Agricultural systems by design

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INRAE

ideas INITIATIVE FOR DESIGN IN AGRIFOOD SYSTEMS

Agricultural systems by design

Threats of environmental pollution to biodiversity and ecosystem functions in foodscapes

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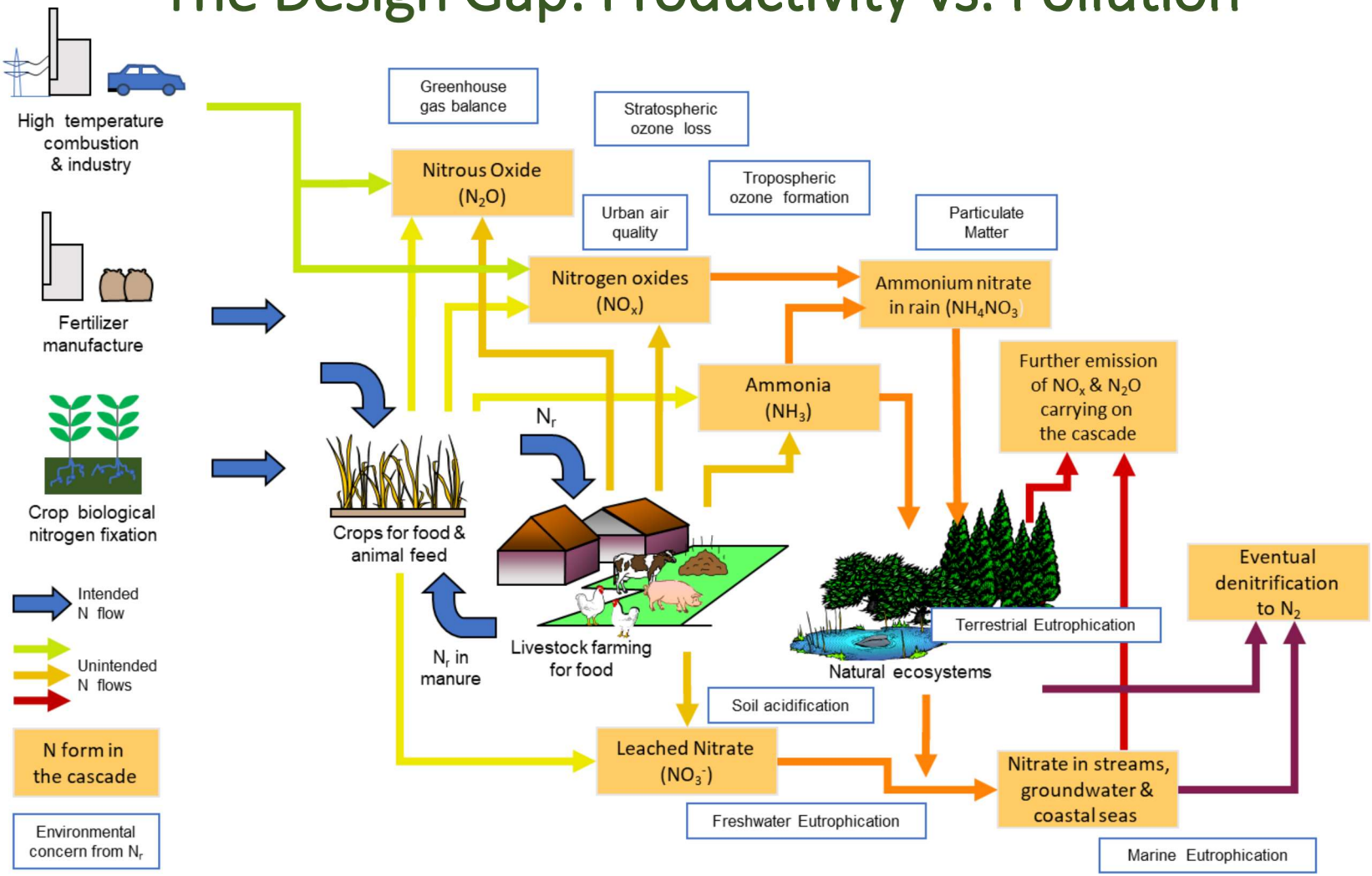
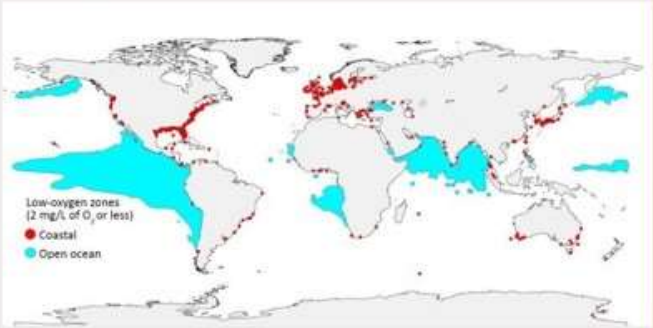
The Design Gap: Productivity vs. Pollution



When Farming Systems Ignore Pollution costs

Global Crisis



- 400+ aquatic dead zones doubling each decade since 1960s (Diaz & Rosenberg, 2008), caused by nutrient pollution (Drechsel et al., 2023 -CGIAR CGSpace)

The Impact (e.g Water Hyacynth in L. Victoria)

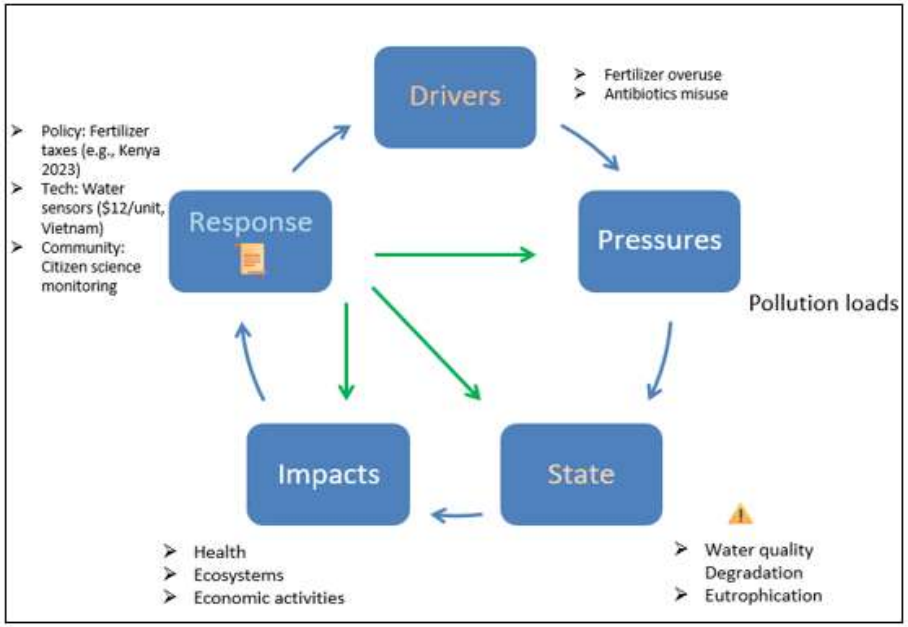
Fertilizer runoff-major driver of significant fisheries decline & economic hardship for dependent communities (Medina et al., 2023; Masso et al., 2024 -CGIAR CGSpace)

Hidden Costs

- Antibiotics and pesticides in aquaculture drive drug-resistant bacteria (Drechsel et al., 2023 - CGIAR CGSpace)

Systems Solutions for Pollution Monitoring

DPSIR Framework



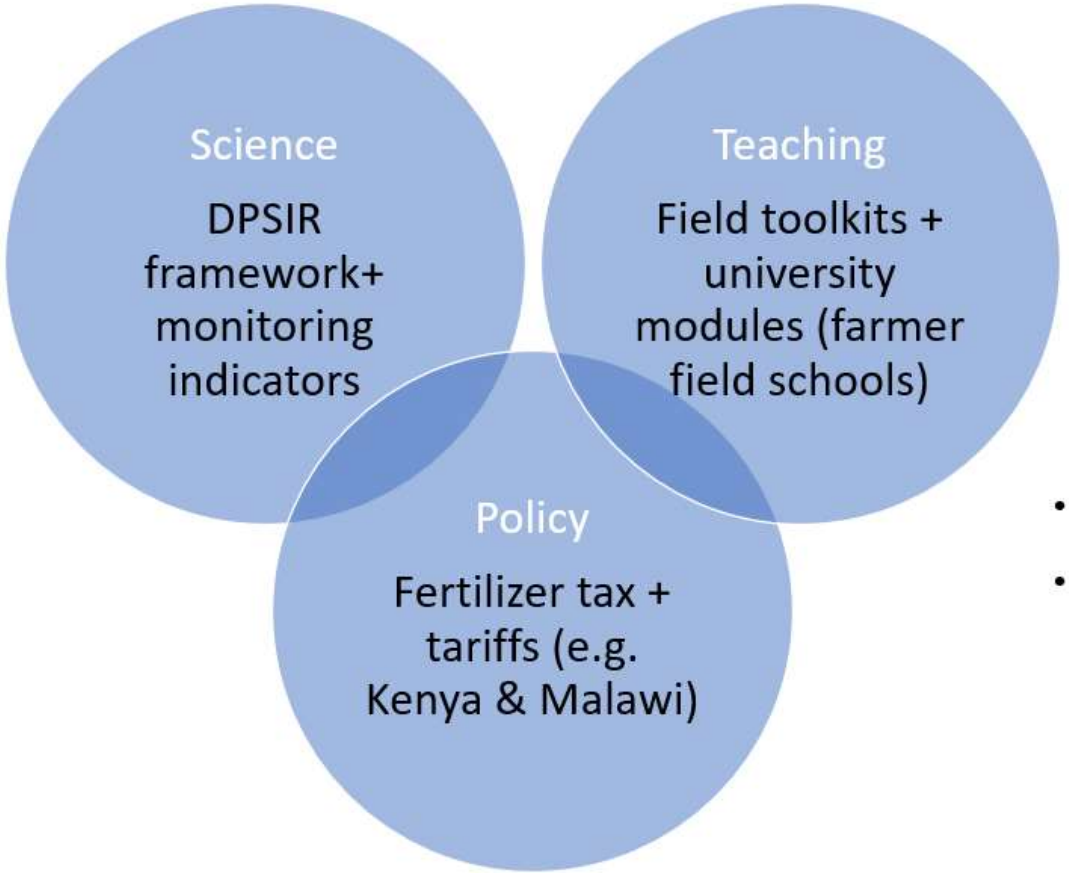
CGIAR's Proven Interventions

- Use of **knowledge management toolkits** *and* **performance indicators** *for soil health, nutrient management, and circular economy*

Response Type	Example	Impact
Policy 📜	National agroecology policies	18 countries adopted CGIAR frameworks
Technology ♻️	Circular economy innovations	30% waste reduction in 7 LMICs
Behavioral 👩‍🌾	Farmer field schools for IPM	50% pesticide reduction in East Africa

Source: CGIAR SIDA Report 2024

Let's Invest in Environmental Assessments



- *Each $1 invested in assessment saves $12 in remediation*
- *Assessment tools form part of a broader* **knowledge management system** *tracking indicators like nutrient runoff and soil health*
(CGIAR SIDA Report,2024)

Designing the Future – Call to Action

Every farming system needs:	1. Environment assessment budget 2. Biodiversity and ecosystem health indicators 3. Citizen science 4. Capacity and knowledge sharing for foodscape actors Align with **performance indicators** *for ecosystem health (e.g., soil health cards, pollinator counts*
Let's co-design tools for:	• Researchers: Standardized metrics • Policymakers: Threshold databases • Farmers: Simple test kits • **All** Foodscape Actors: Knowledge management toolkits