



# Triple

Discover Connect Collaborate

## Connecting within-discipline infrastructures in support of cross-disciplinary collaborations to tackle global changes: an open challenge for open science

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IRD

IR DATA-TERRA





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**Sara Kada** - Infectious disease modeler, she is currently a researcher at GEOMATYS, where she develops solutions to provide emerging and re-emerging infectious disease risk using mathematical modelling and geospatial data.

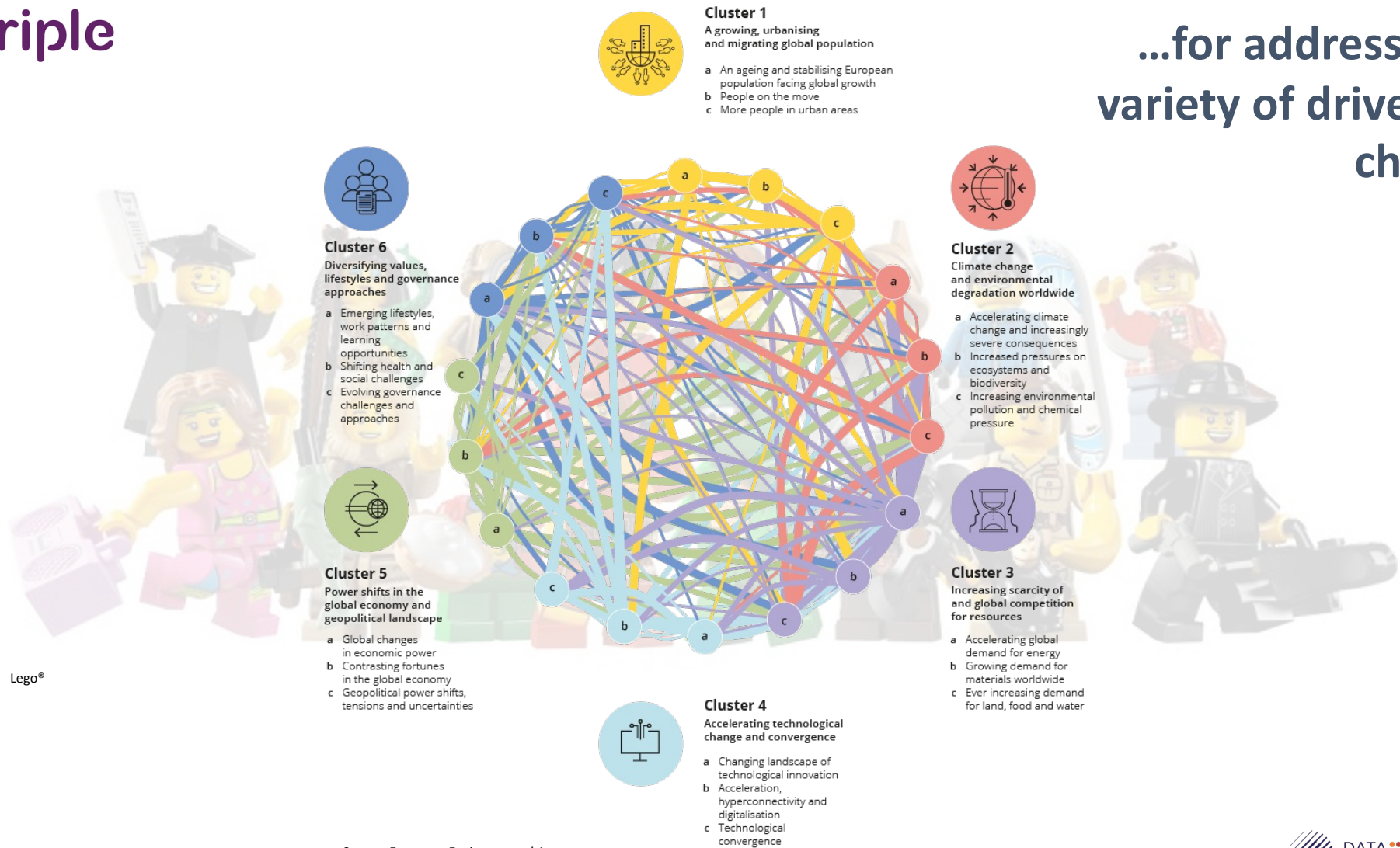
**Alessia Smaniotto** - She develops and coordinates R&D projects for the French infrastructure OpenEdition in the field of participatory research. She is a member of the coordination team of the European OPERAS infrastructure, and represents the infrastructure within the European Citizen Science Association (ECSA). She currently coordinates the European project COESO.





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# ...for addressing a variety of drivers of change

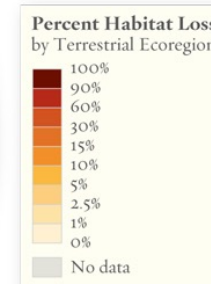
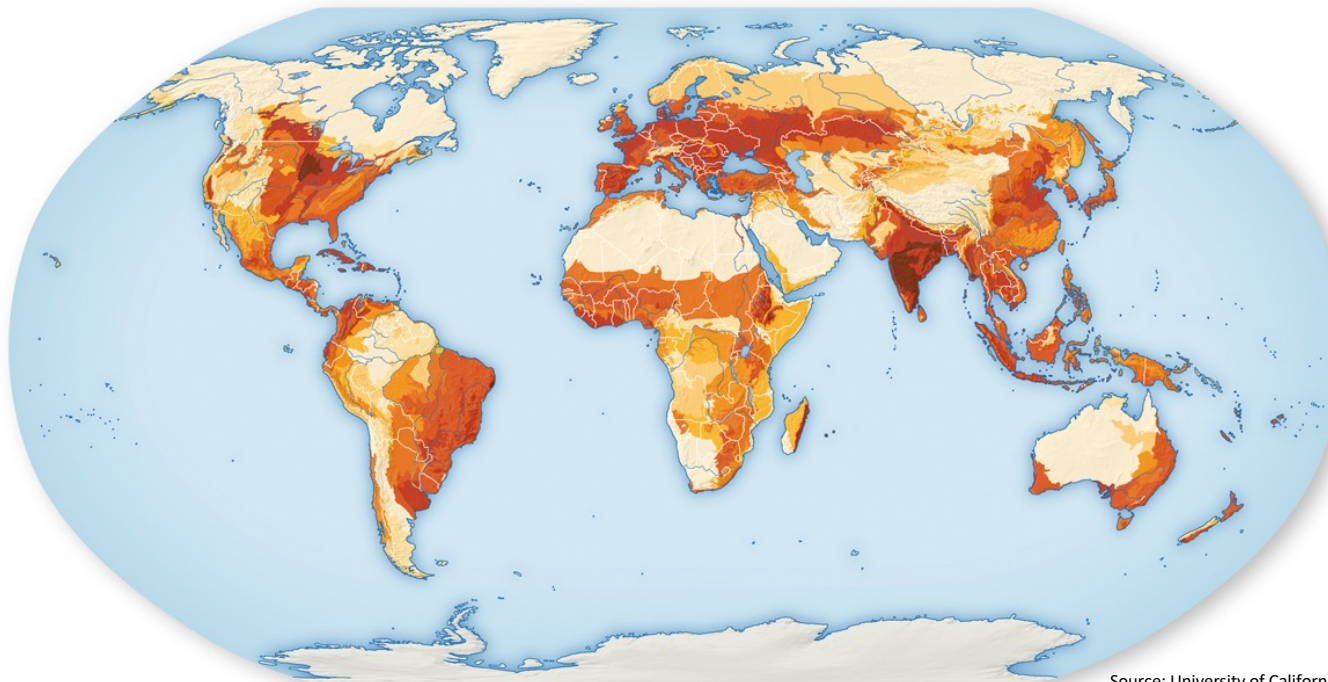
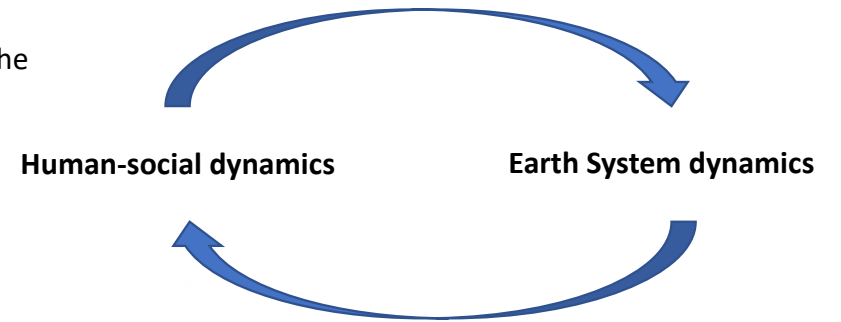


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Source: European Environmental Agency

# Actual global changes

The global changes, environmentally speaking, refer to rapid changes in land-use, biogeochemical cycles, climate and biodiversity occurring on an unprecedented scale in the Earth System.



Source: University of California Press 2010

*Percent of the earth's habitats that have been converted by humans*

# On the Brink

## The Biggest Threats to Earth's Biodiversity

Over the past few decades, the variety of life on Earth has decreased significantly.

**68%** Vertebrate species populations have dipped an average of 68% between 1970 and 2016.

What key factors have contributed to this loss? Here's a look at some of the major threats to the world's biodiversity, and the impact each threat has globally.

### Invasive species and disease

Invasive species can disrupt native species by:

- Introducing disease
- Preying on native species
- Taking up space, food, and other resources



### Climate Change

Climate change triggers irregular seasonal change, which confuses the natural order of phenomena such as migration and reproduction.



### Pollution

Different forms of pollution have various effects on a species' environment. For instance, an oil spill has a sudden impact, whereas other pollutants, like microplastics, have a more gradual effect.

### Changes in land and sea use

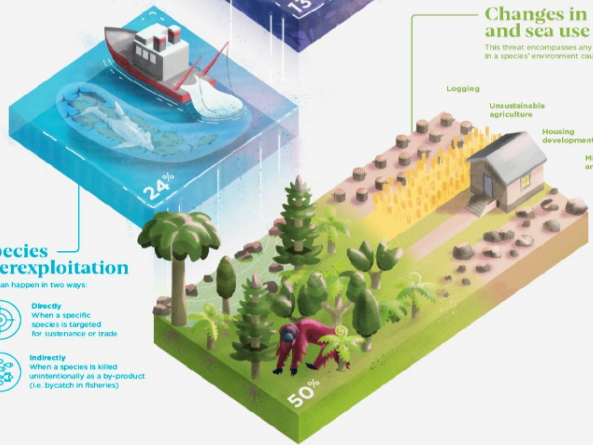
This threat encompasses any change in a species' environment caused by:

- Logging
- Unsustainable agriculture
- Housing development
- Mining and more

### Species overexploitation

This can happen in two ways:

- Directly** When a specific species is targeted for sustenance or trade
- Indirectly** When a species is killed unintentionally as a by-product (i.e. bycatch in fisheries)



EDITORIAL

## Climate science speaks: "Act now"

"It is now up to leaders in every country... to act boldly."

EDITORIAL

"...communities must lead and define research..."

## Decolonize climate adaptation research

PERSPECTIVE

## Adapting to the challenges of warming

The impact of regional heat events is becoming more important to quantify

Accelerated Article Preview

## Climate change increases cross-species viral transmission risk

Received: 24 January 2020

Colin J. Carlson, Gregory F. Albery, Cory Merow, Christopher H. Trisos, Casey M. Zipfel,

Accepted: 21 April 2022

Evan A. Eskew, Kevin J. Olival, Noam Ross & Shweta Bansal

POLICY FORUM

## Strengthen climate adaptation research globally

More international incentives and coordination are needed

Source: Science; Nature



The question refers to the **Earth System governance**...

- Spatial downscaling (from global to local) and integration of scales;
- Roles and responsibilities of actors... justice, fairness and equity;
- Attributes to enhance capacity to adapt;
- Accountability and legitimacy in terms of balance of interests and perspectives.

- Find **extensive new sources of data about the human-social dynamics of global changes** (demography, migration, consumption, socio-economic processes, governance, wellbeing, health, etc.), and derive robust comprehensive views of the global state from those data.
- Use the knowledge extracted from these data to feeding different models of social dynamics related to various aspects of global changes to **allow policy makers and citizens to explore possible futures and better understand past trends**. It should be underlined that we expect the system to include a multiplicity of models and data sources, corresponding to different problems and questions, and developed by a large scientific community.
- Include the **participation of stakeholders and decision makers at various stages of the modelling process**, in order to incorporate some of their specific knowledge.





**CHALLENGE**

**Technical...**  
Understandable  
metadata across  
domains,  
Interdisciplinary data  
access and discovery  
harmonization,  
Interoperable services...

**Economic...**

**Social...**  
Trustworthiness,  
justice and equity...

**Scientific...**  
Different epistemology  
between "hard" and  
"soft" sciences,  
Objectivity in science...

**Geopolitical...**

*“What are the major challenges of cross-disciplinary data and service integration technically, scientifically and socially to face global changes?”*

- Share **experiences**, as well as technical and conceptual solutions already explored for integrating diverse data types from a variety of sources within interdisciplinary projects;
- Stimulate **dialogue** with SSH communities around technical and epistemological barriers and bottlenecks on transdisciplinary approaches; and then
- Participate to the identification of some valuable theoretical and practical **collaboration** perspectives among disciplines as an efficient way for the analysis and the comprehension of global changes.