

# A perspective on the linkages between LCLUC to Future Earth GRNS (NEXUS)

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# About Future Earth

**futureearth**  
Research. Innovation. Sustainability.

## Who is Future Earth?

Future Earth is a global network of scientists, researchers, and innovators collaborating for a more sustainable planet.

Our mission is to advance research in support of transformations to global sustainability.

Our vision is of a sustainable and equitable world for all, where societal decisions are informed by openly-accessible and shared knowledge.

# About Future Earth

## Who We Are

GOVERNING COUNCIL

SECRETARIAT

GENERAL ASSEMBLY

INTERNATIONAL OFFICES

GOVERNANCE

JOIN FUTURE EARTH

Future Earth harnesses the experience and reach of thousands of scientists and innovators from across the globe. This global community is spread over a series of networks and governing and advisory bodies.

### GOVERNING COUNCIL

The Future Earth Governing Council is the elected, operational decision-making structure working on behalf of the Assembly. It oversees the strategic and scientific direction of Future Earth and supports timely decision processes to advance Future Earth's agenda, strategies, activities and structures. The Governing Council is composed of 17 voting members representing the Future Earth Community: the Global Research Networks, the National and Regional Structures, and the Global Secretariat Hubs (Boards of Directors and Funders). In addition, the Governing Council has dedicated seats for representatives from low and middle-income countries as well as early career professionals.

### GENERAL ASSEMBLY

The Future Earth Assembly is an inclusive body representing the full scope of the Future Earth community. The Assembly provides a platform for broad consultation and enables the full community to participate in the development of Future Earth core agenda, strategies, activities and structures.

### SECRETARIAT

The day-to-day operations of Future Earth are carried out by the Secretariat, which is based in eight Global Hubs. These Global Hubs are located in Canada (Montreal), China (Beijing), France (Paris), Japan (Tokyo), South Asia (Bengaluru), Sweden (Stockholm), Taipei (Taipei), and the USA (Boulder and Fort Collins, Colorado, and Fairfax, Virginia).

### CUSTODIAN ORGANIZATIONS

Future Earth has been supported by four Custodian Organizations: the United Nations Educational, Cultural and Scientific Organization (UNESCO), the UN Environment Programme (UNEP), the International Science Council (ISC), and the Belmont Forum. These organizations are considered key to achieve Future Earth's mission by lending their name and leveraging their reputation, networks and other resources to support Future Earth's development, advance its international positioning and effective multi-stakeholder engagement. Custodian Organizations are responsible for establishing and supporting Future Earth's overall mandate, ensuring the fulfillment of its vision and mission, and safeguarding Future Earth's core values.

# About Future Earth

## What does Future Earth do?

We exist to support collaboration between researchers and stakeholders from all different regions, backgrounds, and sectors who are working to generate actionable, solutions-oriented knowledge to help transform toward societies that provide good and fair lives for all within a stable and resilient Earth system.

Future Earth's global community is composed of diverse [Global Research Networks](#), Regional Partners, and National and Local Networks spread across regions, continents, and time zones, coordinated by [Secretariat-led Hubs](#).

The organization's [Governing Council](#), composed of 17 elected members representing the Future Earth community, oversees the scientific and strategic direction of the organization. The [General Assembly](#), which meets annually, is representative of the entire Future Earth Community and fosters knowledge-sharing, innovation, partnership, and participation. Future Earth is supported by four Custodian Organizations: UNESCO, UNEP, ISC, and the Belmont Forum, which help establish and support Future Earth's overall mandate by leveraging their networks, name, and reputations on behalf of the organization.



### Facilitate Research and Innovation

Our [27 Global Research Networks](#) explore interactions among humans and the planet's land, air, water, and biodiversity. We develop and partner on initiatives like the [Earth Commission](#) and the [Science-Based Pathways for Sustainability](#) convened by Future Earth that work to develop science-based targets for systems like land, water, and biodiversity.



### Build and Mobilize Networks

Our vast, transdisciplinary networks link policy, business, and civil leaders with researchers to address key nexus issues, like urbanization, water resources, land-use change, emergent risks, and sustainable production and consumption. Together with the Belmont Forum, Future Earth organizes and hosts the [SRI Congress](#), an annual transdisciplinary gathering of scientists, leaders, innovators, and researchers—the largest global gathering in the sustainability science space.



### Shape the Global Narrative

We help incorporate the latest science into global decision-making and engage in conversations on sustainability solutions. By filling critical gaps in knowledge through transdisciplinary research, our network helps businesses, cities, and governments set meaningful, science-based targets and work toward effective solutions to issues of sustainability. Our [IQ New Insights in Climate Science](#) and award-winning [Anthropocene Magazine](#) offer key takeaways and insights to spark new conversations and guide decision-making.

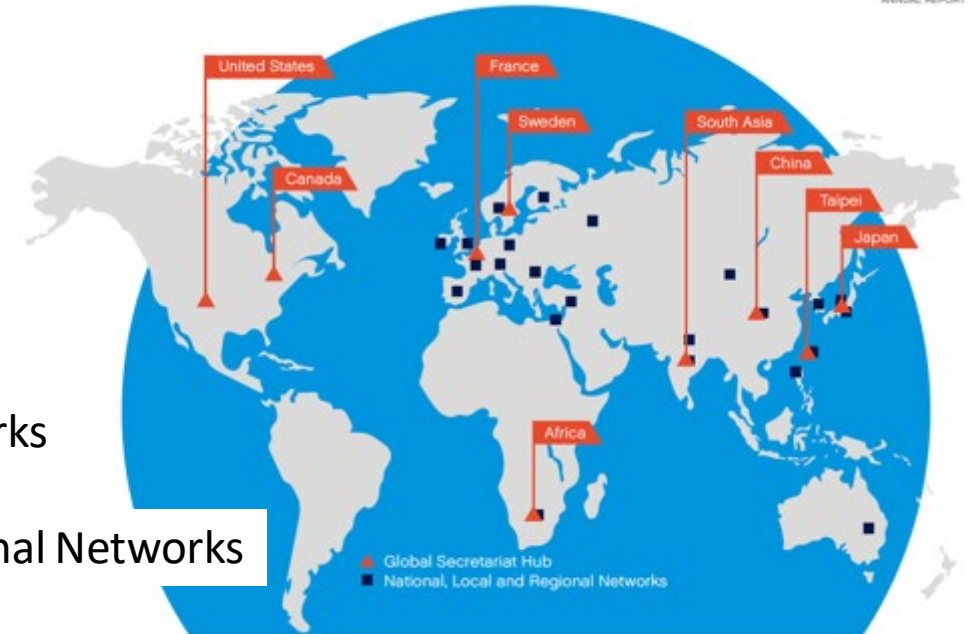
# About Future Earth

## A GLOBAL NETWORK of researchers and innovators

**09** Global Secretariat Hubs

**27** Global Research Networks

**23** National, Local & Regional Networks



Future Earth Annual Report: 2021-2022

<https://futureearth.org/2022/09/20/future-earth-annual-report-2021-2022/>

# The Importance of LCLUC in Future Earth GRNs

A total 27 GRNs and many of them can potentially be good partners with LCLUC

# Land Related 5 GRNs

GLP — Global Land Programme

GMBA — Global Mountain  
Biodiversity Assessment

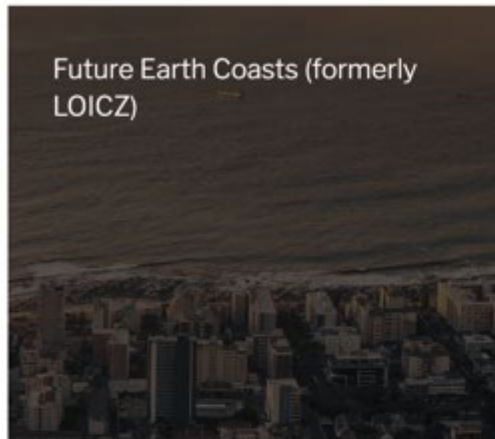
iLEAPS — Integrated Land  
Ecosystem-Atmosphere  
Processes Study

Natural Assets Knowledge-  
Action Network

Water Future — Sustainable  
Water Future Programme

Land information is critically needed in the activities of these GRNs!

# Water Related 5 GRNs



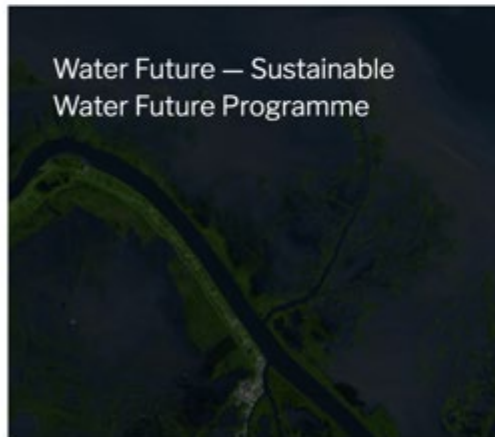
Future Earth Coasts (formerly LOICZ)



IMBeR — Integrated Marine Biosphere Research



MAIRS-FE – Monsoon Asia Integrated Research for Sustainability



Water Future — Sustainable Water Future Programme

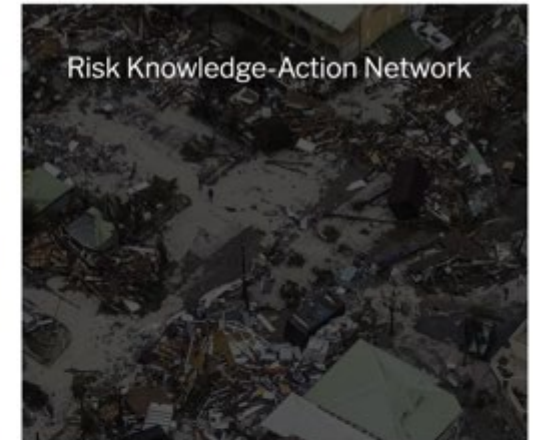


Water-Energy-Food Nexus Knowledge-Action Network

Information related to the temporal and spatial dynamics, quality and quantity, in the air, on the surface, in the soils, or underground, is critically needed to achieve the missions of these GRNs.

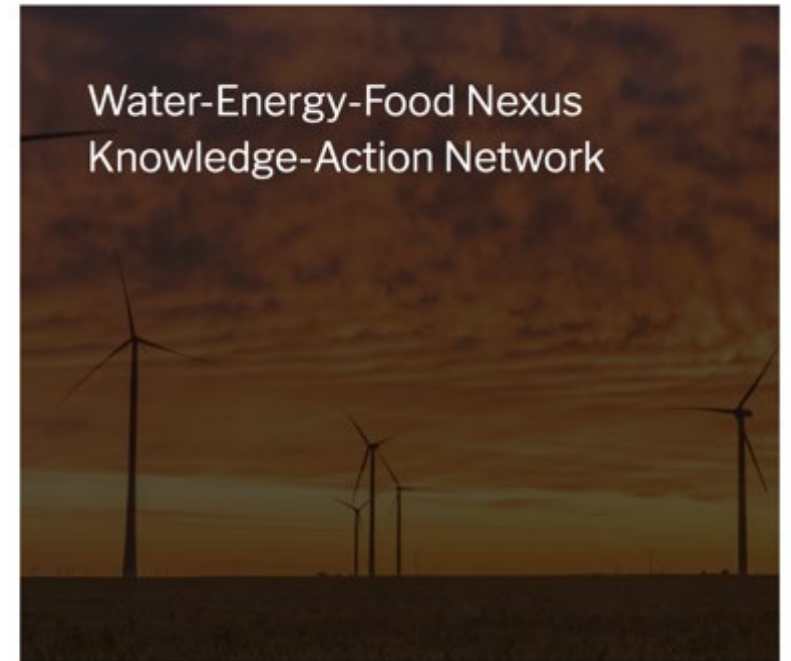


## Urban Related 4 GRNs



Detailed attributes, spatial patterns, changes of urban land plays a key role in these GRNs.

## Energy & Food Related 2 GRNs



Vital to these GRNs is the information and understanding of the land cover and use, including detailed attributes of land system that contribute to the energy and food services. More on this later.

# Climate Related 13 GRNs

AIMES – Analysis, Integration & Modelling of the Earth System

bioDISCOVERY

GCP – Global Carbon Project

IGAC – International Global Atmospheric Chemistry

iLEAPS – Integrated Land Ecosystem-Atmosphere Processes Study

IRG – Integrated Risk Governance Project

Water Future – Sustainable Water Future Programme

MAIRS-FE – Monsoon Asia Integrated Research for Sustainability

oneHEALTH (formerly ecoHEALTH)

PAGES – Past Global Changes

PECS – Programme on Ecosystem Change and Society

Risk Knowledge-Action Network

SOLAS – Surface Ocean-Lower Atmosphere Study



## Water-Energy-Food Nexus Knowledge-Action Network

### WEF NEXUS GRN (2018-)

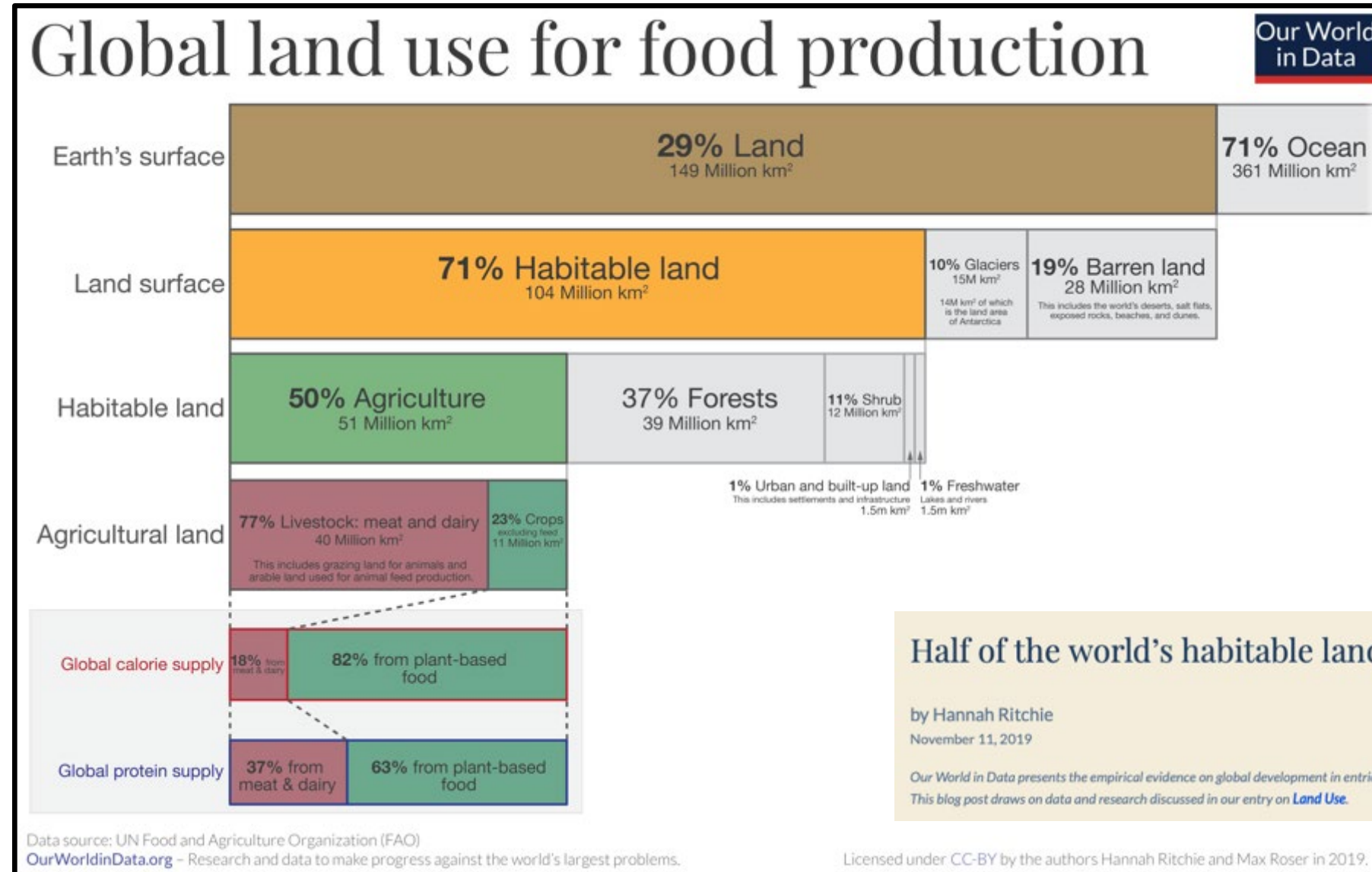
Delivering water, energy, and food for all in a sustainable and equitable way is one of the major challenges faced by our societies.

Future Earth's Water-Energy-Food Nexus Knowledge-Action Network is a network of people and organizations working to address nexus challenges. We're fostering transdisciplinary research and communicating the importance of holistic system approaches across water, energy, and food systems.

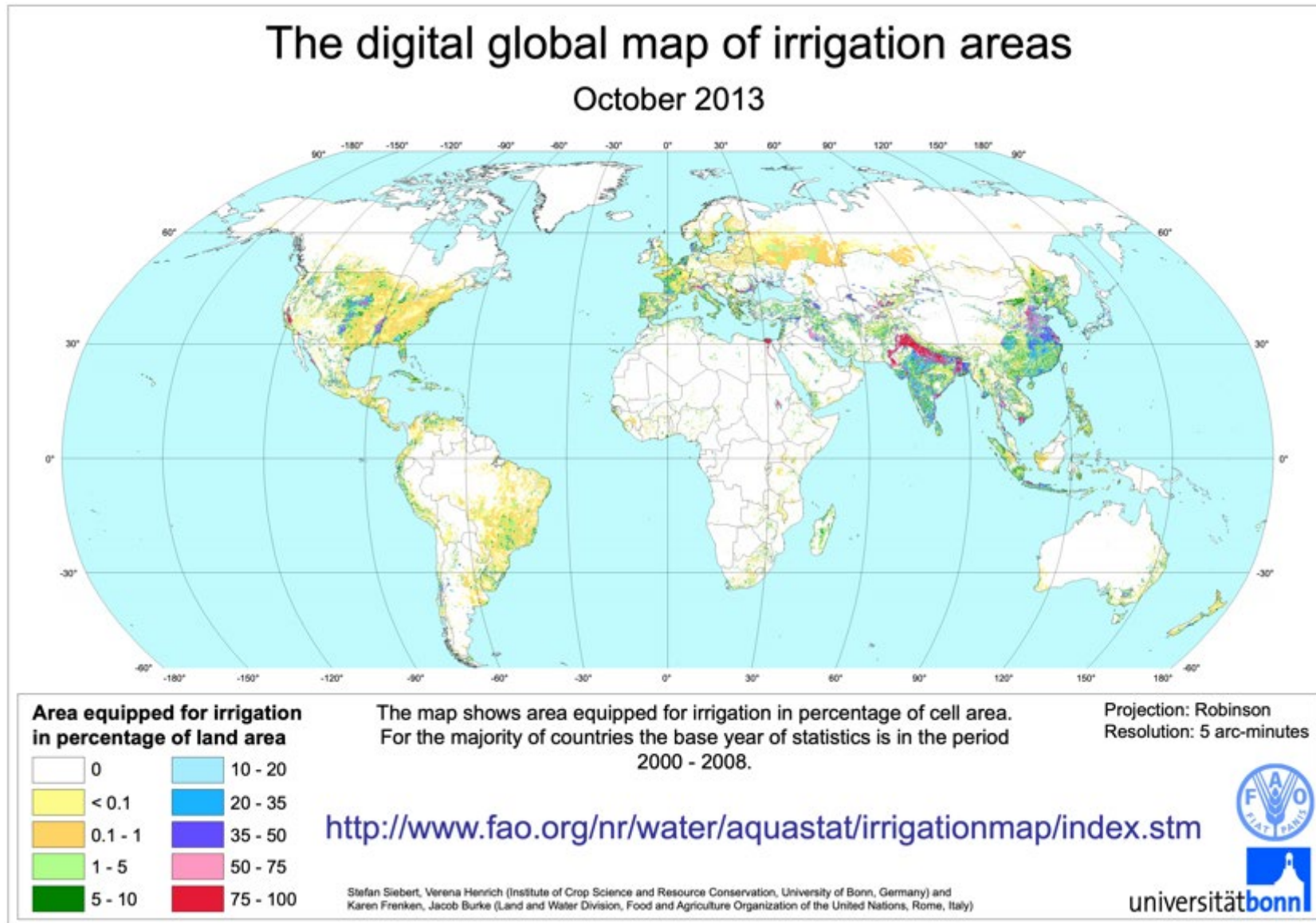
The Network is unique in that it is not dominated by any one of the three sectors, instead providing a balanced platform for discussion and agenda setting. Together with Future Earth's [Global Research Projects](#), the Network brings together experts from across disciplines to break down the silo-thinking which inhibits transdisciplinary research and solutions.

<https://futureearth.org/networks/global-research-networks/water-energy-food-nexus/>

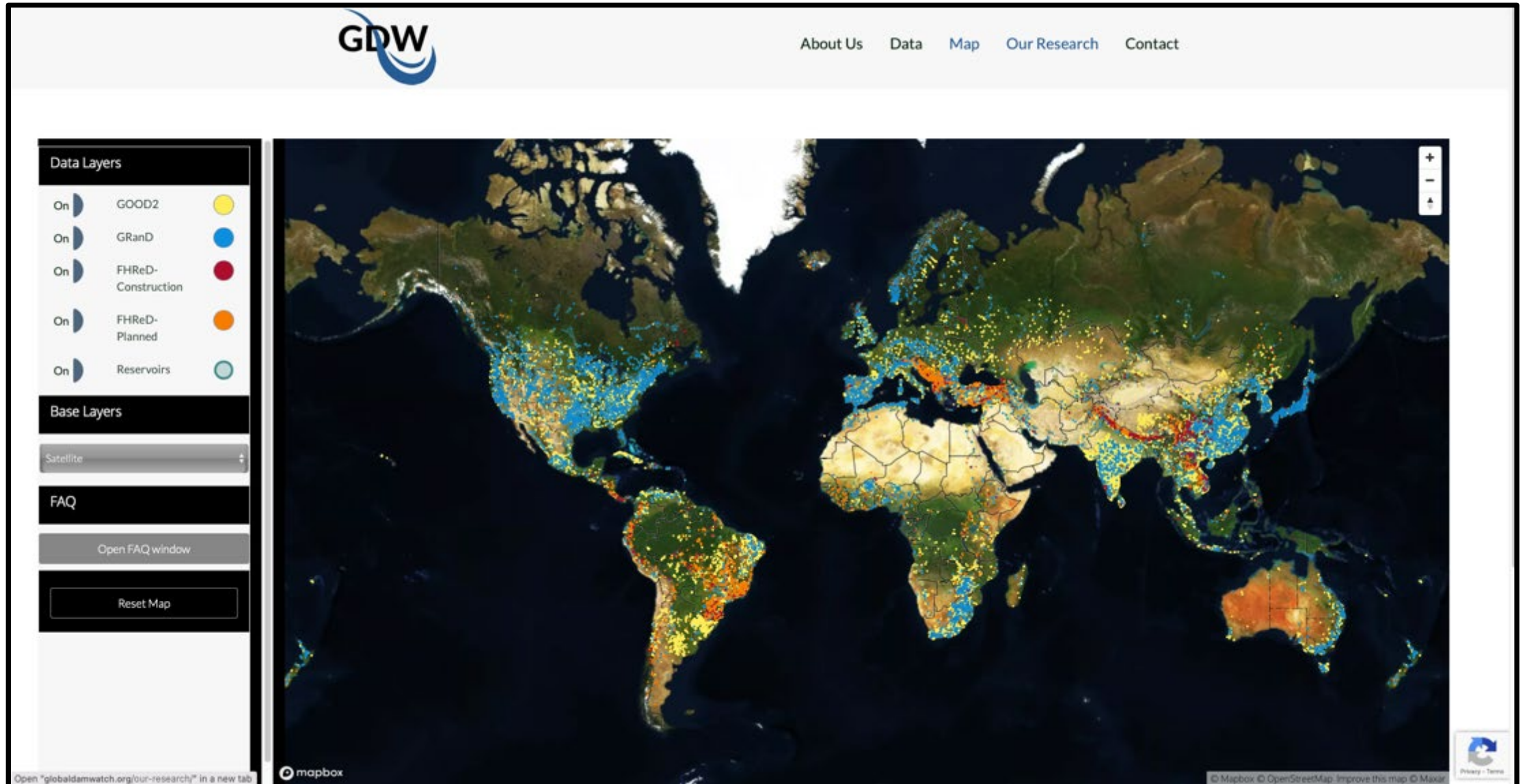
# Land, food and water



# Land, food and water

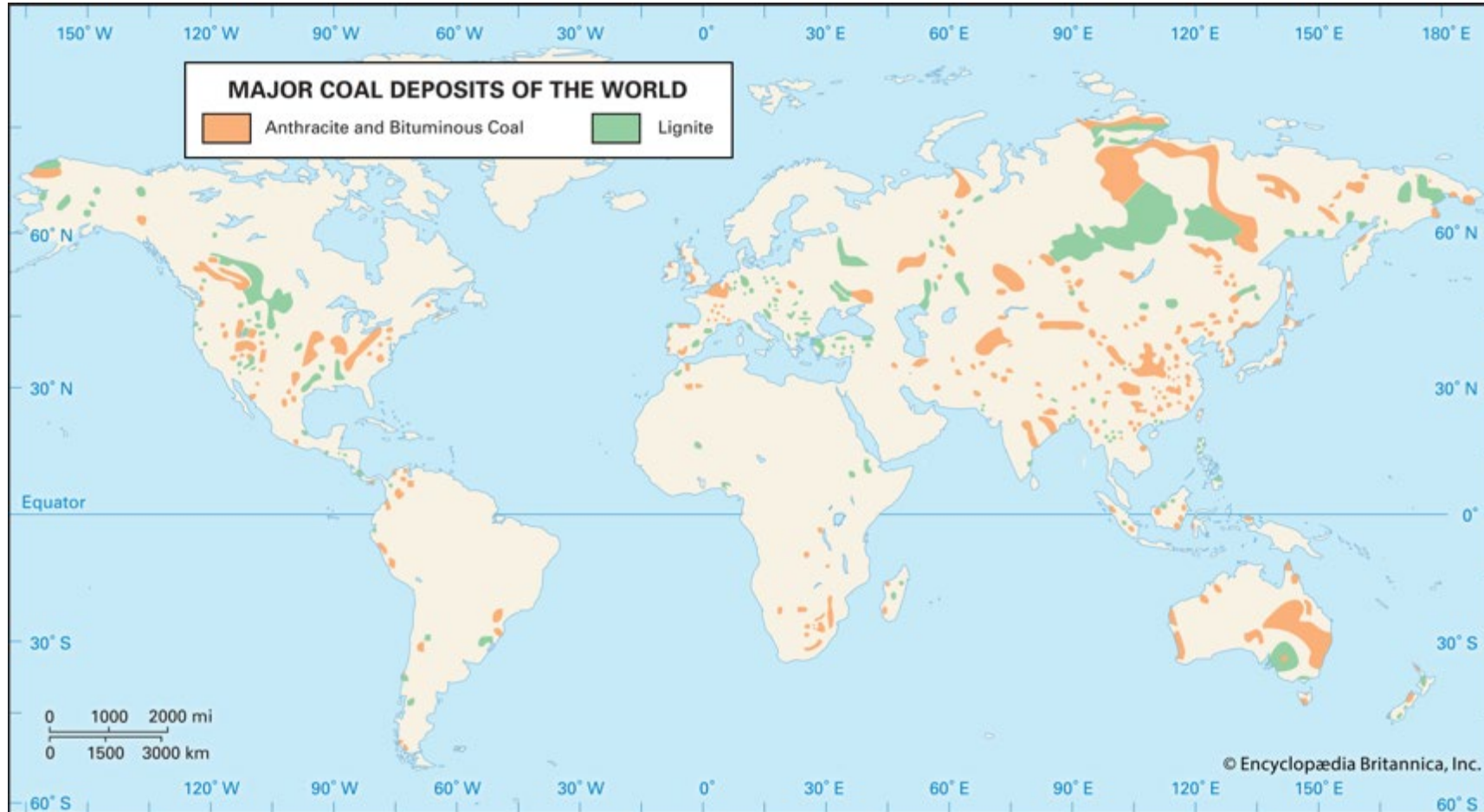


# Land, food and water



Source: GDW at <http://globaldamwatch.org/map/>

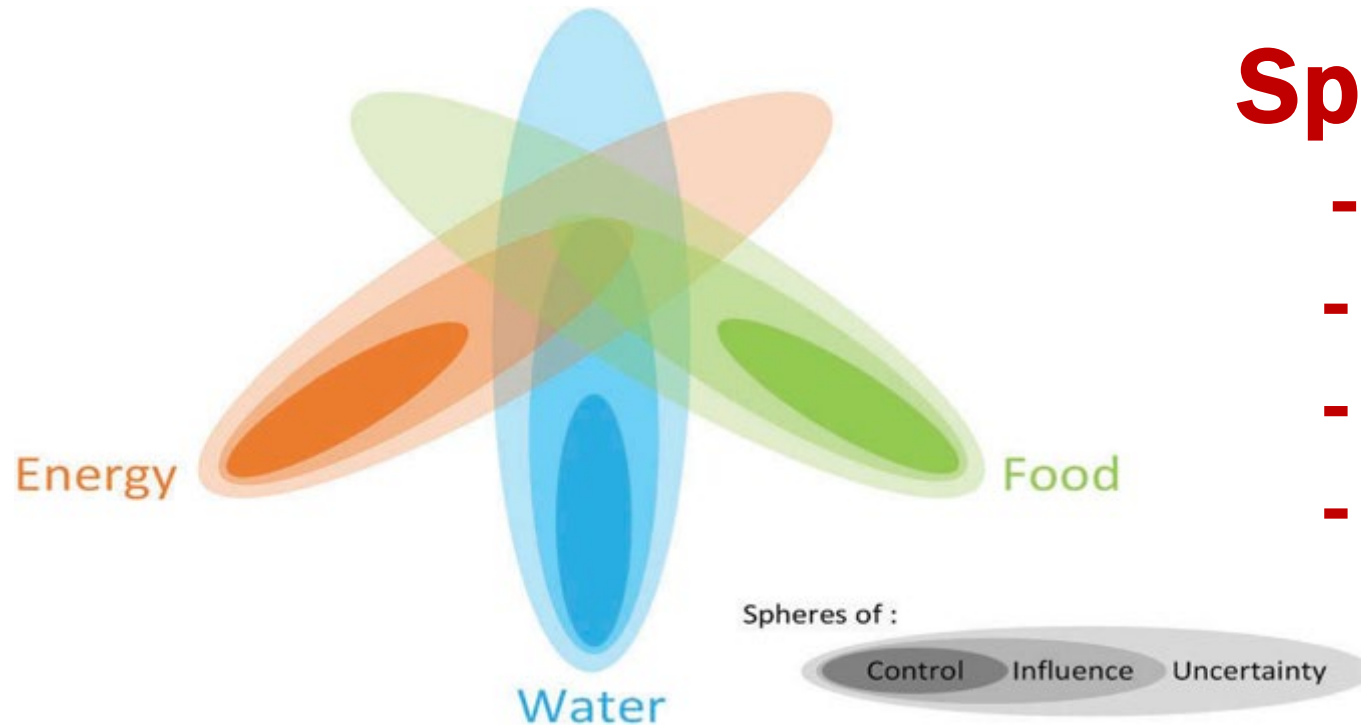
# Land and energy (coal)



<https://cdn.britannica.com/14/105414-050-4D46A250/Coal-Deposits-World-MAP.jpg>



# A specific challenge facing WEF Nexus research



## Spheres:

- Sectors
- Scale
- Space
- Society

OPINION PAPER



## Challenges in operationalizing the water–energy–food nexus

J. Liu<sup>a</sup>, H. Yang<sup>b,c</sup>, C. Cudennec<sup>d</sup>, A.K. Gain<sup>e</sup>, H. Hoff<sup>f,g</sup>, R. Lawford<sup>h</sup>, J. Qi<sup>i</sup>, L. de Strasser<sup>j</sup>, P.T. Yillia<sup>k,l</sup> and C. Zheng<sup>a</sup>

# Linking LCLUC to the NEXUS

<https://eo4wef.org/>

Lead: Richard Lawford

## GEO for water energy food nexus



Photo by T. G. D. G. G. G. G. G.



Photo by King Le. G. G. G. G.



Photo by NASA (n)

A lack of awareness on the interconnections among energy, food and water resources is one of the main barriers to the nexus thinking

Brandoni and Bojnjaković (2018)

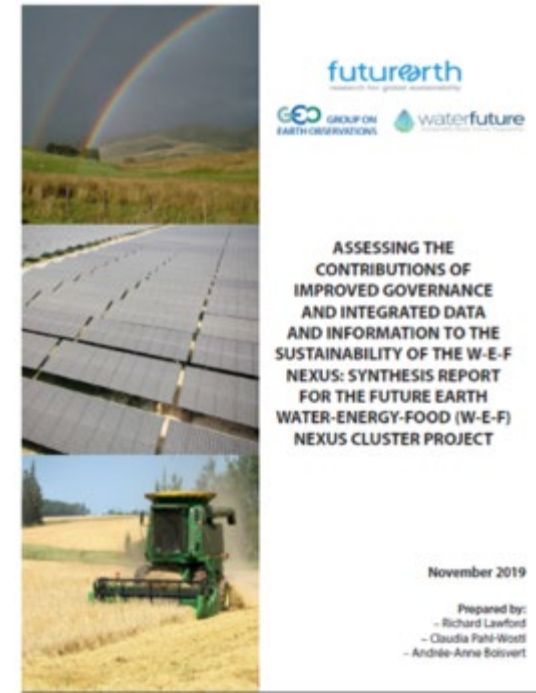
## Affiliated Activities: GEO Earth Observations for the Water-Energy-Food Nexus (EO4WEF)

Enables GEO to demonstrate its service capabilities and data principles and to promote integration through data use.

The GEOEO4WEF Community Activity (See <https://eo4wef.org/end>) develops testbeds to assess the use of Earth observations, integrated data services, and analytical tools by stakeholders.

### Priority areas for action

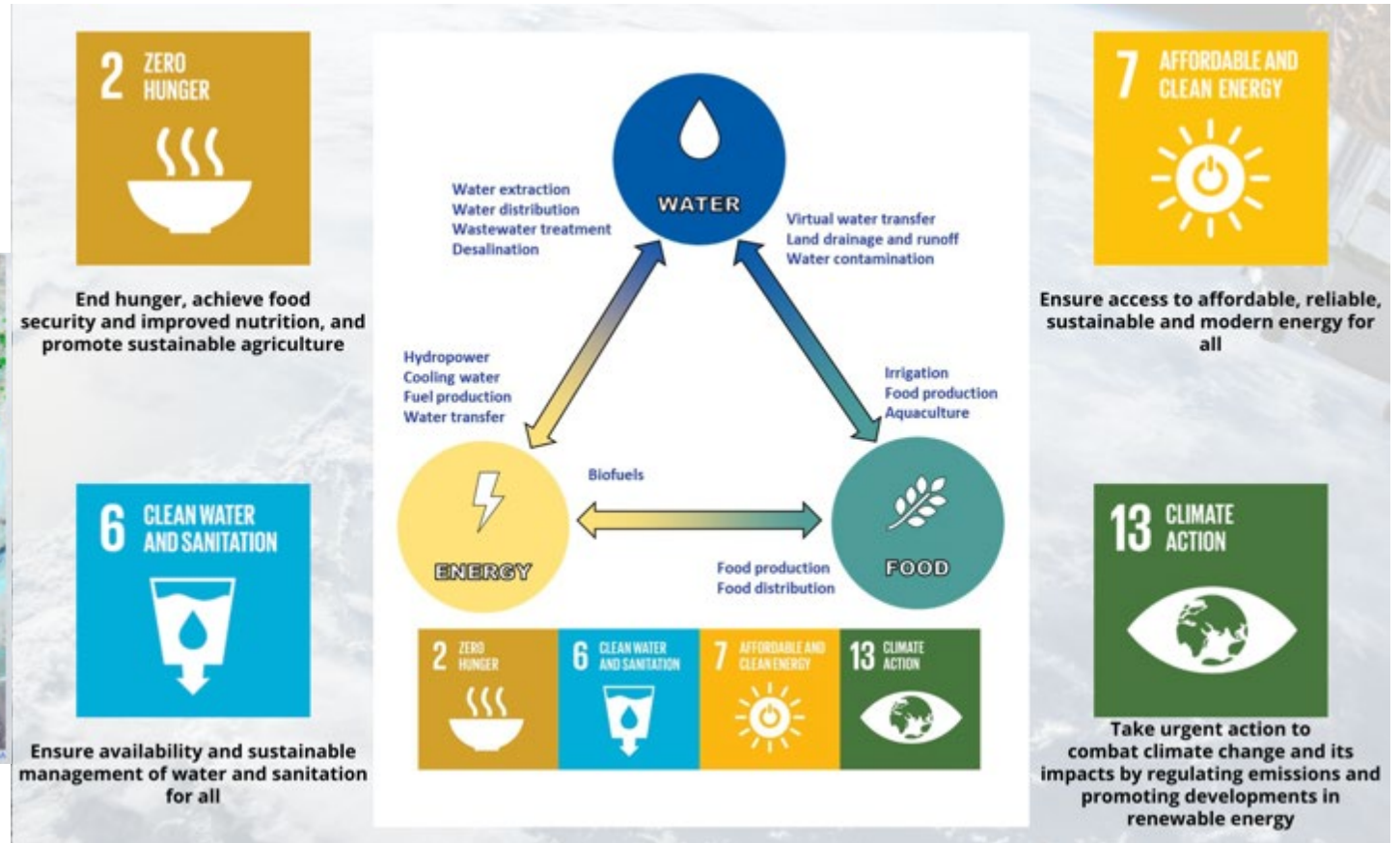
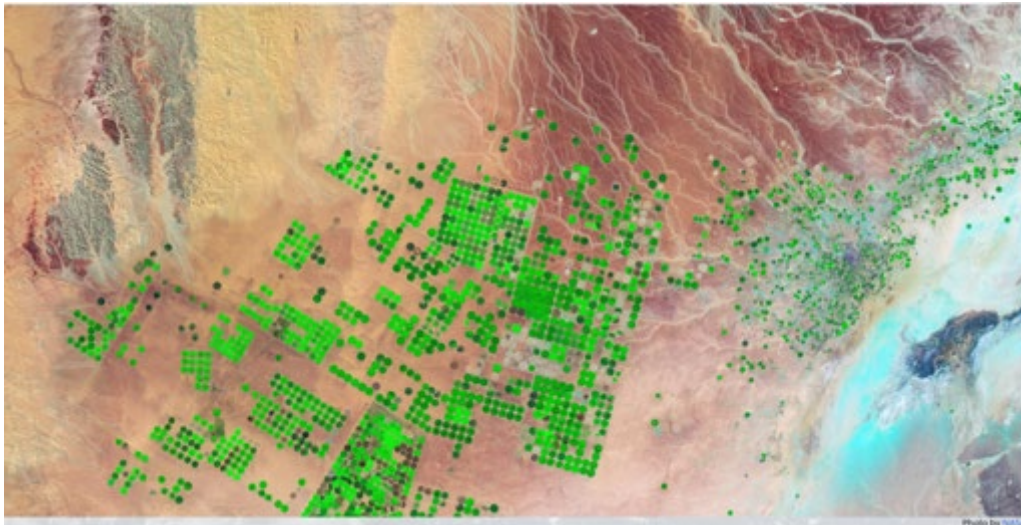
- development of a WEF definition and typology of terms,
- review of information requirements to support climate change and SDGs
- development of an inventory of WEF Nexus projects using EO
- contribution to the GEO Knowledge Hub
- provision of tools to access EO data from Space Agencies.

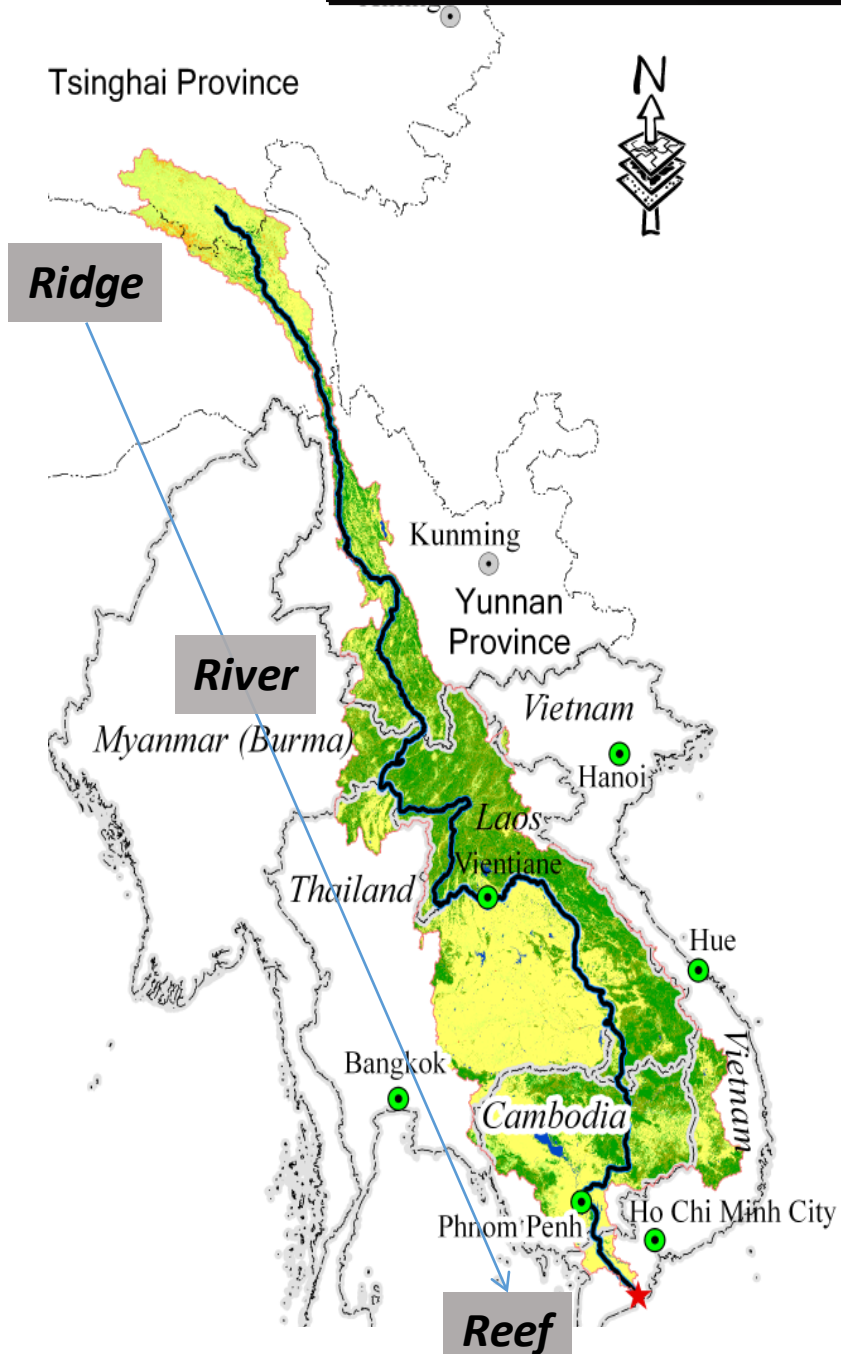


The GEO EO4WEF Community Activity develops and promotes ways in which Earth observations can be more effectively incorporated into the planning and management of the nexus between these three resource areas. GEO members play important roles in collecting, archiving, and disseminating the relevant data and in developing the policy frameworks which will allow the WEF Nexus concept to be implemented. This activity supports GEO efforts to use its capabilities to better support the W-E-F Nexus community.

**GEO EO4WEF**

EO DATA FOR THE WATER-ENERGY-FOOD NEXUS





Wetlands (a), fisheries(b), local produce (c), hydro dam(d), hydropower plant(e), irrigation canal (f), agriculture drought (g), paddy rice field expansion (h) and fishnet (i) related issues within the Mekong River Basin.

# Summary and Recommendations

- LCLUC plays a critical role in Future Earth missions, by providing critical data, products and information of the Earth surface.
- Can contribute to the research in many GRNs, especially those related to land, water, food, urban, and nexus.
- Detailed land cover and land use dynamics information or attribute is needed; moving beyond cover types and uses.
- Partnerships with FE community can co-benefit FE and LCLUC missions, e. g. EO4WEF.
- A liaison would be a good mechanism to promote collaborative efforts.
- LCLUC's 1) data and information of land systems, 2) well established international networks, and 3) funding mechanism, can contribute significantly in the WEF Nexus



# Thank you!

for your attention and thanks to the  
LCLUC program and its leadership!

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**Happy LCLUC 25<sup>th</sup> Anniversary!**

