

# ***Agricultural and the Nutrient Management Problem***

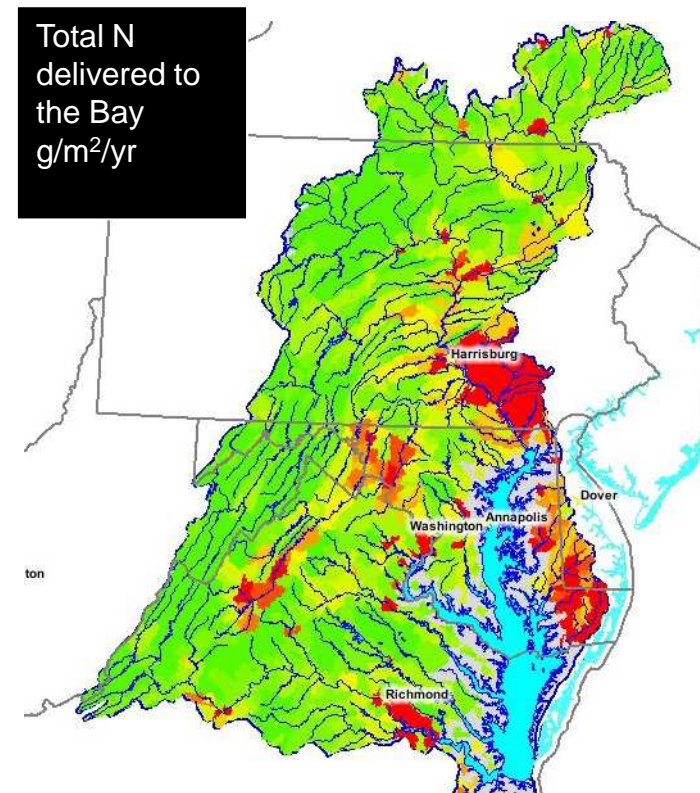


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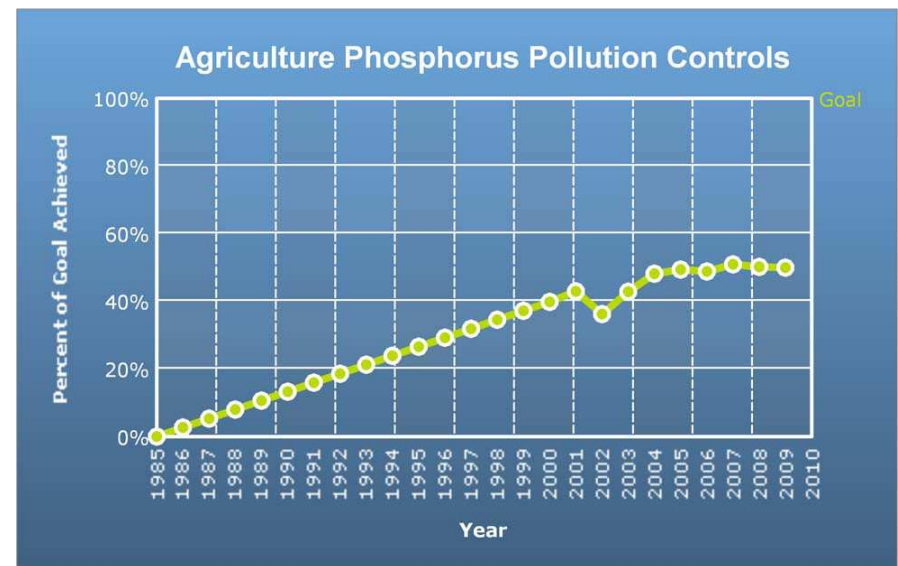
# Solving the Agriculture Nutrient Problem

- Ag nutrient pollution is a nonpoint source problem
  - Many, many small contributions that add up over a watershed
- Vast array of stakeholders
  - A large number and large variety of farms
  - Public and private stakeholders . . . With many agendas
- Long timeframe problem
  - It took a long time for the problem to develop
  - It will take a long time to solve
  - Complex social and economic interactions



# Solving the Agriculture Nutrient Problem

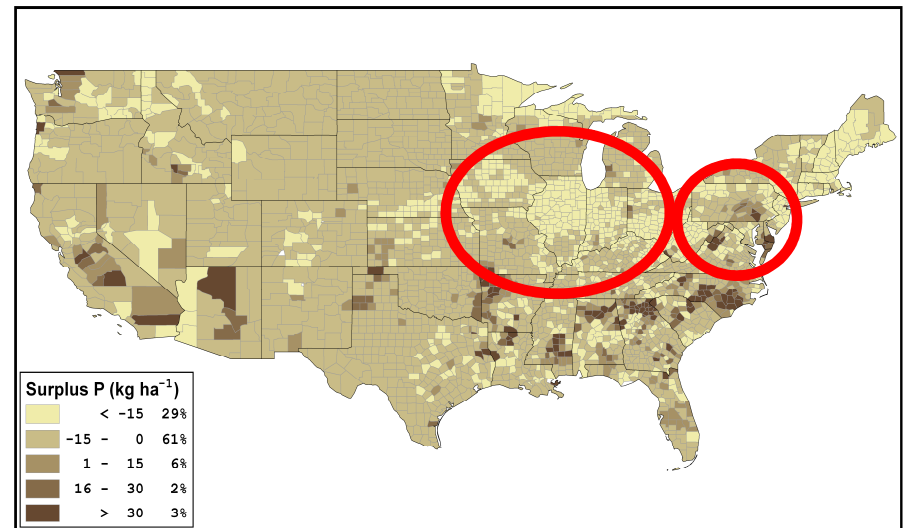
- The non-point nutrient problems in agriculture show up at the farm level
- Most of the effort has been focused on addressing the problem on individual farms
  - Improving on-farm nutrient management
  - Nutrient Management Plans
  - Improved Best Management Practices
  - Variety of technologies have contributed
- We have made a lot of progress
  - Not enough progress
- New initiatives continue the focus on farm management?



Chesapeake Bay Program, 2009

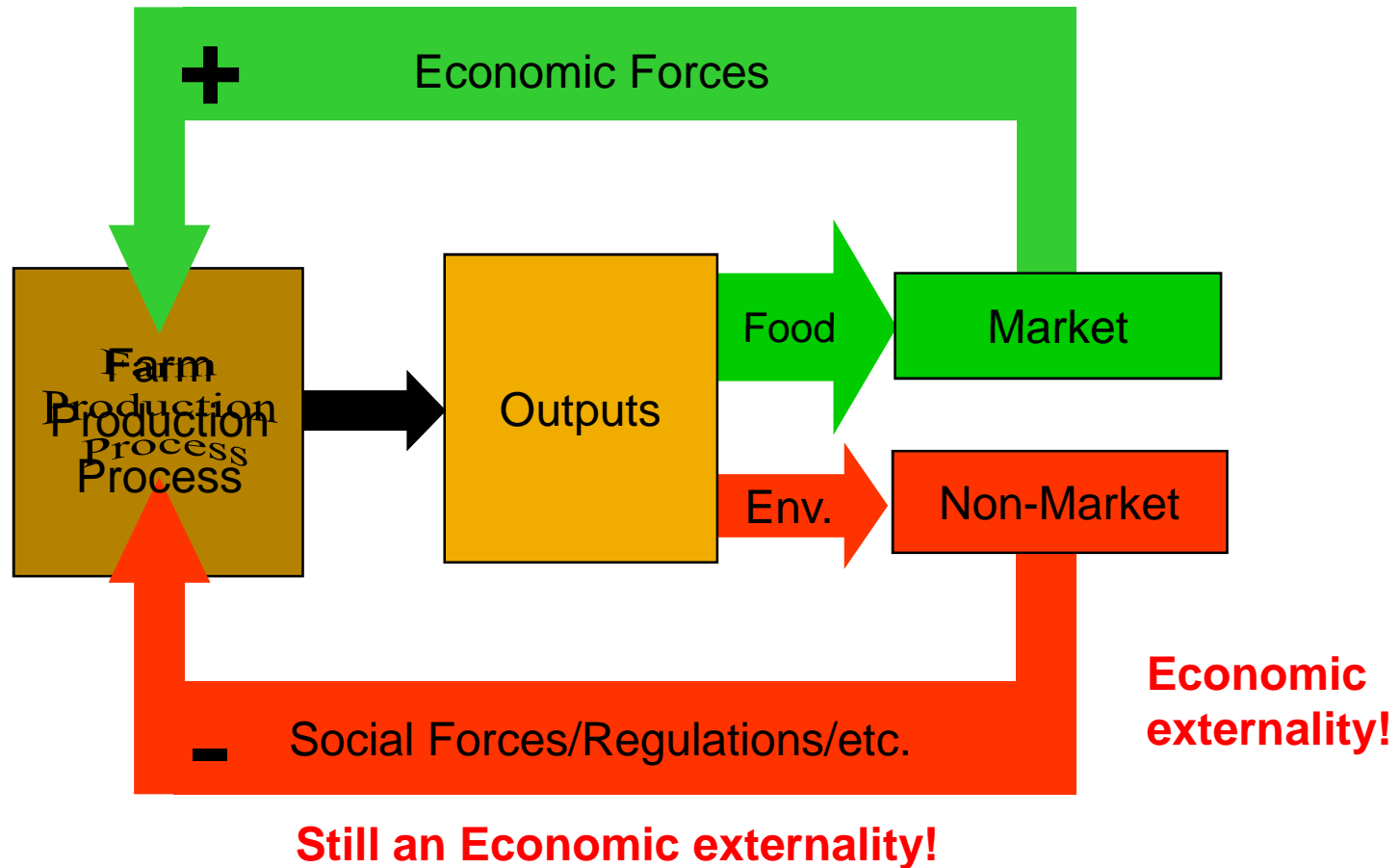
# Solving the Agriculture Nutrient Problem

- There is a need for continued effort to improve management on individual farms but. . .  
Mismanagement is not the only cause of nutrient problems from agriculture
- The other, more fundamental reason for the problem, has to do with the structure of modern animal agriculture
  - Evolution of animal agriculture since WW II
  - Specialization, regionalization, economies of scale, etc.
  - Driven by economic competitiveness and technology
  - Economic externality of environmental costs



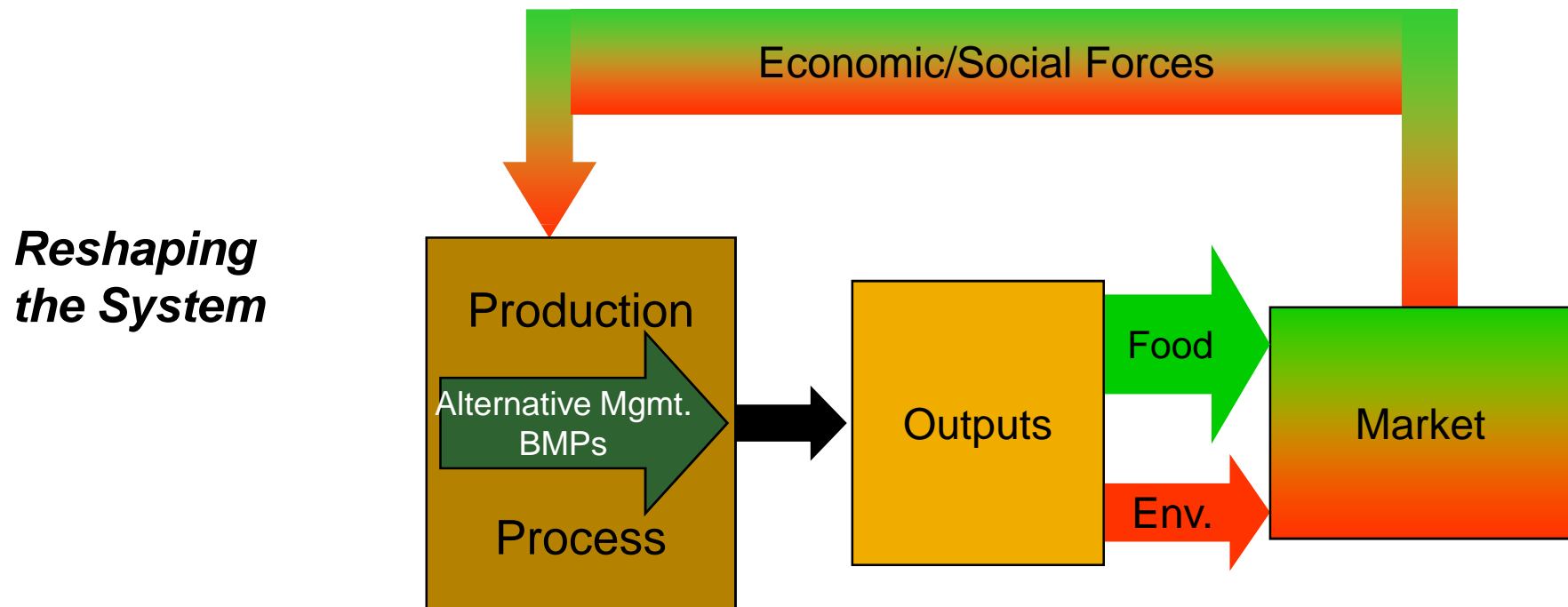
Maguire et al., 2007

# Strategic Conflict Between Food Production and the Environment



# Strategic Conflict Between Food Production and the Environment

To achieve balance . . .



. . . We need to internalize the environmental costs of food production

# Solving the Agriculture Nutrient Problem

- We must realize that there is a cost to producing food in a way that reduces nutrient pollution
  - Not a win-win
  - Improved management  $\neq$  more profit
- The first challenge is how to internalize those costs
  - Especially difficult because we are talking about food
- No one simple action that will make this happen
  - Changes in public attitude
  - Shifts in policy
  - New technologies
  - What is the first step?

# Solving the Agriculture Nutrient Problem

- Then there a lot of exciting opportunities to apply technologies to address the problems
  - Nutrient management planning technologies
  - Manure application technologies
  - Manure treatment technologies
  - Transportation
  - Alternative uses for manure
  - Bioenergy from manure
  - Improved cropping systems
  - More efficient crops and animals
- Technologies alone will not solve the problem



# Solving the Agriculture Nutrient Problem

- Ag nutrient pollution is a diverse and dispersed problem
- Extremely complex, long term, with many and varied stakeholders
- A solution will depend on understanding the fundamental causes of the problem and their interactions
- There will be a cost to solving the problem.
- It comes down to how we produce our food