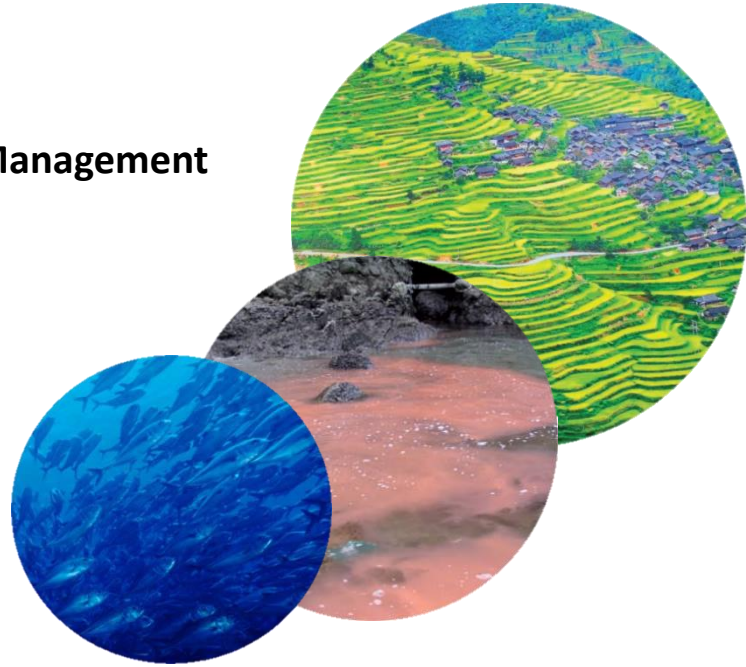
Global Partnership on Nutrient Management

The Nutrient Challenge in the Global Context

Technical and Policy Workshop on Sustainable Nutrient Management

18 November 2015
East Asian Seas Congress
Danang, Vietnam



Christopher Cox PhD
Programme Officer
Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities (GPA)

The global concern

- Oceans and Coasts – the very basis of much of the world's economy.
  - 350 million jobs globally linked to the oceans.
- Marine environment supplies planet with key services
  - climate regulation, storm protection, food security, nutrients cycling etc..
  - All these services underpin lives and livelihoods in different sectors from tourism to fisheries.
- Oceans are suffering from advanced degradation mainly as a result of human activities.
  - Over the past decades marine pollution has become an increasingly significant problem.
- Marine pollution occurs when harmful, or potentially harmful, effects result from the entry into the ocean of chemicals, particles, industrial, agricultural and residential waste, noise, plastic debris or the spread invasive organisms.
- With growing population, set to reach nine billion by 2050 - marine pollution and impacts are likely to build up unless global action is taken to sustainably manage and protect oceans and coastal ecosystems

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The global concern

- Approximately 80% of marine pollution stems from land-based activities
- Bathing in polluted water – millions of cases of gastro-enteritis and respiratory disease every year
- Eating infected shellfish is a common cause of infectious hepatitis and long-term liver damage
- The social cost of treating diseases caused by sewage contamination is comparable to that of diseases such as diptheria and lung cancer

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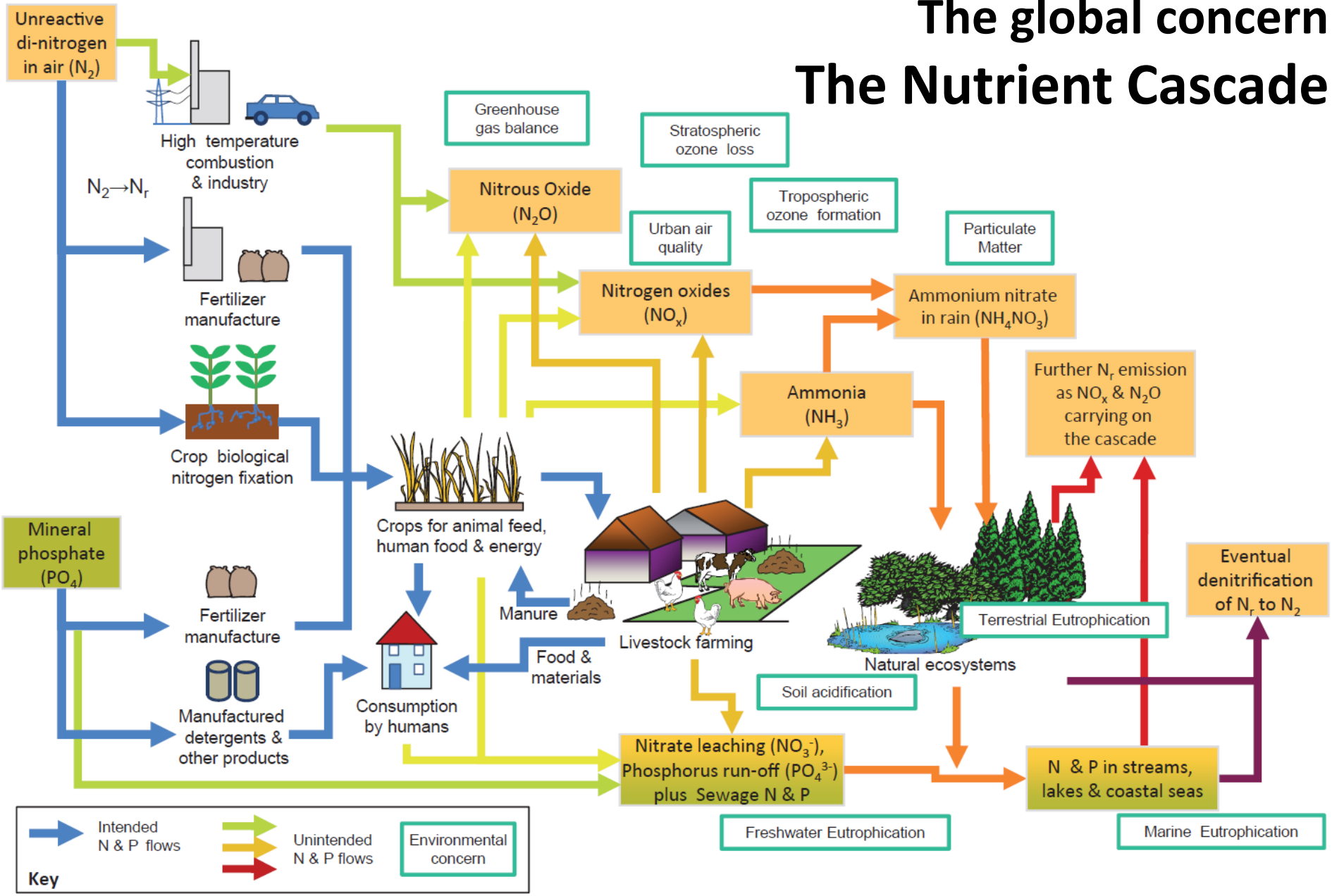
The global concern
The Nutrient Cascade



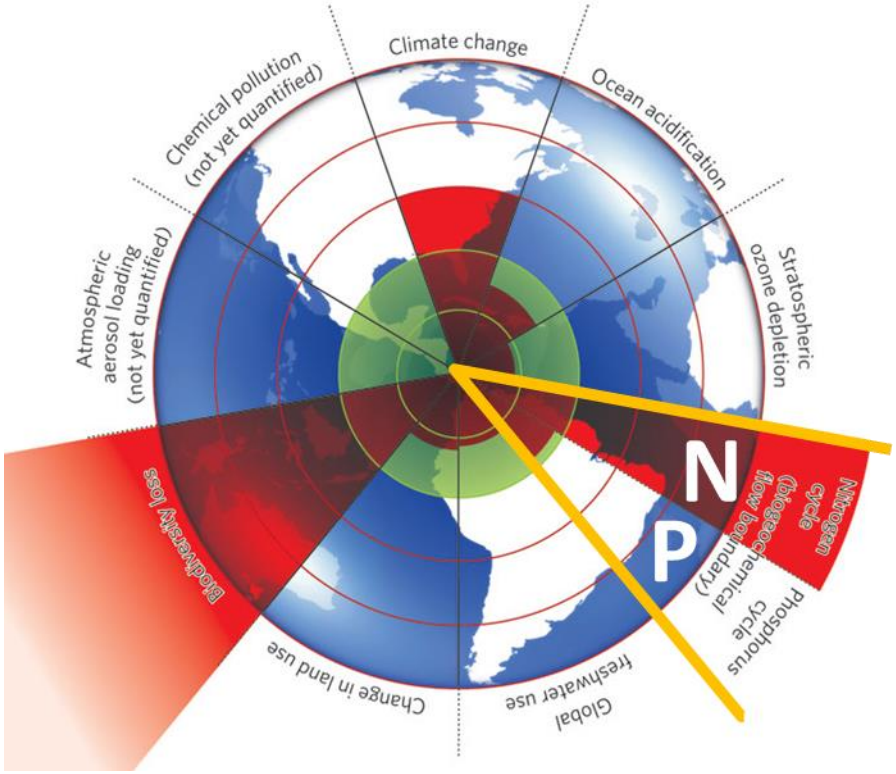
Simplified overview of nitrogen (N) and phosphorus (P) flows highlighting major present-day anthropogenic sources, the cascade of reactive nitrogen (Nr) forms and the associated environmental concerns (in: Our Nutrient World, from Sutton et al., 2011b)

The global concern

Nitrogen and phosphorus inputs to the biosphere and oceans

In the context of the Planetary Boundaries framework (Johan Rockström et al., 2009)

- Planetary boundaries define safe operating space for humanity with respect to the Earth system; associated with the planet's biophysical subsystems or processes
  - Boundary for N_2 is greatly exceeded
  - Boundary for P is being approached



Source: Johan Rockström et al., Nature 461, 472-475 (24 September 2009)

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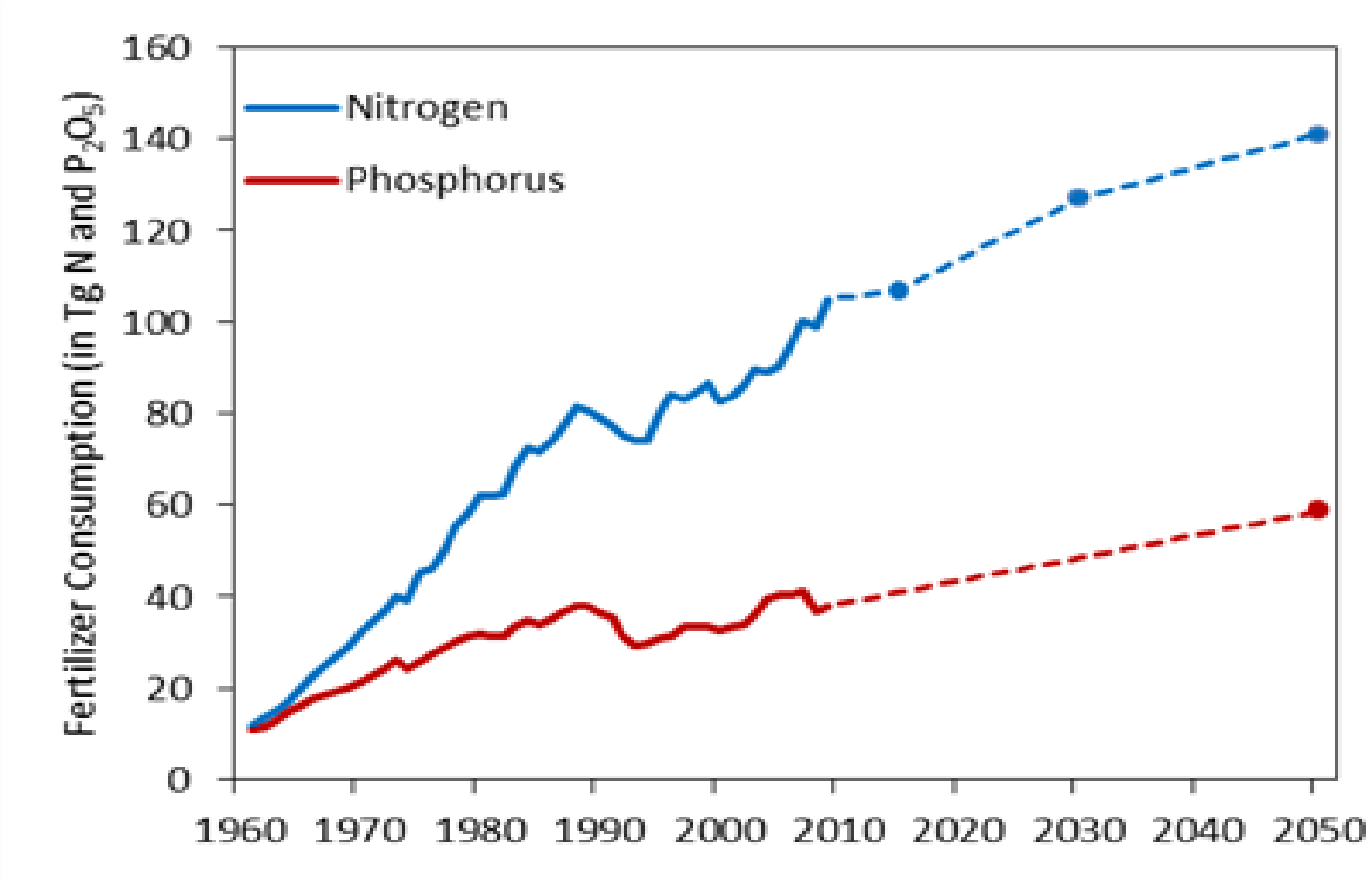
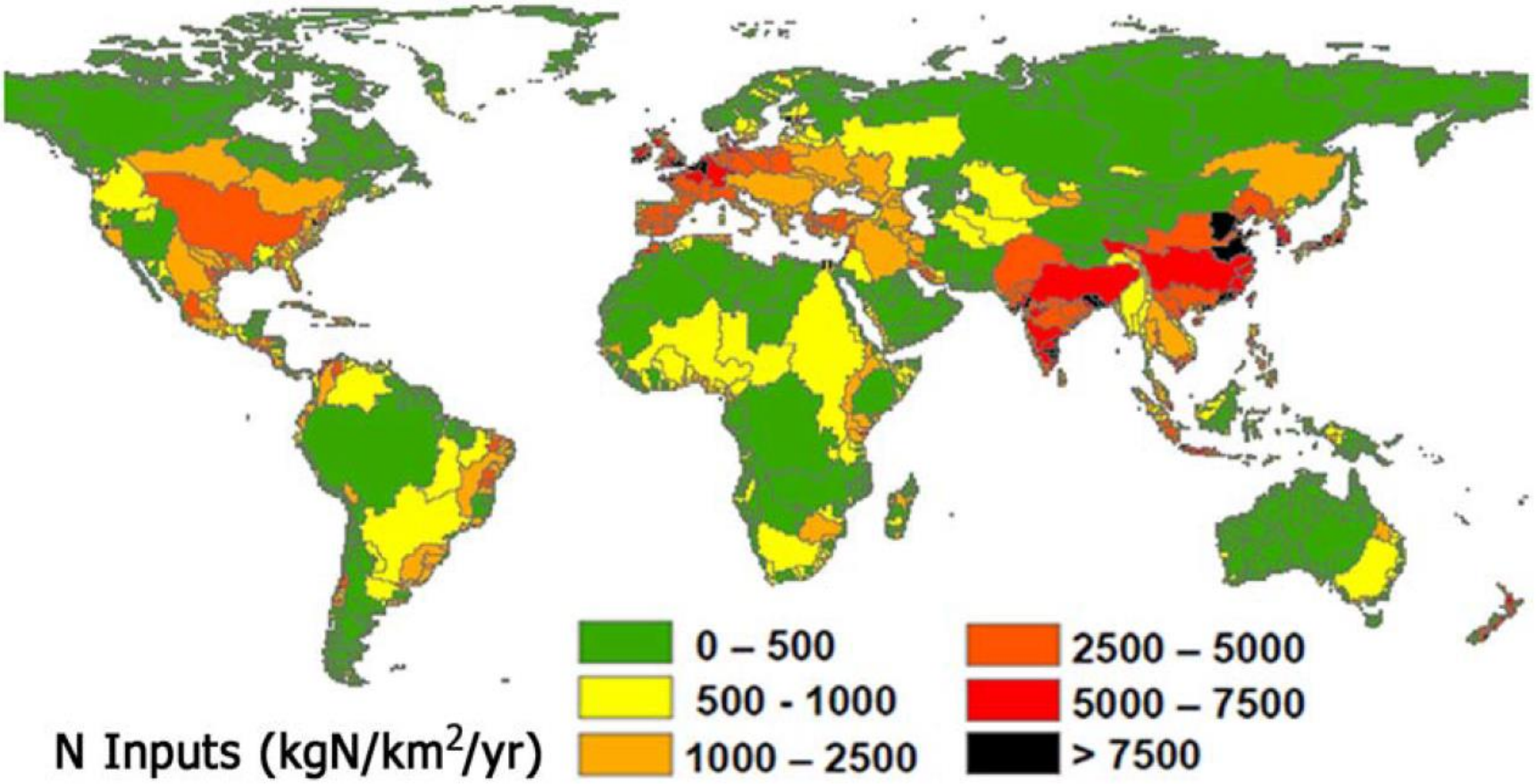


Trends in global consumption of mineral fertilizer (nitrogen and phosphorus) and projected possible futures.
Source: FAO 2012

The global concern

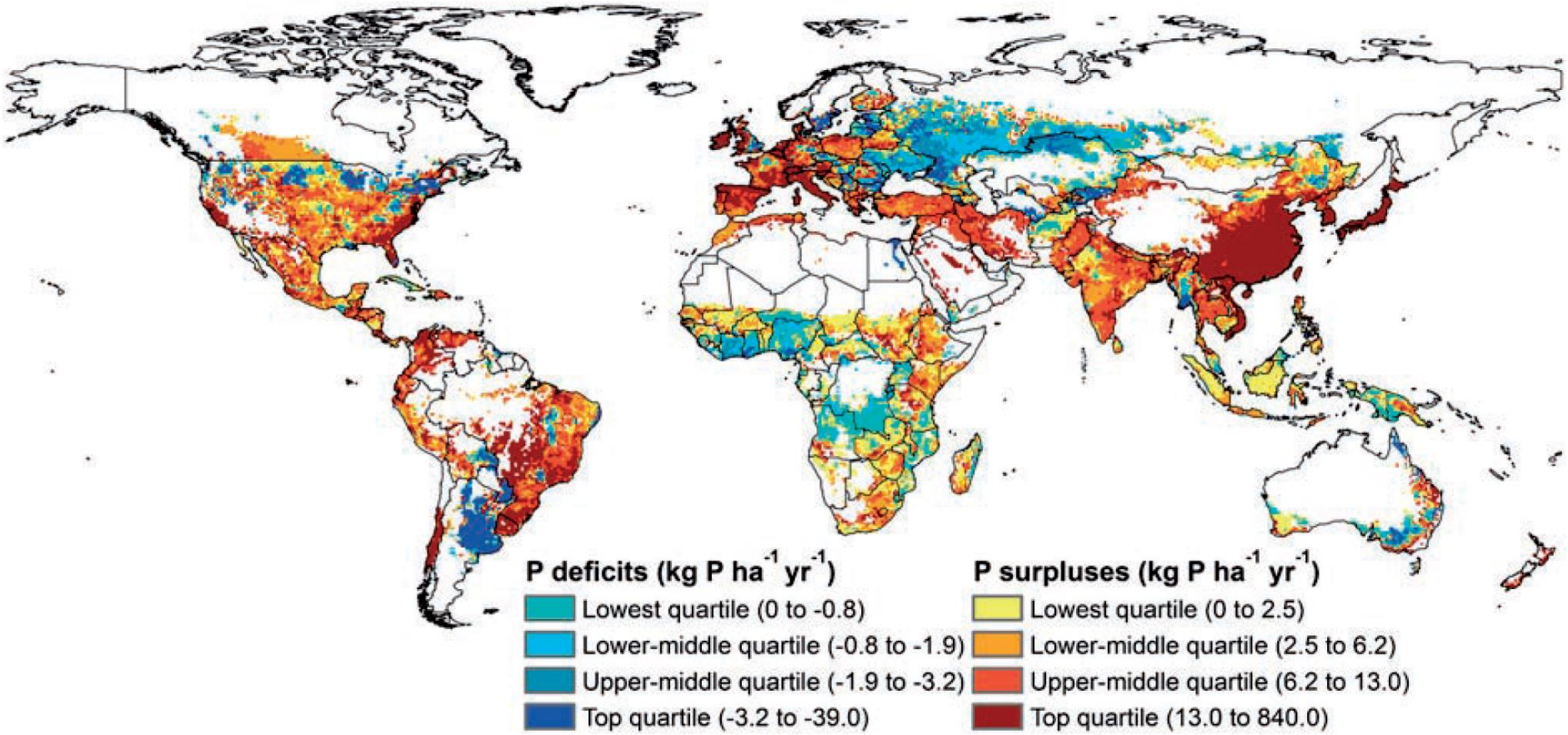
Too Much and Too Little Nutrients: regional variations in Nitrogen



Estimated net anthropogenic nitrogen inputs according to the world's main river catchments (Source: Our Nutrient World 2013).

The global concern

Too Much and Too Little Nutrients: regional variations in Phosphorous



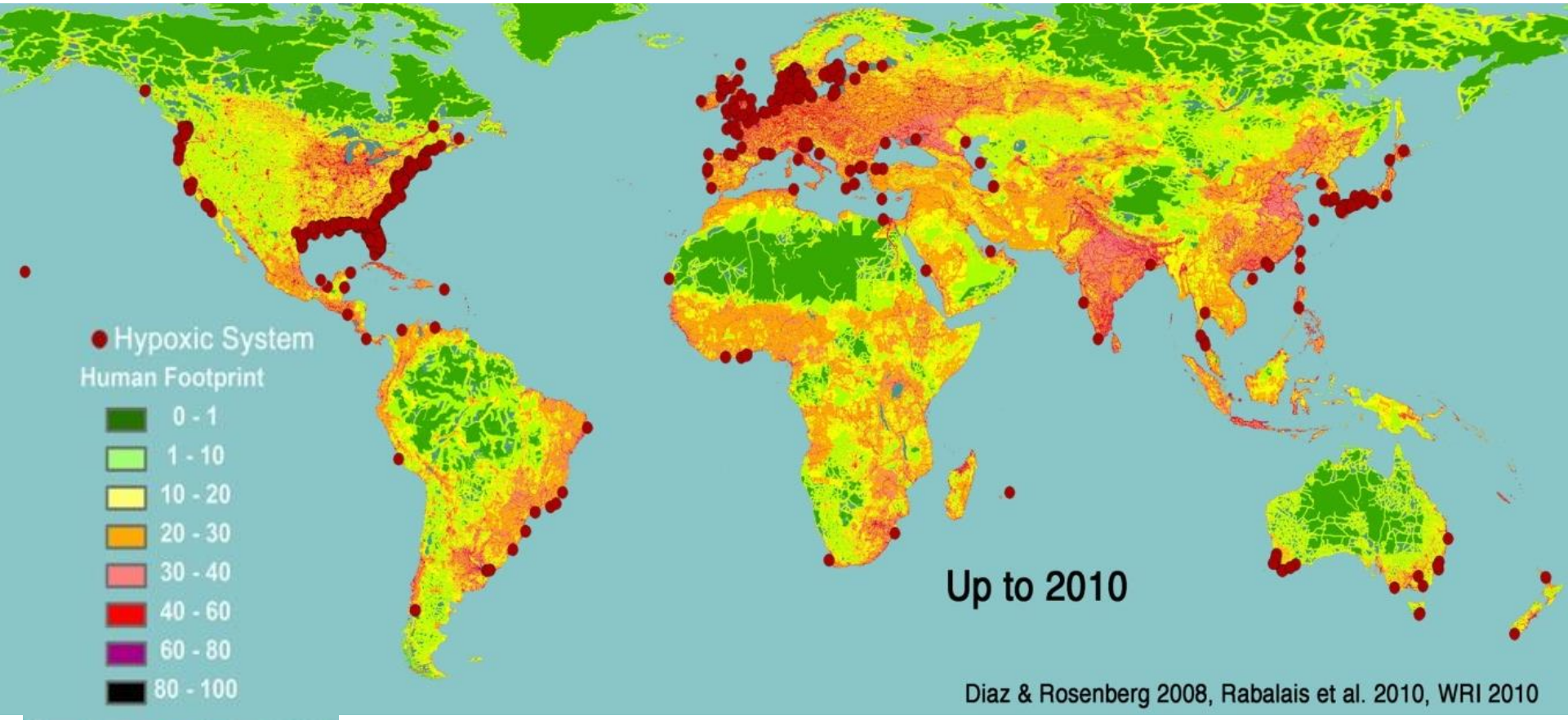
Estimated global phosphorus surplus and deficit.

Source: Our Nutrient World, 2013, citing (MacDonald et al., 2011)

The global concern

Impacts of nutrient loading

mortality of benthic organisms, collapse of fisheries and shellfish poisoning



>500 eutrophic/hypoxic coastal systems

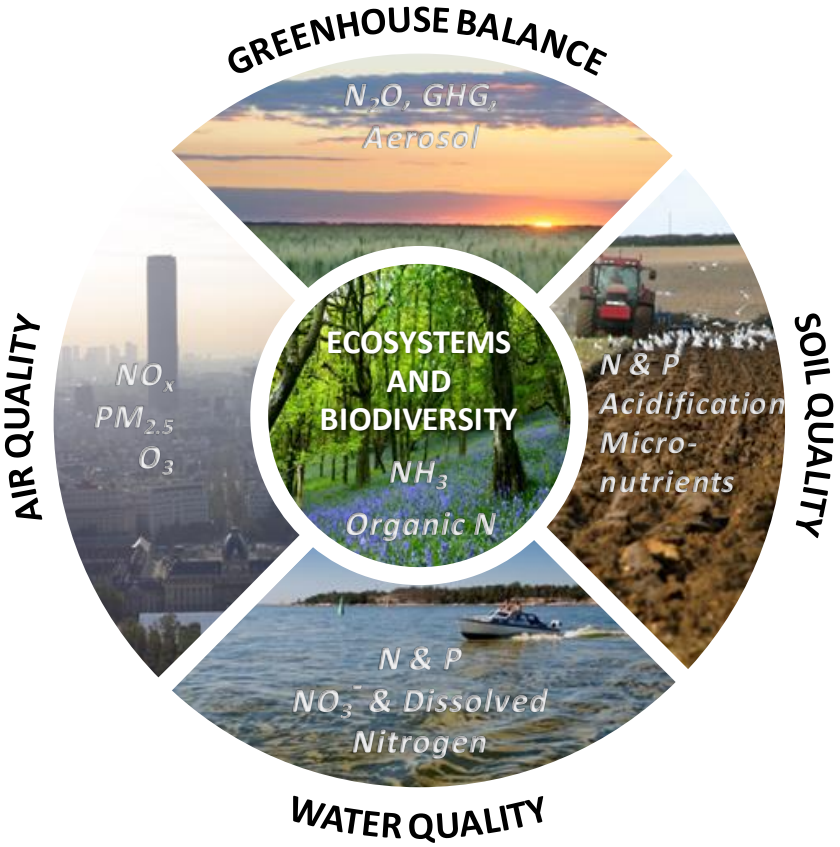
>245,000 km^2 of water area worldwide

Global loss of ecosystem services =USD 200 billion/year

The five key threats of excess nutrients

The **WAGES** of
too much or
too little N and P

Water quality
Air quality
Greenhouse balance
Ecosystems
Soil quality



Modified from the European Nitrogen Assessment (2011)

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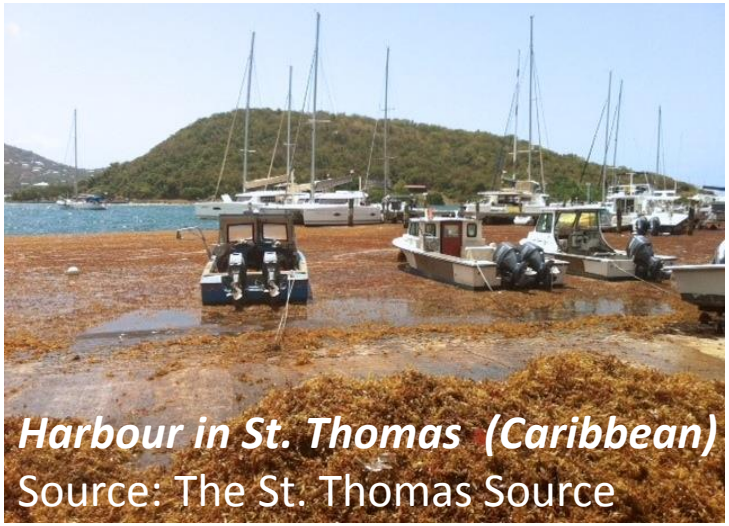
Water quality

- Climate change drivers?
  - Warmer ocean temperatures, chemistry, circulation patterns
    - Sargassum proliferation (Caribbean, West Africa); Harmful algal blooms (worldwide)
    - Under active research


Harbour in St. Thomas (Caribbean)
Source: The St. Thomas Source


HAB and fish kills in Seychelles
Source: Seychelles News Agency


Qingdao, China, province of Shandong
Photo credit: Philip Roeland via Flickr CC

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Air quality & Greenhouse balance

- Climate drivers also important in land-atmosphere interactions with respect to pollution through emissions of greenhouse gas nitrous oxide (N_2O) and ammonia (NH_3) to the atmosphere
- N_2O contributes to stratospheric ozone depletion, increasing the risk of skin cancer from UV-B radiation

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Soil quality and land degradation

- Nutrient deficits in parts of the globe – African continent of note
  - Extraction of nutrients without replenishment, physical erosion
  - Land degradation and declining yields
- Climate change will exacerbate conditions
  - Deeping land degradation with changes in temperature and moisture/water regimes

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Towards global action…

The Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities (GPA)

- Washington Declaration
  - Over 108 governments declared commitment to protect and preserve the marine environment from impacts of land-based activities
  - **GPA adopted in 1995**
    - Only global intergovernmental mechanism explicitly addressing the linkages between freshwater, coastal and marine environments.
    - Voluntary, action-oriented, intergovernmental programme led by UNEP
  - GPA designed to address accelerating degradation of the world's oceans and coastal areas

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Towards global action

- **UN SG's Oceans Compact** calls for "reducing pollutants from sea and land-based activities, including ..... litter, harmful substances and nutrients from wastewater, industrial and agricultural runoff entering the world's oceans"
- **CBD Aichi Target 8:** calls for action to reduce pollution, including from excess nutrients, to levels that are not detrimental to ecosystem function and biodiversity, and the sustainable development goals.
- **Sustainable Development Goals:**
  - Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture
  - Goal 6: Ensure availability and sustainable management of water and sanitation for all
  - Goal 12: Ensure sustainable consumption and production patterns
  - Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development

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Global Partnership on Nutrient Management (GPNM)

- Established in 2009
- Key roles:
  - Catalyze strategic advocacy and co-operation at the global and regional levels
  - As a knowledge platform to support science policy interaction and translating science for policy makers
  - To provide information and enhance capacities to address the growing problem of nutrient over-enrichment and eutrophication
  - To position nutrient issues as part of the international sustainable development agenda
    - advance Sustainable Development Goals, in particular under **Goal 14 on conservation of the oceans and Goal 2 on sustainable agriculture**

GPNM Steering Committee, December 2014

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Thank you

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http://unep.org/gpa/default.asp