



An Overview of European Nutrient Policy

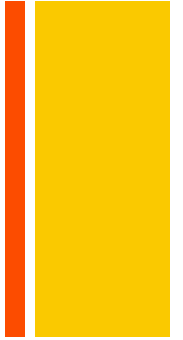


...And a Normative View of What Could Happen in the U.S.



Leif Nielsen
Washington State University
School of the Environment
NSPIRE Fellow, PhD Student
leif@wsu.edu

+ Presentation Overview

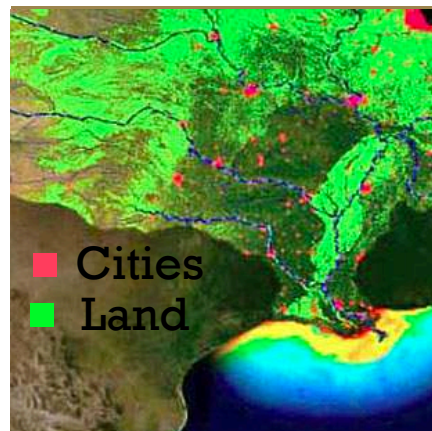
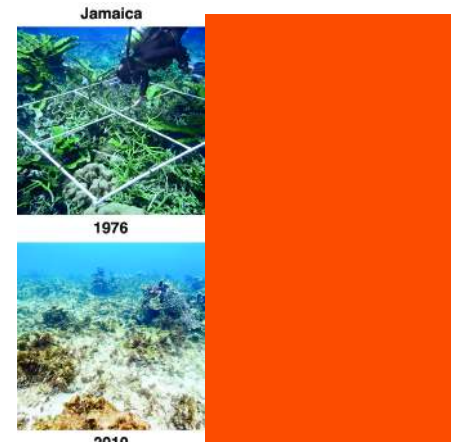


- The nutrient problem (why we care)
- Types of policy vehicles for nutrient policy
- European nutrient policies
- U.S. Farm Bill
- Normative view on where agricultural nutrient policies can be implemented in the US



Why should we care about nutrient problems?

- We have doubled the amount of available nitrogen on Earth
- Human health: Nitrate in drinking water; Blue Baby Syndrome; Intestinal cancer
- Ecosystem shifts and degradation
- River, stream, and lake algae blooms
- Hypoxia, ocean dead zones, fish kills
- Ocean acidification: loss of coral reefs





Nitrogen is a wicked problem for a variety of reasons...



- The problem changes over time and by location -- there is high uncertainty in measurements
- There is no defined solution or endpoint to the problem
- There is no agreement between stakeholders on what the problem is
- Values and goals are not necessarily shared by all parties involved

...It is a social, economic, political, and scientific issue



Sources of nutrient pollution



Non-point source -- Runoff from a diffuse area: urban stormwater, agriculture

Point source -- discharge from a single location: factories, waste water treatment plant



Types of policy instruments for nutrient reductions

Regulations

- Public land use planning
- Pollution standards and limits
- Fertilizer restrictions
- BMP mandates

Economics

- Taxes
- Subsidies / Incentives
- Import / export tariffs
- Emission markets

Communication / Outreach

- Extension services (e-Extension)
- Education / Information
- Co-operative approaches

+ European Union nutrient policies implemented and enforced by:



1. Water Framework Directive
2. Urban Waste Water Treatment Directive
3. Nitrates Directive
4. Groundwater Directive
5. Marine Strategy Framework Directive

+ EU nutrient policies

■ Nitrogen issues addressed by policies

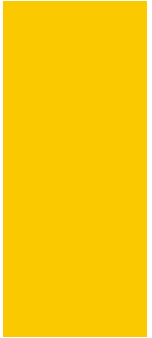
1. NH_3 emissions from agriculture
2. NO_3 pollution of groundwater and surface water from agriculture
3. TN from urban WWTP

■ Policy mechanisms regulating nitrogen:

1. Input control (N ag. application limits)
2. Discharge limits
3. Nr concentration limits in water bodies
4. Exposure limits and critical Nr loads



EU nutrient policies



Water Framework Directive

- To protect inland surface waters, groundwater, tidal waters, and coastal waters from pollution and excessive use
- River basin management plans for designation of protected areas
- Establishing and maintaining good ecological status in surface waters

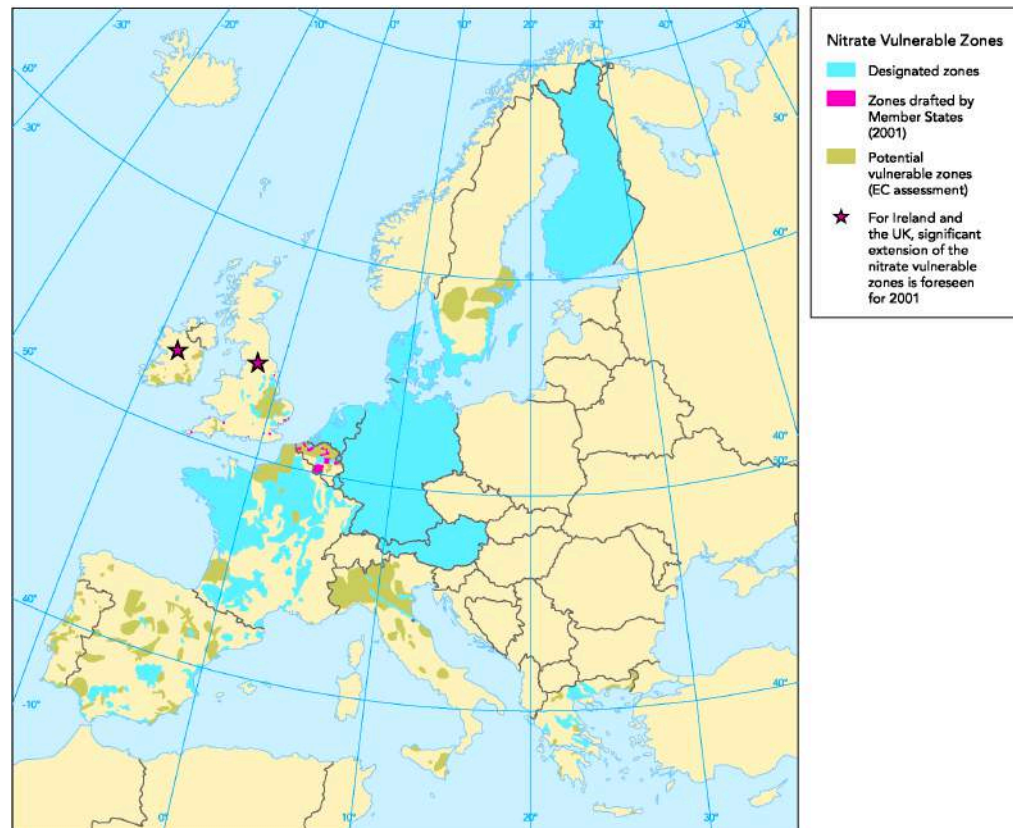
Urban Waste Water Treatment Directive

- Regulating waste water and industrial water discharge in urban areas
- Identifies sensitive surface water areas
- Waste water discharge to sensitive areas **MUST**:
 1. Reduce 70-80% of TN from effluent
 2. max annual TN conc. are limited to 1.5-10 mg/l (depends on city size)

+ EU Nitrate Directive

- Reducing nitrate leaching from agricultural sources (Established in 1991)
- Designated Nitrate Vulnerable Zones (NVZs)
- Good ag. practice code (BMPs) (voluntary)
- N application limits in NVZs
- Water quality criteria (50 mg/l NO_3^- and eutrophic designation) special status
- Animal manure application limit (170 kg N/ha/yr)
- Water monitoring network

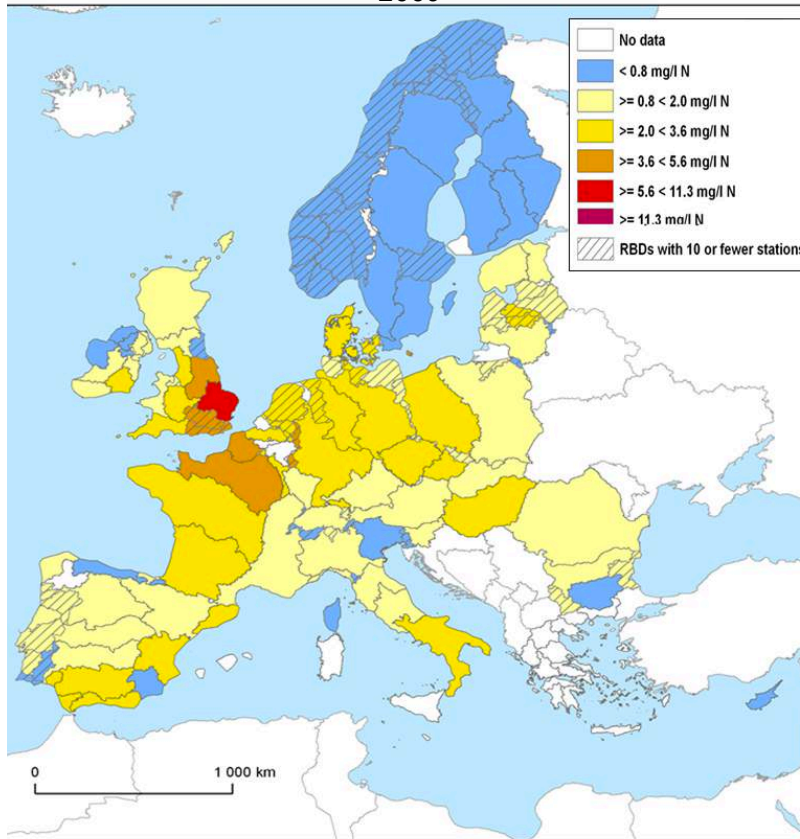
Map of EU-27 Nitrate Vulnerable Zones



EEA, 2002

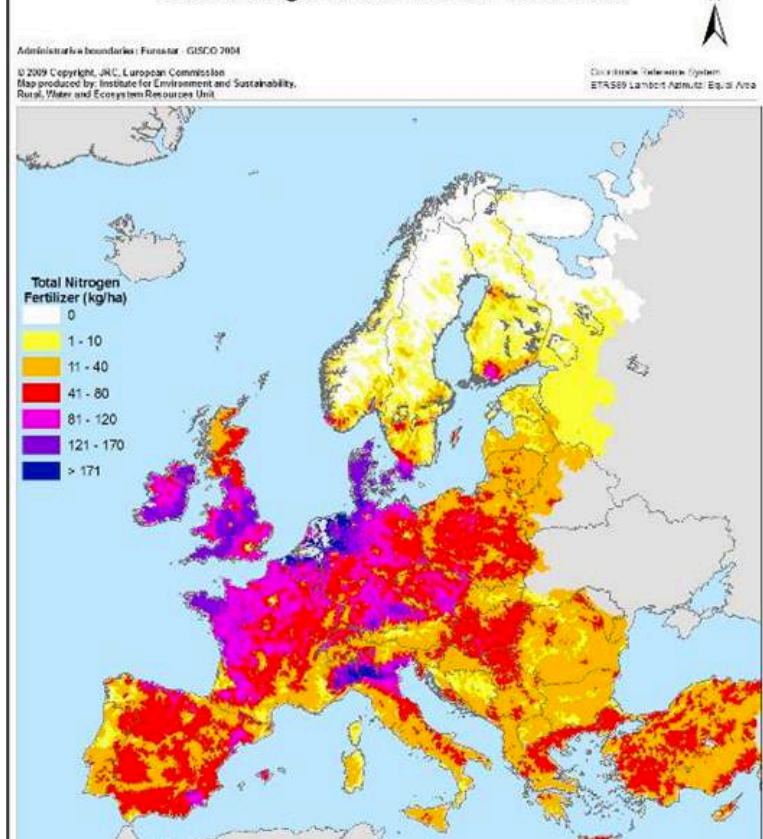
+ EU Nitrate Directive

Average annual river nitrate conc. by National River Basin District
2009



EuroStat, 2012

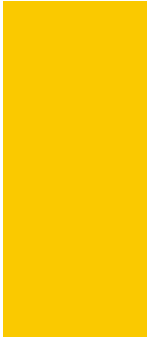
Total Nitrogen Fertilizer for Year 2005



EuroStat, 2011



EU nutrient policies continued...



Groundwater Directive

- Groundwater quality standards for nitrate and pesticides
- River Basin Districts designate groundwater bodies
- EU-27 groundwater monitoring network established in 2006
- 50 mg/l NO_3^- as maximum limit in groundwater

Marine Strategy Framework Directive

- A framework to achieve and maintain Good Environmental Status by 2020
- ① Biodiversity maintained
- ② Invasive species do not adversely alter ecosystem
- ③ Commercial fish species populations are healthy
- ④ Food-webs ensure long-term abundance and reproduction
- ⑤ Eutrophication is minimized
- ⑥ Sea floor integrity
- ⑦ Alteration of hydrographical conditions does not adversely affect the ecosystem
- ⑧ Contaminant concentrations do no harm and in seafood are below safe levels
- ⑨ Marine litter does not cause harm
- ⑩ Introduction of energy does not adversely affect the ecosystem



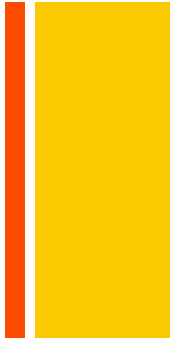
Lessons learned from the EU:

What academic researchers have discovered about European nutrient policies

- In general, only modest reductions in Nr emissions from agriculture have been achieved to date; Across EU-27 there has been a 15-20 % reduction in N and P emissions from agriculture
- International conventions have played a key role in raising awareness and establishing nutrient policy measures in EU
- Compliance and effectiveness of policies differ; in decreasing order:
 1. Reducing NO_x emissions from
 2. Reducing N and P to waters from industries and households
 3. Reducing NH₃ emissions and NO₃ leaching from agriculture
- When nutrient reduction policies are implemented results are not immediate, in fact it may be many years before nutrient pools draw down, and decreases in nutrient levels are evident
- There are increasing efforts to cluster single EU Directives into larger Framework Directives
- There is need to find an optimal mix of policy instruments targeted to the emission sources as well as the stakeholders involved



Overview of U.S. Farm Bill



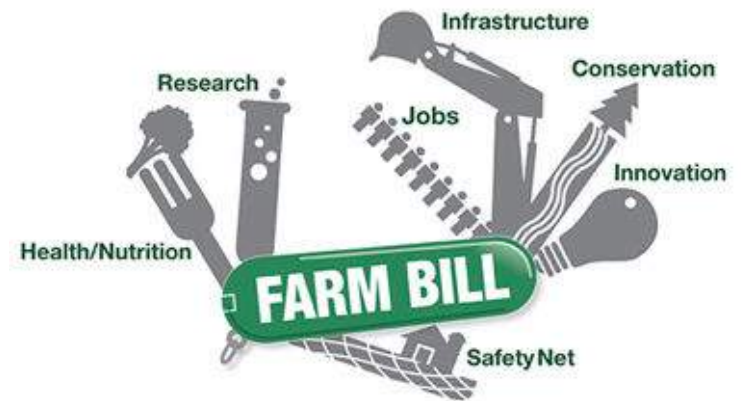
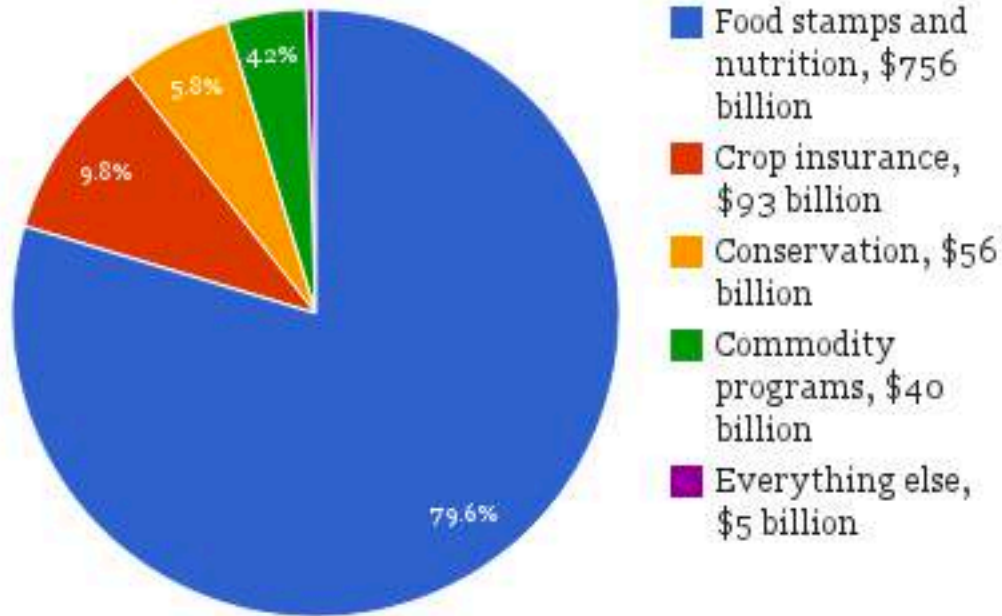
- U.S Farm Bill is a major agricultural policy driver (Reganold et al. 2011)
- Almost \$1 trillion over 9 years
- Largest components of the Farm Bill
 - Suppl. Nutrition Assistance Program (SNAP)
 - (~80 % of Farm Bill)
 - Commodity subsidies
 - Crop insurance / disaster relief
 - Conservation programs (CRP)
- Revision to 2014 Farm Bill
 - Removal of direct payment subsidies, and revises the crop insurance program
 - Rural Development (\$150 million per year for water and wastewater infrastructure)
 - Foreign Agriculture (~\$300 million per year)



+ Farm Bill continued...



What's in the farm bill? (Costs from FY2014-2023)

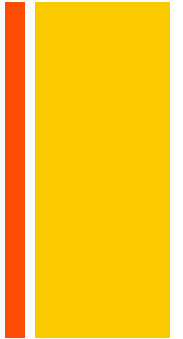


"It's like a Swiss Army knife."

- President Obama 2/7/14



U.S. Nutrient Policy



- The Farm Bill is the largest piece of Agriculture policy in the U.S
- Agriculture sector contributes the largest amount of N and P
- The U.S. Farm Bill is potentially the largest arena for nutrient policy
- Potential locations for nutrient policy in the U.S. Farm Bill
 - Crop insurance program
 - CRP
 - SNAP
 - Foreign trade

Existing Research Programs in USDA on nutrients and non-point runoff

- NIFA
- NRCS
- ARS
- FS

Important U.S. nutrient programs

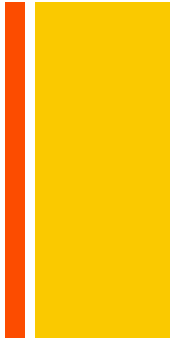
- Mississippi River Gulf of Mexico Nutrient Taskforce
- USDA Conservation Effects Assessment Project (CEAP)

...It is the will of the people that brings about change (policy) ...if the will is there then there will be a way

(Deborah Stone, Policy Paradox, 2011)



Existing nutrient reduction technologies, management, and measures



- No fall fertilizer application (potential for ~25 % reduction in Nr emissions)
- No till farming
- Easily accessed database of farming innovations for farmers (e-Extension)
- BMPs such as the 4R's (right source, right rate, right time, right place) concept of fertilizer application play an important role in reducing nutrient pollution to water
- Offer Federal financial assistance to farmers to adopt practices that improve NUE, and for installing and maintaining naturalized buffer strips
- Use nitrogen BMPs as a condition for receiving farm program benefits
- Potential for missions markets such as water quality trading and greenhouse gas cap-and-trade
- Nitrogen fertilizer taxes
- ON FARM REDUCTIONS WILL BE CHEAPER THEN DOWNSTREAM POLLUTION REMEDIATION
- Use knowledge from CEAPs to regionalize nutrient reduction policies (Northwest is different than Midwest)



+ Questions and Comment

Thanks to REACCH for hosting!

Thanks to NSPIRE for funding, NSF Grant #0903714



+ References (works cited)

Publications

Douring, O. 2014. Personal correspondence. Washington, D.C.

European Nitrogen Assessment. 2011. ed. Sutton, M.A. et al. Cambridge University Press.

Reganold, J. et al. 2011. Transforming U.S. Agriculture. *Science*, 332: 670-671.

Ribaudo, M. et al. 2011. Nitrogen in Agricultural Systems: Implications for Conservation Policy. USDA Economic Research Service.

Stone, D. 2012. Policy Paradox: The Art of Political Decision Making. W.W. Norton & Company. 408 p.

USDA. 2014. U.S. Farm Bill Highlights.

Images

1. wallpaperswide.com/european_city-wallpapers.html
2. dispatch.com/content/graphics/2012/11/26/water-threats-day-2-side-art-gebkccvt-1bioreactor2-kr-02-jpg.jpg
3. flickr.com/photos/kevinmcneal/5693483146/
4. water.usgs.gov/nawqa/ecology/pubs/cir-1391/
5. www.globaltimes.cn/attachment/100721/e27ee45d78.jpg
6. 3.bp.blogspot.com/-n8nKRKgWsZo/TiWx5q40vvI/AAAAAAAAA/paOx0GXWMms/s1600/DrinkBaby.jpg
7. coastalscience.noaa.gov/research/pollution/hypoxia
8. news.nationalgeographic.com/news/2010/09/100916-fish-kill-louisiana-gulf-oil-spill-dead-zone-science-environment/
9. eea.europa.eu/data-and-maps/figures/nitrate-vulnerable-zones-eu
10. epp.eurostat.ec.europa.eu/statistics_explained/index.php/Agri-environmental_indicator_-_mineral_fertiliser_consumption
11. epp.eurostat.ec.europa.eu/statistics_explained/index.php/Agri-environmental_indicator_-_nitrate_pollution_of_water