Sustainable Nutrient Management
Global Perspectives and Context

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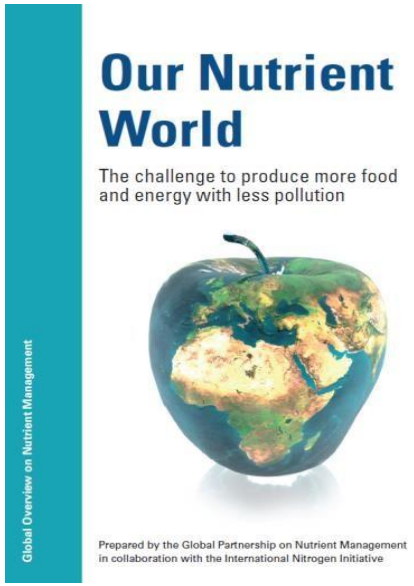
3 March 2021

Context



Foreword

FRONTIERS 2018/19
Emerging Issues of Environmental Concern

"Every year, an estimated US$200 billion worth of reactive nitrogen is now lost into the environment, where it degrades our soils, pollutes our air and triggers the spread of "dead zones" in our waterways."

UN environment

Joyce Msuya
Acting Executive Director
United Nations Environment Programme

Photo credit: ollcit / Shutterstock.com

The Nitrogen Fix:
From nitrogen cycle pollution to nitrogen circular economy

The global nitrogen challenge

The *UNEP 2014 Year Book* highlighted the importance of excess reactive nitrogen in the environment.[1] Its conclusions are alarming. This is not just because of the magnitude and complexity of nitrogen pollution, but also because so little progress has been made in reducing it. Few of the solutions identified have been scaled up, while the world continues to pump out nitrogen pollution that contributes significantly to declines in air quality, deterioration of terrestrial and aquatic environments, exacerbation of climate change, and depletion of the ozone layer.[2-10] These impacts hinder progress toward the Sustainable Development Goals as they affect human health, resource management, livelihoods and economies.[11-15] Yet there are signs of hope. The past four years have seen a transformation in approaches to managing nitrogen pollution. These include new thinking for both consumption and production in order to seriously address the nitrogen problem.[16-24]

Nitrogen is an extremely abundant element in the Earth's atmosphere. In the form of the N_2 molecule, nitrogen is harmless, making up 78 per cent of every breath we take. The two nitrogen atoms are held together by a strong triple bond (N≡N), making it extremely stable and chemically unreactive. The planet benefits because N_2 allows a safe atmosphere in which life can flourish, while avoiding the flammable consequences of too much oxygen. The environmental interest in nitrogen focuses on the conversion of N_2 into other chemically reactive forms. For simplicity, scientists refer to all other nitrogen forms as "fixed" or "reactive nitrogen" (N_r).[11,25] There are many types of N_r with many different effects –

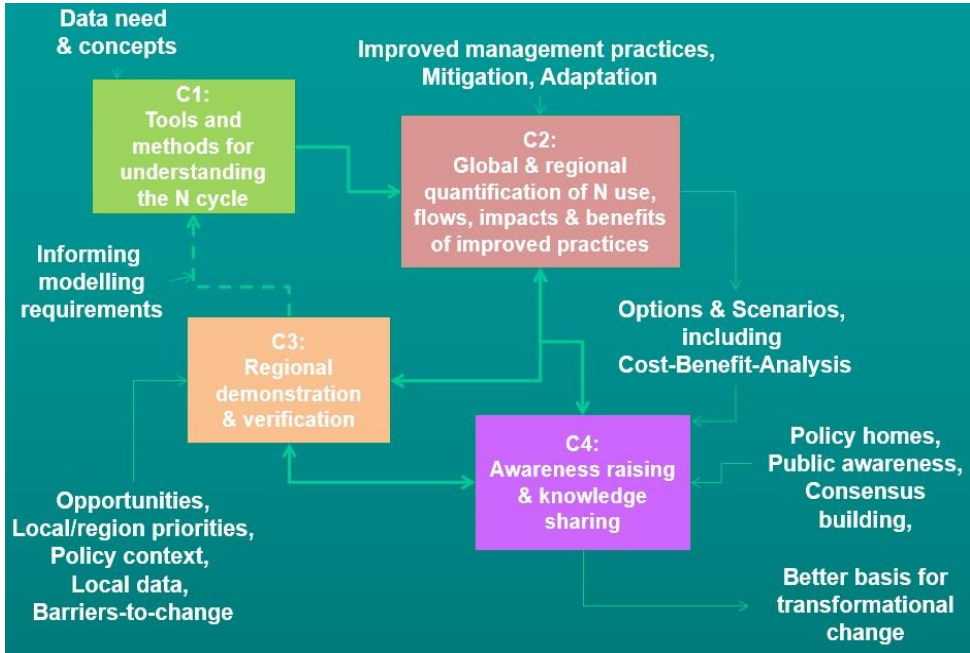
Modified from the European Nitrogen Assessment (2011)

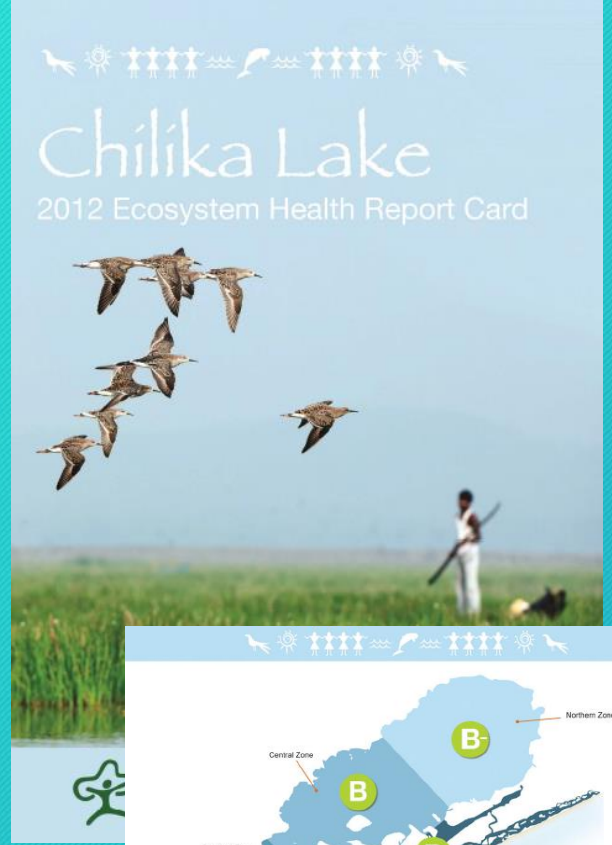
SACEP

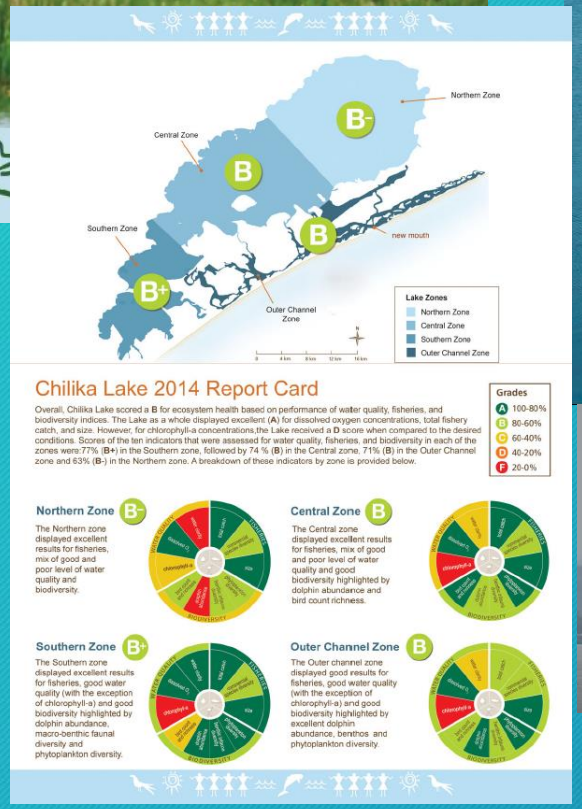
सत्यमेव जयते
Goverment Of India

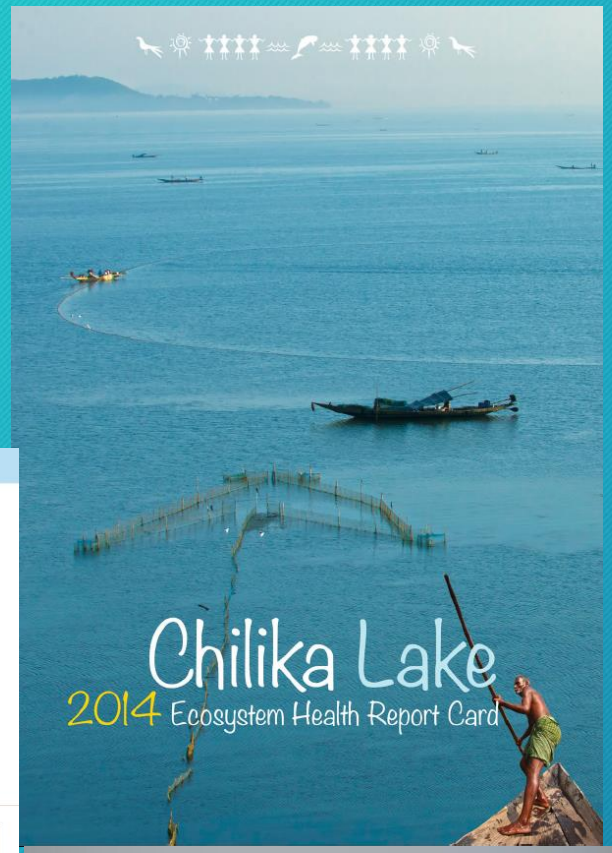
International Nitrogen Initiative

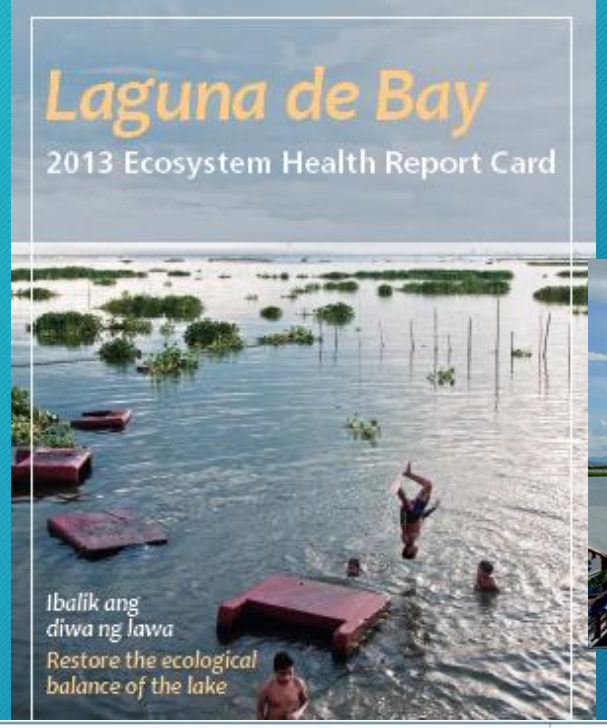
Towards the INMS
International Nitrogen Management System
www.inms.international

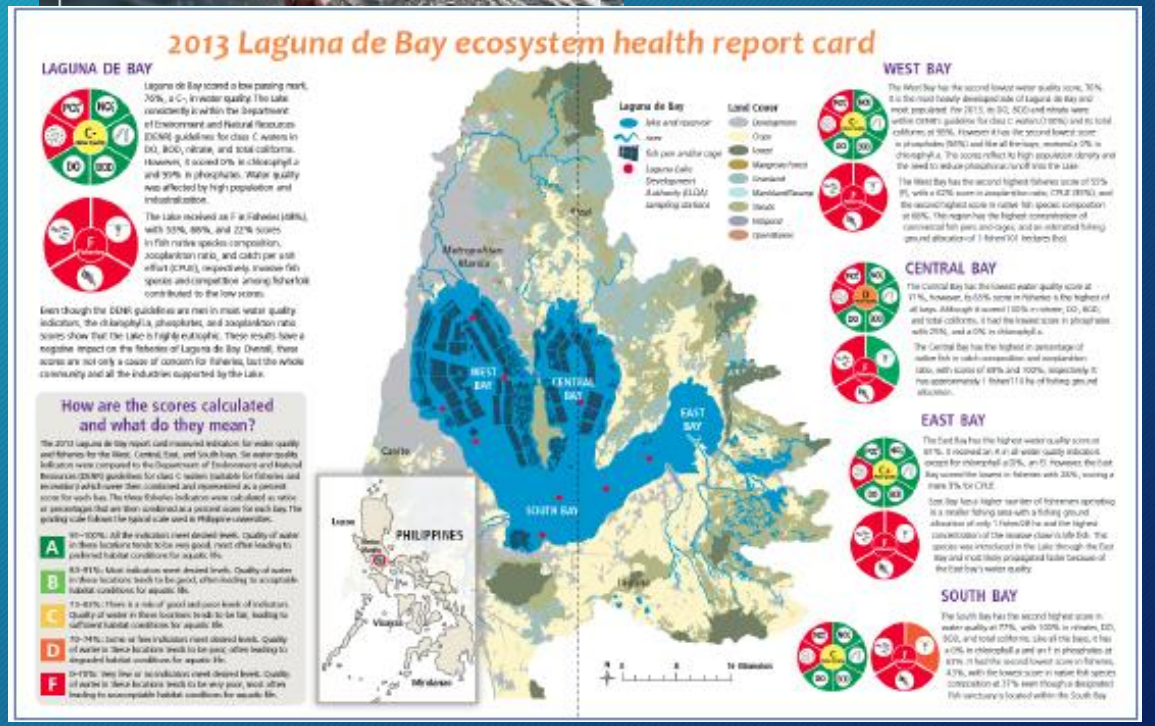



Chilika Lake
2012 Ecosystem Health Report Card


Northern Zone
Central Zone
Southern Zone
Outer Channel Zone
new mouth
B-
B
B
B+
Lake Zones
Northern Zone
Central Zone
Southern Zone
Outer Channel Zone
Chilika Lake 2014 Report Card
Overall, Chilika Lake scored a B for ecosystem health based on performance of water quality, fisheries, and biodiversity indices. The Lake as a whole displayed excellent (A) for dissolved oxygen concentrations, total fishery catch, and size. However, for chlorophyll-a concentrations,the Lake received a D score when compared to the desired conditions. Scores of the ten indicators that were assessed for water quality, fisheries, and biodiversity in each of the zones were:77% (B+) in the Southern zone, followed by 74 % (B) in the Central zone, 71% (B) in the Outer Channel zone and 63% (B-) in the Northern zone. A breakdown of these indicators by zone is provided below.
Grades
A 100-80%
B 80-60%
C 60-40%
D 40-20%
F 20-0%
Northern Zone B-
The Northern zone displayed excellent results for fisheries, mix of good and poor level of water quality and biodiversity.
Central Zone B
The Central zone displayed excellent results for fisheries, mix of good and poor level of water quality and good biodiversity highlighted by dolphin abundance and bird count richness.
Southern Zone B+
The Southern zone displayed excellent results for fisheries, good water quality (with the exception of chlorophyll-a) and good biodiversity highlighted by dolphin abundance, macro-benthic faunal diversity and phytoplankton diversity.
Outer Channel Zone B
The Outer channel zone displayed good results for fisheries, good water quality (with the exception of chlorophyll-a) and good biodiversity highlighted by excellent dolphin abundance, benthos and phytoplankton diversity.


Chilika Lake
2014 Ecosystem Health Report Card


Laguna de Bay
2013 Ecosystem Health Report Card
Ibalik ang
diwa ng lawa
Restore the ecological
balance of the lake

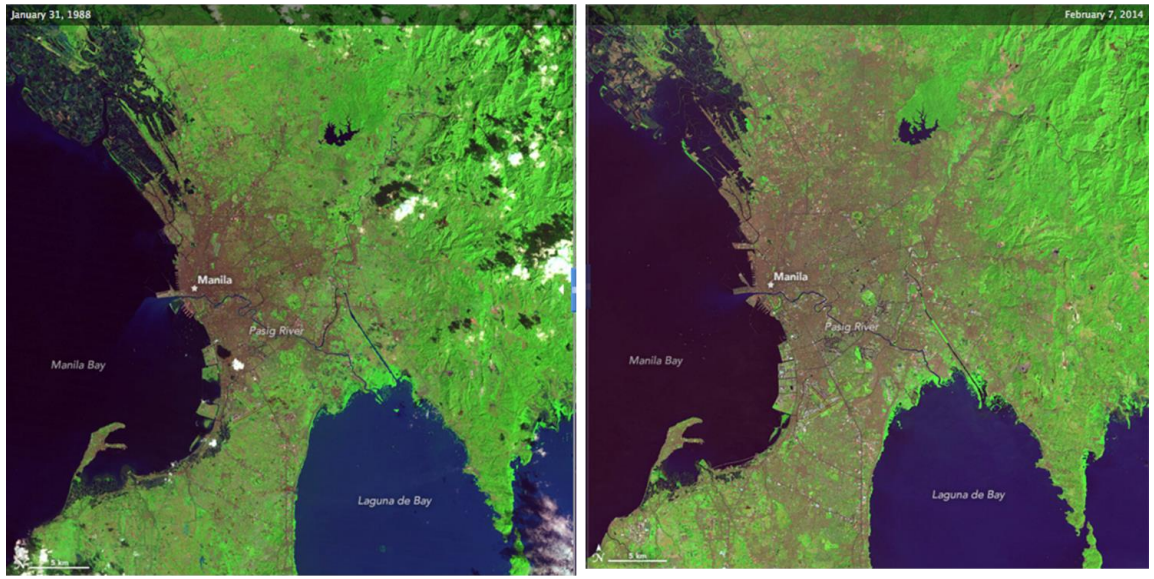

2013 Laguna de Bay ecosystem health report card
LAGUNA DE BAY
How are the scores calculated and what do they mean?
WEST BAY
CENTRAL BAY
EAST BAY
SOUTH BAY
PHILIPPINES

Development and application of the final source-impact models for Manila Bay in developing nutrient reduction strategies

Metro Manila

1988

2014



Rural areas (mainly farmland and forest) appear light green. Urban areas are gray.
Source: http://earthobservatory.nasa.gov/IOTD/view.php?id=86780&src=fb

Emissions and loads

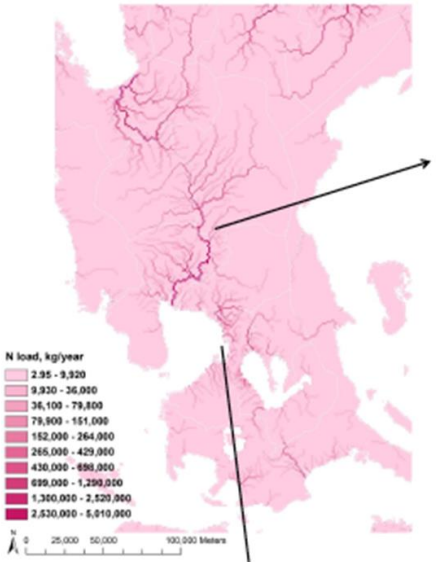


Figure 6. Total N load from domestic and agricultural sources in the Manila Bay watershed (2010)

One of the major rivers in the Manila Bay Watershed, the Pampanga River, drains a majority of the agricultural areas in the watershed bringing in as much as **1.47 million kg of N** and **395 thousand kg of P load to the bay per year**

Pasig river passes through most of the densely populated urban areas in Metro Manila bringing in as much as **3.61 million kg N** and **340 thousand kg P load into the bay per year.**

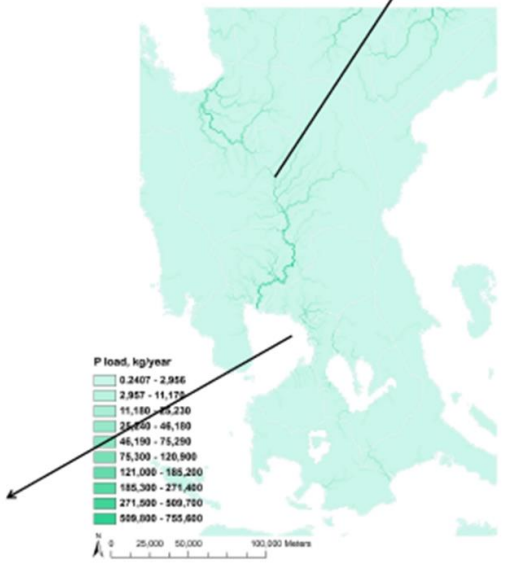
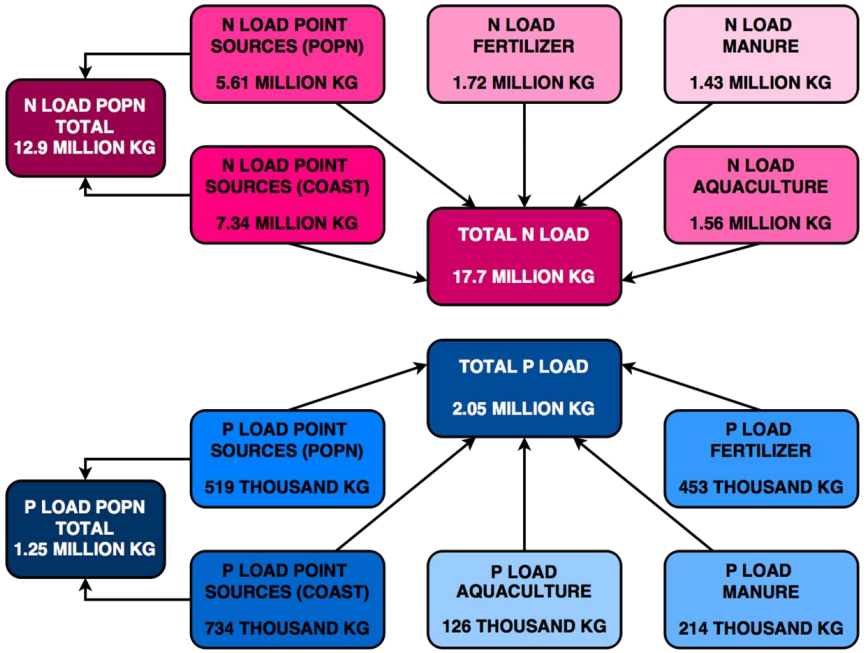
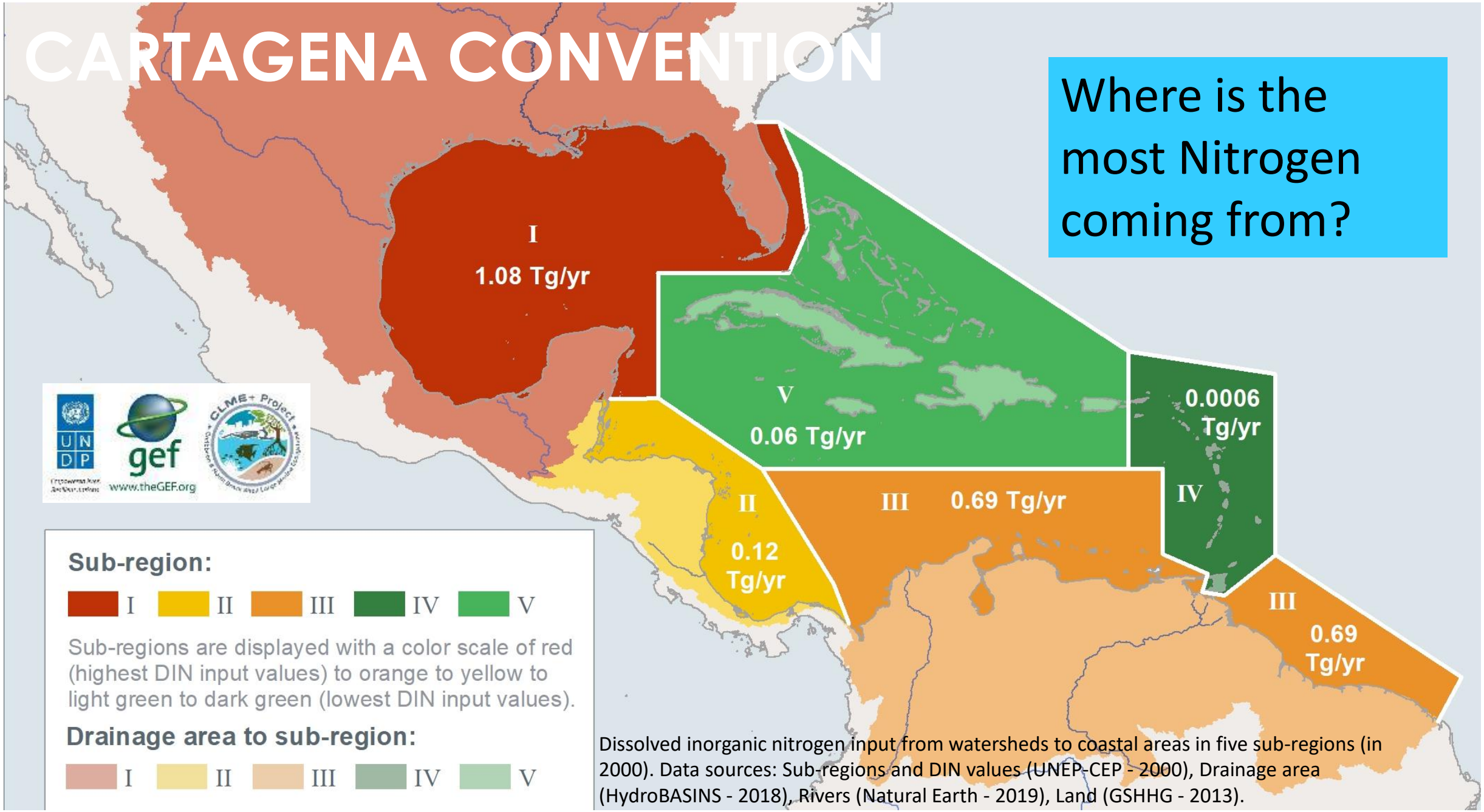


Figure 7. Total P load from domestic and agricultural sources in the Manila Bay watershed (2010)





Dissolved inorganic nitrogen input from watersheds to coastal areas in five sub-regions (in 2000). Data sources: Sub-regions and DIN values (UNEP-CEP - 2000), Drainage area (HydroBASINS - 2018), Rivers (Natural Earth - 2019), Land (GSHHG - 2013).

Global Nitrogen Campaign Launch
Colombo, Sri Lanka
23-24 October 2019

“Nitrogen for Life - Everywhere and Invisible”
Halve Nitrogen Waste by 2030

- Colombo Declaration on Sustainable Nitrogen Management adopted
- Multi-Actor Dialogue: Science-Policy-Political (250 participants, 30 countries)
- Nitro Concert (over 1,400 participants for inaugural session)
- Campaign Communication Strategy and Marketing Strategy (under development)

Intergovernmental Working Group on Nitrogen Management

AFRICA (7)
- Benin
- Eswatini
- Seychelles
- Sudan
- Uganda (2)
- Madagascar
- South Africa

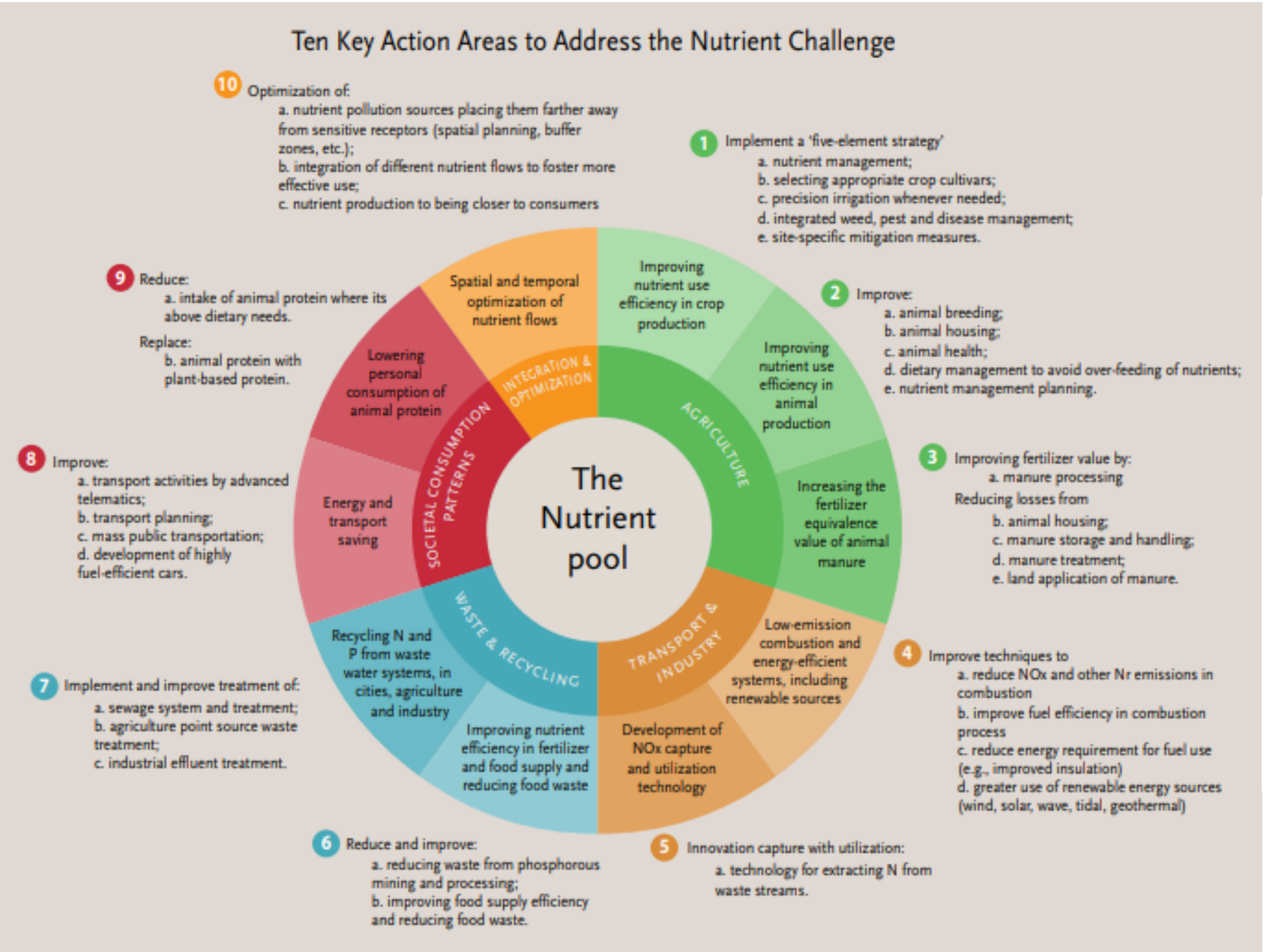
LATIN AMERICA & CARIBBEAN (6)
- Brazil
- Chile
- Paraguay
- Haiti
- Guatemala
- Mexico (3)

ASIA PACIFIC (11)
- Bhutan
- Fiji
- Kyrgyz Republic
- Lao PDR
- Myanmar
- Pakistan
- Sri Lanka
- New Zealand
- Iran Republic
- India
- China

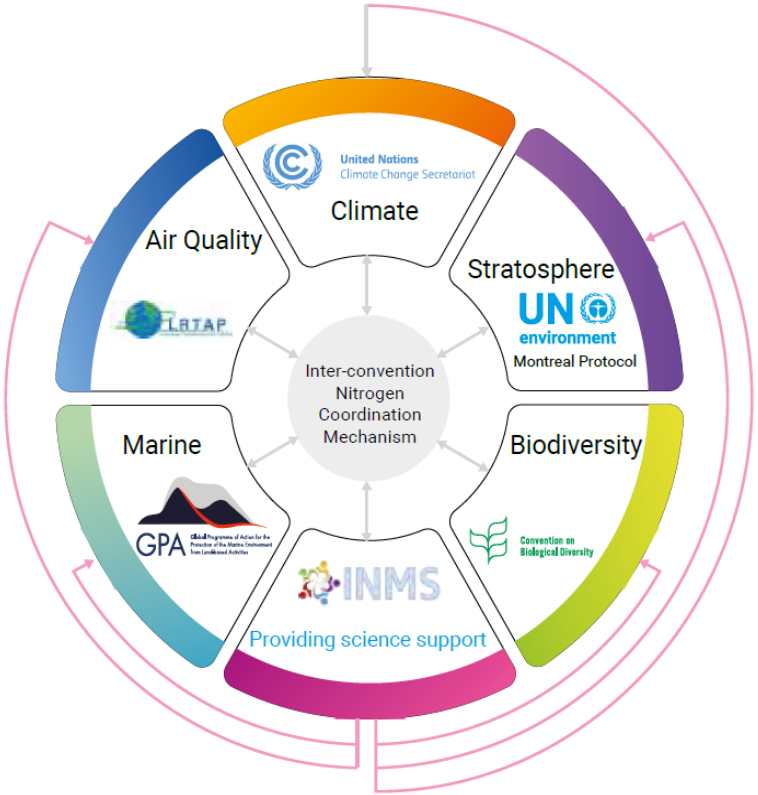
WEST ASIA (3)
- Oman
- Turkey
- Cyprus

EUROPE (9)
- Croatia
- Romania (3)
- Albania
- Belgium
- Germany
- Sweden (2)
- Spain
- Hungary
- Poland (2)

N. AMERICA (1)
- United States



Inter-convention Nitrogen Coordination Mechanism



Sutton et al. (2019) The Nitrogen Fix. UNEP *Frontiers*

Opportunities

UNITED NATIONS FOOD SYSTEMS SUMMIT 2021

UN Ocean Conference
Lisbon, Portugal

UNITED NATIONS DECADE ON ECOSYSTEM RESTORATION 2021-2030

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

Nitrogen is everywhere, yet invisible, across the UN Sustainable Development Goals (SDGs).

2020 UN BIODIVERSITY CONFERENCE
COP 15 - CP/MOP10-NP/MOP4
Ecological Civilization-Building a Shared Future for All Life on Earth
KUNMING · CHINA

UN CLIMATE CHANGE CONFERENCE UK 2021
IN PARTNERSHIP WITH ITALY

Thank you for your attention!

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