

# Finding the balance: Past and future nutrient flows in Pennsylvania and the Mid-Atlantic Region

Penn State Dairy Nutrition Workshop  
Grantville, PA  
October 26-27, 2004



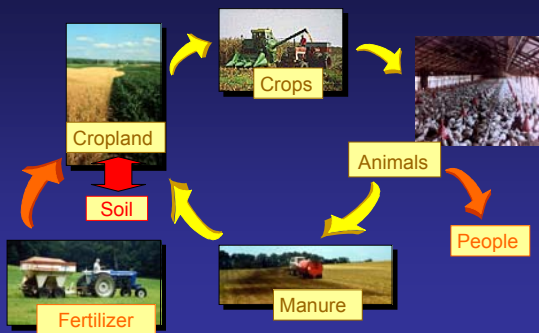
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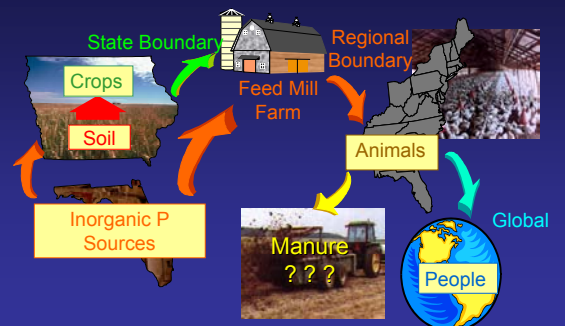
## Outline

- Phosphorus Cycle
- Budget Approach & Limitations
- Results
  - State
  - County
  - Mid-Atlantic
- Future Work
- Workshop Goals

## Phosphorus Cycle



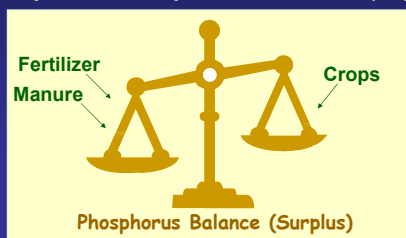
## P Cycle has become Fragmented



## Phosphorus Budget Approach

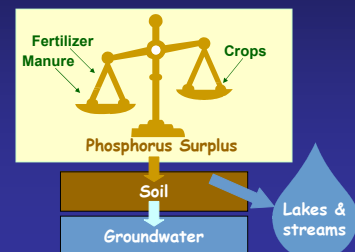
- Estimate major phosphorus flows for cropland from 1939 to present

$$\text{Inputs} - \text{Outputs} = \text{Balance (+/-)}$$



## Interpreting Phosphorus "Balance"

- Surpluses can contribute to water quality degradation
- Fate of surplus phosphorus not estimated



## Estimating Major Phosphorus Flows

### Fertilizer



### Crops



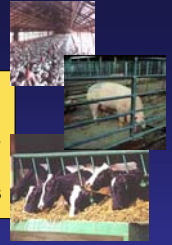
### Manure

### Cropland



### Manure

- Hogs
- Cattle
- Poultry
- Sheep
- Horses



### Manure Production

- animal numbers (Census of Agriculture)
- "standard" rates of manure production and P concentration
- recovery factors

### Fertilizer



### Fertilizer use

- State-level fertilizer sales reports (USDA, TVA, American Association of Plant Food Control Officials)
- County-level fertilizer sales reports
- Allocation to counties by tonnage or cropland areas



- Corn
- Small grains
- Soybeans
- Hay
- Potatoes



### Crops



### Crop Production

- quantity harvested (Census of Agriculture)
- "standard" concentrations

### Cropland

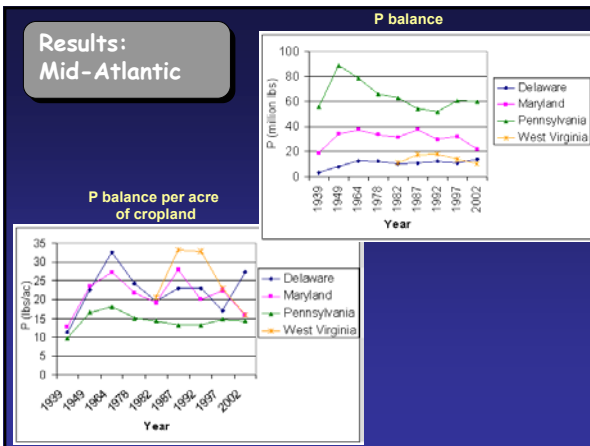
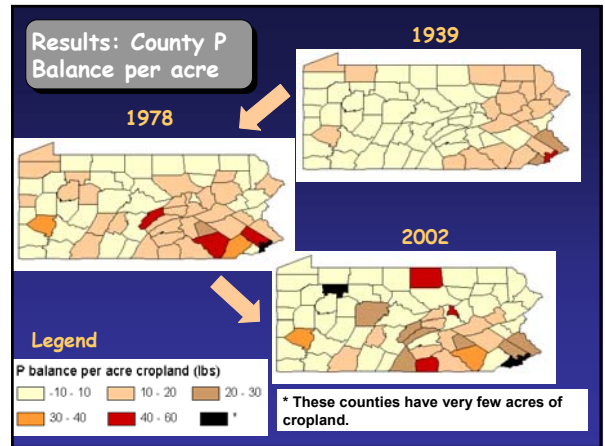
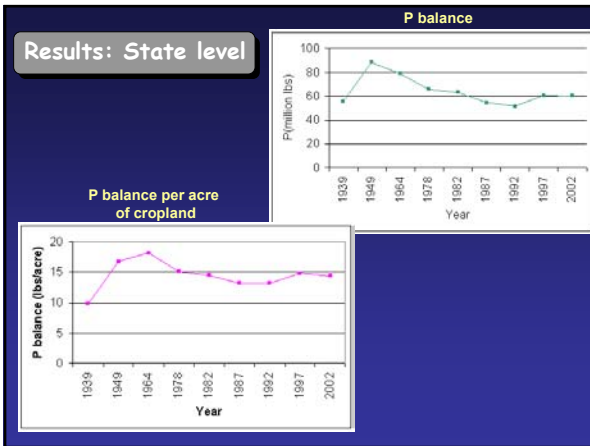
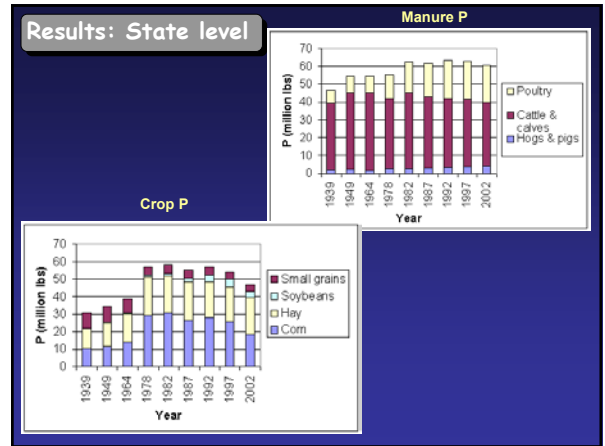
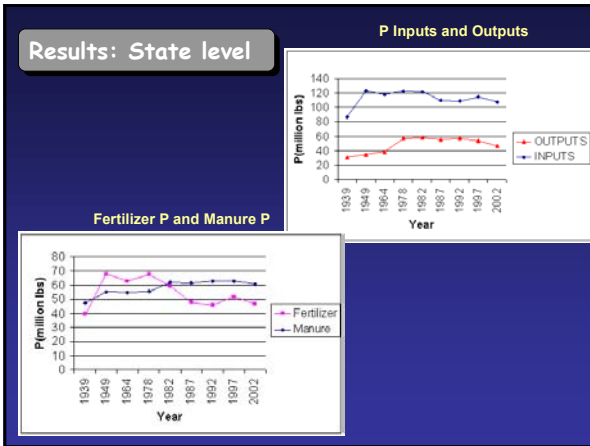
- acres harvested (Census of Agriculture)



### Cropland

## Limitations

- Non-agricultural areas not considered
- Manure and fertilizer transfers not considered
- Fate of surplus nutrients not estimated
- Standard manure and crop factors may not be appropriate for all areas
- Weather variations affect crop yields, budgets



<http://www.mawaterquality.org/budget/>

### Mid-Atlantic Regional Water Quality Program

#### Nutrient Budgets for the Mid-Atlantic States

**Regional Project**

As part of the Mid-Atlantic Regional Water Quality Project, extension specialists and researchers at several Mid-Atlantic universities are developing nitrogen and phosphorus budgets for agricultural cropland. Budgets will be posted here as they are developed.

**Introduction:**  
[Nutrient budgets](#)  
[Budget account](#)

**Budgets:**

- [Pennsylvania](#)
- [Delaware](#)
- [Maryland](#)
- [Virginia](#)
- [West Virginia](#)
- [Mid-Atlantic](#)
- [Delaware](#)

**Budget Details:**

- [Methods](#)
- [Assumptions](#)
- [References](#)

**Glossary**

**Contact Us**

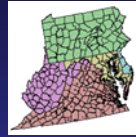
**Mid-Atlantic States:**

- [Pennsylvania](#)
- [Delaware](#)
- [Maryland](#)
- [Virginia](#)
- [West Virginia](#)

## Extension & Outreach

- Develop extension messages
- Link with specialists in management practices and policy
- Use budgets to guide development of nutrient management policies and programs

## Further Budget Development



Counties



Physiographic Regions



Watersheds

- Develop P budgets for counties, regions and watershed in all Mid-Atlantic states
- Expand and refine nutrient flows
- Develop Nitrogen budgets

## Acknowledgements

- Nutrient Budget team
  - Doug Parker, University of Maryland
  - Charles Abdalla, Penn State
  - Alan Collins, West Virginia University
  - Dave Hansen, University of Delaware
  - Jim Pease, Virginia Tech
- Robert Graves, Penn State
- Virginia Ishler, Penn State

## Les Lanyon



- Professor of Soil Science and Management, Penn State University
- Former leader of the Nutrient Budget team
- Les passed away on May 26, 2004 at the age of 55.

## Questions??

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## Today's Activity

- Interact with factors affecting P budgets at two scales:
  - Farm
  - County