

Systems Analysis in the Americas

The power of Systems Analysis: *How the integrated approach of systems analysis increases efficiencies and effectiveness of government policies*

Dr. Albert van Jaarsveld
IIASA Director General and Chief Executive Officer

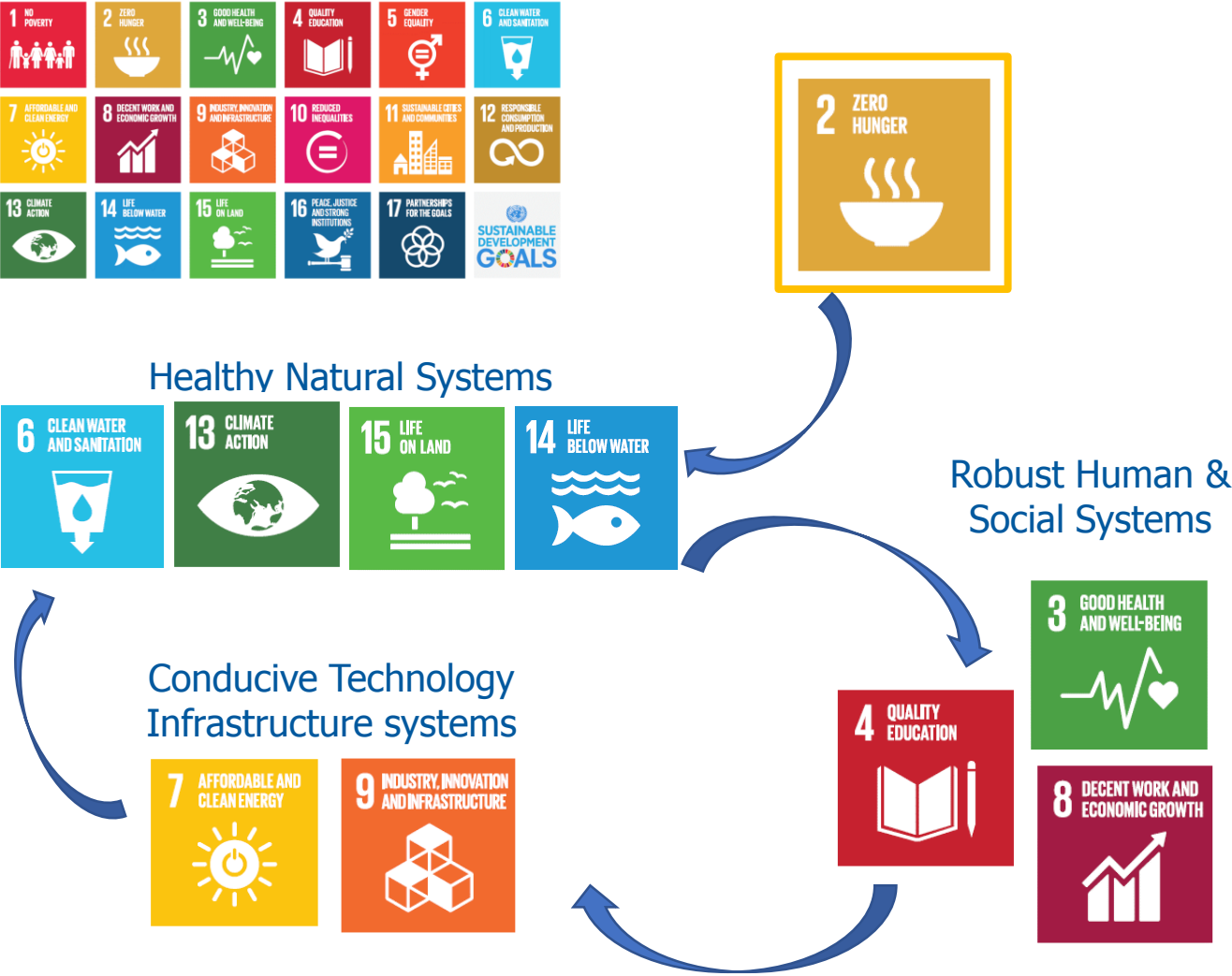
September 2019



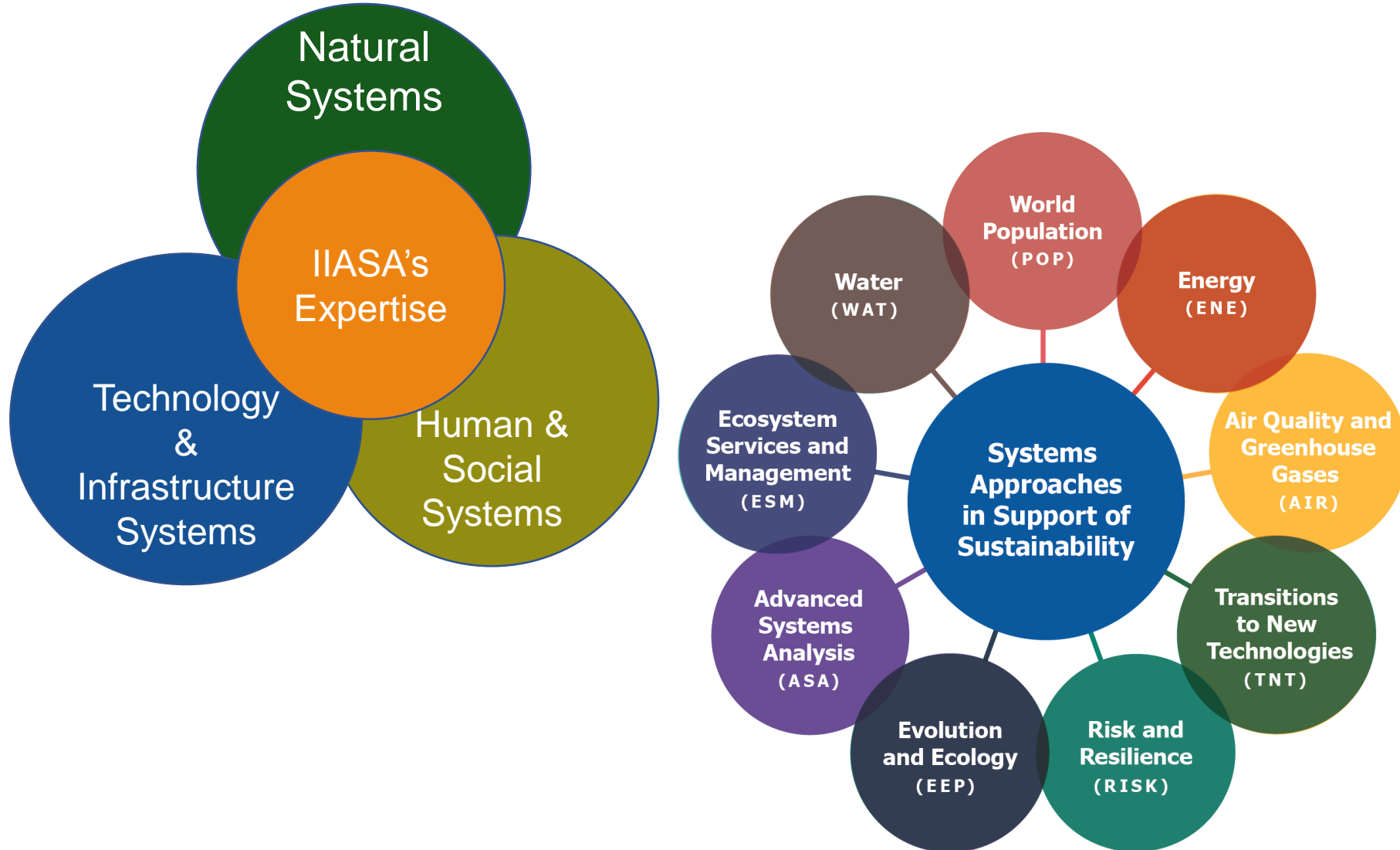


An international research institute that conducts multidisciplinary/transdisciplinary research to help policymakers find long-term solutions to global and universal challenges facing countries

Systemic understanding?



Solving global and universal challenges



Improving the science policy interphase – addressing global and universal challenges through systems approaches

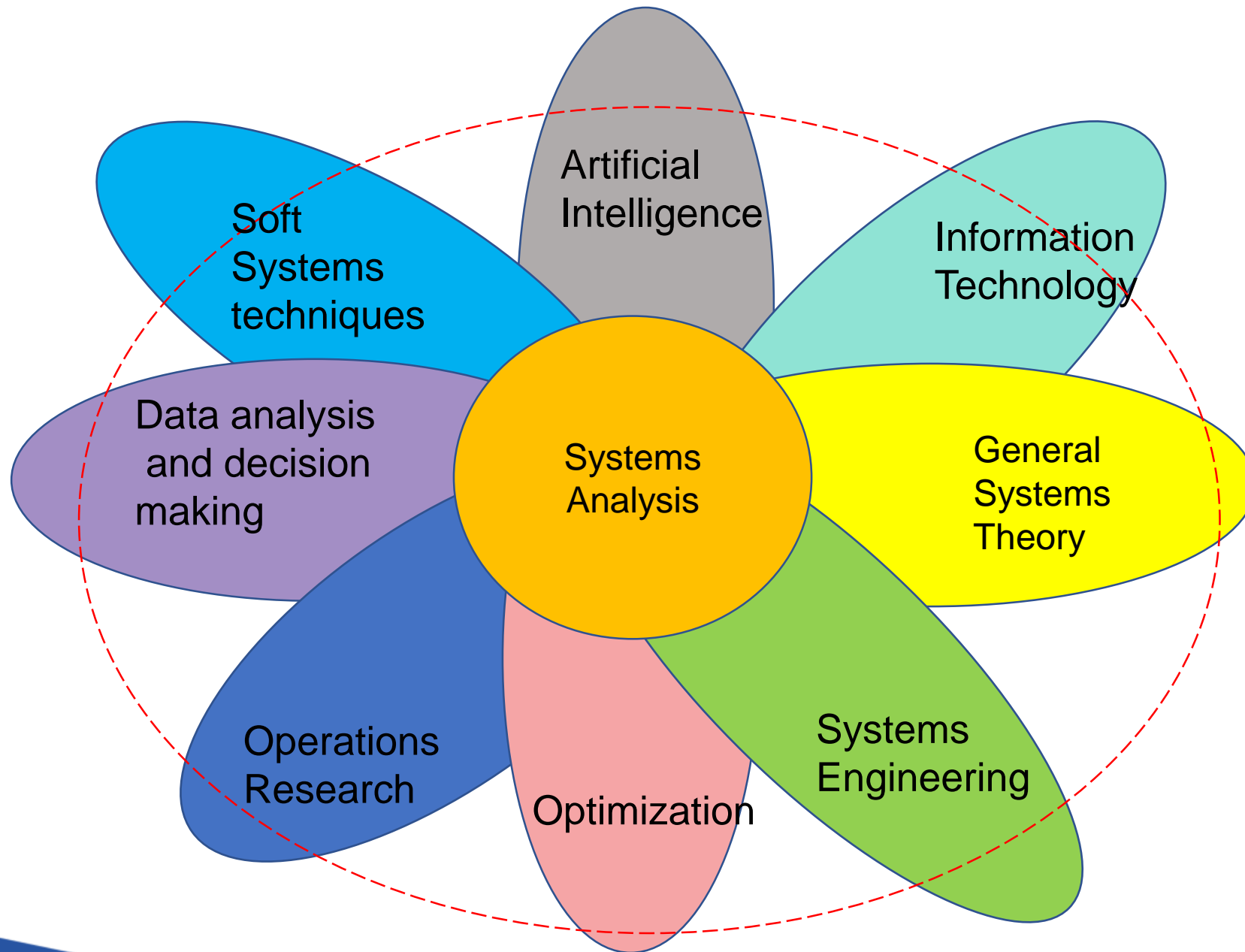
Role of Systems thinking

- We live in a systems world
- Improved integration - economic, social, environmental and policy dimensions
- Inherent non-linearities
- Combination of scientific, policy and practical expertise – pursuit of sustainability
- Governance implications - design, management (institutions, organizations and social structures)
- Uncertainty towards resilience (risk)

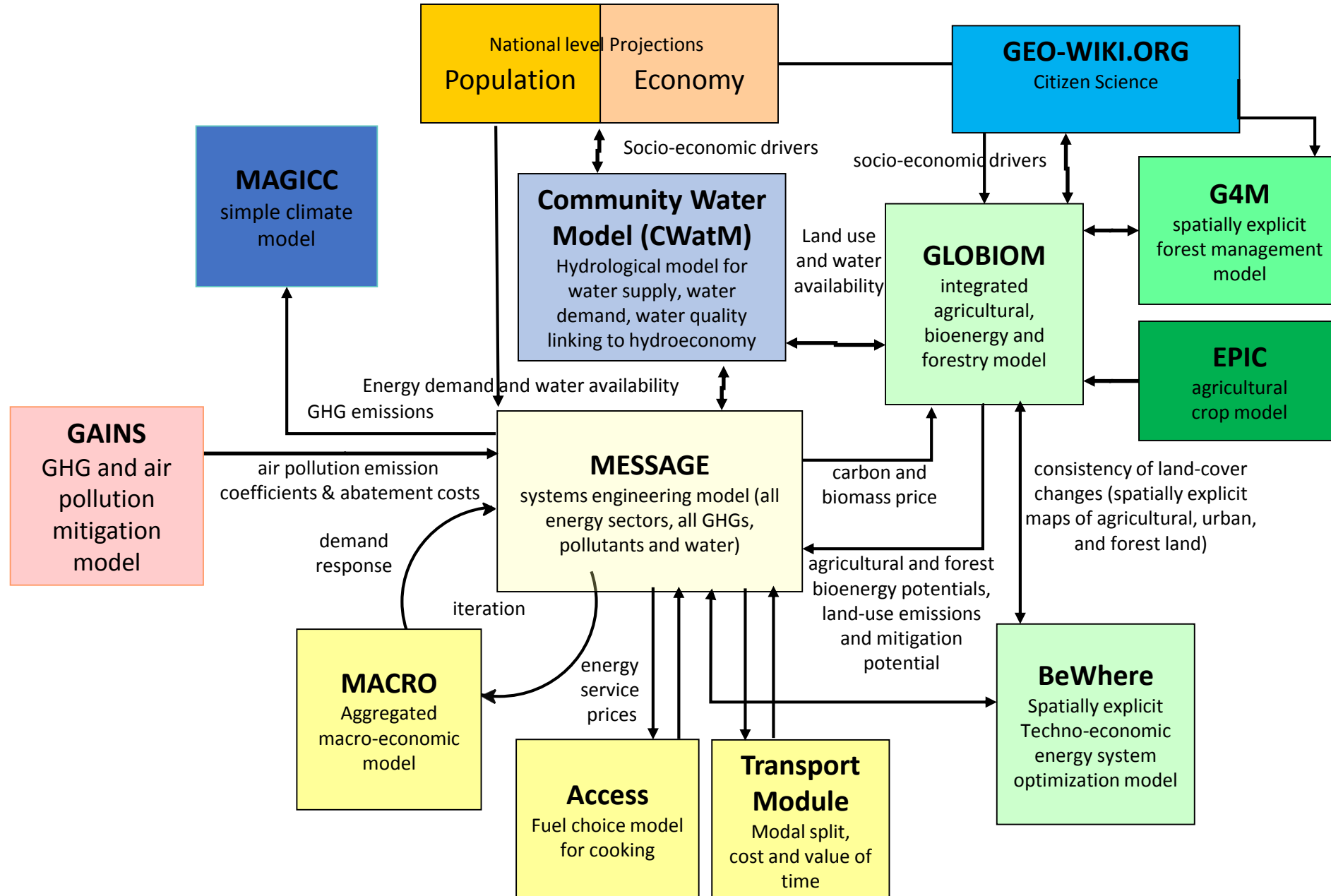
Today's problems are often yesterday's solutions

- Minimizing unintended consequences

Systems Analysis: Tools of the trade



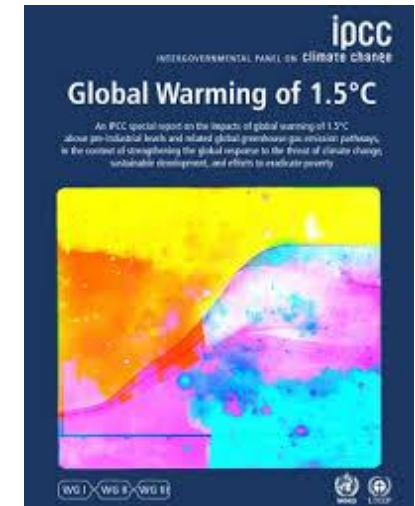
The pursuit of an integrated assessment framework



Recent Policy Impact - IPCC Special Report on Global Warming of 1.5°C

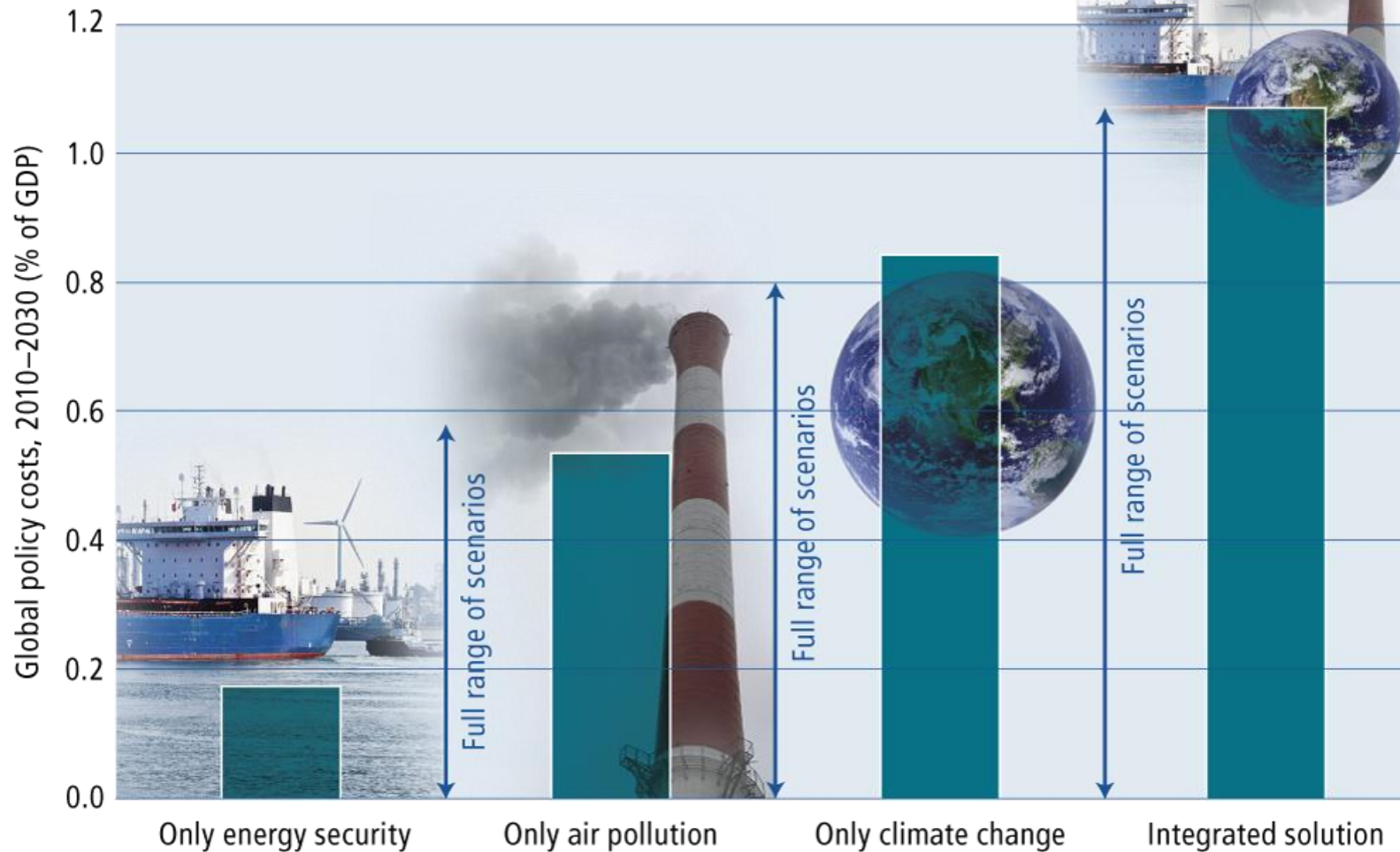


Paris climate change agreement aims for a global response to limit temperature increase to 1.5°C. At this time, December 2015, IIASA had one of the few research groups that had conducted analysis into how to achieve this target.

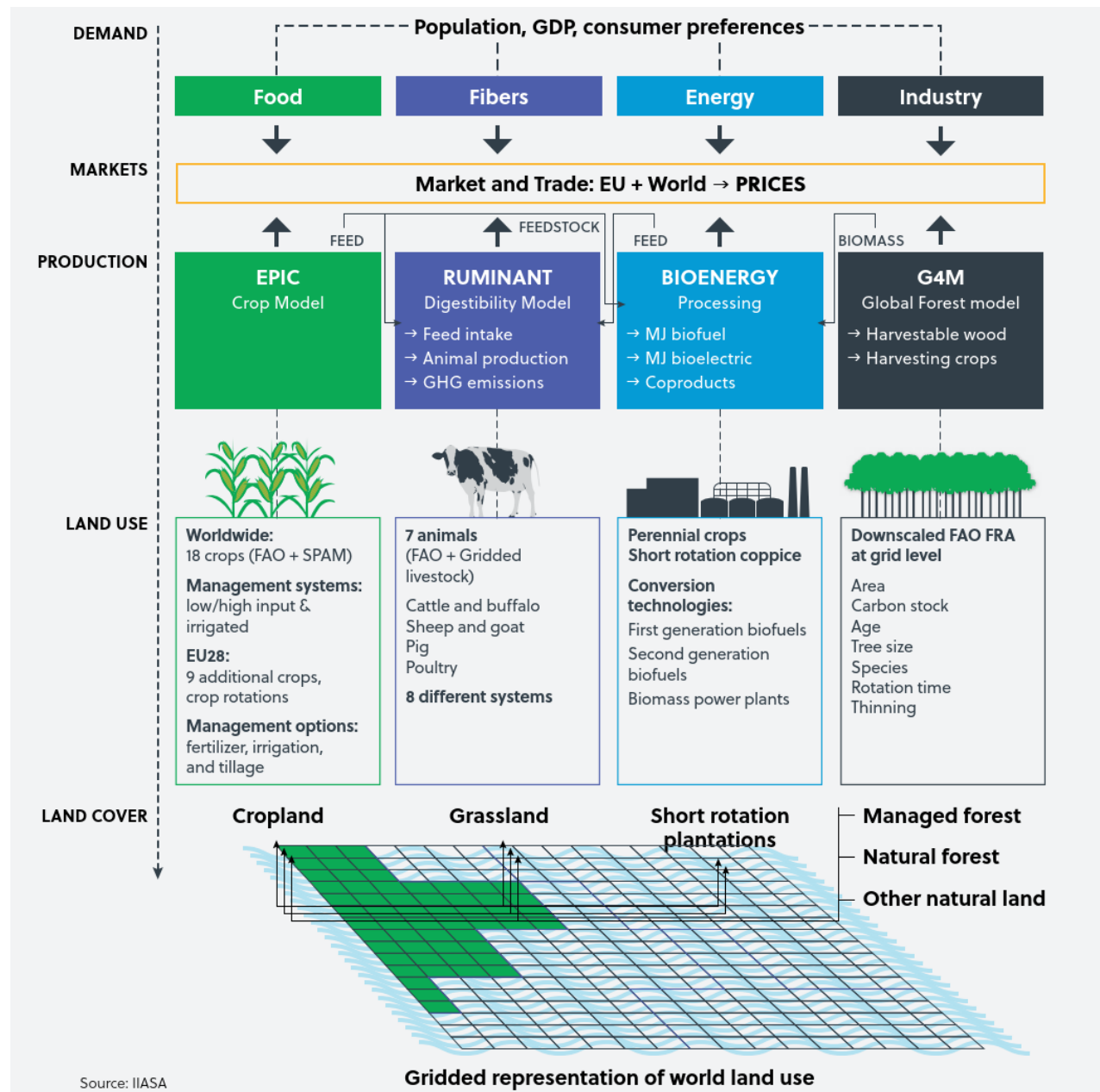


The European Commission adopted a long-term strategy, A Clean Planet for all, on how Europe can become climate neutral by 2050 and meet its Paris Agreement commitments. IIASA research contributed to the quantitative backbone

Multiple benefits of integrated policies (harnessing synergies and trade-offs)



Source: McCollum, Krey, Riahi, 2012



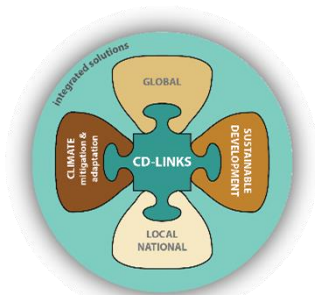
GLOBIOM

Integrating disciplines

CD-LINKS: Cutting edge science, integration of global and national perspective

- low carbon development pathways, climate change and sustainable development linkages, policy, capacity

GLOBAL transformation pathways



Improved representation of national circumstances and policy priorities

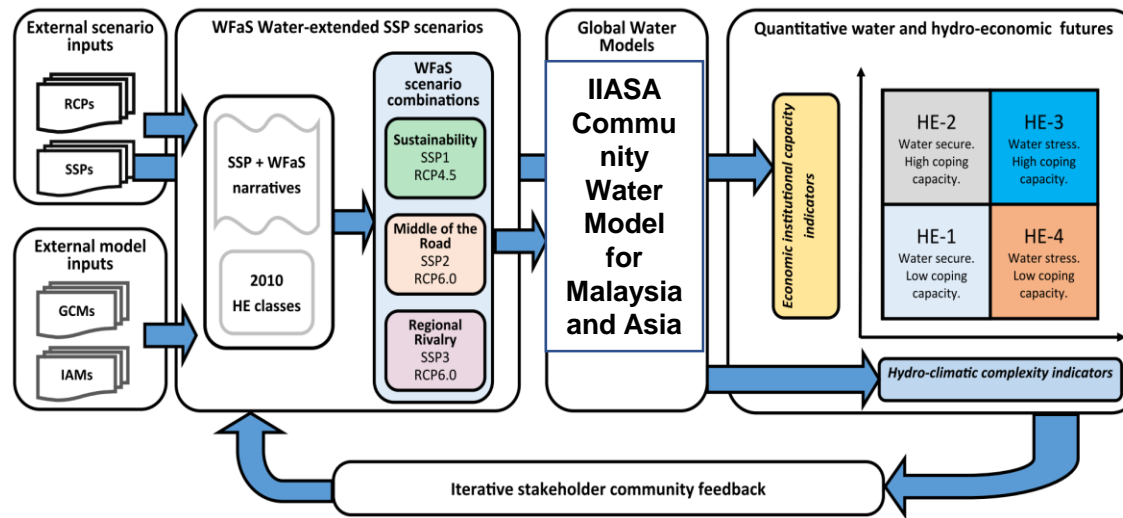
Integrating spatial scales

NATIONAL mid-century strategies

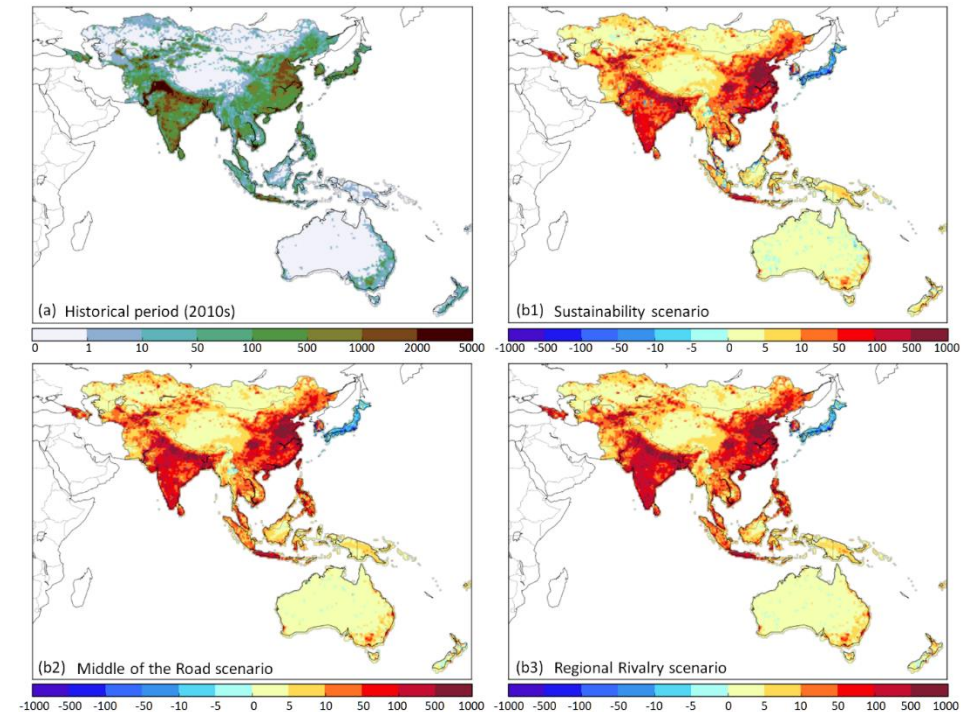
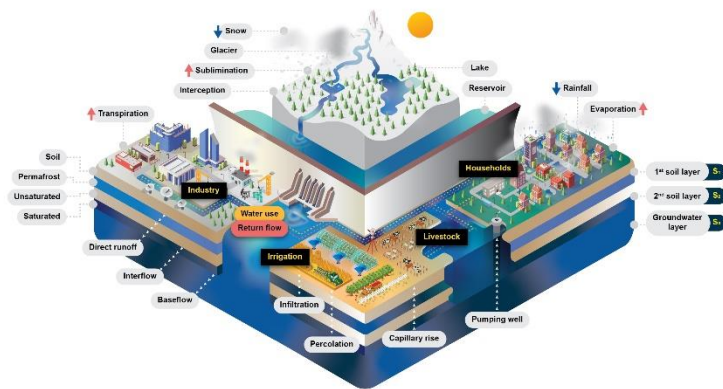


Water Futures and Solutions (WFaS) Initiative and framework

*Malaysia has seasonal water scarcity



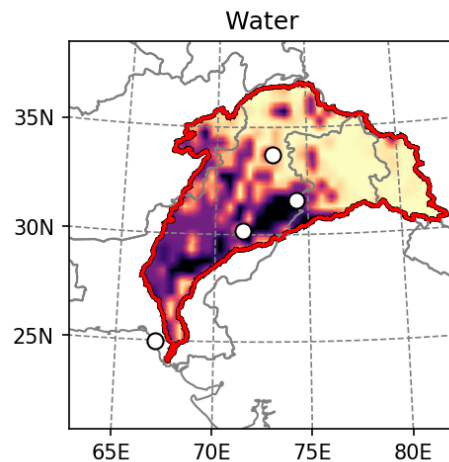
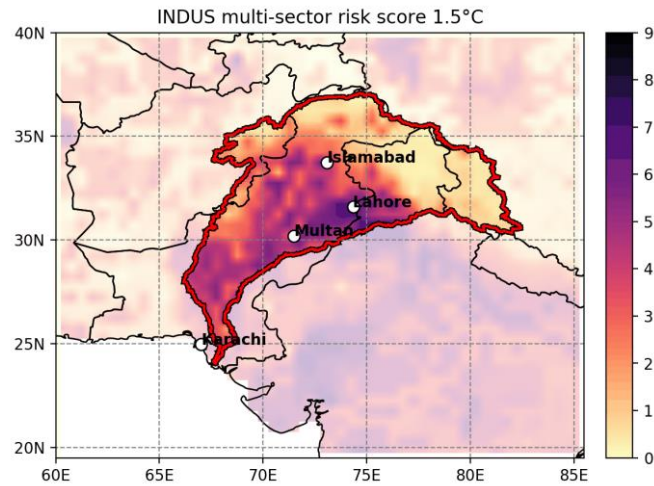
Malaysia/Asia Future water demand for 3 SSP-RCP scenarios



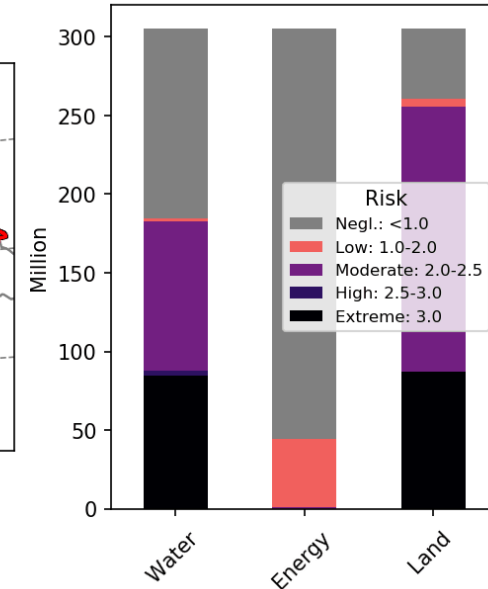
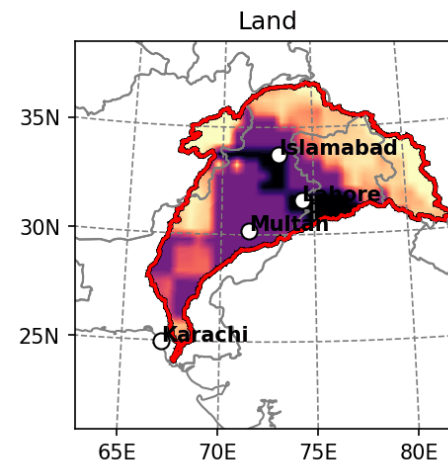
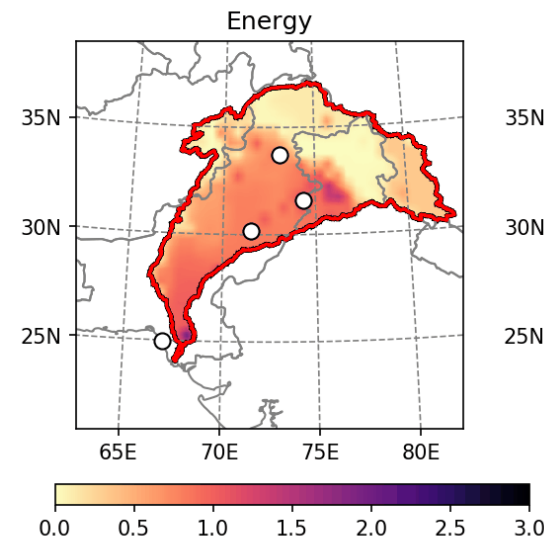
Integrating temporal scales

Hotspot basin: *Indus – ISWEL project*

Current risks in water and land sectors
With warmer temperatures
– energy risks affect most regions



1.5°C



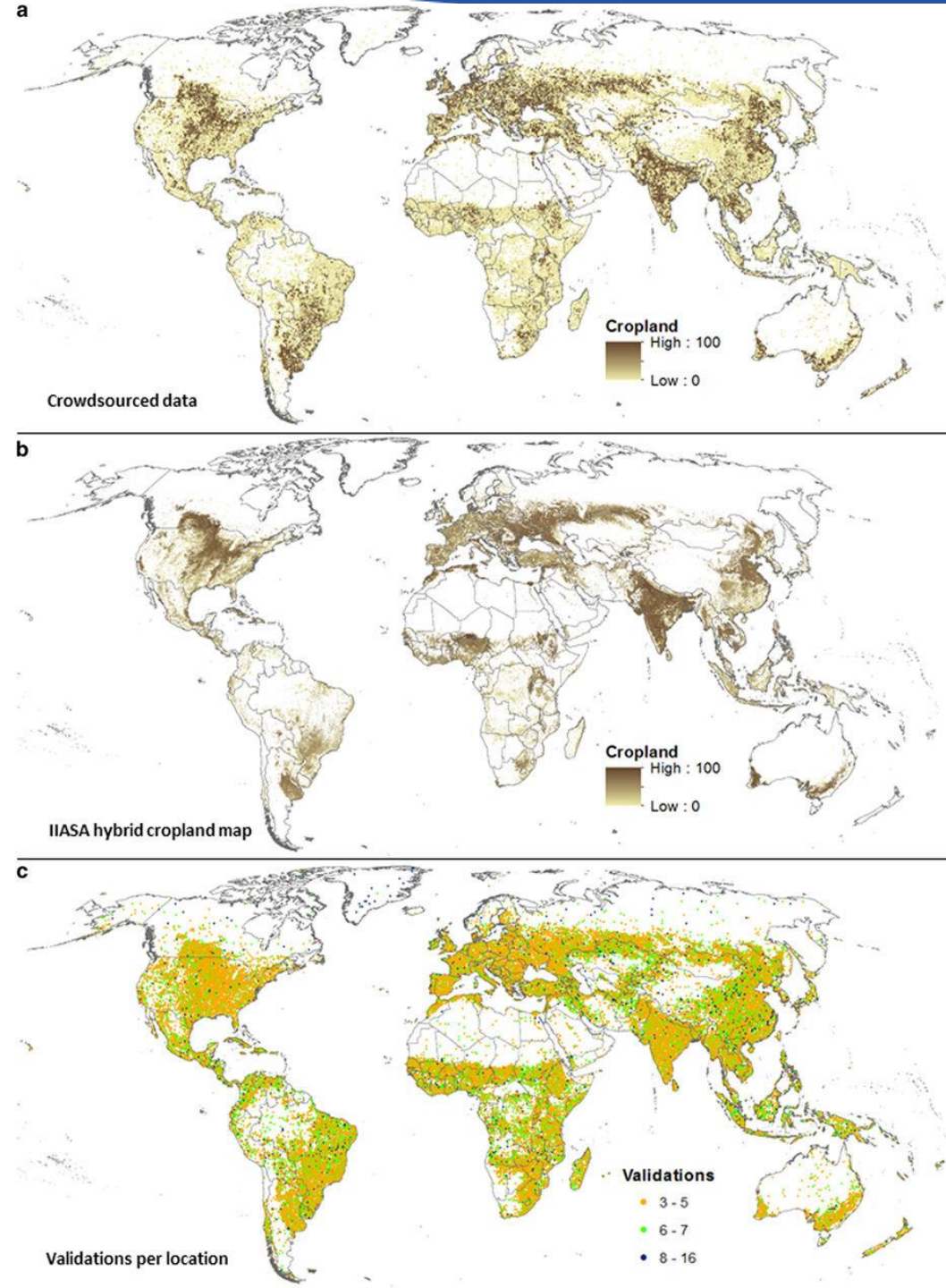
Integrating disciplines, temporal and spatial scales

Citizen scientists and IIASA scientific network make three new data sets on forest cover, land use and cropland publicly available

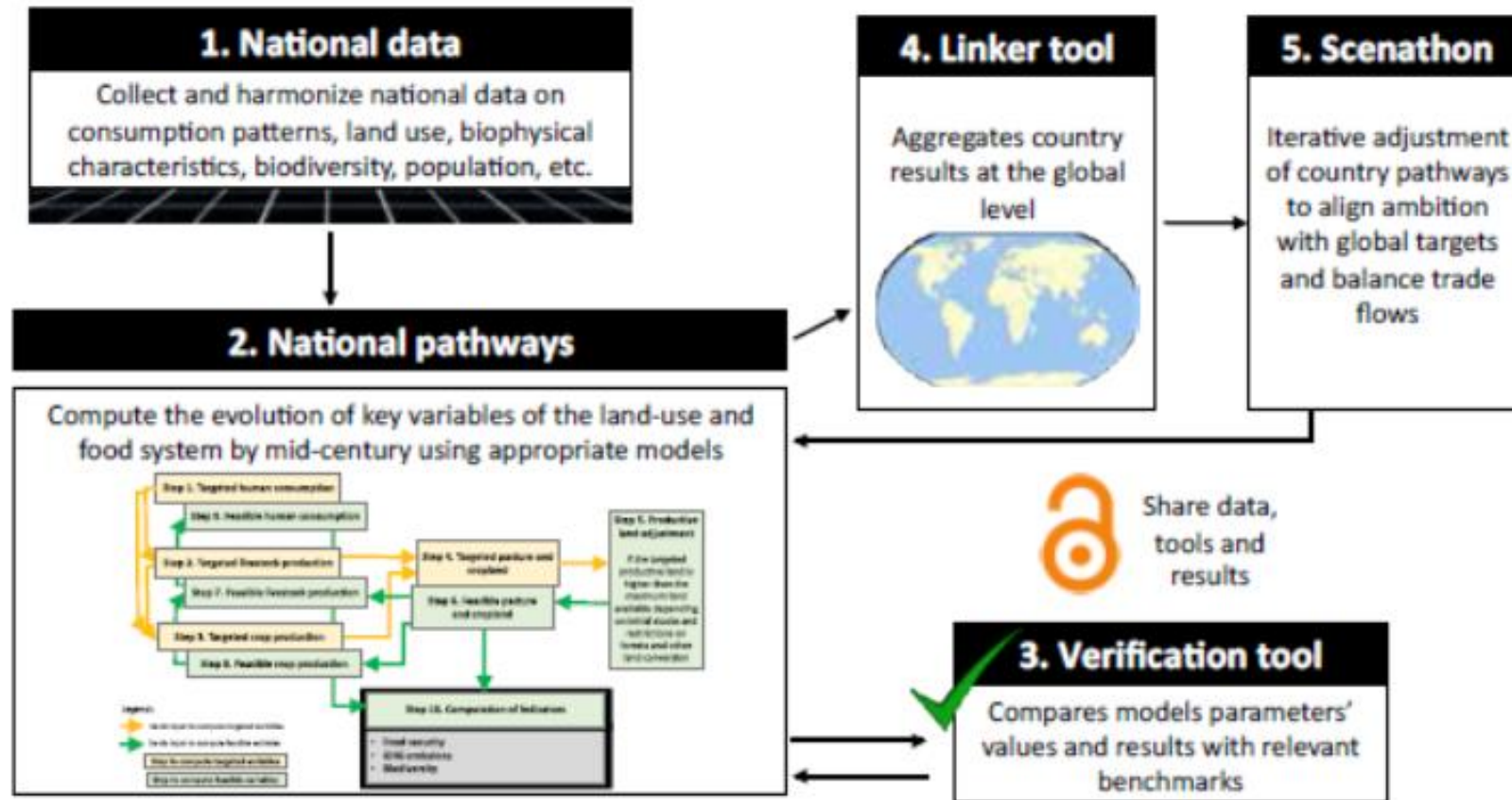
Laso Bayas JC, Lesiv M, Waldner F,
Schucknecht A, Duerauer M, See L, Fritz S,
Fraisl D, et al. (2017). A global reference
database of crowdsourced cropland data
collected using the **Geo-Wiki platform**.
Scientific Data 4: e170136.
DOI:10.1038/sdata.2017.136.

SCIENTIFIC DATA

Citizen science

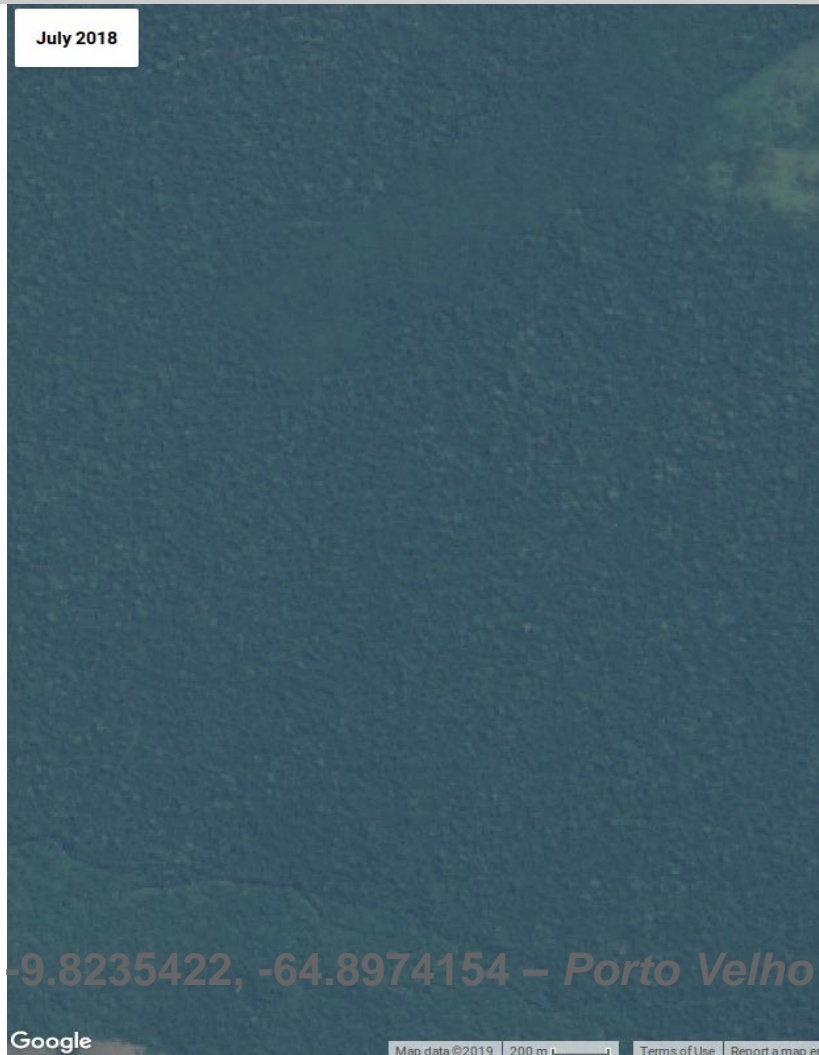


Food, Agriculture, Biodiversity, Land, Energy (FABLE)



Co-design, co-production and co-implementation

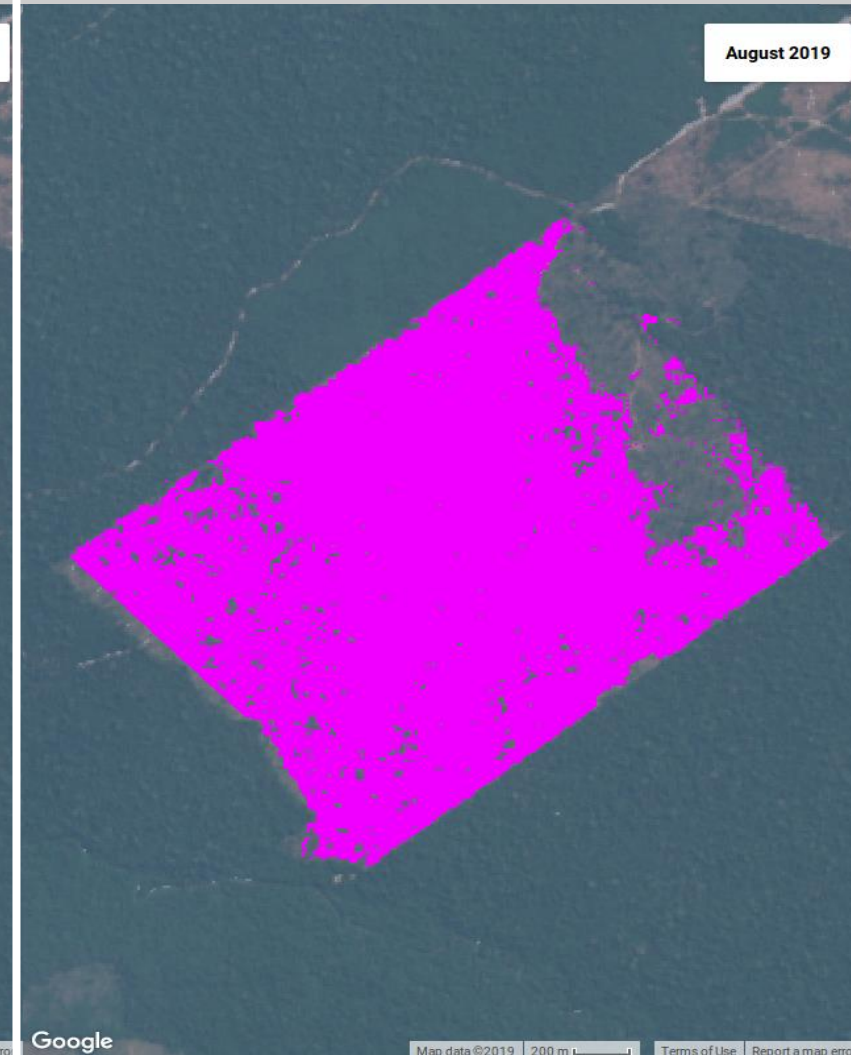
Forest cover



Deforestation



Automated deforestation detection using Sentinel 2



“A man who uses an imaginary map thinking that it is a true one,
is likely to be worse off than someone with no map at all.”
— **Ernst Schumacher**,

Improved Human Development Index

The Human Life Indicator

IIASA researchers have introduced a new, simple measure for human wellbeing across countries, called the Human Life Indicator (HLI), that takes inequality into account and could replace the commonly used but error-prone Human Development Index (HDI).



Huge crowds of people, Hong Kong © Tidusx | Dreamstime.com

Measuring the overall wellbeing of populations is crucial for evaluating the success of policies. The Human Life Indicator expresses wellbeing in terms of years of life, similar to life expectancy at birth. However, unlike any other current measure, it takes not only the mean value but also the inequality in longevity into account. The wide availability of mortality data means that the HLI can be used for reliable comparisons of wellbeing across countries, in the past as well as the present.

Figures in Table Re-Aging 4 includes the Human Life Indicator, the Human Development Index, and life expectancy at birth for all UN countries and regions.

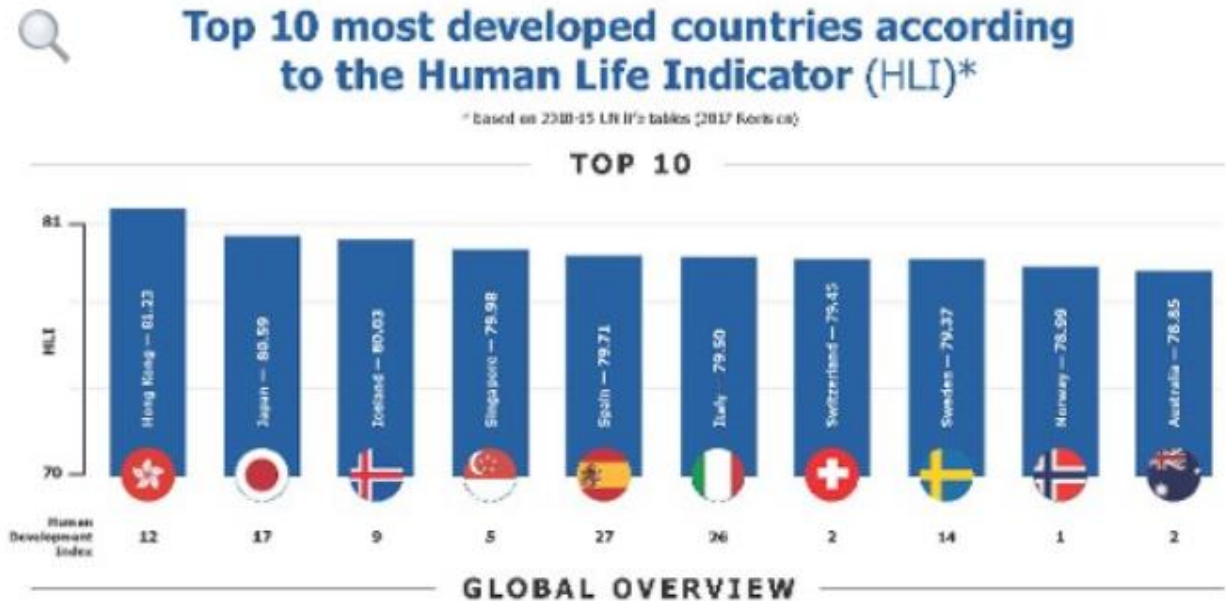
The Human Life Indicator and life expectancy at birth are based on the UN's 2017 revision of *World Population Prospects*. The Human Development Index is from 2016.

New measures of human development are now available for downloading

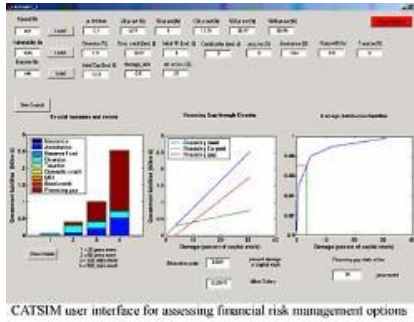
[DOWNLOAD DATA](#)

Data accompanying Ghislandi S, Sanderson WC, Scherbov S (2018), *A Simple Measure of Human Development: the Human Life Indicator Population and Development Review*.

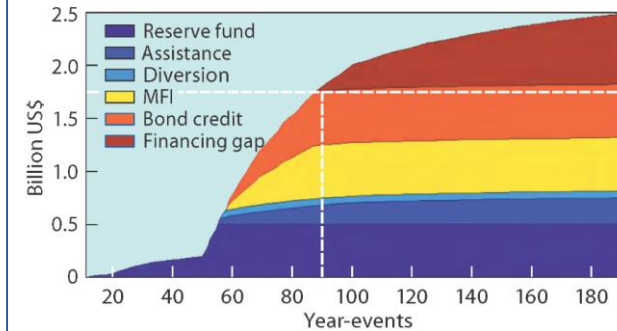
The research leading to these results has received funding from the European Research Council under the European Union's Seventh Framework Programme (FP7/2007-2013) / ERC grant agreement no ERC2012-AdG 323947-Re-Ageing. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.



Dealing with systemic risks under conditions of uncertainty

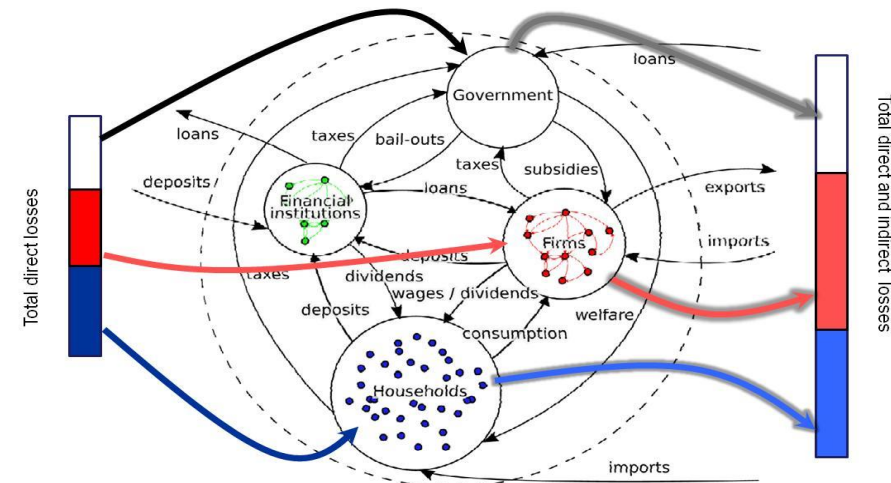


1. CATSIM (catastrophe simulation) model for disaster mitigation and development planning – 25 Finance ministries (risk transfer mechanisms)



CATSIM: The Mexican government issued catastrophe bonds to cover the risk of a major earthquake or hurricane--risk transferred to the international reinsurance and capital markets.

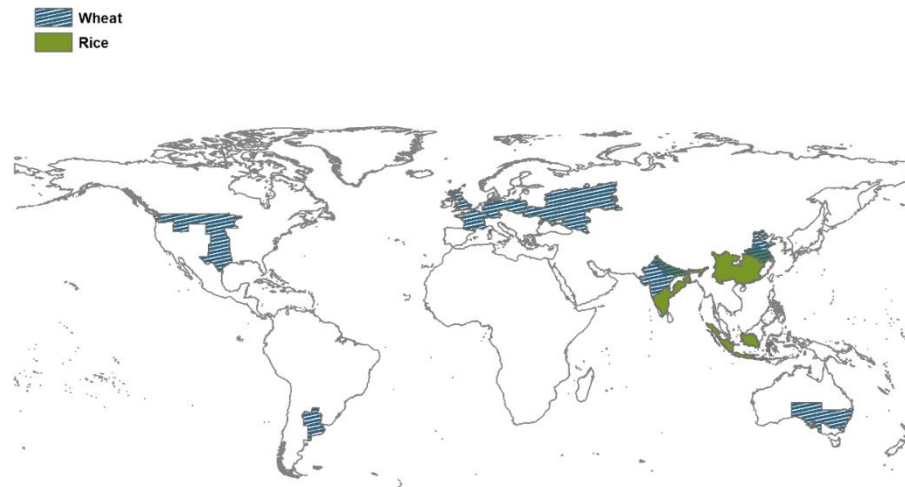
2. SHELscape - spatially-explicit agent-based model: post-natural disasters impacts on local economies with regional dependencies (100 000s).



3. Soft systems techniques -
Participatory decision support
systems, smart games and social
simulations to tackle policy issues
- overcome analysis paralysis
(>15)



4. IIASA applies advanced
methods (copula) that
improve assessments of
spatially diverse risks by
accounting for their
interdependencies



Risk of failure of multiple bread baskets

Six Major Transformations (TWI2050.org)



Attracting some of the best researchers



Prof. Tjalling Koopmans
and Prof. Leonid Kantorovich
Nobel Prize in **Economics** (1975)

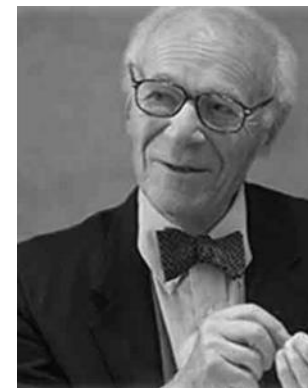


Prof. Thomas C. Schelling
Nobel Prize in **Economics**
(2005)

Prof. Crutzen and
Prof. Mario Molina
Nobel Prize for **Chemistry**
(1995)



Prof. Lawrence Klein
Nobel Prize in **Economics**
(1980)



Authors of the Intergovernmental Panel
on Climate Change Reports
Nobel **Peace Prize** (2007)



Prof. William Nordhaus
Nobel Prize in **Economics**
(2018)

IIASA highly cites researchers, 2018

- *Clarivate Analytics (top 1% 2006-2016)*



Keywan Riahi

Program Director, Energy Program

Michael Obersteiner

Program Director, Ecosystems and Management Program



Zbigniew Klimont

Research Scholar, Air Quality and Greenhouse Gases Program

Andreas Richter

Guest Research Scholar, Ecosystems and Management Program



Petr Havlik

ERD Center Head and Deputy Program Director, Ecosystems Services and Management Program

Volker Krey

Deputy Program Director, Energy Program



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Acting Program Director, Water Program



Thank you

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Systems solutions for
today's complex problems

