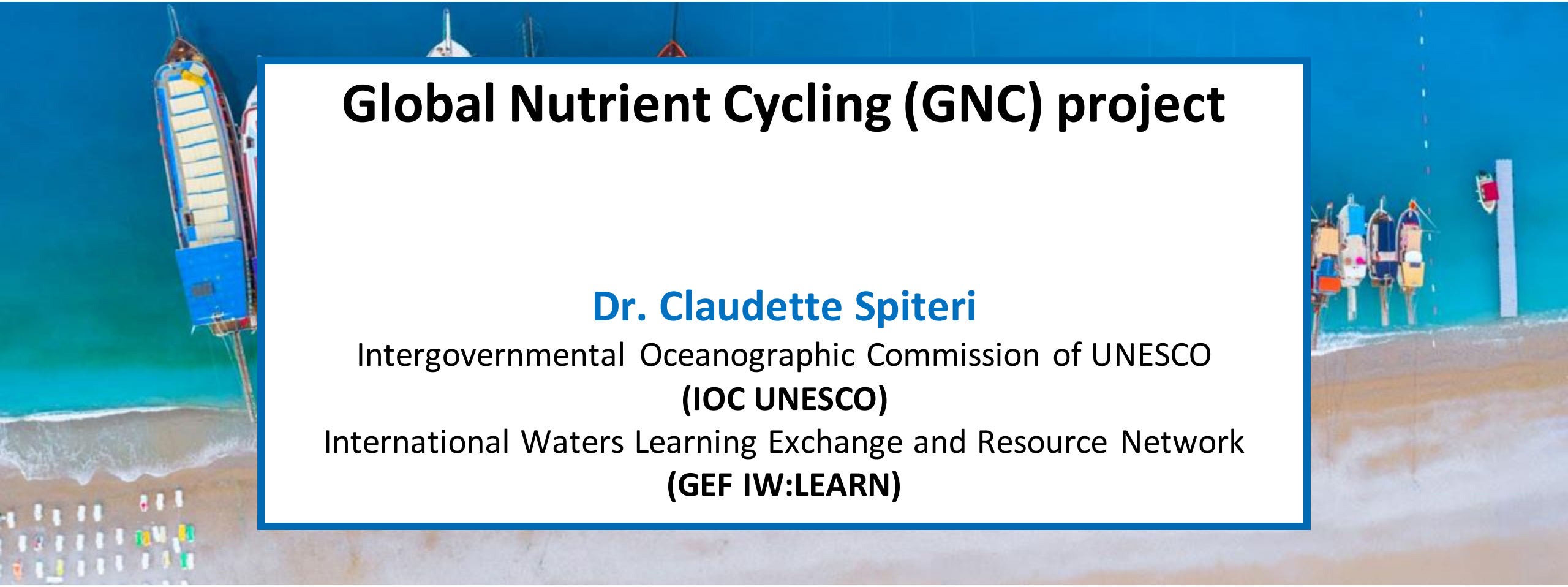

Global Nutrient Cycling (GNC) project

Dr. Claudette Spiteri

Intergovernmental Oceanographic Commission of UNESCO

(IOC UNESCO)

International Waters Learning Exchange and Resource Network

(GEF IW:LEARN)

Global Nutrient Cycle (GEF-GNC)

- To initiate comprehensive, effective and sustained programmes addressing **nutrient over-enrichment and oxygen depletion from land-based pollution of coastal waters in Large Marine Ecosystems (LMEs)**
- To provide the foundations including **partnerships, information, tools and policy mechanisms** for governments and other stakeholders

Two scales: Global and demonstration region (Manila Bay, Philippines)

Structure

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Component A

- **Global partnership on Nutrient Management** addressing causes and impacts of coastal nutrient over-enrichment and hypoxia

Component B

- Quantitative analysis of relationship between **nutrient sources and impacts** to guide decision making on policy and technological options

Universiteit Utrecht

Washington State University

Component C

- Establishment of **scientific, technological and policy options** to improve coastal water quality policies in LMEs and national strategy development

Component D

- Development of **nutrient reduction strategies** through application of quantitative source-impact modelling and best practices in Manila Bay watershed

Component E: Monitoring and evaluation effective project coordination

Component F: Management and oversight

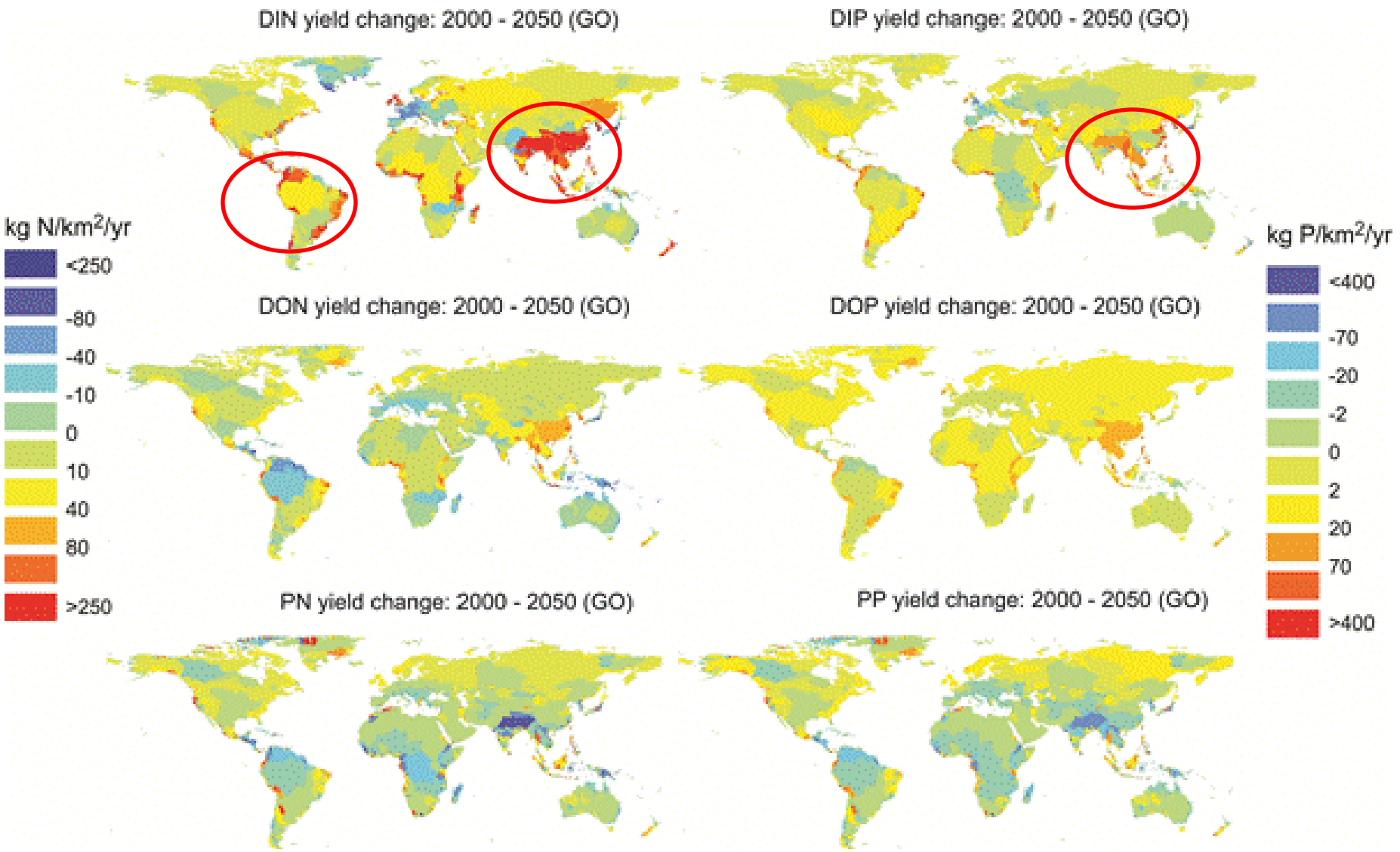
Global Nutrient Cycle (GEF-GNC) – Component B

1. Overview of knowledge	• Overview of existing tools for source-impact analysis of nutrients in LMEs and their target audiences
2. Global nutrient sources	• Global database with documentation of data on nutrient loading and occurrence of harmful algal blooms, hypoxia, effects on fish landings, fish abundance, and composition of fish populations
3. Global Impacts	• Nutrient impact modeling for global and local to regional nutrient source impact analysis
4. Demonstration region	• Development of regional models of coastal effects under different physical regions using regional data for the Manila Bay demonstration region
5. Training	• Regional and national scientists and policy experts, particularly from developing countries, trained in using nutrient source-impact modeling
6. Guidelines	• Nutrient source-impact guidelines and user manuals for integrated eutrophication assessment and nutrient criteria development

Global Nutrient Sources

- Development of a **nutrient flow model**
- Used **modeled river nutrient exports** to the coast and inland drainages based on "Global NEWS 2" (Mayorga et al., 2010)
- River nutrient (N, P, Si) export
  - dissolved (D) inorganic (I) nutrients (DIN, DIP, DSi)
  - dissolved organic (DON, DOP)
  - particulate (PN, PP)
  - suspended solids
- Background database used to drive the **Global NEWS models**
  - fertilizer inputs
  - manure inputs
  - atmospheric deposition estimates
  - N fixation inputs
  - Estimates of nutrient export by individual form for the years **1970, 2000**, and scenario runs using four Millennium Ecosystem Assessment scenarios for **2030** and **2050**

Global Nutrient Sources



- **Predicted changes** in per-area nutrient fluxes by large river basin and nutrient form globally between years 2000 and 2050
- Large anticipated changes in **DIN and DIP loading** in South Asia and parts of Central and South America

Global Nutrient Impacts

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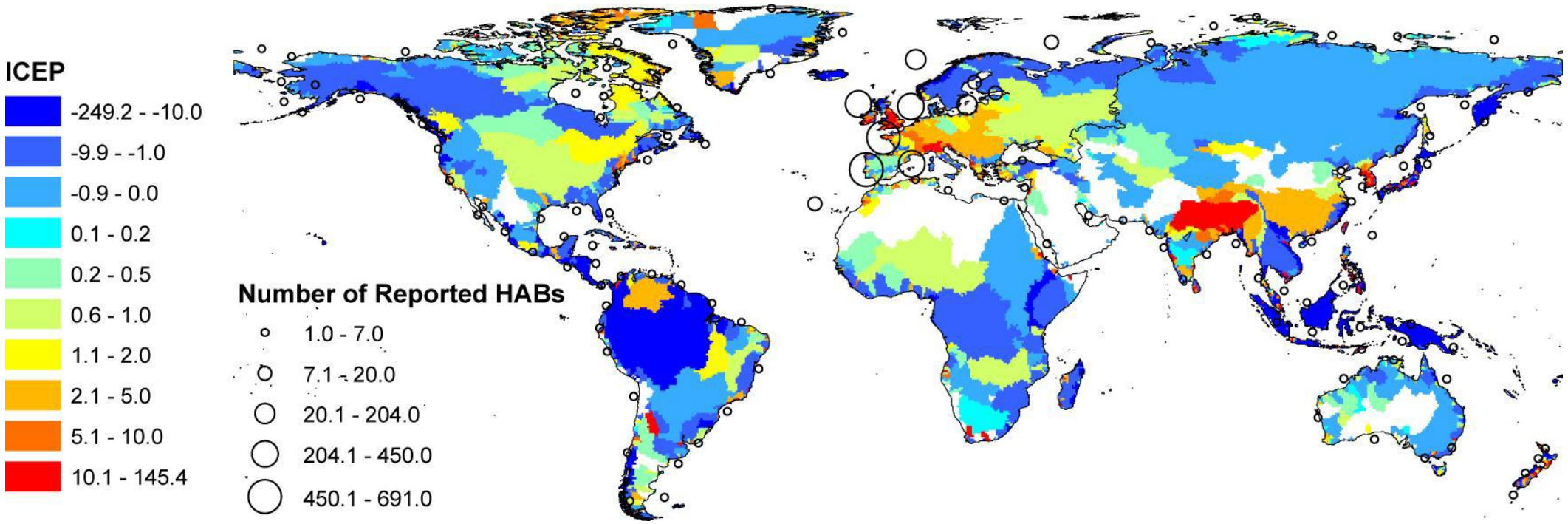
- Calculated **Index for Coastal Eutrophication (ICEP)** values for more than 6000 river basins globally
- Assess the potential risk that non-diatom algal growth may lead to **harmful algal blooms and hypoxia** in coastal marine ecosystems
- Taking into account nutrient loading and element ratios, **local physical and environmental conditions**
- Database developed that includes information about nutrient loading to the global coastal ocean and associated effects of nutrient loading

- **ICEP is calculated based on relative concentrations of nutrients-riverine N, P versus Si deliveries to coastal environments**
  - When Si is in excess over N and P => development of diatoms is favored
  - When N and P are discharged in excess over Si => non-diatoms, often non-siliceous algal species will develop instead

Global Nutrient Impacts



- **SDG Target 14.1**: *By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities*
  - **Indicator 14.1.1: Index of Coastal Eutrophication Potential**

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6 CLEAN WATER AND SANITATION

14 LIFE BELOW WATER

Global Nutrient Impacts

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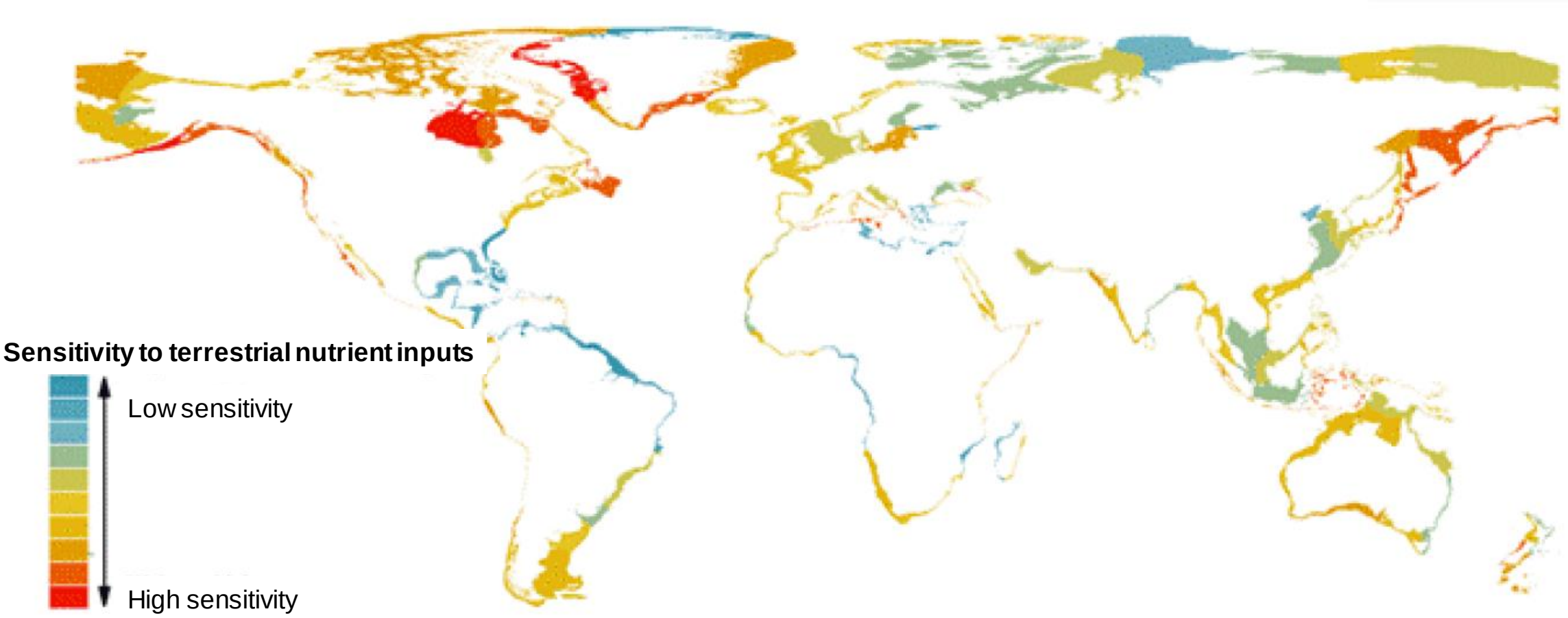

International Nitrogen Management System (INMS)

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- GEF-funded project: ***Towards the Establishment of an International Nitrogen Management System (INMS)***
- Aims to develop the evidence-base to showcase the need for effective practices for **global nitrogen management to deliver measurable benefits for oceans**, as well as climate, atmosphere, land ecosystems and global society
- Over 70 global project partners supporting INMS through co-finance
- Regional demonstrations
  - East Africa, East Asia, Eastern Europe, Latin America, North America, South Asia, Western Europe

Implemented by the UN Environment with funding through the Global Environment Facility (GEF). 'Towards INMS' is executed through the UK Centre for Ecology & Hydrology (UKCEH) representing the interest of the International Nitrogen Initiative

UN environment | UK Centre for Ecology & Hydrology | INI

Towards the INMS
International Nitrogen Management System
www.inms.international

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THANK YOU FOR YOUR ATTENTION

Global Nutrient Cycling (GNC) project

http://www.nutrientchallenge.org/gef-global-nutrient-cycling-gnc-project

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