

Global Partnership on Nutrient Management (GPNM)

*to promote sustainable nutrient management for
ecosystems' health*

Dr. Anjan Datta
Coordinator GPNM
Email: anjan.datta@unep.org



- **Nutrients - nitrogen and phosphorous - are key for maintenance of soil health to grow crops and thus ensuring world food security**
- **Food security of two-thirds of the world's population depends on availability and use fertilizers**

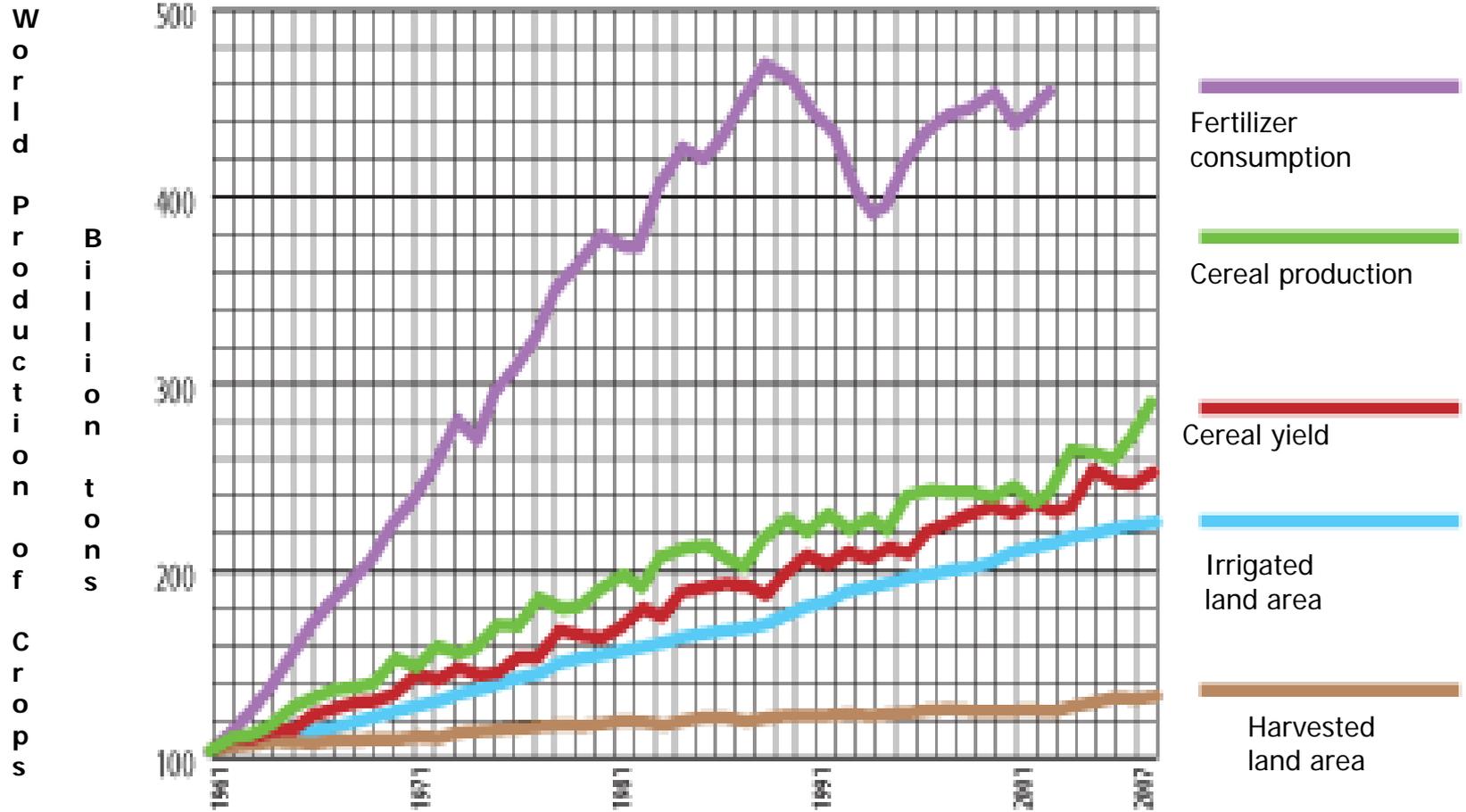


Use of nutrients and unintended impacts

- Since the beginning of the Green Revolution in 1960s:
 - global use of synthetic nitrogen fertilizer increased more than nine folds
 - phosphorus use more than tripled
- Human activities produce around 120m tonnes of reactive nitrogen each year
- Evidence suggests that chemical fertilizers are often over-applied, or applied at a time when they cannot be effectively utilized by crops
- Nearly 75% of added nutrients end up lost to the environment wasting the energy used to produce them, and causing pollution through emissions of the greenhouse gas nitrous oxide (N_2O) and ammonia (NH_3) to the atmosphere, plus losses of nitrates (NO_3), phosphate and organic N and P compounds to water.

Indicators of global crop production intensification, 1961-2007

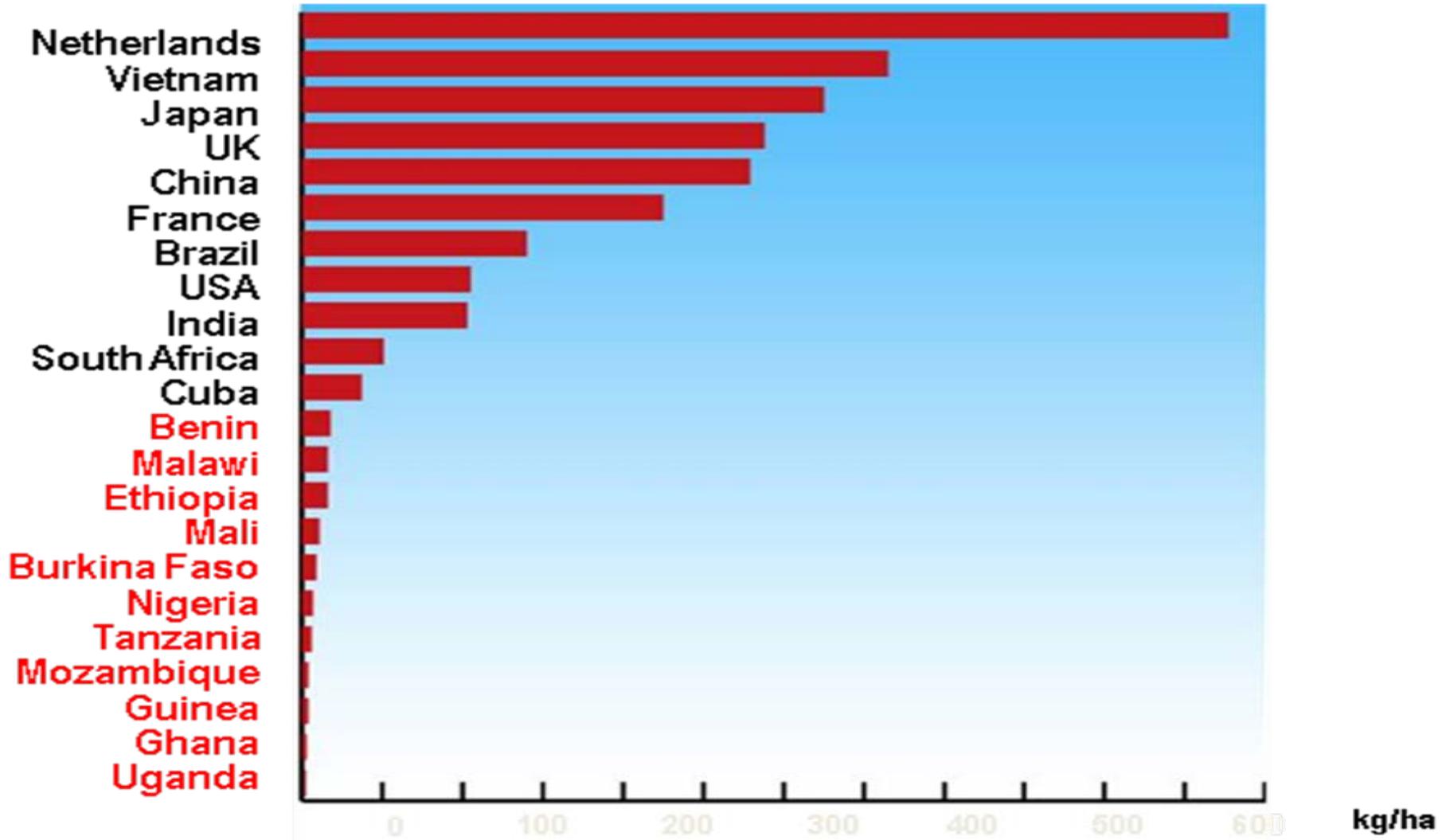
Index (1961=100)



Source: Save and Grow, FAO 2011

- FAO predicts that by 2030 global nitrous oxide (N₂O) emission from fertilizer and manure application will increase by 35% to 60%
- Global Warming Potential of N₂O is 296 times greater than a unit of CO₂
- The [State of the World's Land and Water Resources for Food and Agriculture](#) (2011) notes that while the last 50 years witnessed a notable increase in food production, "in too many places, achievements have been associated with management practices that have degraded the land and water systems upon which food production depends."
- During 1981 – 2003 nearly 25% of the global land area got degraded i.e., reduction in the capacity of the land to provide ecosystem goods and services over a period of time

Nutrient world is not uniform - in some parts of the world there is “Too Much” of Nutrients, and in some parts there is “Too Little”



European Nitrogen Assessment 2010 notes “Nitrogen as a threat to European soil quality”

ENA highlights that Nitrogen has a negative effect on soil quality of natural soils

Decreases plant diversity

Increases soil acidification and increased release of heavy metals

Loss of soil biodiversity

Planetary Boundaries

due to
human
interference
the nitrogen
cycle has
gone
beyond
appropriate
global limits

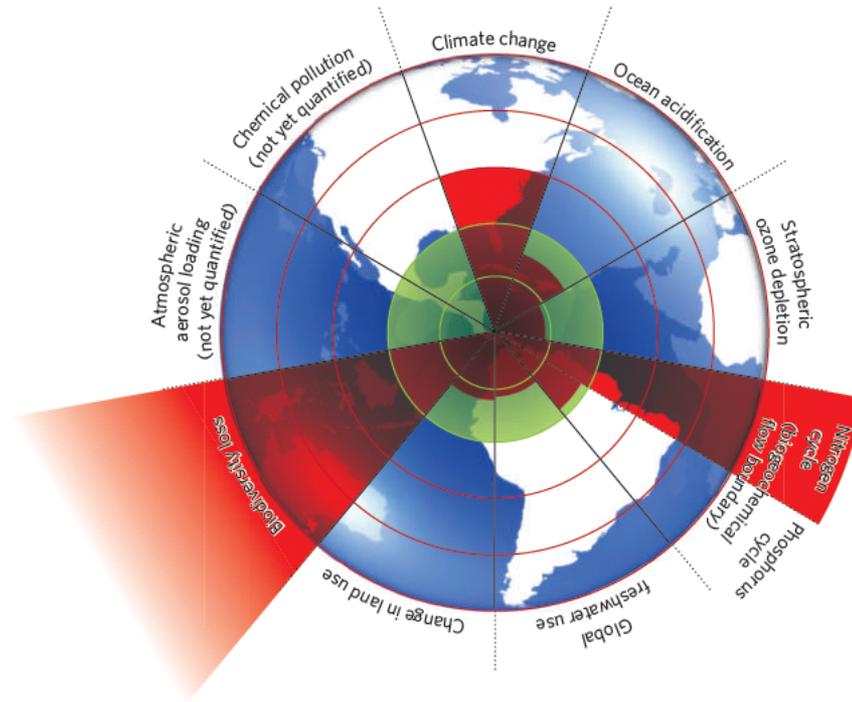


Figure 1 | Beyond the boundary. The inner green shading represents the proposed safe operating space for nine planetary systems. The red wedges represent an estimate of the current position for each variable. The boundaries in three systems (rate of biodiversity loss, climate change and human interference with the nitrogen cycle), have already been exceeded.

Source: Johan Rockström et al, in The Nature 24 September 2009

The five key threats of excess nutrients

The WAGES of
too much or
too little of nutrients

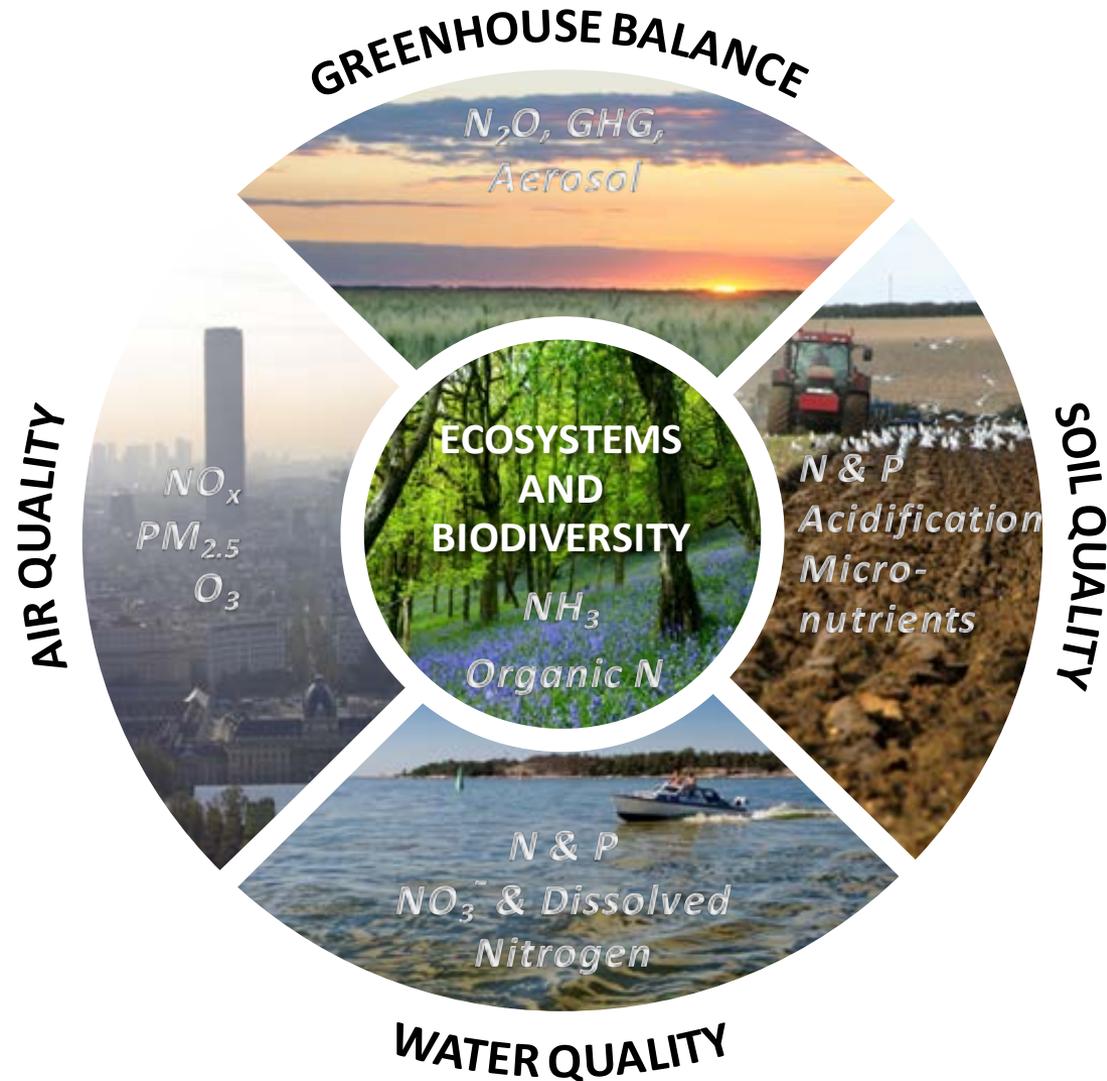
Water quality

Air quality

Greenhouse balance

Ecosystems

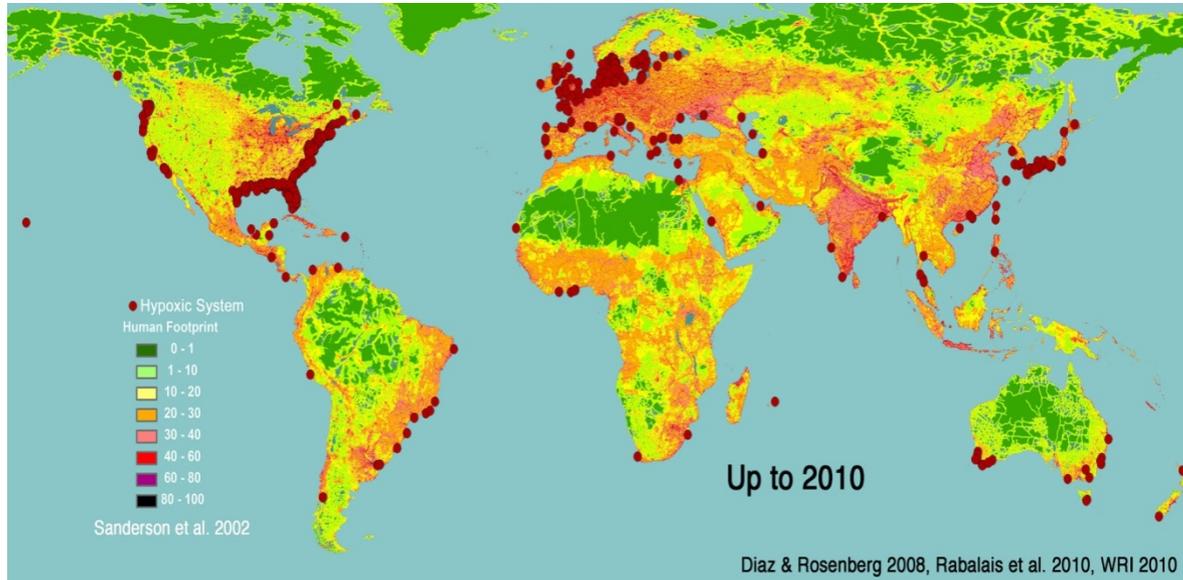
Soil quality



Nutrients cause eutrophication (leading to adverse impacts including mortality of benthic organism, collapse of fisheries and shellfish poisoning)

**>500
eutrophic/
hypoxic
coastal
systems**

**>245,000
km² of
water area
worldwide**



**Global loss
of
ecosystem
services
=USD 200
billions/year**



Images of altered global nitrogen and phosphorus cycles.

- A. Electricity generation, releasing nitrogen oxides (NO_x) to the air
- B. Motor vehicles, releasing NO_x to the air
- C. Food consumption associated with agricultural and waste losses of N and P (The food for one week of this US family is shown)
- D. Algal blooms associated with N and P pollution (An image from China prior to the Beijing Olympics 2008)
- E. Coastal dead zones, with lack of oxygen leading to fish kills as a result of N and P pollution
- F. Lack of N and P adequate depletes soil nutrient capital, degrading agricultural land and reducing long-term yields.

The Nutrient Challenge

A **seeming divide** between societal needs for food and energy and a complex web of adverse environmental impacts.....

This divide – ‘the nutrient challenge’- is set to intensify, to the cost of countries, as population, urbanisation and food and energy demands increase.

Greatest Challenge: How to realize the dream of 4 WINs at the same time?

- High crop yield
- High efficiency of resource use
- Improved soil fertility and
- Better environment quality

The Global Partnership on Nutrient Management (GPNM) has been launched to answering this challenge

- a global partnership of governments, scientists, policy makers, private sector, NGOs and international organisations

- an One UN initiative

- guided by a Steering Committee; UNEP is the Secretariat

GPNM Members are:

Government: USA, The Netherlands, Italy, Thailand, Indonesia, India, EU, UNECE (TFRN/LRTAP).....

Industry: IFA, WPI, NFC

Science: IGBP, INI, IFDC, SCOPE, ING, NEC, WU-USA, NEL, ETH-Zurich, UoU- Netherlands, AU-India, CU-Bangkok, CAU - Beijing, China – UK SAIN, Global TraPs.....

UN System: FAO, UN-Habitat, IOC/UNESCO, UNDP, IAEA, UNEP

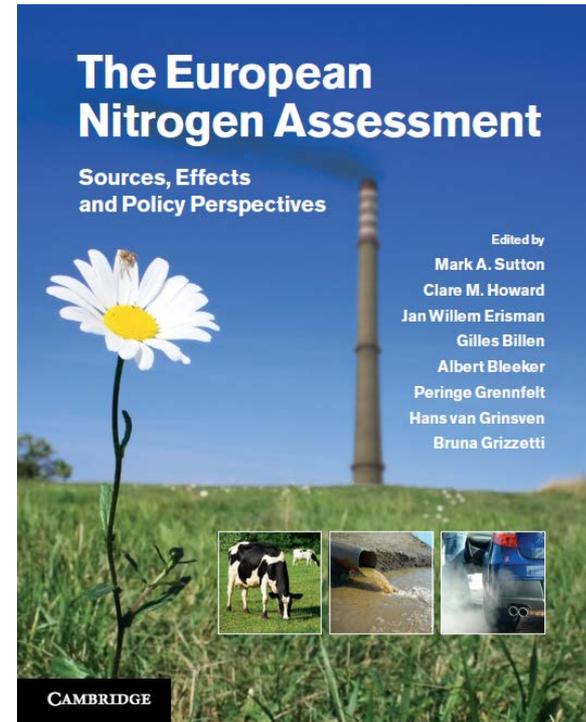
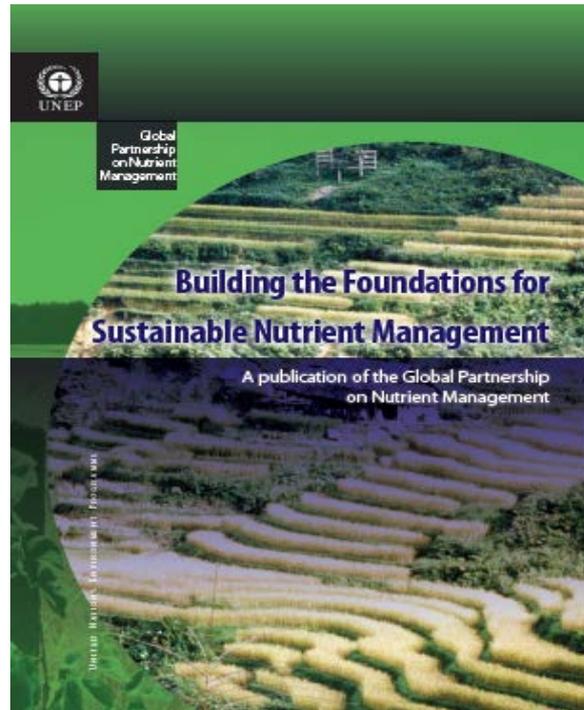
NGOs: GETF, TNC, SCON

Role of the GPNM

- strategic advocacy and co-operation at the global and regional levels to build consensus in promoting nutrient use efficiency and work with stakeholders to develop guidance, strategies or policies on sustainable use of nutrients
- enhancing the capacities of various stakeholders to design and implement effective management policies
- a knowledge platform to support science policy interaction and translating science for policy makers
- positioning of nutrient issues as part of international sustainable development agenda

Role of the GPNM

- innovation and knowledge regeneration to reduce nutrient losses and improve overall nutrient use efficiency



Nutrients – in the Global Agenda

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.

Manila Declaration adopted by 64 governments and the EU at the 3rd Intergovernmental Review Meeting of the Global Programme of Action (January 2012): called for further development of the GPNM and associated regional and national stakeholder partnerships, as well as their activities(and) "to step up efforts to develop guidance, strategies or policies so as to improve nutrient use efficiency ..., and to mitigate negative environmental impacts through the development and implementation of national goals and plans...".

The Rio+20 Outcome document notes "with concern that the health of oceans and marine biodiversity are negatively affected by marine pollution, including marine debris.....and *nitrogen-based compounds*...." (para 163)

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*"

All positive signals of governments commitment and good starting points

Final Word

Effective nutrient reduction strategies would call for new approaches and outreach to society. GPNM is addressing this through its network of members

We acknowledge important role of governments, industry, science community, international agencies and NGOs to address the Nutrient Challenge

GPNM is fully committed to work with all stakeholders to accelerate our efforts to understand how the Earth's ecosystems are impacted by unsustainable use of Nutrients

GPNM look forward to work with **Global Soil Partnership (GSP)** to create enabling conditions for the development of appropriate public policies

**GPNM acknowledges the value of partnering
with GSP to secure the Harvest**

Green Fields and Blue Oceans



THANK YOU