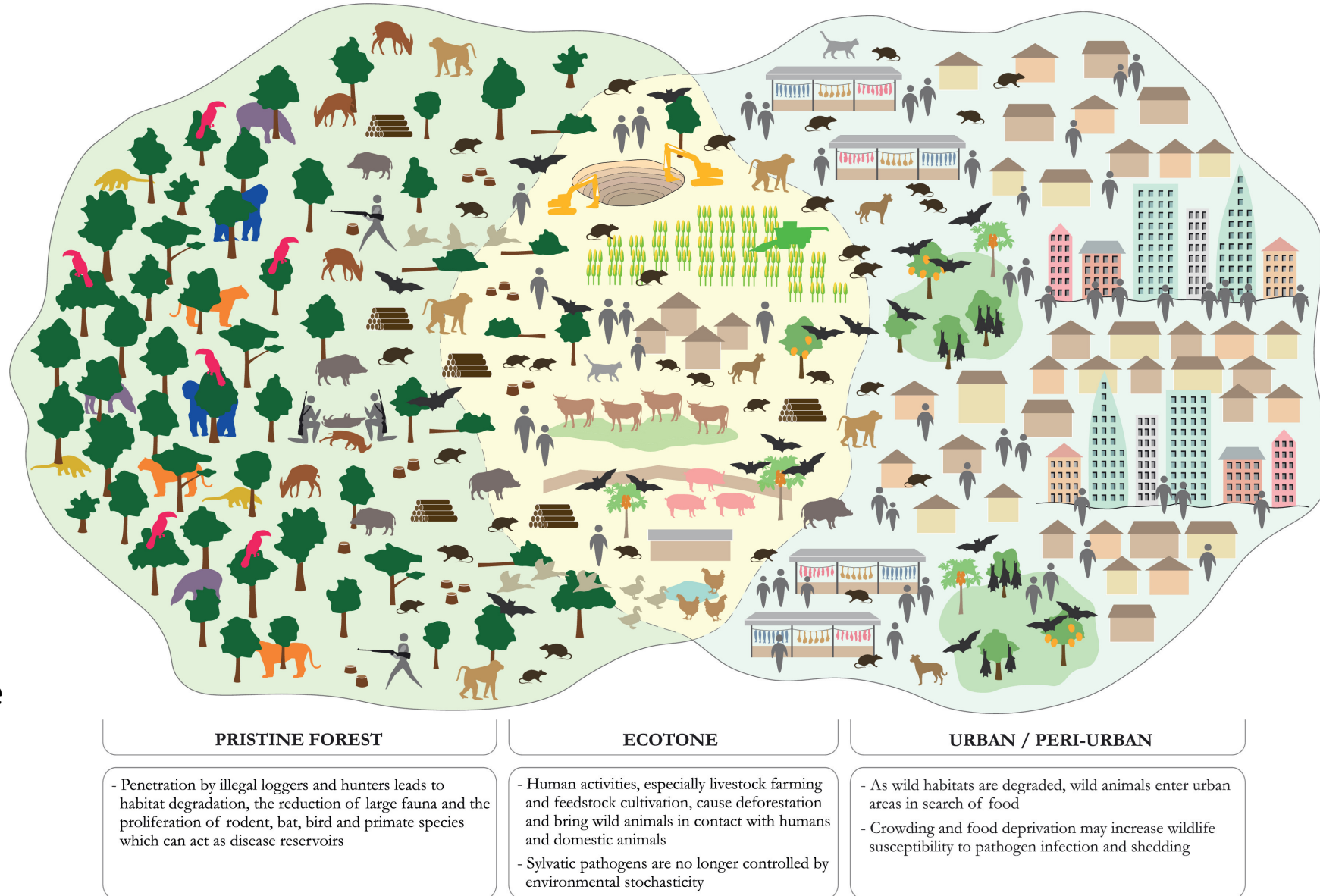




# Averting wildlife-borne infectious disease epidemics requires a focus on socio-ecological drivers and a redesign of the global food system

eClinicalMedicine  
2022;47: 101386

- Degrado/riduzione habitat
- Allevamenti/coltivazioni in prossimità habitat degradati
- Contaminazione acqua
- Consumo animali selvatici
- Commercio in mercati con animali selvatici/animali allevati
- Specie selvatiche colonizzano aree urbane



## FLEXITARIAN DIET

### High

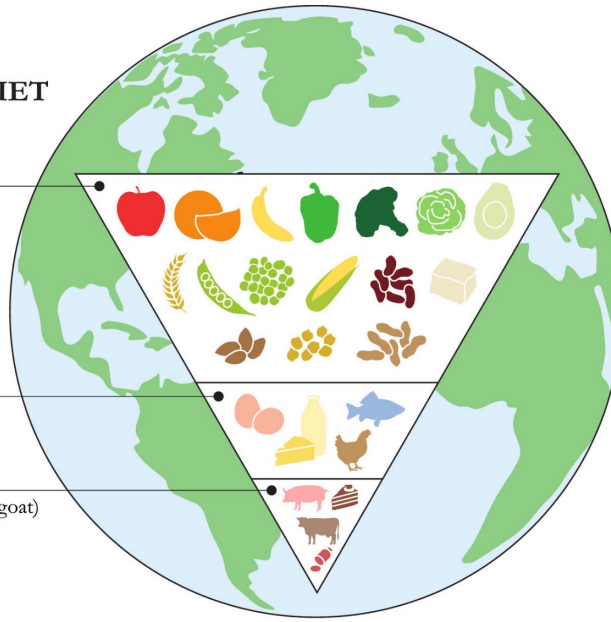
Fruit and vegetables  
Pulses and legumes  
Wholegrains  
Nuts and seeds  
Unsaturated plant oils

### Modest

Fish, poultry  
Dairy, eggs

### Low

Red meat (beef, pork, lamb, goat)  
Processed meat  
Saturated fats  
Added sugar  
Refined grains  
Highly processed foods



**REDUCED GHG emissions from:**

- Tropical deforestation for livestock agriculture
- Ruminant enteric fermentation
- Livestock manure

**REDUCED biodiversity loss from:**

- Tropical deforestation for livestock agriculture

**IMPROVED human health:**

- Lower overall morbidity and mortality risk
- Reduced exposure to overweight, obesity and non-communicable diseases (type II diabetes, colorectal cancer, cardiovascular diseases and stroke)

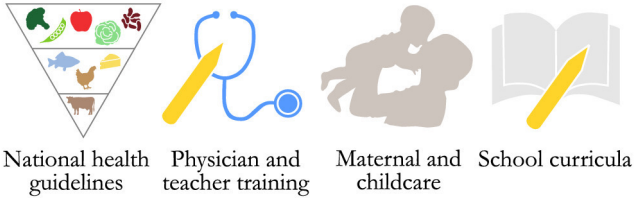
**REDUCED risk of zoonoses from:**

- Livestock-driven tropical deforestation, which facilitates proximity of wildlife with humans and domestic animals
- Prevalence of disease reservoir species in degraded wild habitats

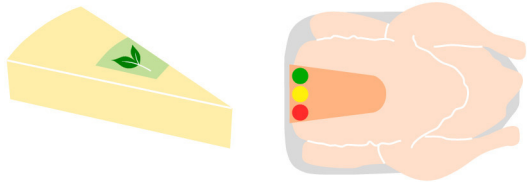
## SOFT MEASURES

### Targeting Conscious Behaviour

**EDUCATION** about healthy diets from sustainable food systems



**ECO-LABELS** on food packaging with information on environmental impacts

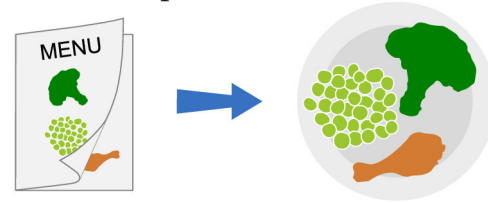


### CONSUMER CAMPAIGNS

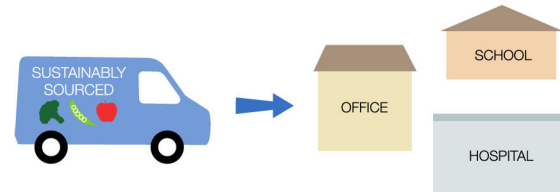


### Targeting Unconscious Behaviour

**RESTAURANT MENUS** offering vegetarian dishes in higher proportions or as default option



**FOOD PROCUREMENT POLICIES** increasing proportion of plant-based meals



**PROTEIN ANALOGUES** development and marketing (e.g. plant- and insect-based)



## HARD POLICIES

**TAXATION OF LIVESTOCK SOURCE FOOD CONSUMPTION** with tax revenue used to subsidize fruit and vegetable consumption and improve the nutrition of disadvantaged citizens



**STATUTORY DUTY FOR RETAIL AND HOSPITALITY SECTORS** to publish a public annual report on total sales and production method of different food types



Soft strategies may catalyse public support for policy change toward harder regulatory measures





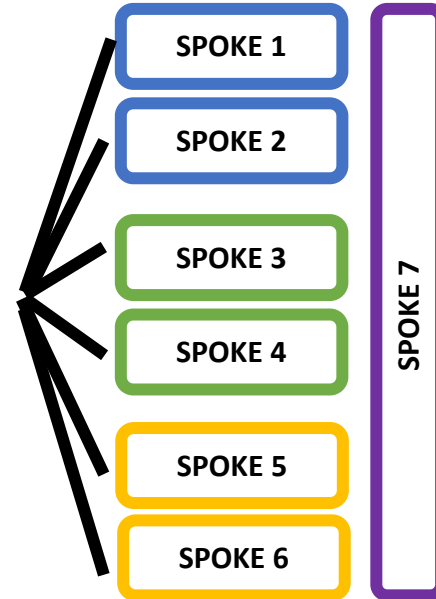
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PIANO NAZIONALE DI RIPRESA E RESILIENZA



**NATIONAL  
BIODIVERSITY  
FUTURE  
CENTER**



- **Quantificare** la biodiversità (terrestre, marina, urbana)
- **Monitorare** gli effetti delle azioni umane sulla biodiversità
- **Proteggere e conservare**
- **Restaurare/riqualificare**
- **Studiare** legame tra biodiversità, qualità aria/acqua/cibo e benessere umano
- **Fare formazione/Divulgazione/Sensibilizzazione**

