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Global Nutrient-related Water Quality Challenges: The scale of the problem
全球营养物质污染及对水环境的挑战

Global Nutrient Management Conference
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Outline

- What is Eutrophication?
  什么是富营养化？
- Impacts of eutrophication
  富营养化的影响
- Sources and pathways of nutrients
  营养污染物的来源
- Drivers
  动因
- Scale of the problem
  问题的严重程度
- Future trends
  发展趋势

What is eutrophication?
什么是富营养化？

- Nutrient (nitrogen & phosphorus) pollution in aquatic systems

  营养物质(氮磷)过剩对水体造成污染

- Leads to increased biomass production—upsetting the balance of the systems

  造成水体生物量(藻类)的急剧增长——影响水生态系统的平衡

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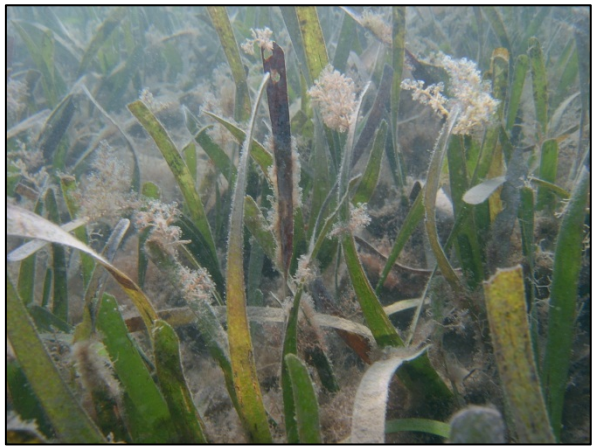
Impacts of Eutrophication 富营养化的影响

Nuisance/toxic algae blooms
有毒藻类爆发

Loss of SAV (nurseries)
沉水植物死亡



Dead Zones
水体死亡区

Regime Shifts
系统稳态转换

Fish Kills 鱼类死亡

“When you can’t breathe nothing else matters”

American Lung Association
美国肺协会

Economic consequences
经济损失

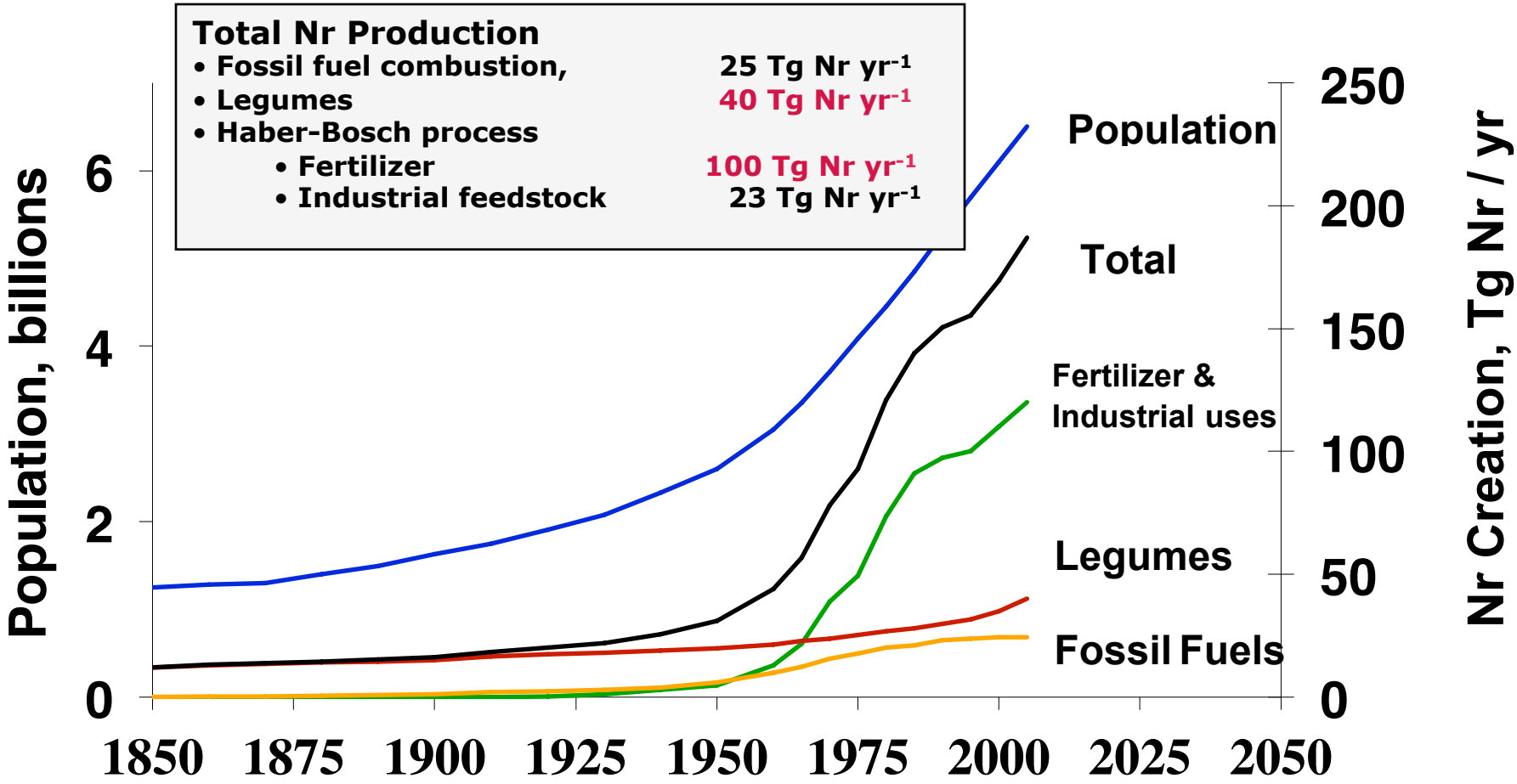
- Loss in tourism/recreation
  旅游业损失
- Increased costs to treat drinking water
  自来水处理成本增加
- Loss of drinking water source
  饮用水源被破坏
- Aquaculture losses
  渔业损失
- Capture fisheries losses
  捕捞渔业损失

Sources and Pathways of Nutrients
营养污染物的来源和途径

- Sources 来源
  - **–Agriculture 农业**
  - –Sewage 城市污水
  - –Urban runoff 城市雨洪
  - –Fossil Fuels 化石燃料
- Pathways 途径
  - –Air 空气
  - –Surface Water 地表水
  - –Groundwater 地下水

74% of Nitrogen is used for Agriculture
78% of this is lost to environment

74%的氮元素被农业利用
其中78%流失进入环境



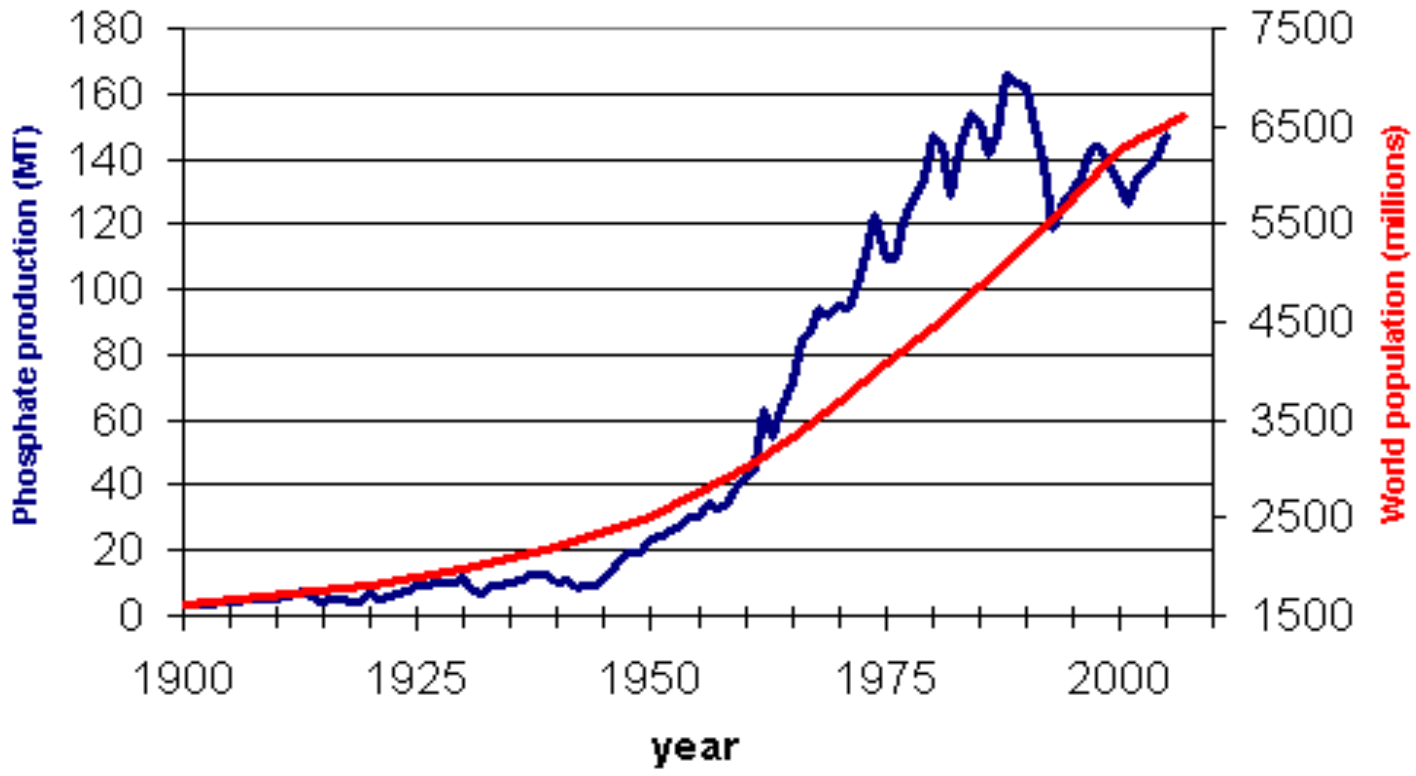
Reactive Nitrogen Creation 1850 - 2005

Source: Galloway et al., 2003

Rock phosphate production sits at 150 million metric tons/year;

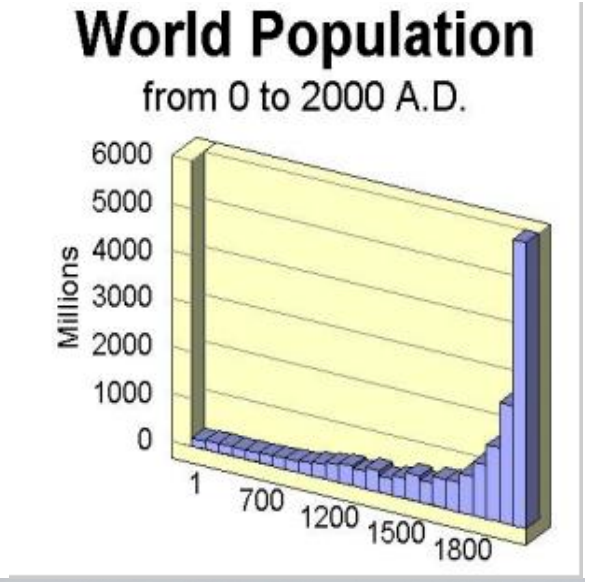
90% of rock phosphate is used for fertilizer production

全球磷矿的产量为1.5亿吨/年，90%被用于肥料生产



World Rock Phosphate Production v. Population

Dery & Anderson 2007



Drivers of Nutrient Pollution 动因

- Population growth 人口增长
- How we produce our food 生产方式
  - Intensification and fertilizers 化学农业
- Dietary Choices 饮食选择
  - 1kg of meat has 5 times the N footprint of 1kg of vegetables/grains (visit www.n-print.org). 1公斤肉的氮足迹是1公斤素菜的5倍
- Land use Conversion 土地利用
  - 90% of cropland gains from forests. 约有90%的农地之前是森林

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Eutrophic and Hypoxic Systems 1969 1969年富营养化及缺氧区

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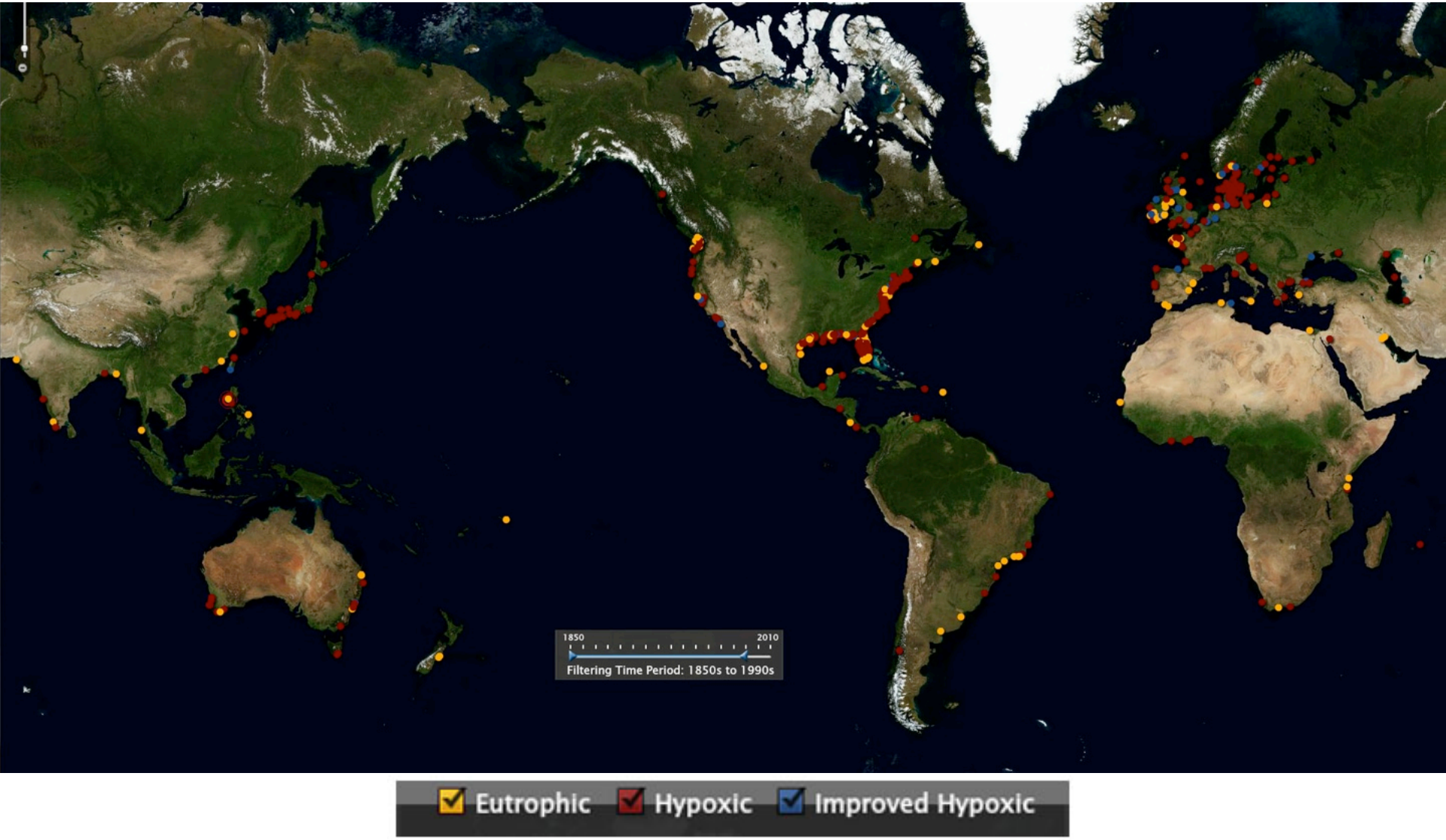
Eutrophic and Hypoxic Systems 1999 1999年富营养化及缺氧区



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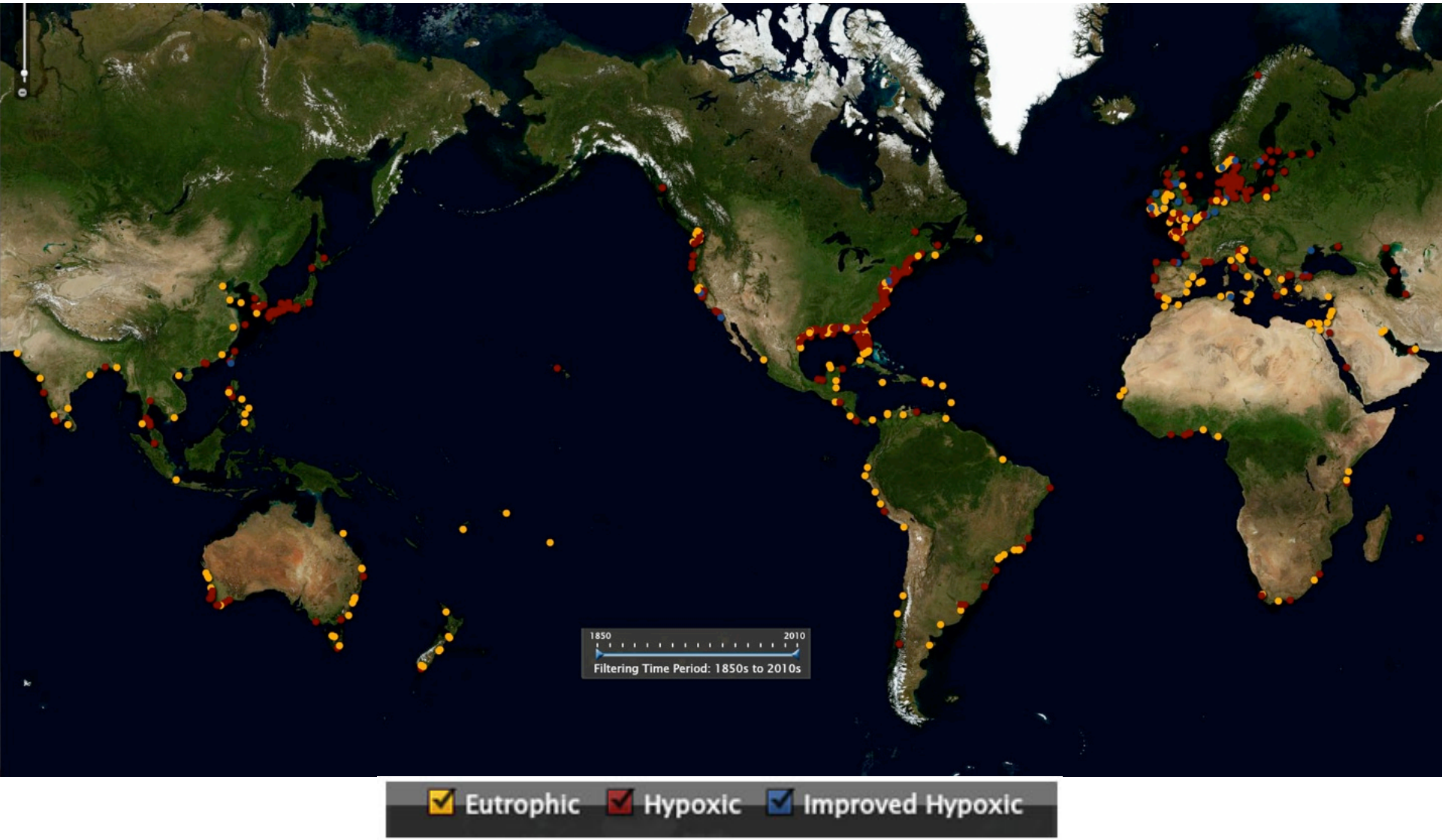
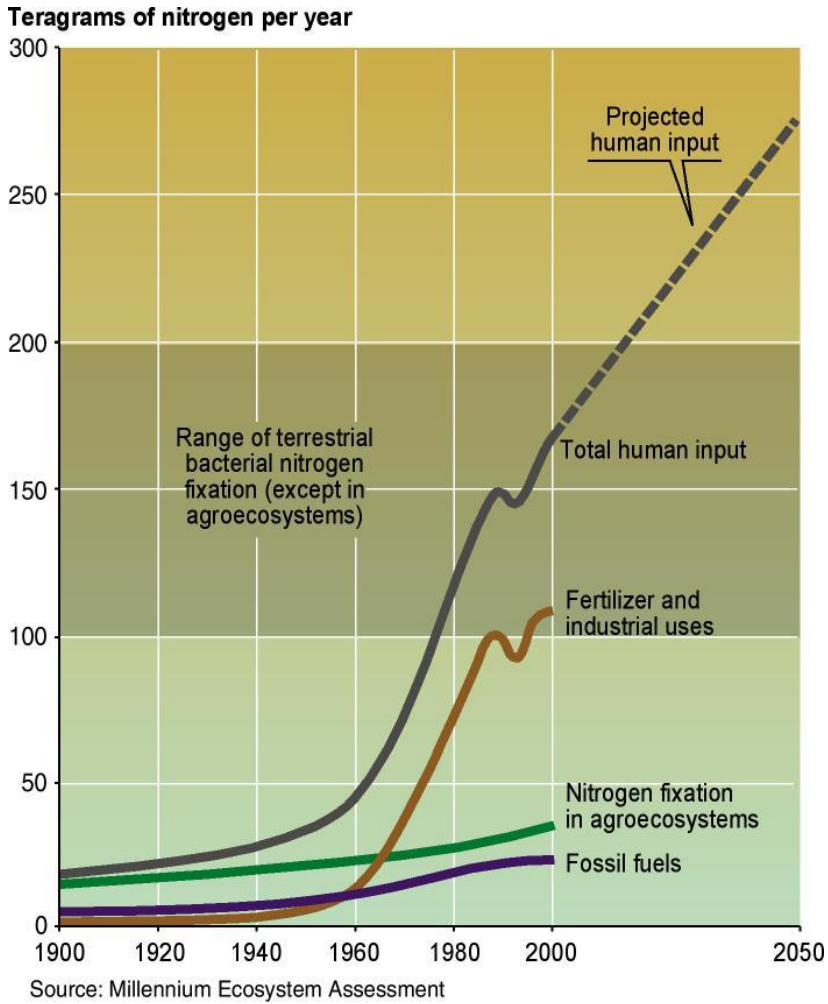
Eutrophic and Hypoxic Systems 2011 2011年富营养化及缺氧区



How will feeding an additional 2 Billion people impact our water quality?
为20亿新增人口提供食物将对水质造成什么影响？



Source: Millennium Ecosystem Assessment

Human-created nitrogen expected to increase 46% by 2050

由人类活动产生的氮将在2050年增长46%。

Other factors will influence the severity of eutrophication
其他影响因素

- Climate Change 气候变化
  - Increase in severe storms=more runoff
  - Warmer temps=more stratification
  - Warmer temps=longer growing season
  - Warmer temps=upwelling

- Overfishing 过度捕鱼

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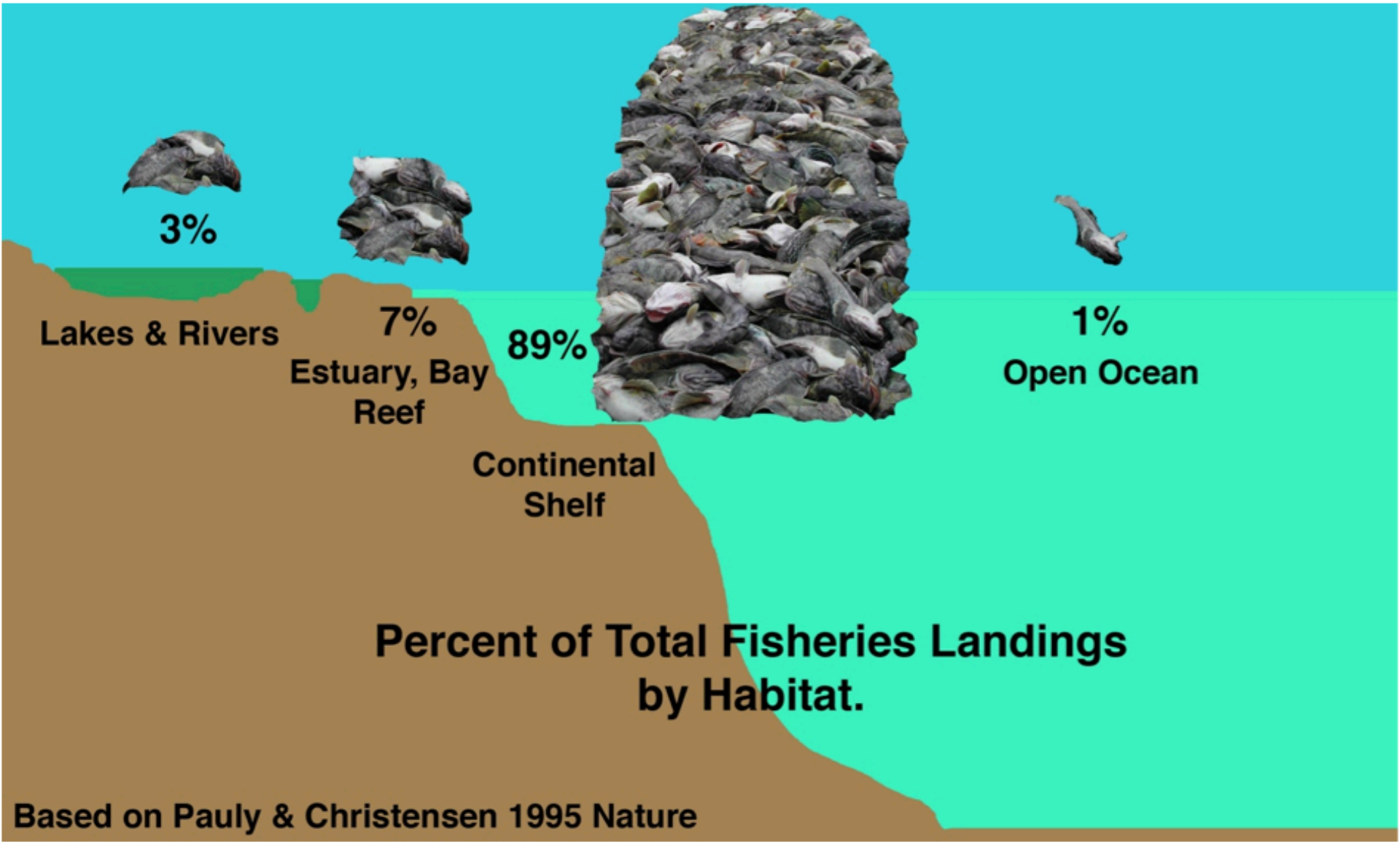
Potential to impact Fisheries 对渔业的影响



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Some systems have shown improvement 有的地方出现了改善

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www.wri.org/eutrophication

Eutrophication & Hypoxia

Nutrient Pollution in Coastal Waters

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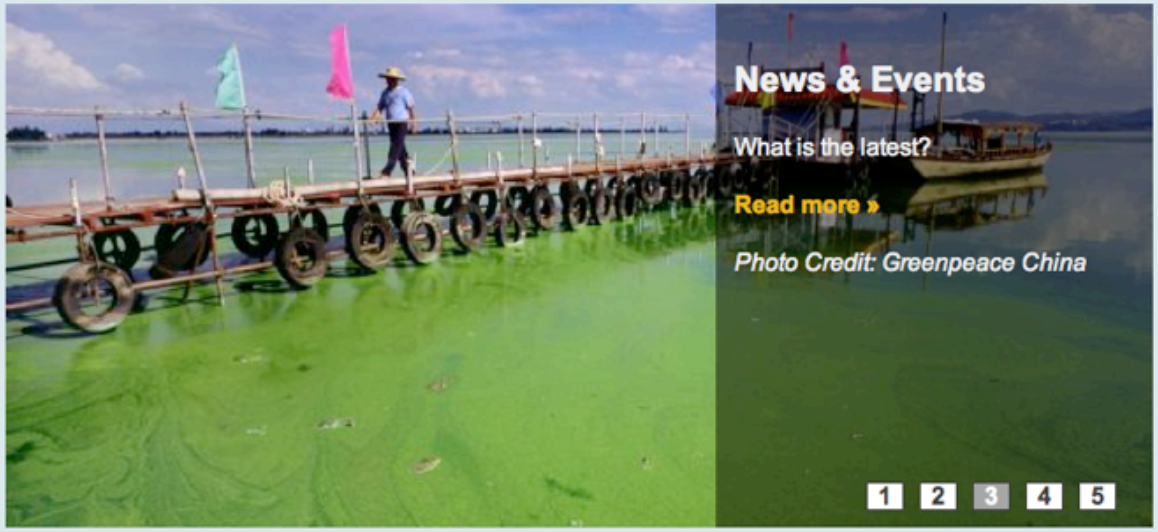

What Is Eutrophication?

Eutrophication—the over-enrichment of water by nutrients such as nitrogen and phosphorus—is a leading threat to water quality around the world. Also known as "nutrient pollution," eutrophication upsets the natural balance of aquatic ecosystems, which can lead to algal blooms, red tides, hypoxic or "dead" zones, fish kills, and, eventually, ecosystem collapse.

More about eutrophication »

Stories

New Fact Sheet Helps Chesapeake Bay States Design Nutrient Trading Programs
Jul 15, 2011
from WRI Insights

"Shocking" New Report Confirms Threats to World's Oceans and Reefs
Jun 22, 2011

News

» EPA Committee Completes Report on Agricultural Issues - Southeast AgNET

» Province releases water quality standards - The Daily Graphic/Central Plains Herald-Leader

» EPA approves Montana water pollution plan | Washington Examiner

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Thank You 谢谢

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