

Conference

Biodiversity and Re/insurance



One Health”: a concept for the management of sanitary issues

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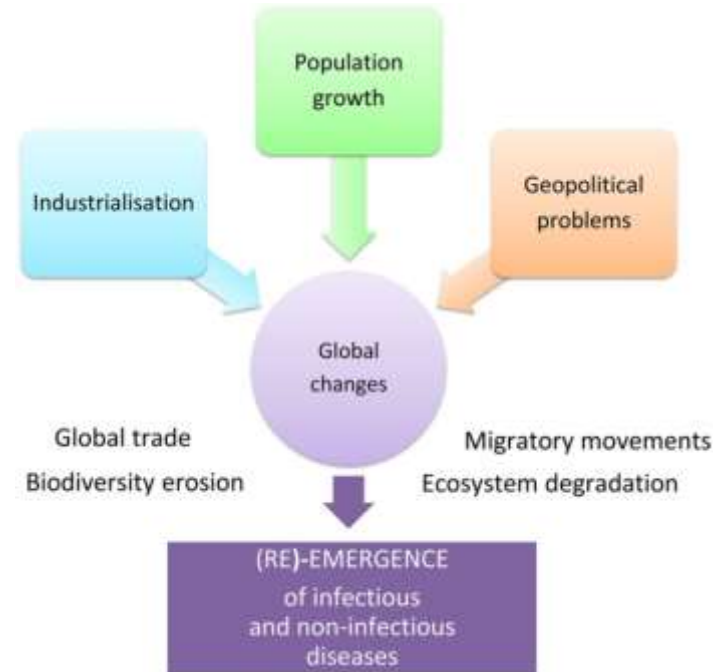
Head of the Parasitology team (UMR7245)

President of the French Society of Parasitology

Context and findings



- - **Emerging/re-emerging diseases** at the interface with wildlife, favoured by global change
- - **Collapse of biodiversity**, the health and economic consequences of which are difficult to assess
- - **Ecosystems** providing essential services but also associated with risks



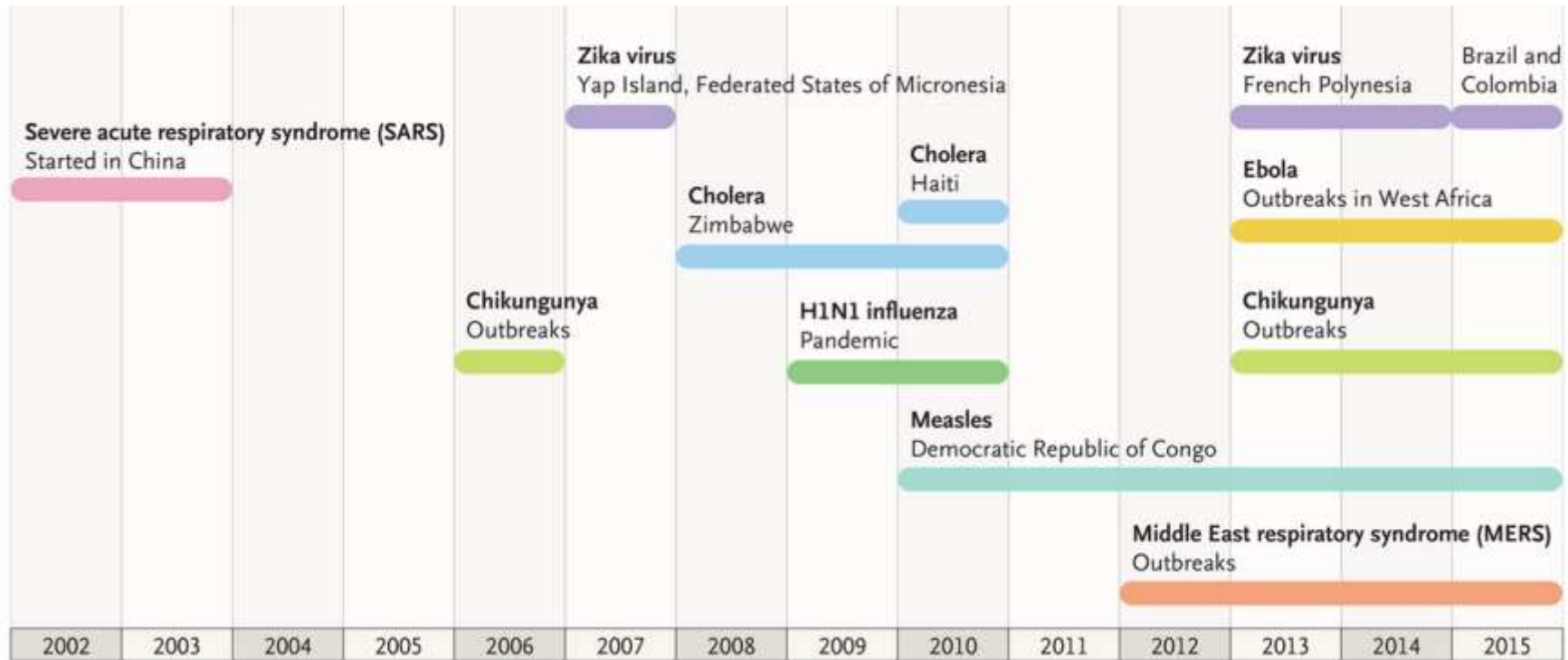
Front Vet Sci. 2018; 5: 14.

- A considerable lack of knowledge to understand processes and inform decisions
- Management based on crisis response
- Lack of a shared culture on the links between biodiversity and health

The history of One Health



Since 2002: SRAS, H1N1, Avian flu, Ebola, etc...



Sands et al, 2016, N Engl J Med; 374:1281-1287

Tensions between international organisations (WHO, FAO, OIE, etc.):

→ One Health = "vague" concept, allowing each actor to reformulate its interests, legitimacy and competences as best as possible

→ One Health = a common agenda and complementary skills to carry it out



The history of One Health

L'accord Tripartite (OIE, FAO, OMS)

Une stratégie mondiale de gestion des risques à l'interface **Homme - Animal - Ecosystèmes**



Organisation des Nations Unies
pour l'alimentation
et l'agriculture



Organisation
mondiale de la Santé

Accord Tripartite des 3 Directeurs généraux

Zoonoses émergentes et endémiques

- Renforcement des systèmes d'alerte
- R&D pour mieux lutter contre les zoonoses émergentes

Résistance aux antimicrobiens

- Plan d'action mondial de l'OMS, avec participation active de l'OIE

Renforcement des systèmes nationaux

- ⇒ Combinaison des outils PVS et RSI (JEE)

2008-10: Adoption of the concept by OIE, FAO and WHO
2019: Publication of "tripartite guide"

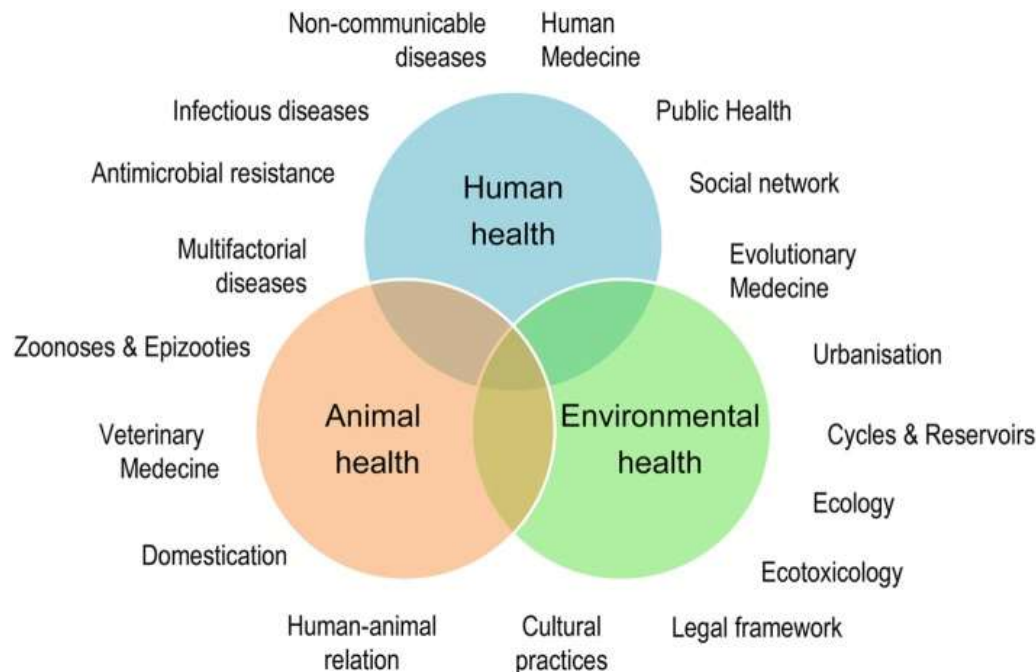
The One Health concept



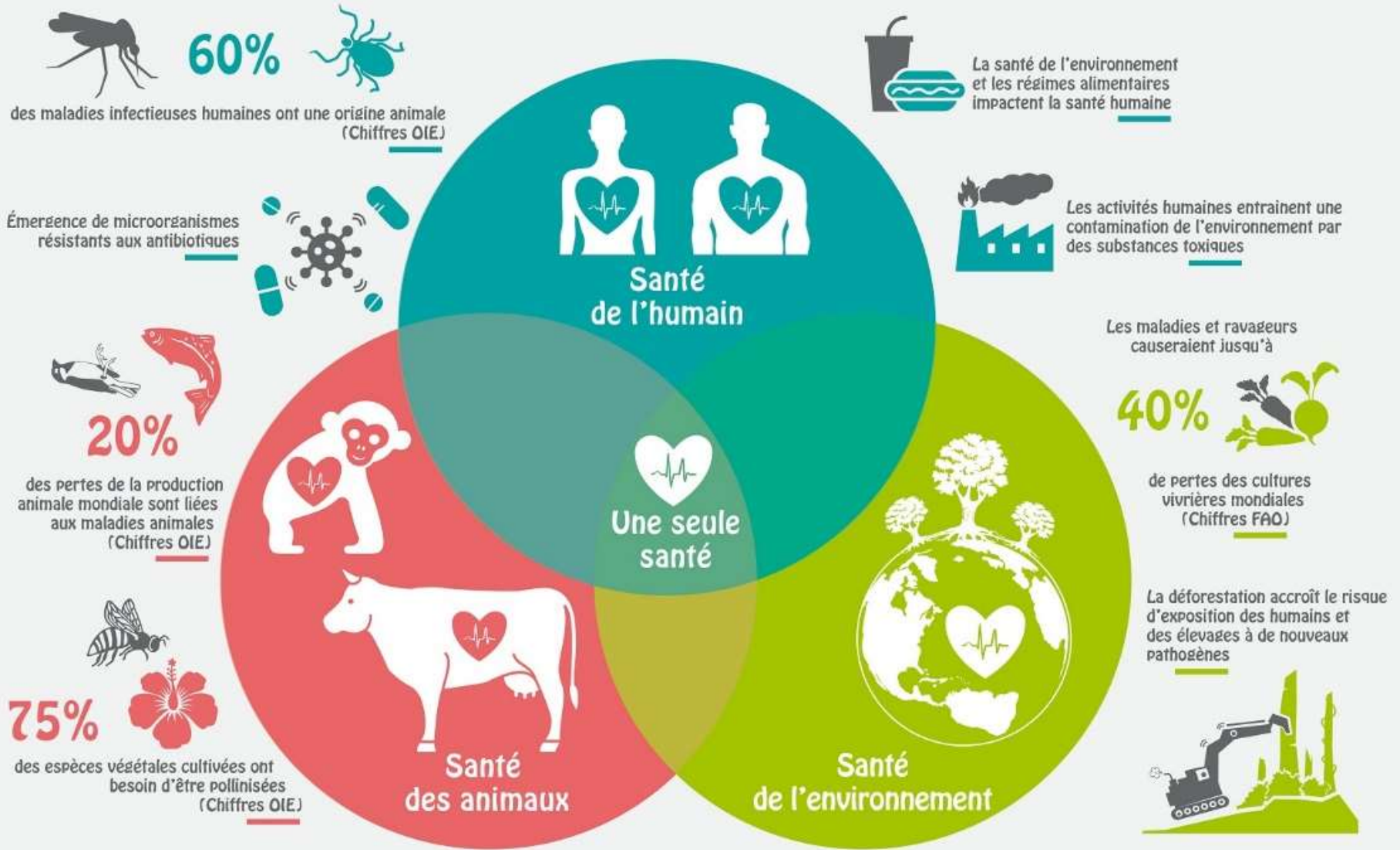
The One Health approach invites us to think about health differently.

Human and **animal** health are **interdependent** and linked to the health of the **ecosystems** in which they coexist.

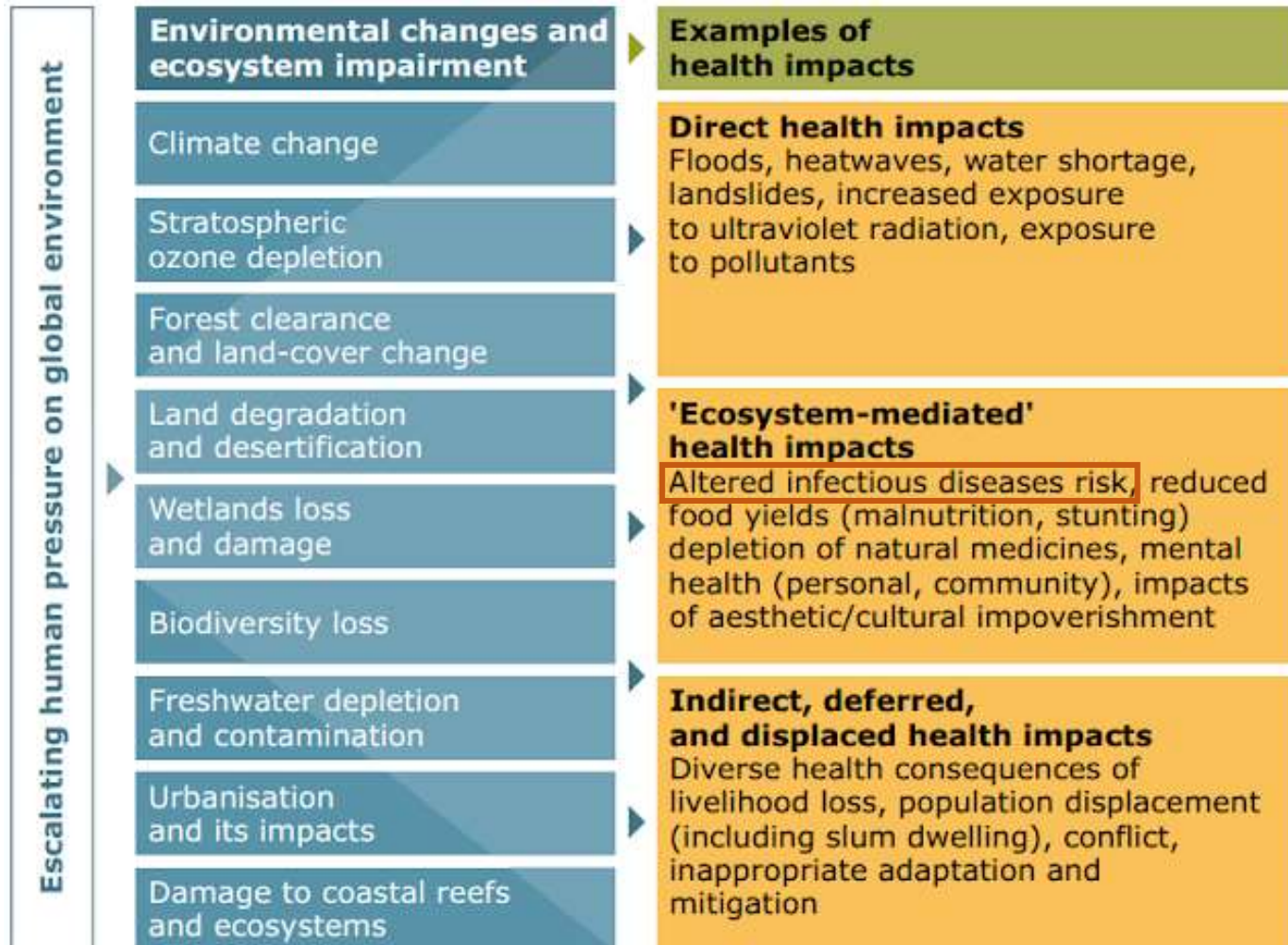
One Health is a **collaborative, multidisciplinary and multisectoral approach** to address urgent, current or potential health threats at the human-animal-environment interface at sub-national, national, global and regional levels.



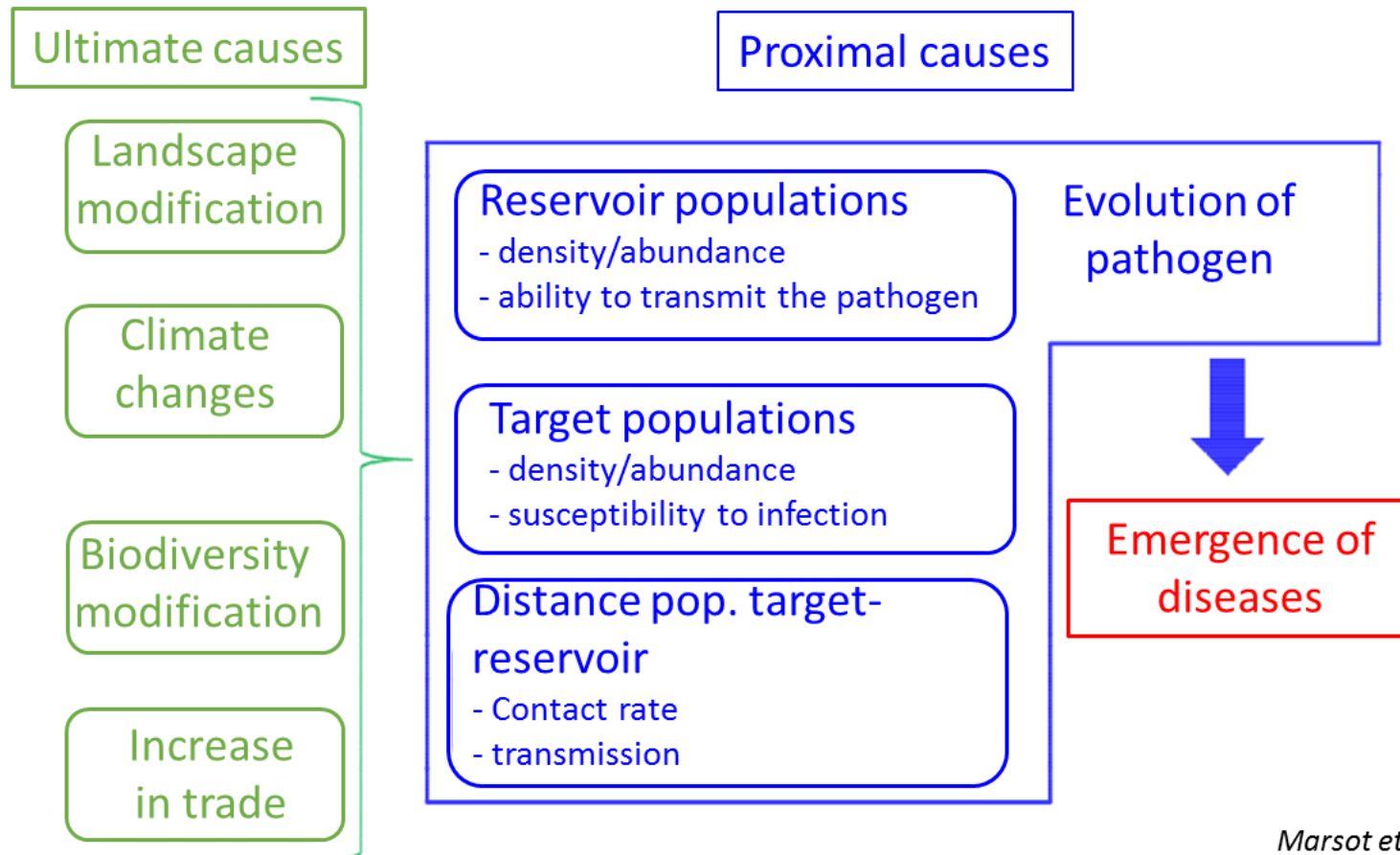
The One Health concept in 2021



Adverse effects of ecosystem change on human health



Why the emergence of infectious diseases?



Marsot et al, 2011

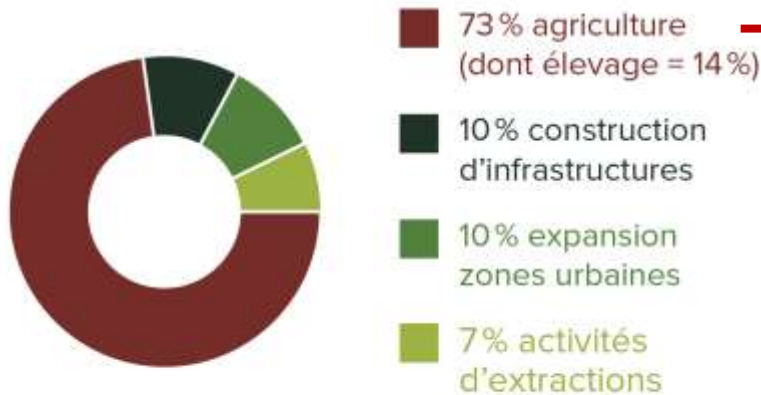
→ Identifying the causes of an emerging/reemerging disease raises questions about understanding complex and often multifactorial phenomena.

Deforestation and emergence of infectious diseases



CAUSES OF DEFORESTATION

analysis of 46 tropical and subtropical countries



Source : Rapport FAO Situation des Forêts du Monde 2016



Artificial fish ponds spread throughout the Brazilian Amazon = breeding grounds for malaria-carrying mosquitoes.

Abandoned pits after illegal gold mining = breeding grounds for malaria-carrying mosquitoes.

Loss of biodiversity and health risk



Biodiversity loss, especially caused by habitat destruction → increases the risk of infection?

- **Wildlife:** Several studies show that increasing local biodiversity in a natural area reduces the number of cases of Lyme disease. Dilution effect= correlation between species richness and infectious disease
- **Breeding** (e.g. poultry farms): very high density of immunocompromised individuals selected solely on the basis of their protein productivity facilitates the transmission of certain virulent viruses (e.g. avian influenza), whereas these are rare in the natural environment.
- **Soil** (1 g = 1 billion bacteria, from one hundred thousand to one million different species). Soil impoverishment → loss of species capable of degrading pollutants + emergence of pathogenic bacteria ("opportunistic strategists") quick to colonise disturbed



Preserving biodiversity = reducing the risk of infection through interspersed populations.

Anti-inflammatory, biodiversity and rabies



Only 2 types of molecules are used to treat animals in more than 65% of clinical cases

Diclofenac: Anti-inflammatory drug widely used in India since the 1980s (prevention of fever and lameness)



97% of vulture populations have disappeared in India since the early 1990s



*Millions of wild dogs
Millions of bites
1 rabies death/1000 bites
30,000 deaths/year, (> 50% world total)*



*Economic cost: USD 30 billion/year
500,000 Indians treated/year
Management of reservoir animal populations (vaccination and sterilisation costs)*

Synthetic chemicals and health risks



Synthetic chemicals: organochlorine pesticides, herbicides, some plasticisers (bisphenol A, certain phthalates), dioxins or related substances (polychlorinated biphenyls, PCBs), polycyclic aromatic hydrocarbons (PAH), flame retardants, etc.



Recent years have seen a rise in controversy over the impact of pesticides and other endocrine disruptors on health and the environment.

Endocrine disruptors: substances that can interfere with our hormonal system

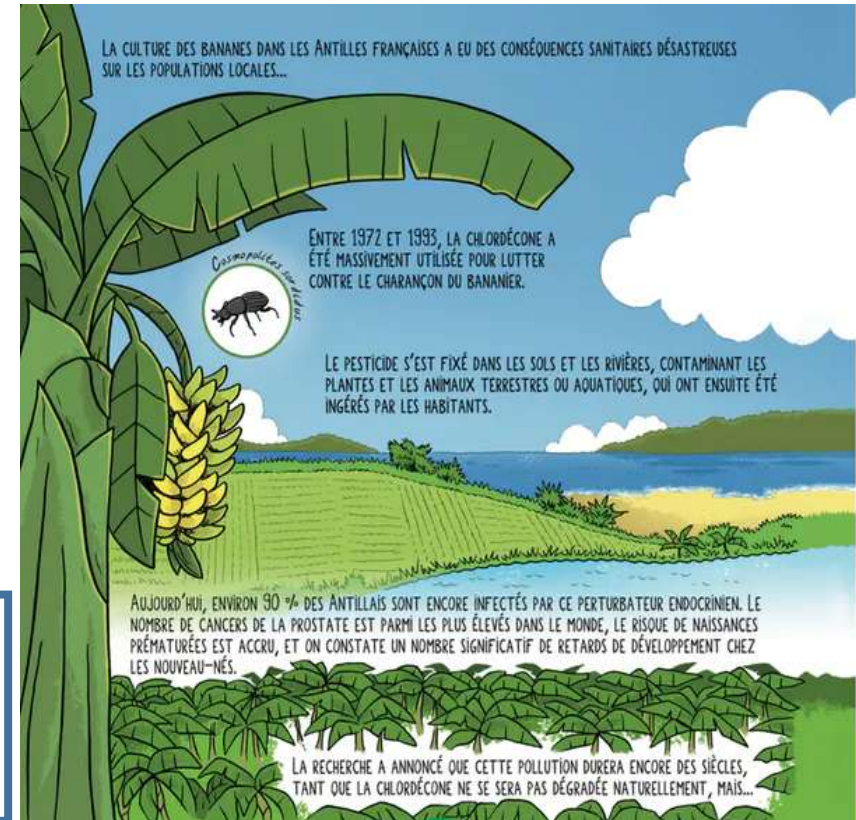
CMR substances: carcinogenic, mutagenic and reprotoxic substances

How can the effects of synthetic chemicals on health and the environment be better taken into account in regulatory procedures?

Insecticide and health risks

Chlordecone, an **insecticide** used on a massive scale in Guadeloupe and Martinique until 1993 to prevent the **banana weevil**, has contaminated the soil, groundwater, rivers and the sea coast. Even today, farm animals are contaminated via their feed (fodder, soil) and can thus lead to contamination risks for humans.

- (i) *resistance to biotic and abiotic biodegradation,*
- (ii) *persistence in the environment,*
- (iii) *bioaccumulation potential in the food chain*
- (iv) *toxicity to living beings (including humans)*



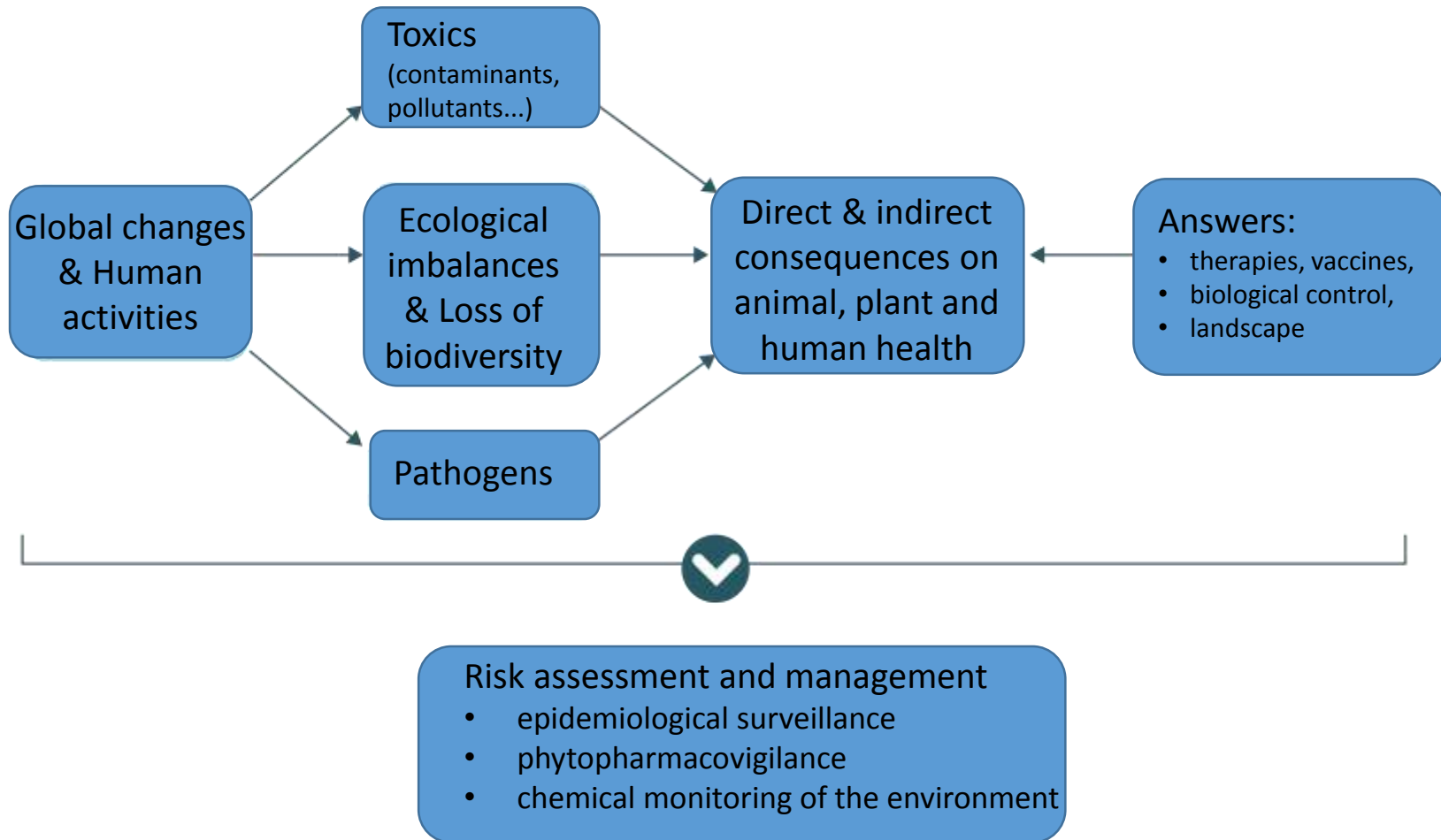
Livestock: cattle reared on polluted sites and inspected in slaughterhouses show \pm significant levels of contamination with individuals $>$ regulatory thresholds set by the EC (threshold set at $100 \mu\text{g CLD.kg}^{-1}$ fat, European regulation EC 839/2008, arrêté du 30 June 2008 NOR: AGRG0816067A).

Human: link between exposure and prostate cancer, link with preterm delivery

From OneHealth to EcoHealth...



...Environmental health at the center of global health



Taking a Multisectoral, One Health Approach: A Tripartite Guide to Addressing Zoonotic Diseases in Countries



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« Growing with the One Health → EcoHealth approach »

