Developing Phosphorus Budgets for Cropland in the Mid-Atlantic Region

National Water Quality Conference
San Diego, CA
February 7-9, 2005

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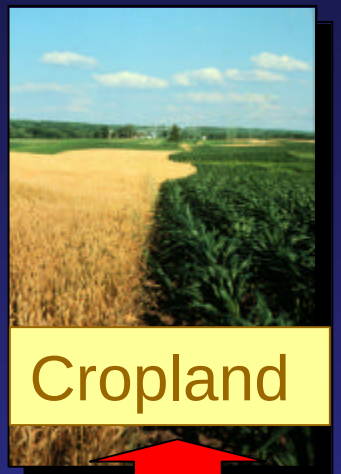
Outline

- Phosphorus Cycle
- Budget Approach & Restrictions
- Results
  - State
  - County
- Future Work

Phosphorus Cycle



Cropland

Crops

Animals

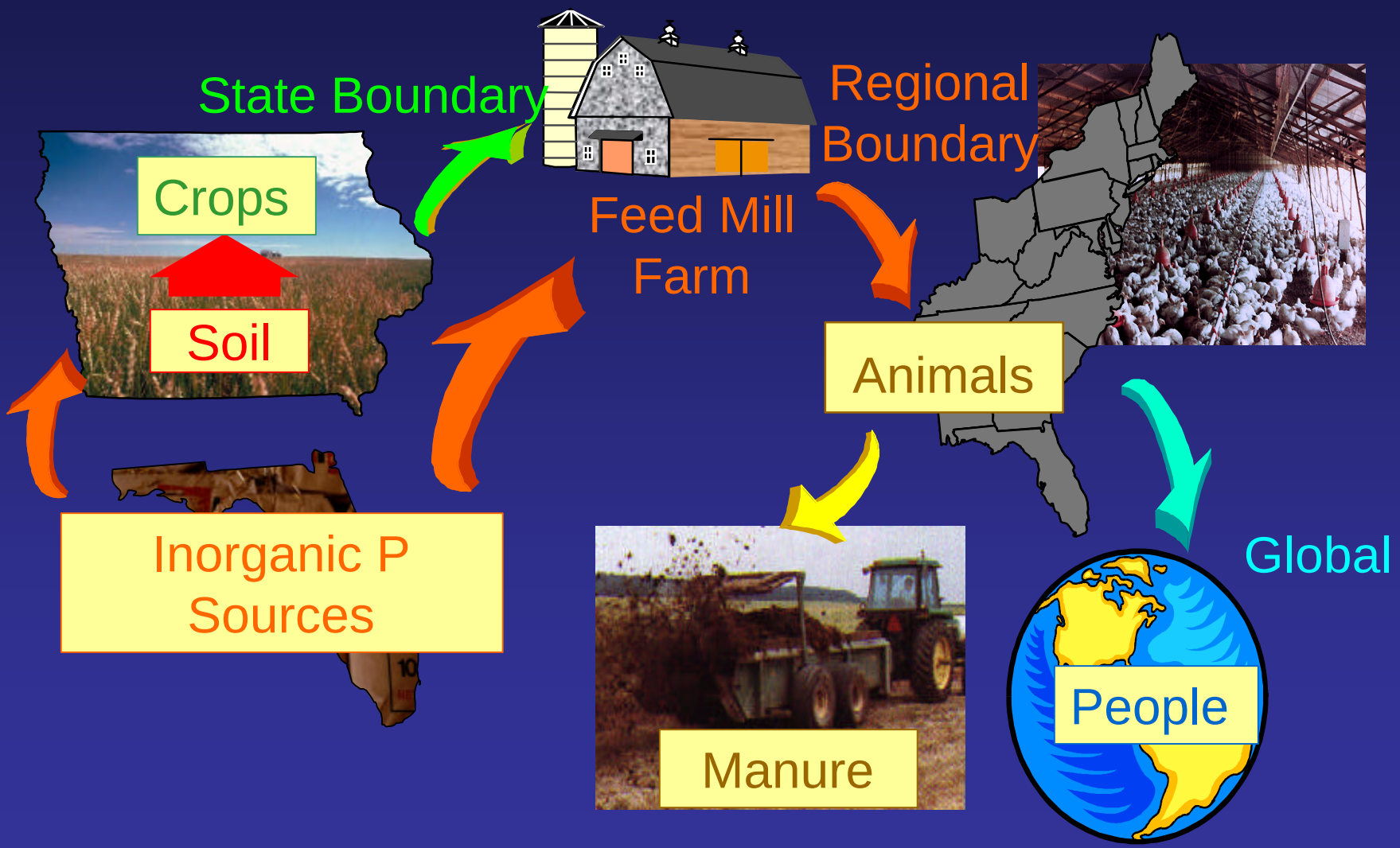
People

Manure

Fertilizer

Soil

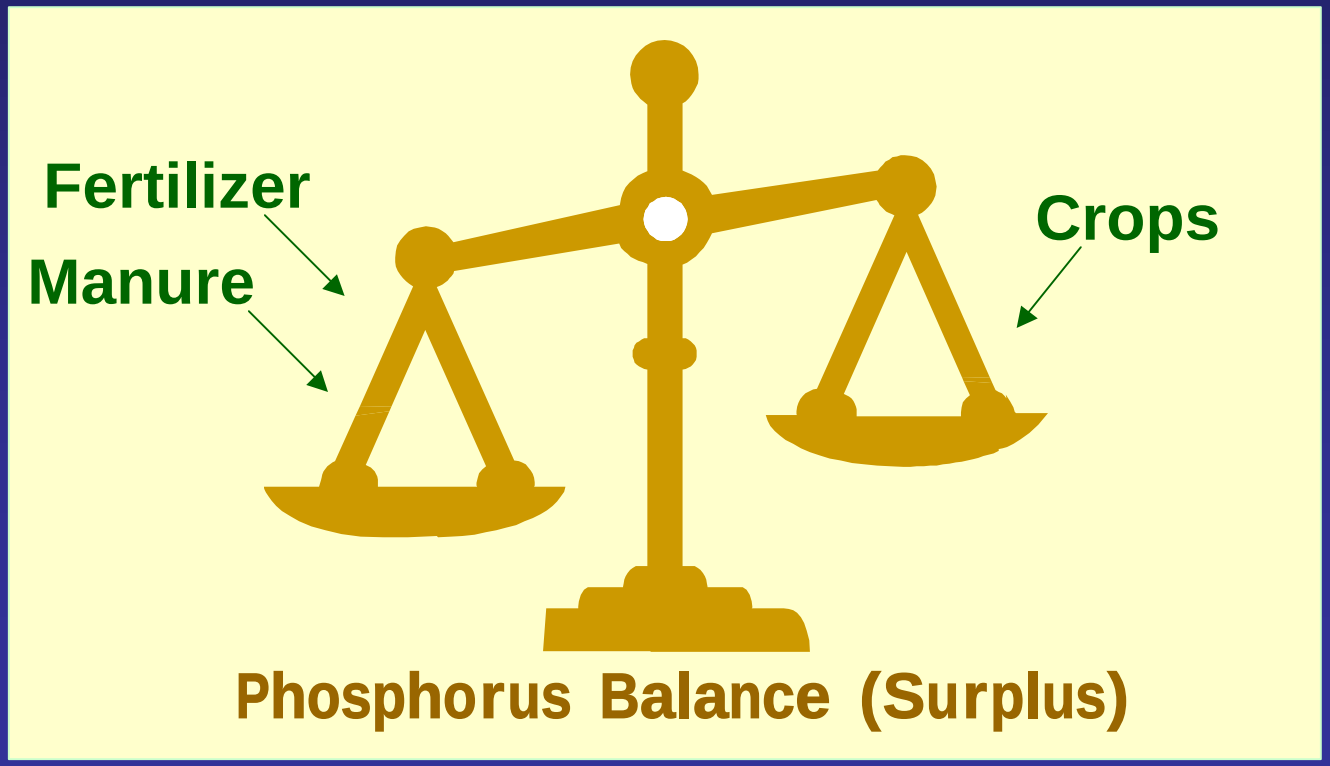
P Cycle has become Fragmented



Phosphorus Budget Approach

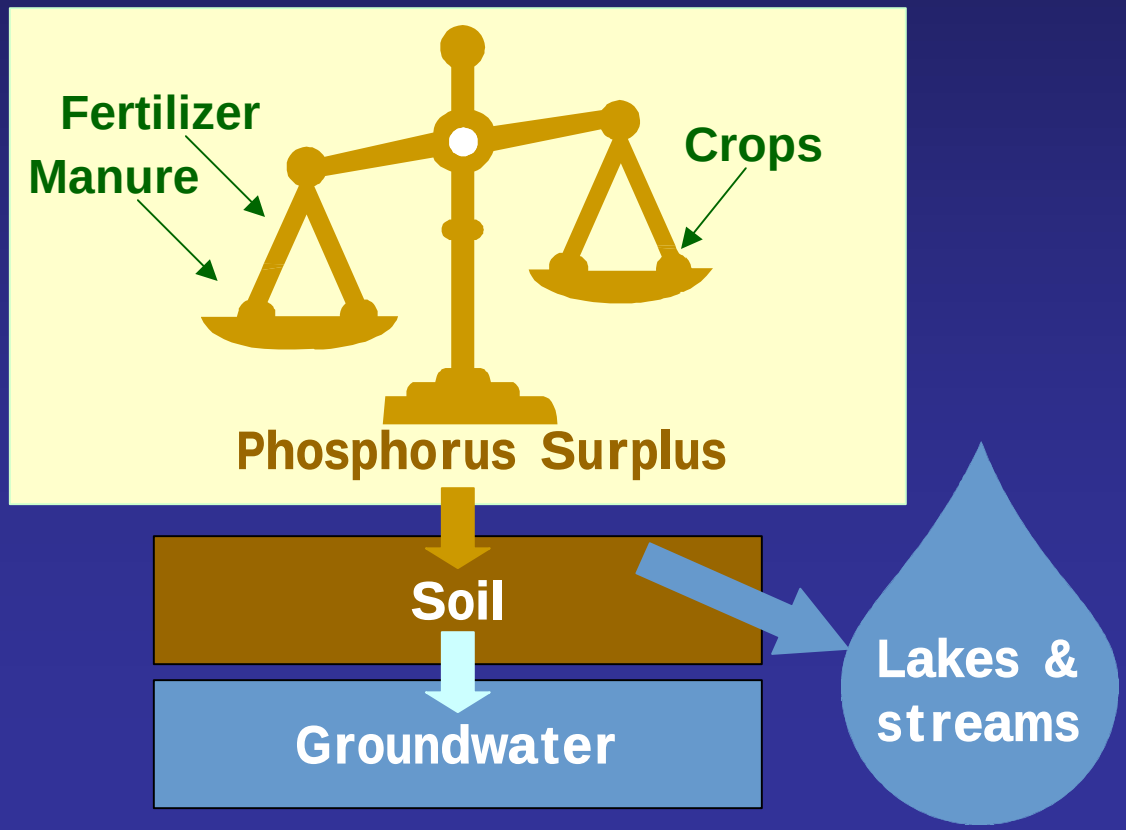
- Estimate major phosphorus flows for cropland from 1939 to present

Inputs – Outputs = Balance (+/-)



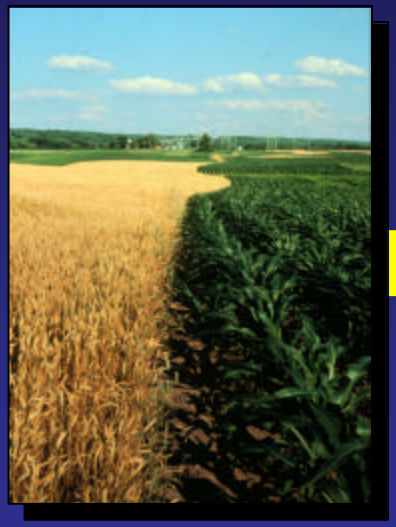
Interpreting Phosphorus "Balance"

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



Estimating Major Phosphorus Flows

Fertilizer



Cropland

Crops

Manure

Manure

-Hogs
-Cattle
-Poultry
-Sheep
-Horses

Manure Production

- animal numbers (Census of Agriculture)
- manure P production coefficients
- 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
-Fruits/vegetables

Crops

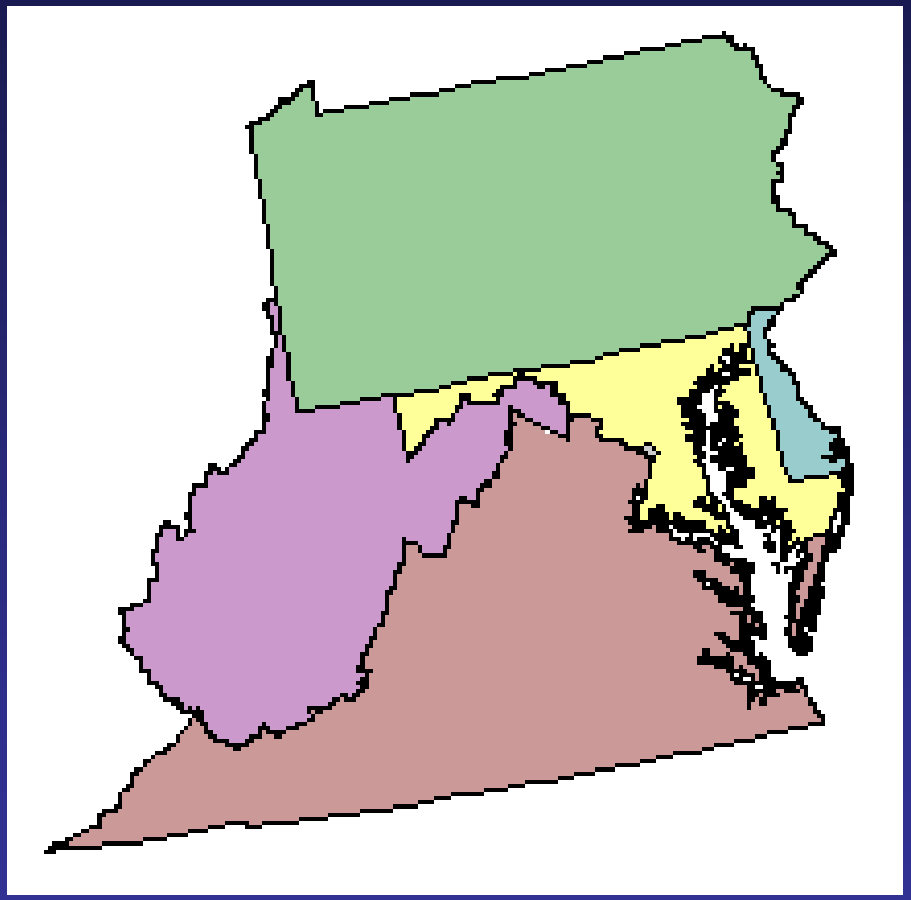
Crop Production

- **quantity harvested (Census of Agriculture)**
- **crop P removal coefficients**

Limitations

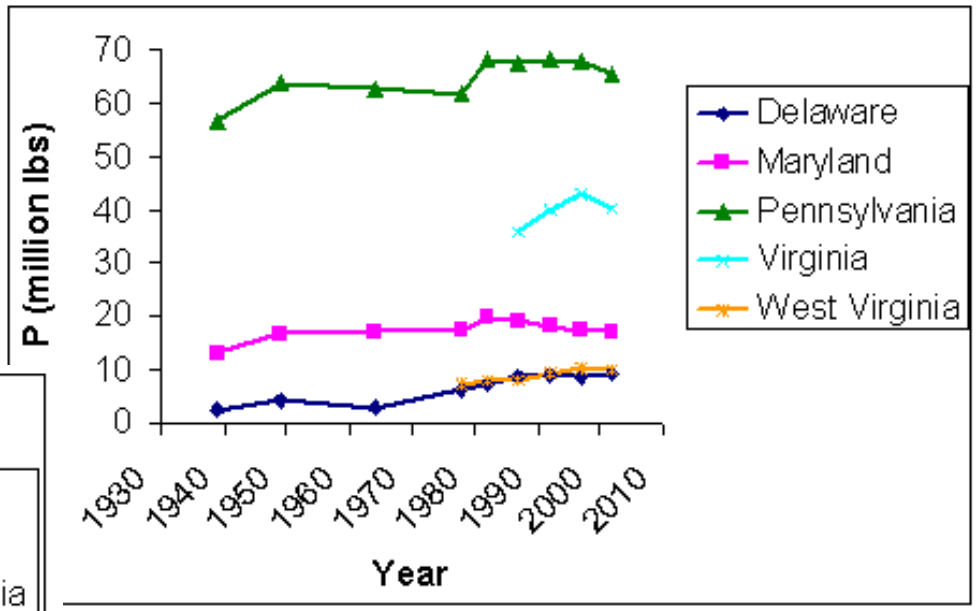
- Non-agricultural areas not considered
- Manure and fertilizer transfers not considered
- Biosolids applications not included
- Fate of surplus nutrients not estimated
- Manure and crop coefficients not necessarily appropriate for all farms in Mid-Atlantic
- Weather variations affect crop yields, budgets

Results: State-level

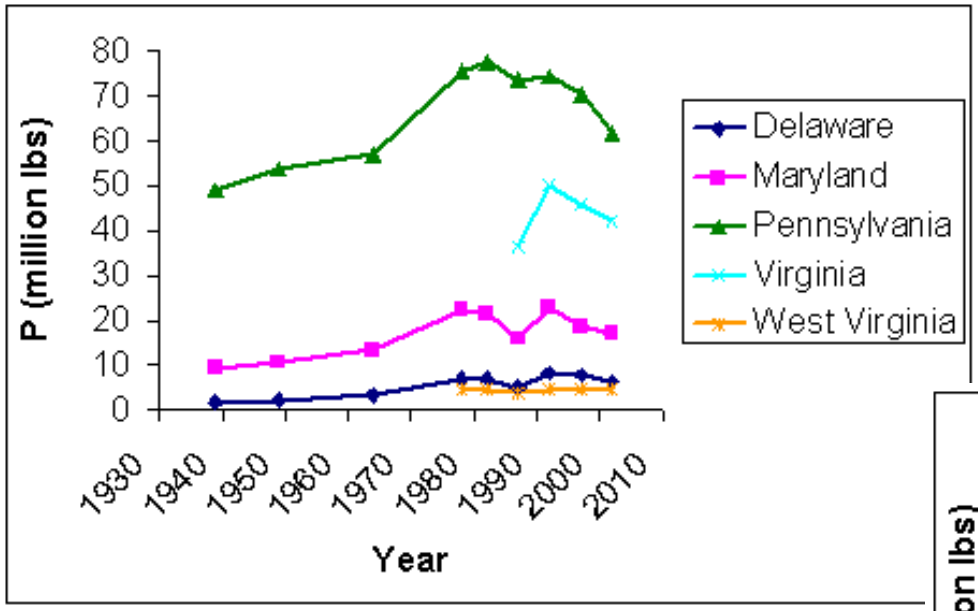


P budget components

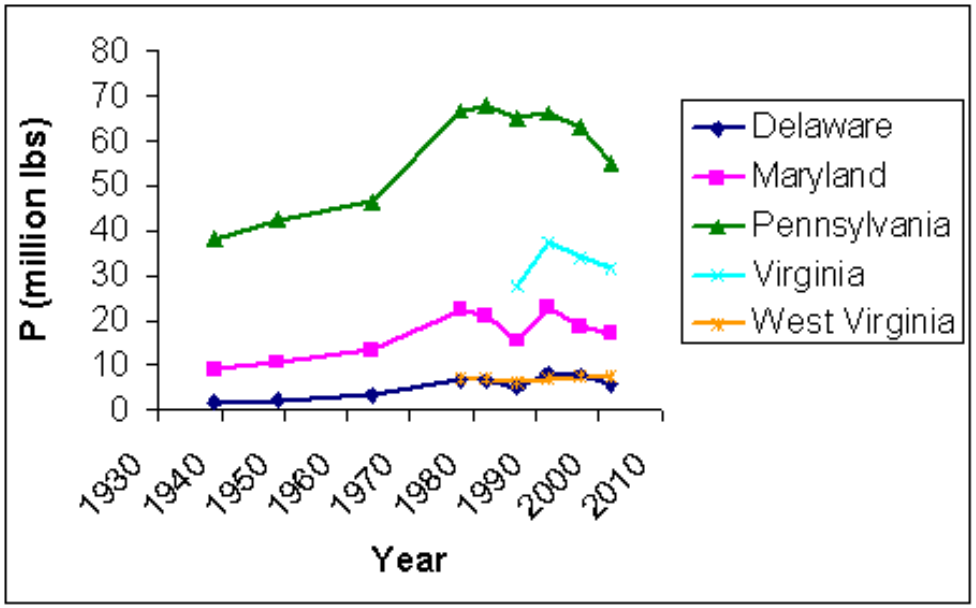
Manure



Fertilizer



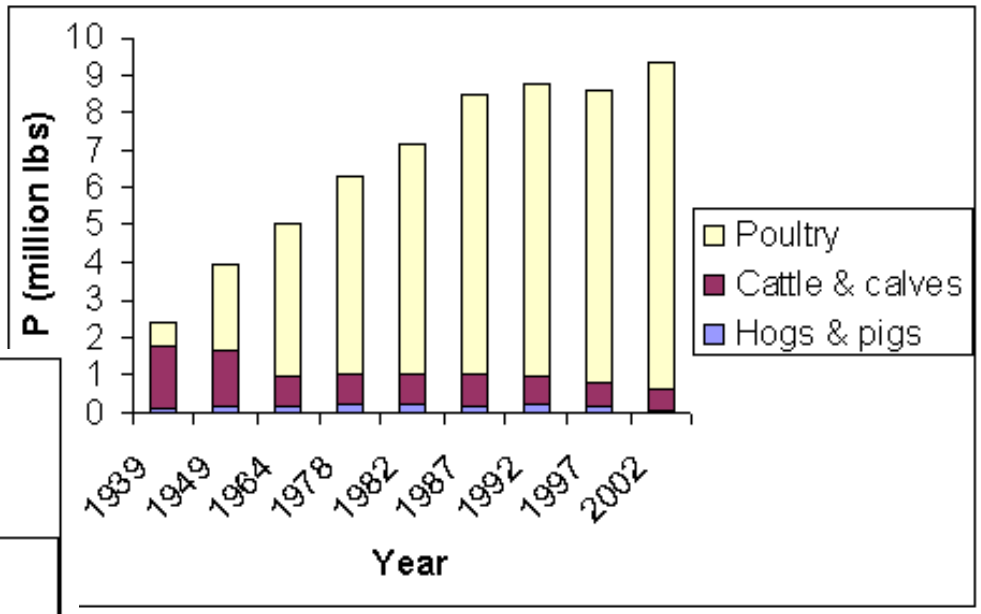
Crops



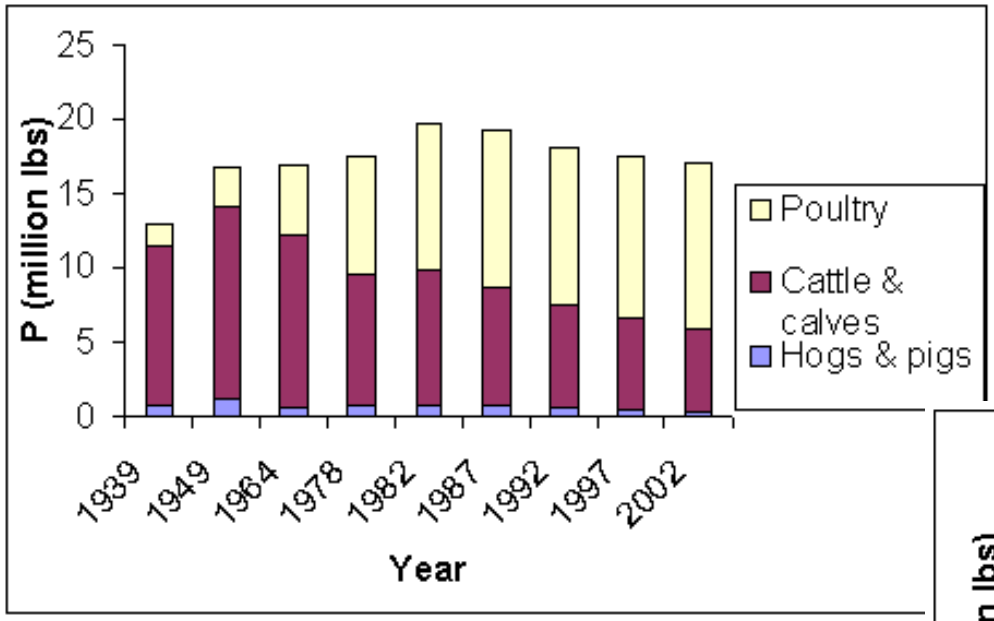
Updated 3/30/2005

Manure P trends

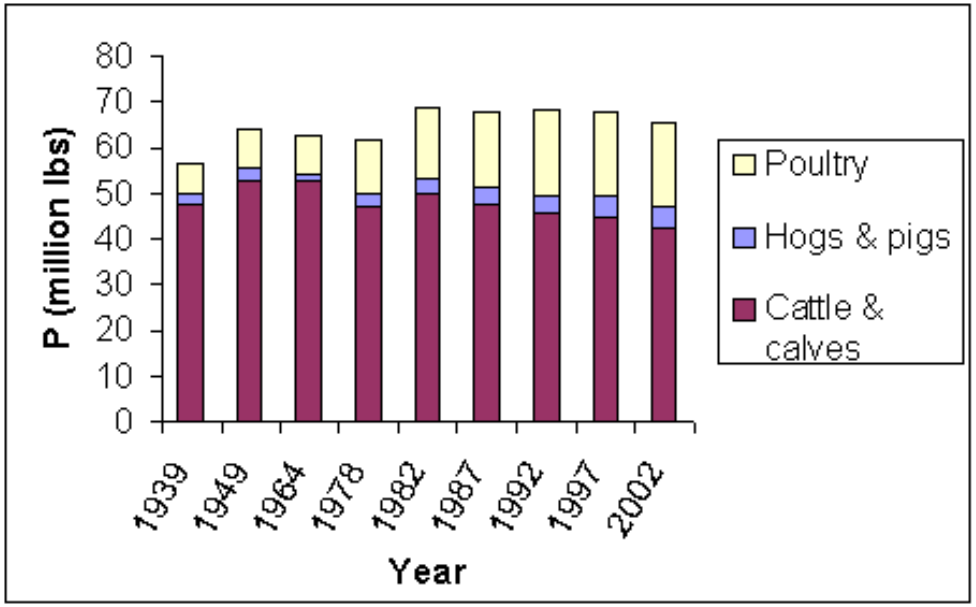
Delaware



Maryland



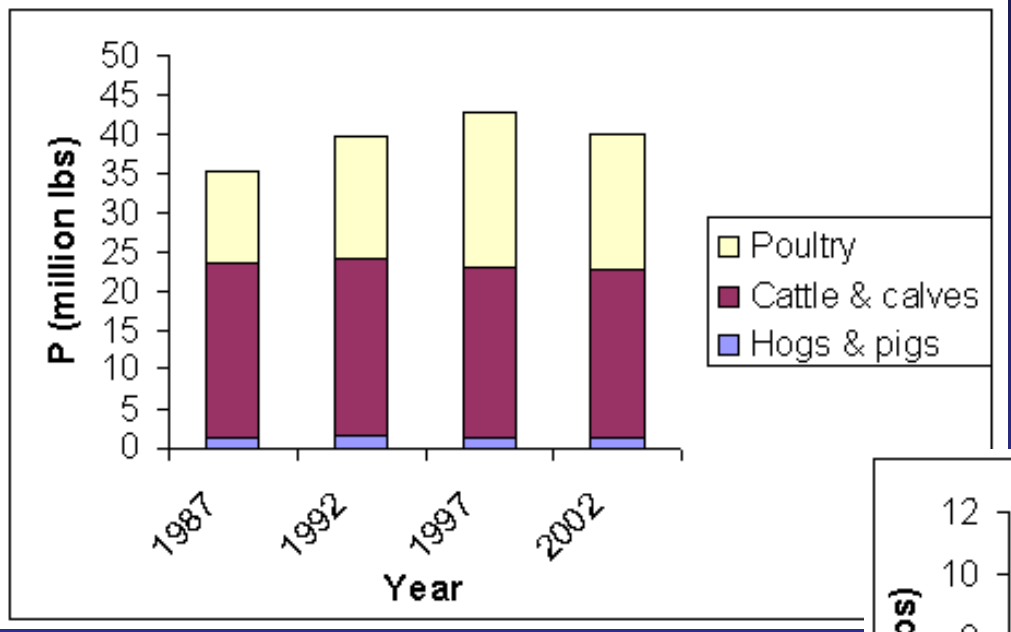
Pennsylvania



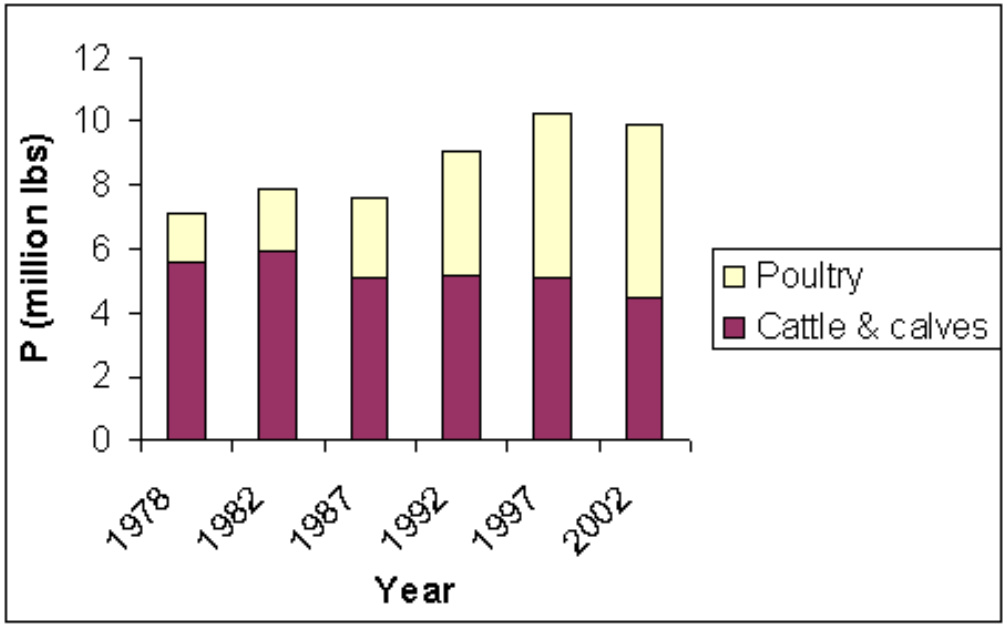
Updated 3/30/2005

Manure P trends

Virginia



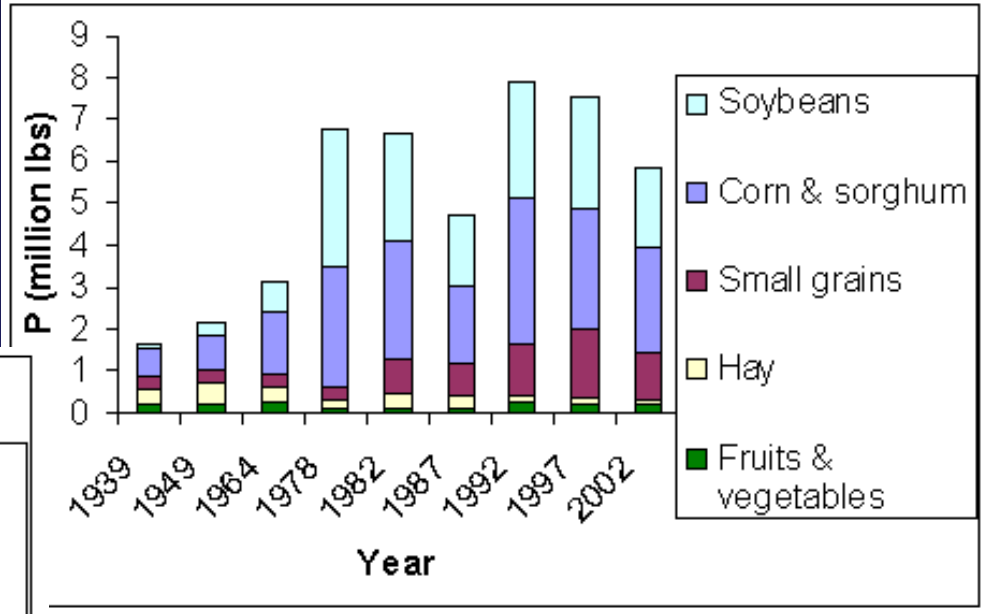
West Virginia



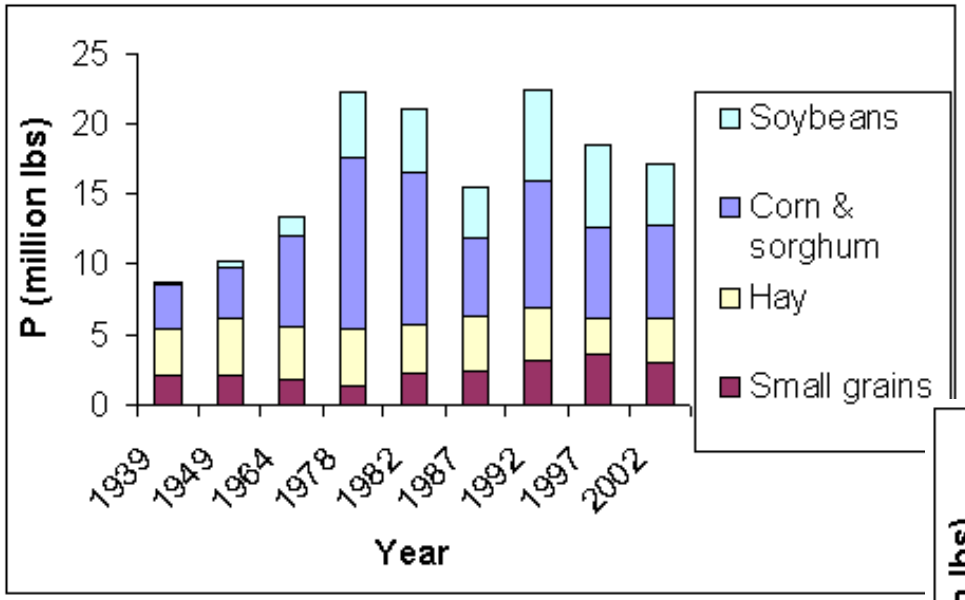
Updated 3/30/2005

Crop P trends

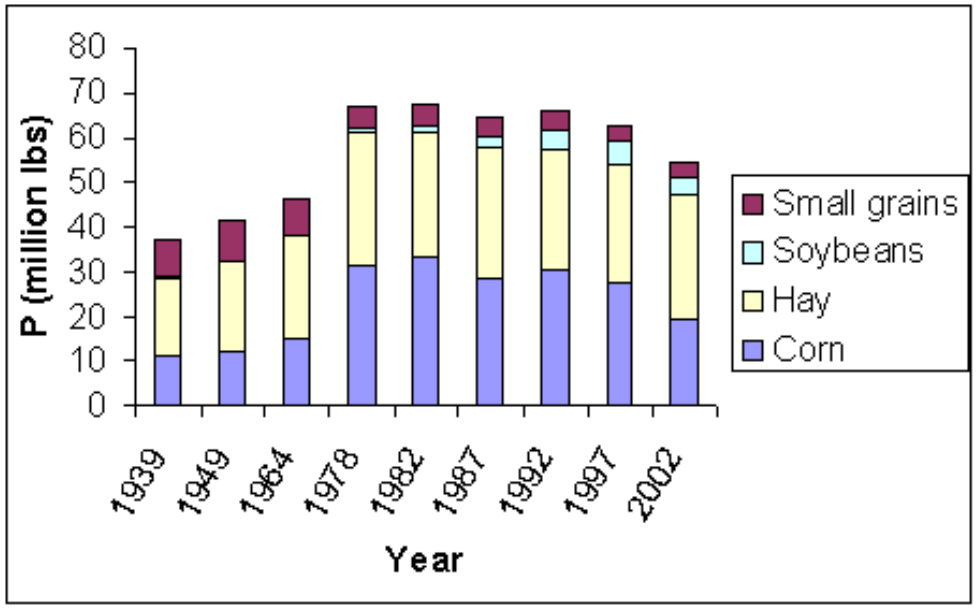
Delaware



Maryland



Pennsylvania



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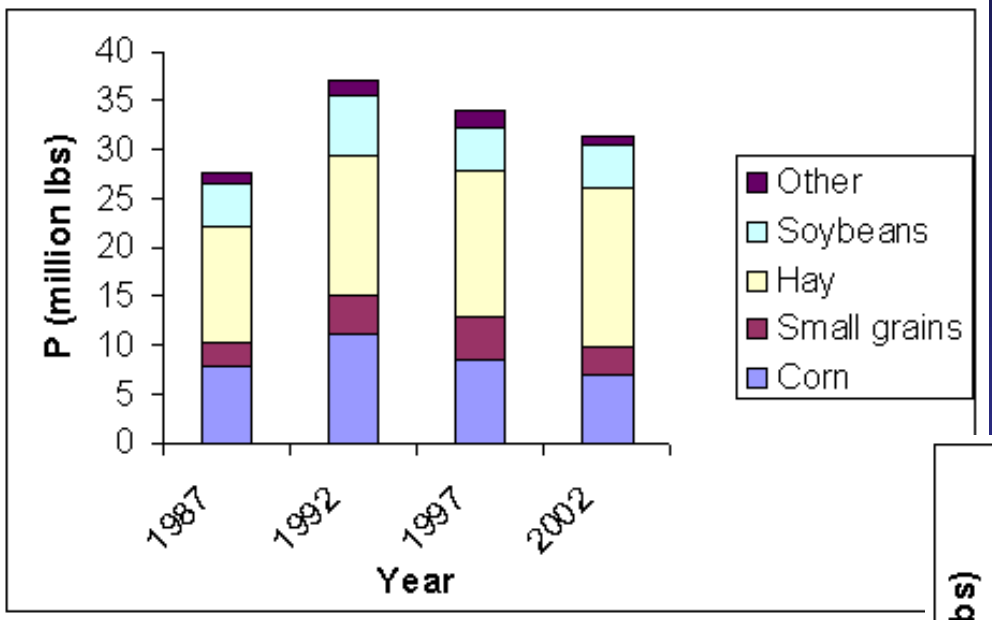
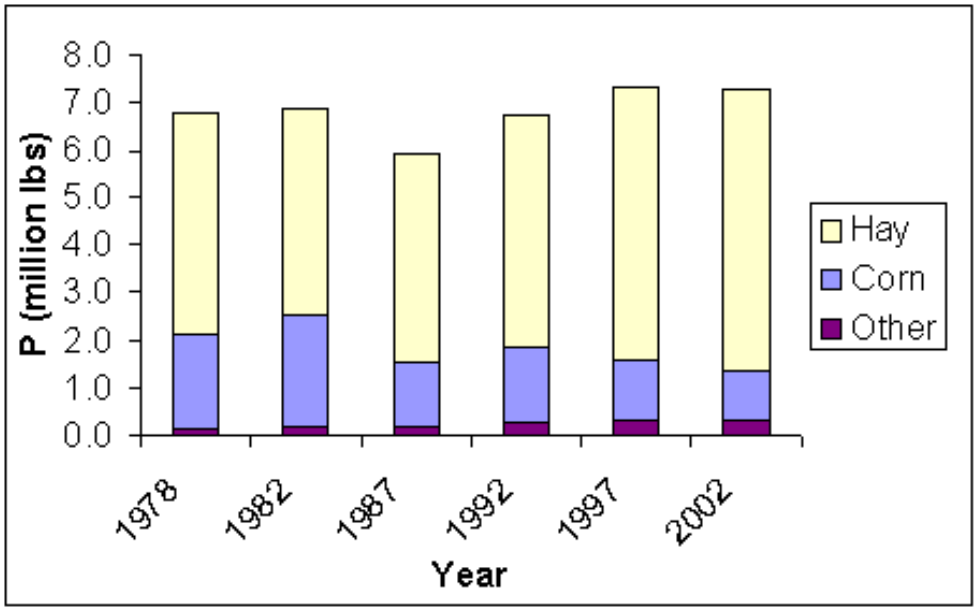
Crop P trends

Virginia



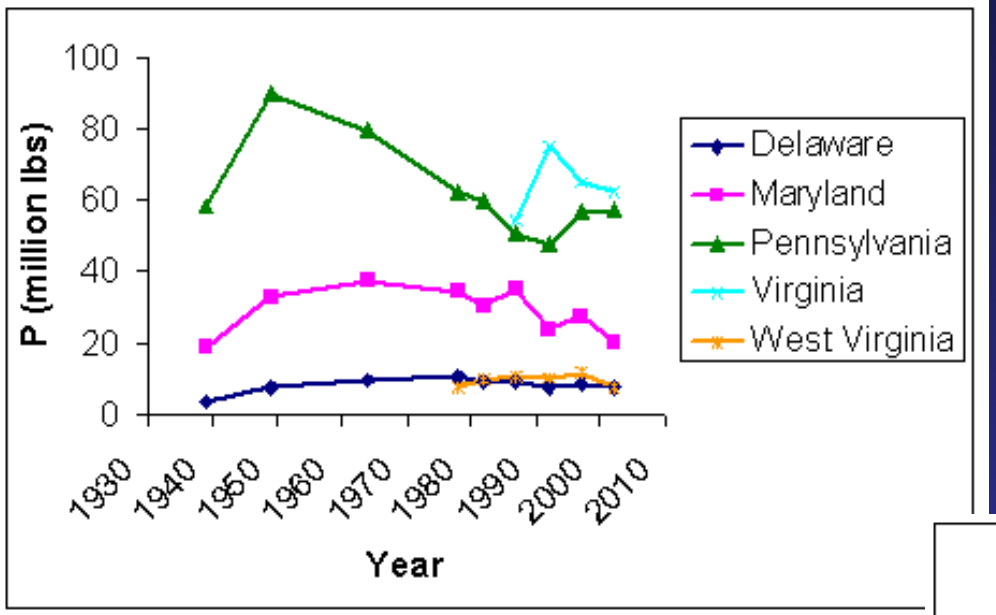
West Virginia



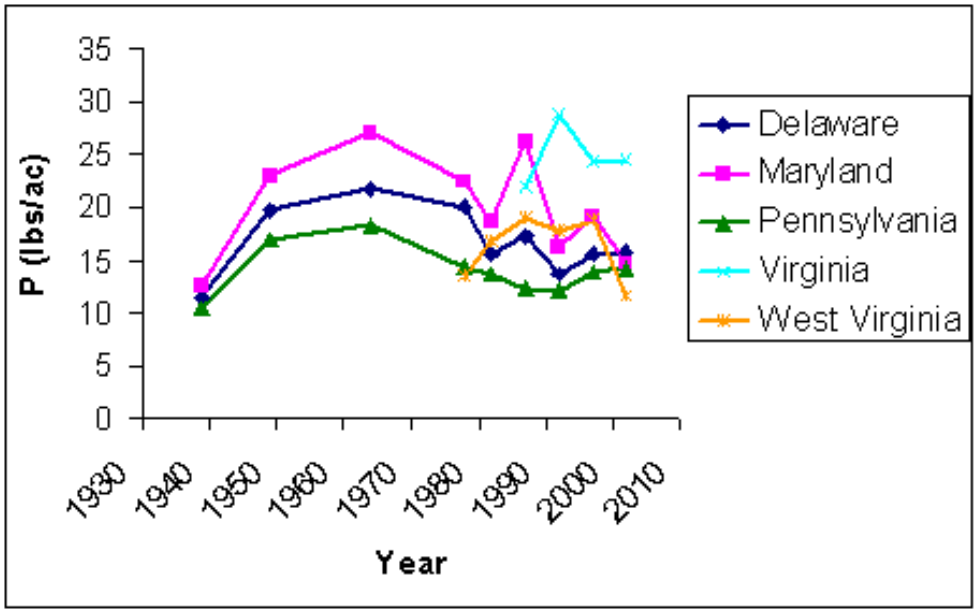
Updated 3/30/2005

P balance trends

P balance



P balance per acre



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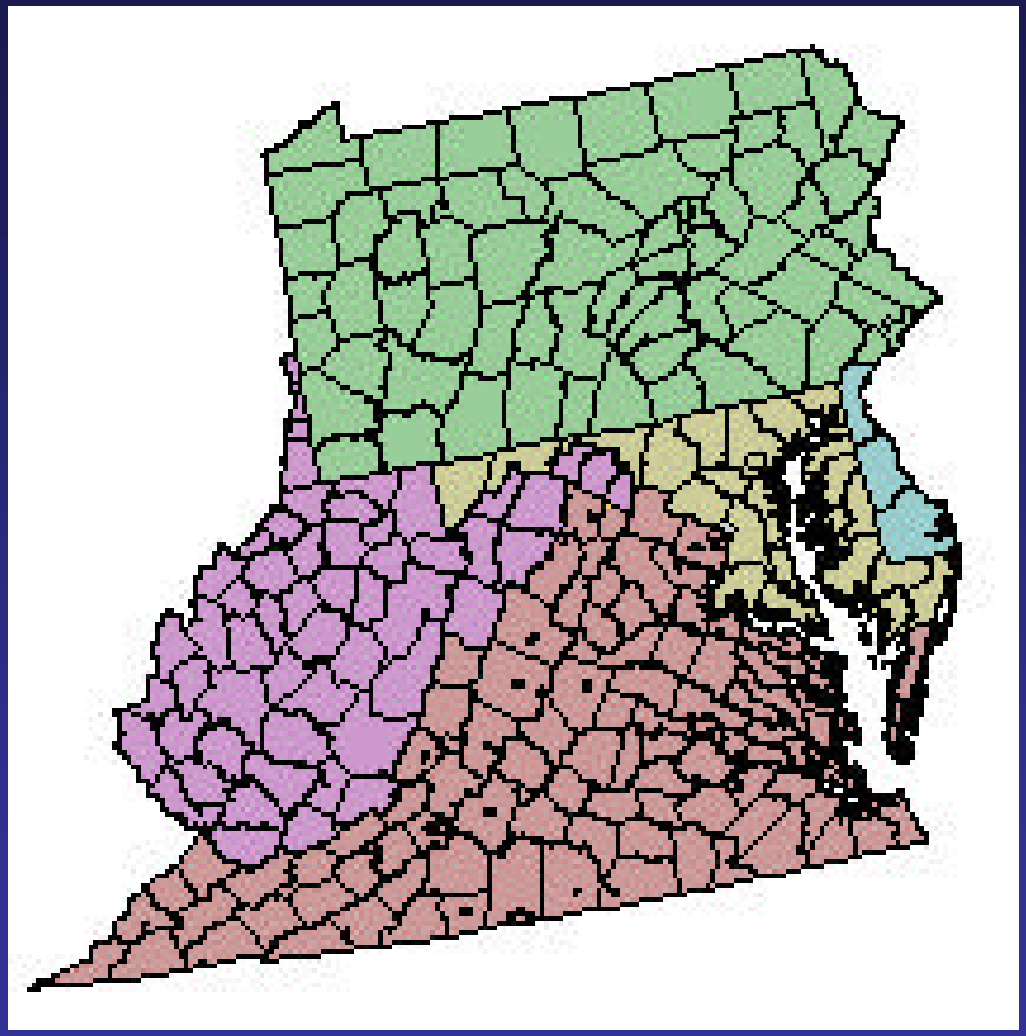
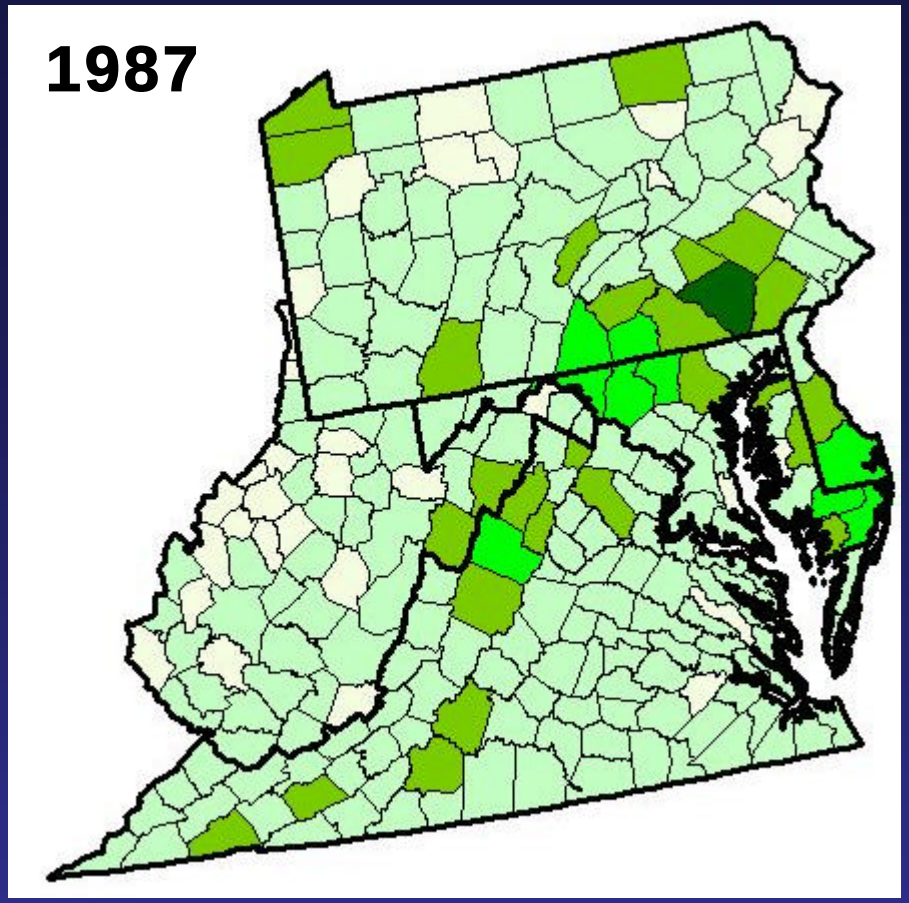
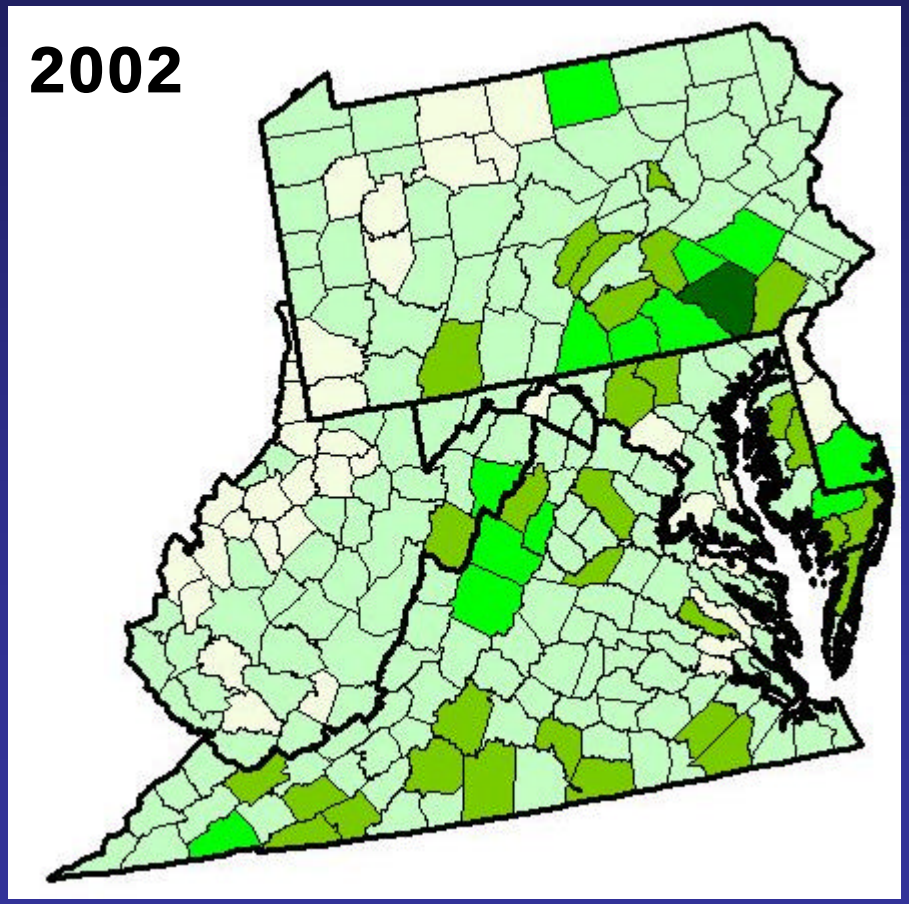
Results: County-level



County P balance





Legend

P balance (tons)

- -500 - 0
- 0 - 500
- 500 - 1000
- 1000 - 5000
- 5000 - 10,000

Updated 3/30/2005

Extension Activities

- Website development
- Small-group meetings
- Manure marketing

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

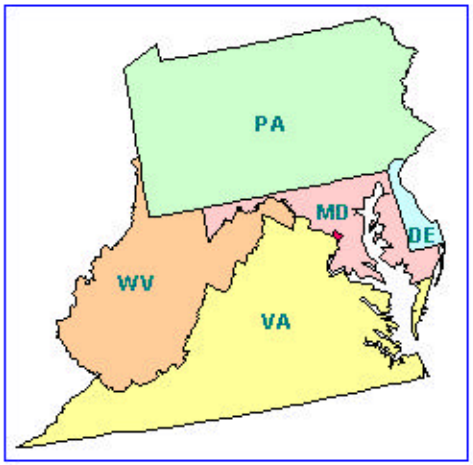
Mid-Atlantic Regional Water Quality Program

Nutrient Budgets for the Mid-Atlantic States

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.

These budgets will improve water quality protection by supporting activities that address the lack of balance between available nutrient supplies and potential nutrient use by crops in a region.

To learn about specific cropland budgets, click on a state below.



Mid-Atlantic States:

Pennsylvania

Delaware

Maryland

Virginia

West Virginia

PENNSTATE

Virginia Tech

University of Maryland

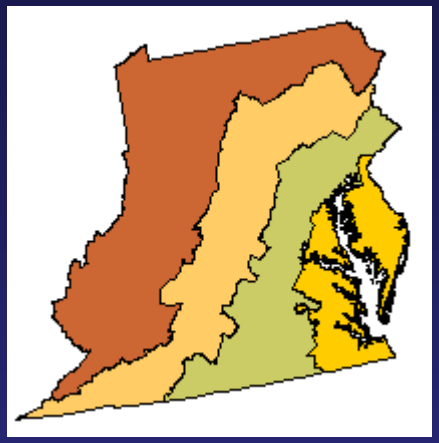
University of Delaware

West Virginia University.

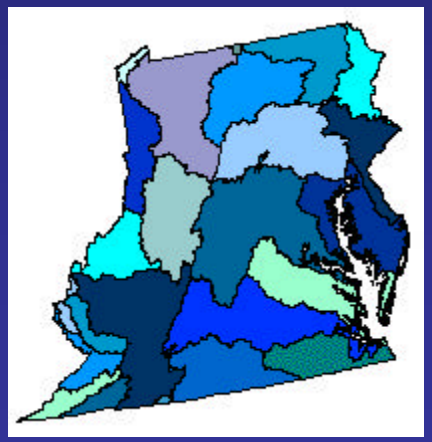
Small-group meetings

- Purpose:
  - Introduce budgets to potential users
  - Use feedback to guide extension program development/ further budget development
- Meetings in PA with:
  - Government agencies
  - Environmental organizations
  - Agribusiness
  - Extension agents
  - Producers

Further Budget Development



Physiographic Regions

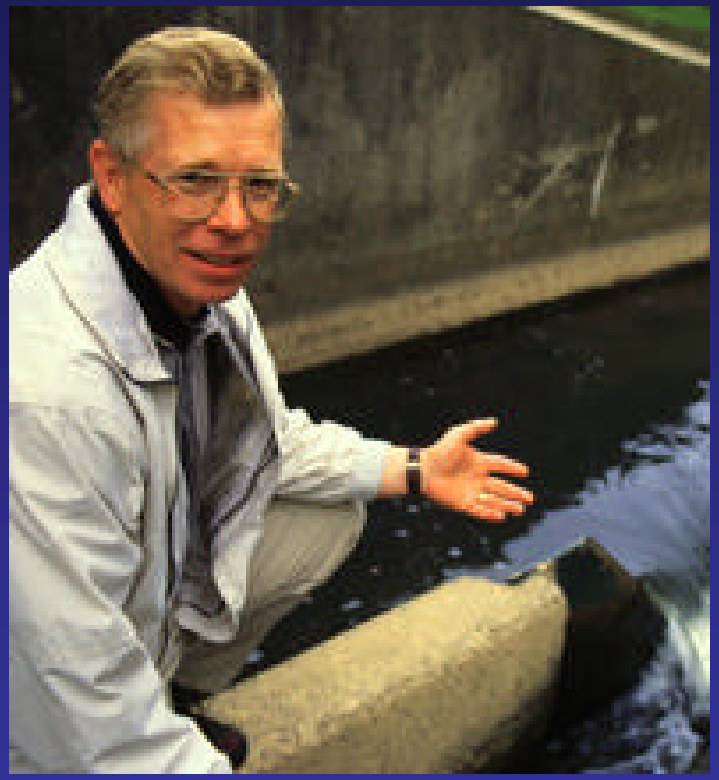


Watersheds

- Develop P budgets for physiographic regions and watersheds
- Expand and refine P flows
- Develop Nitrogen budgets

Acknowledgement

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.

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