Plant Nutrition Canada

Chesapeake Bay Program
Fertilizer Expert Group meeting
6 March 2023

Fertilizer Industry Datasets

with an international perspective

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Plant Nutrition Canada

Outline

- Fertilizer supply chain in the USA
- County-scale data
  - Nutrient balance – NuGIS – AAPFCO
- National-scale data
  - TFI – enhanced-efficiency products
  - IFA – Consumption, Production, Imports, & Exports
  - FAO – cropland nutrient budgets, fertilizer consumption

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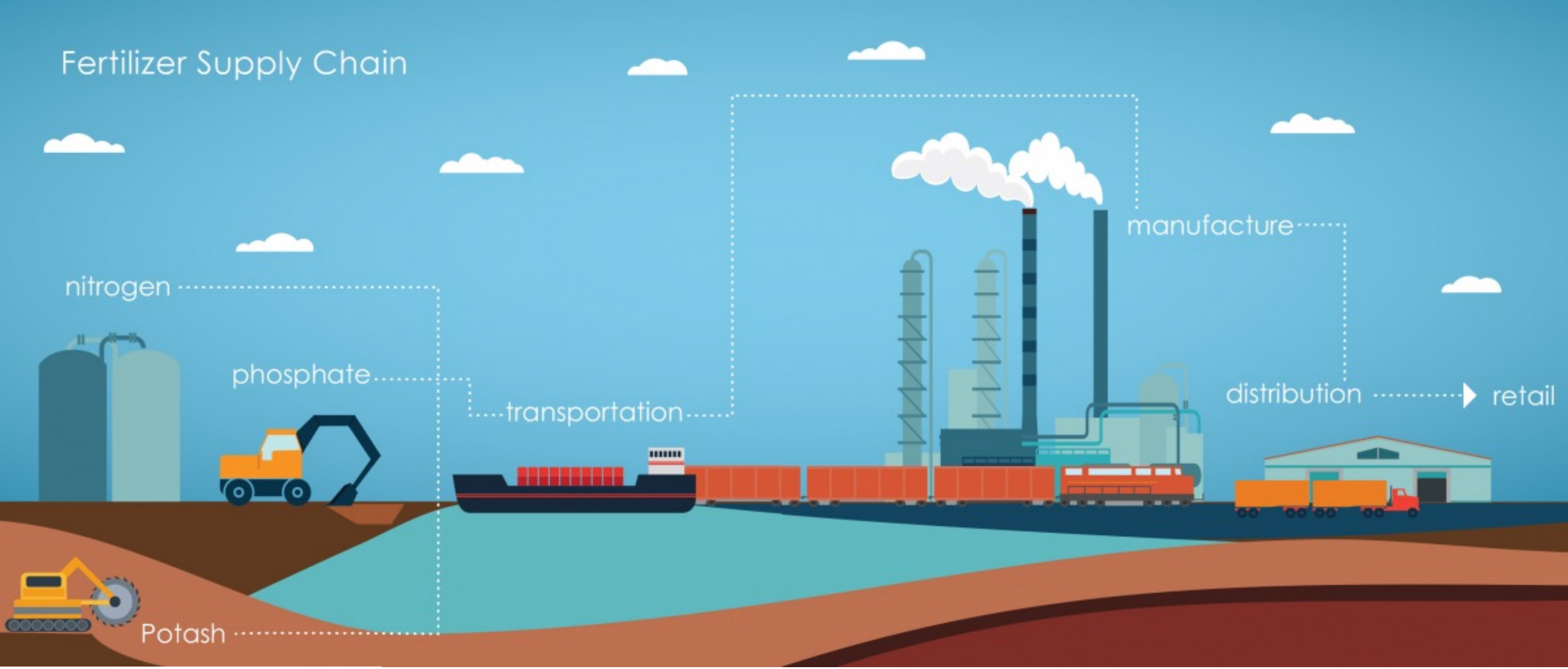

- 487,000 jobs, annual wages >$34B
- N, P_2O_5, K_2O 12-4-5 MMT annually

THE FERTILIZER INSTITUTE

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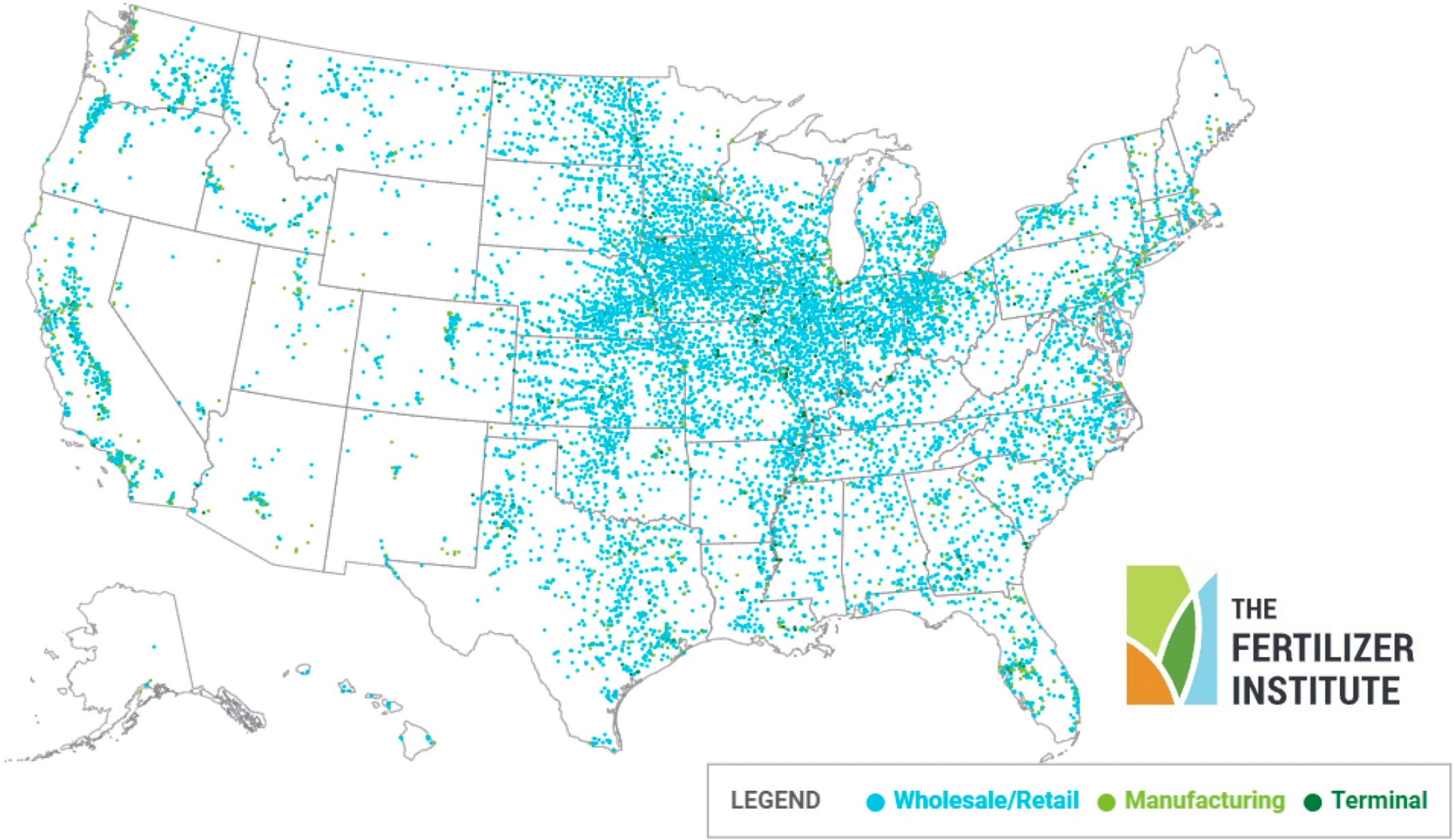
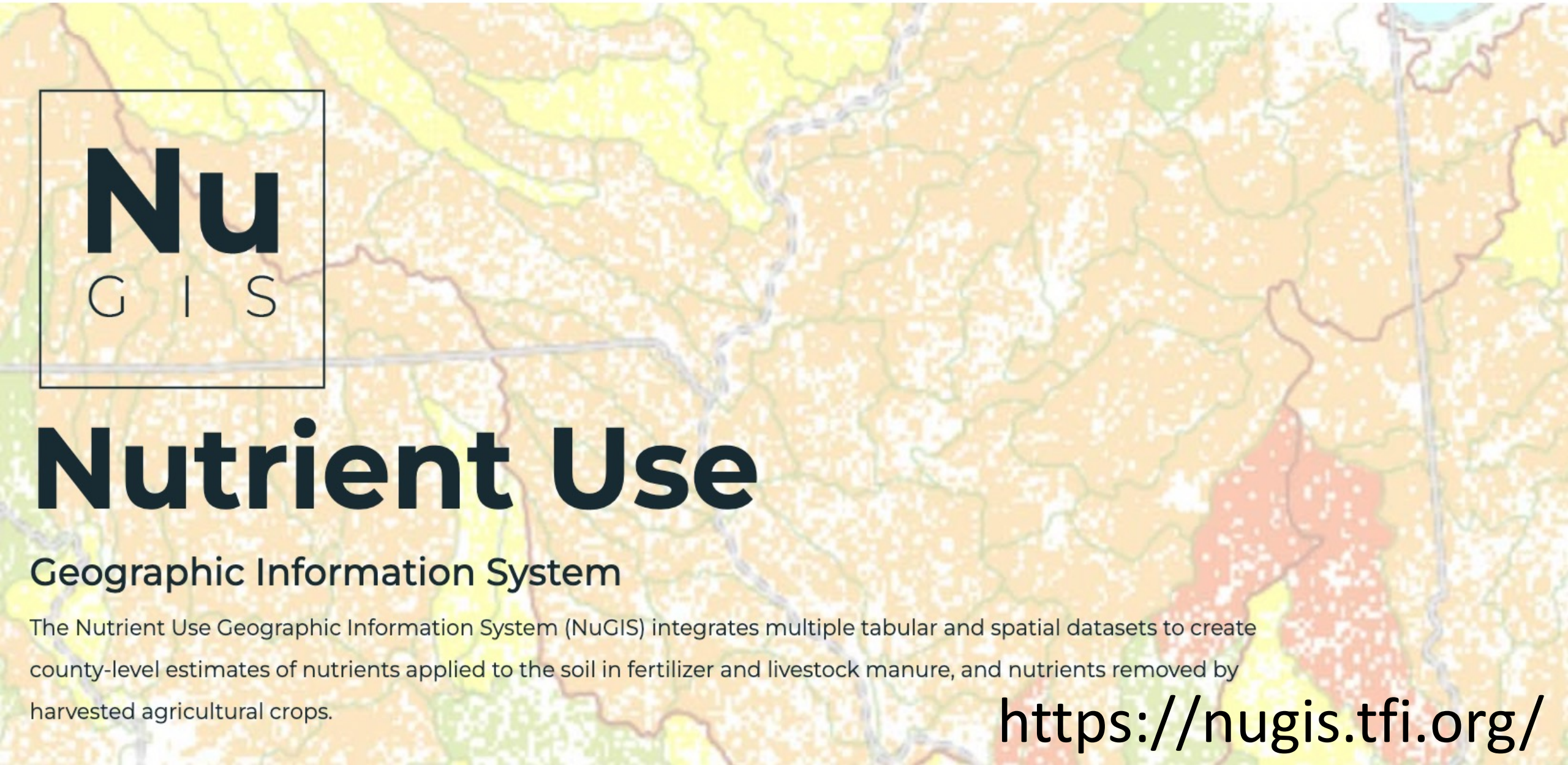

THE
FERTILIZER
INSTITUTE
LEGEND
Wholesale/Retail
Manufacturing
Terminal


Nu
GIS
THE FERTILIZER INSTITUTE
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ABOUT
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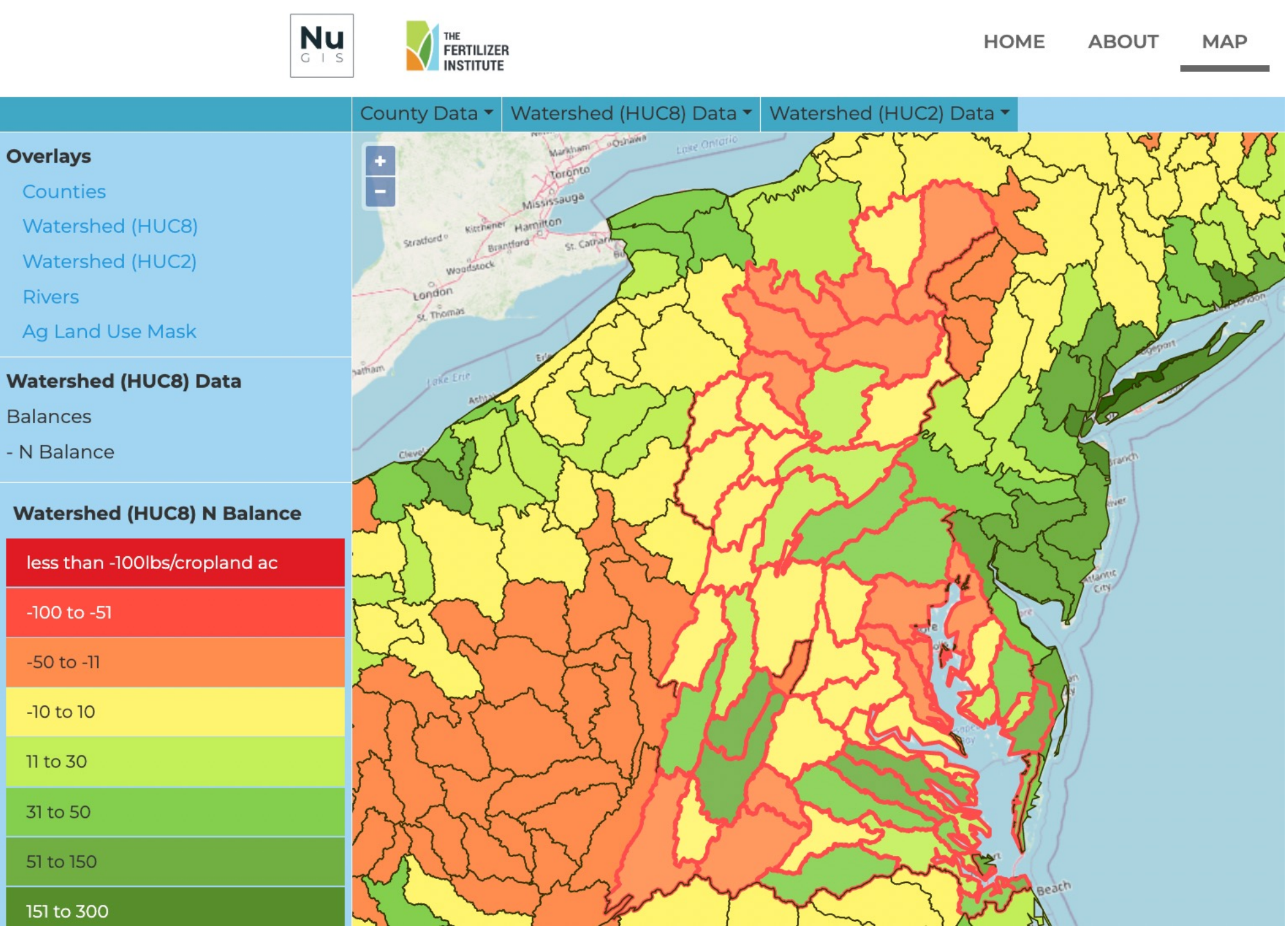
Nu
GIS
Nutrient Use
Geographic Information System
The Nutrient Use Geographic Information System (NuGIS) integrates multiple tabular and spatial datasets to create county-level estimates of nutrients applied to the soil in fertilizer and livestock manure, and nutrients removed by harvested agricultural crops.
https://nugis.tfi.org/



NuGIS AOI Tool

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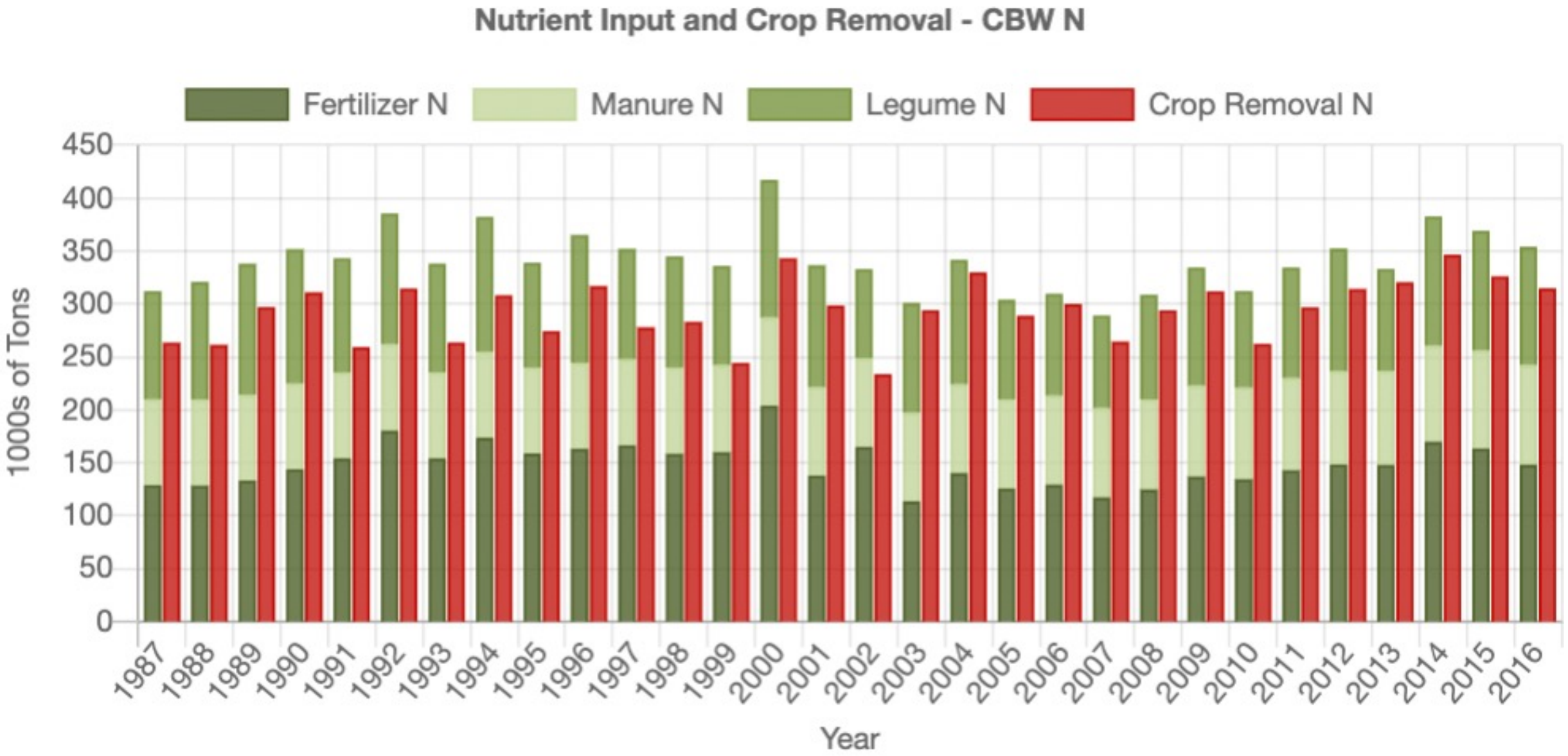

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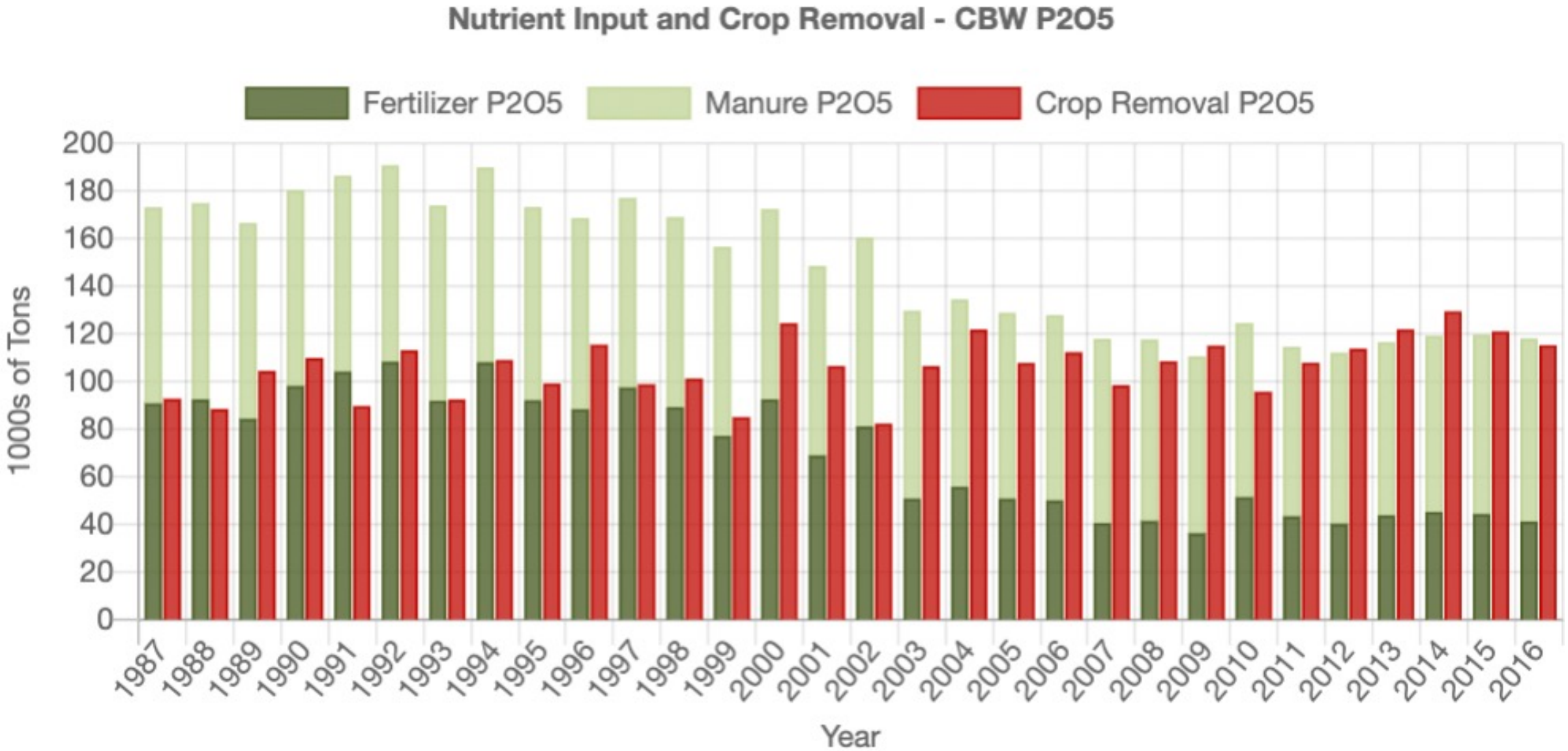

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NuGIS methods: 3 steps to get from AAPFCO county data to HUC8

Apportioning State Total or AAPFCO Unknown County Values

When a state total of fertilizer sales was the only data reported, or data was reported for an unknown location in a state, that data was apportioned to all counties in the state based on each county's reported 'Dollars Spent on Fertilizer and Lime' in the Census of Agriculture.

Spatial Smoothing of County Fertilizer Sales data

The fertilizers sold in a county are not necessarily applied there. The presence of a large fertilizer distributor in one county that delivers fertilizer to several neighboring counties can cause artificially high and low rates of fertilizer nutrients sold per cropland acre in those counties. To account for these factors in modeling fertilizer use spatially we used a spatial interpolation method, similar to that used when creating soil test maps. This was done within-state only, to keep state totals consistent.

Migration of County Data to Watershed Data

Boundaries for watersheds were intersected with county boundaries to produce discrete polygons where each watershed and county overlapped. These discrete County-Watershed polygons were then overlaid with a raster representing agricultural land use at a 30-meter scale. A raster tabulation method was then performed to calculate how many acres of agricultural land use were in each County-Watershed polygon. Acreage was then summarized for each county and for each watershed by county, enabling us to calculate the percentage of each County’s cropland in each watershed.

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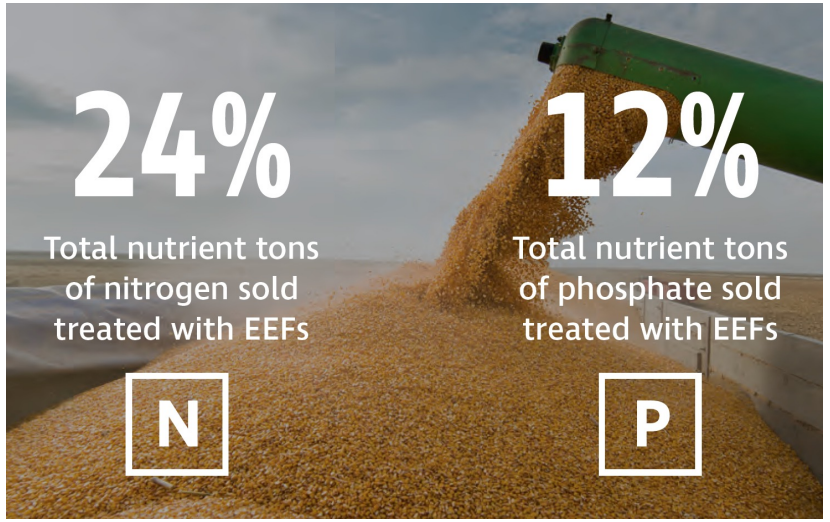
TFI State of the Industry Report, 2018

ENHANCED EFFICIENCY FERTILIZERS

Enhanced efficiency fertilizers (EEFs) are one of the tools farmers can use to improve nutrient uptake by the plant and reduce losses to the environment. EEFs are used in conjunction with both nitrogen and phosphorus fertilizers. The eight companies contributing to the EEF's metric in 2017 reported that 21 percent of total nitrogen and phosphate sold was treated with EEF's. For nitrogen products, five reporting companies manufactured 1,509,215 treated nutrient tons of nitrogen, and retailers sold 996,001 treated nutrient tons of nitrogen. This represents 24 percent of total nutrient tons of nitrogen sold by reporting companies. Three retailer companies reported selling 148,642 treated nutrient tons of phosphate, representing 12 percent of the total nutrient tons of phosphate sold by the reporting companies. The companies reporting EEF sales operate 1,653 U.S. agricultural retail locations.



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Comparative Scope of the Supply and Consumption Data sets

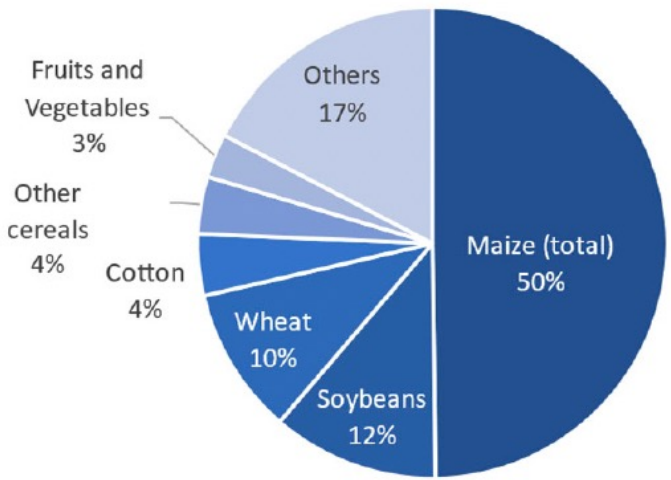
	SUPPLY	CONSUMPTION
Products	Fertilizer raw materials, intermediates and finished products	Fertilizer products only
Uses	All uses (plant nutrition, animal feed and industrial uses)	Plant nutrition uses only (applications to crops, pastures, forests, fish ponds, turf, ornamentals)
Focus Activity	Production and trade (export and import trade matrix by country)	Consumption (nutrient totals only for production and trade)
Timeseries	Yearly and quarterly data since 2002	Yearly data starting in 1961, with breakdown by product from 1973
Units	In both product weight and nutrient (N, P_2O_5 and K_2O) volumes	In nutrient (N, P_2O_5 and K_2O) volumes only
Reference years	Calendars years only	Mix of calendar and fertilizer years
Access	Country data restricted to IFA members	Fully publicly available
Format	Data extracted from database in Excel format	Data extracted from database in Excel format

Fertilizer Use by Crop

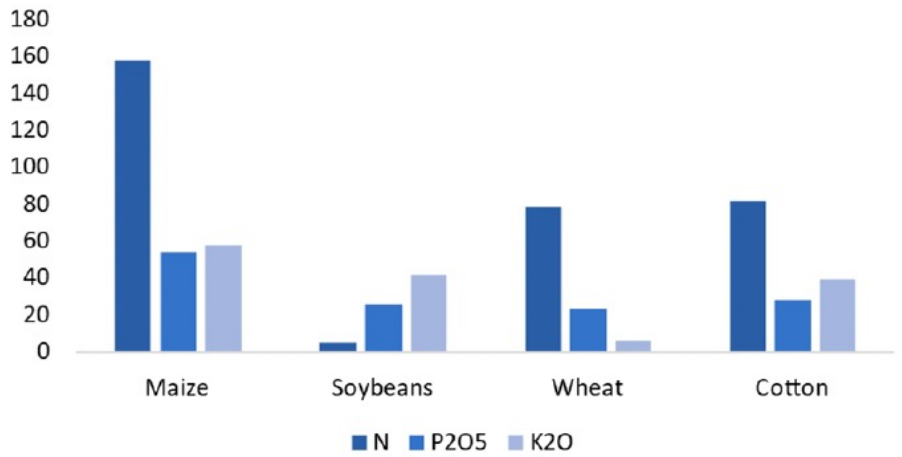
United States

The United States' largest fertilizer consuming crop is maize: it accounted for half of the country's total in 2018/19. The next largest fertilizer consuming crops in 2018/19 were soybeans, wheat and cotton, accounting for 12%, 10%, and 4% of the total respectively. All cereals combined account for 68% of nitrogen consumption, 65% of phosphorus consumption and 52% of potash consumption. Soybeans account for 20% of phosphorous consumption and 29% of potash consumption.

Fertilizer Use by Crop 2018/19 ($N+P_2O_5+K_2O$)



Average Application Rates for Major Crops 2018/19
Kg Nutrients / Ha



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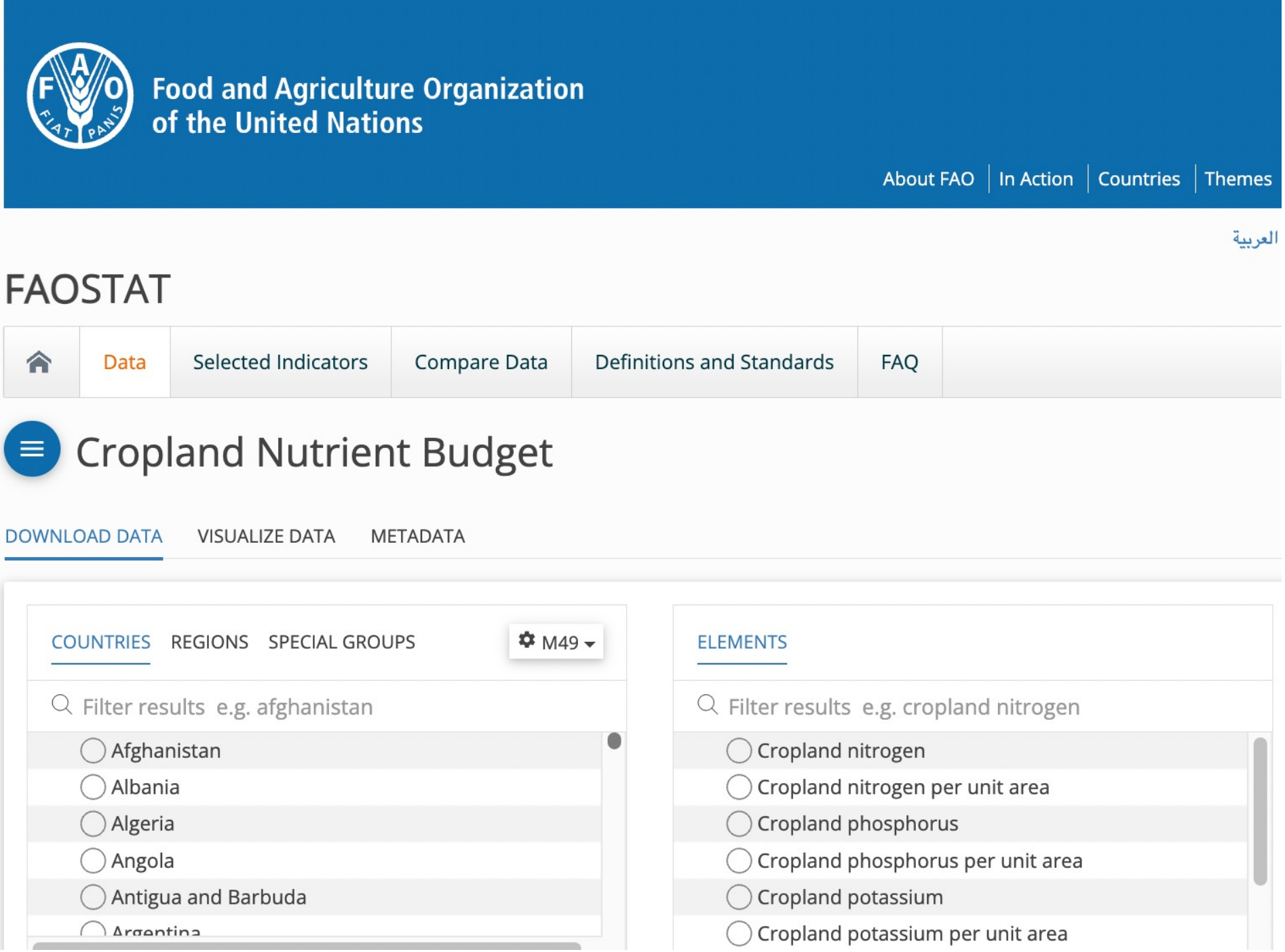

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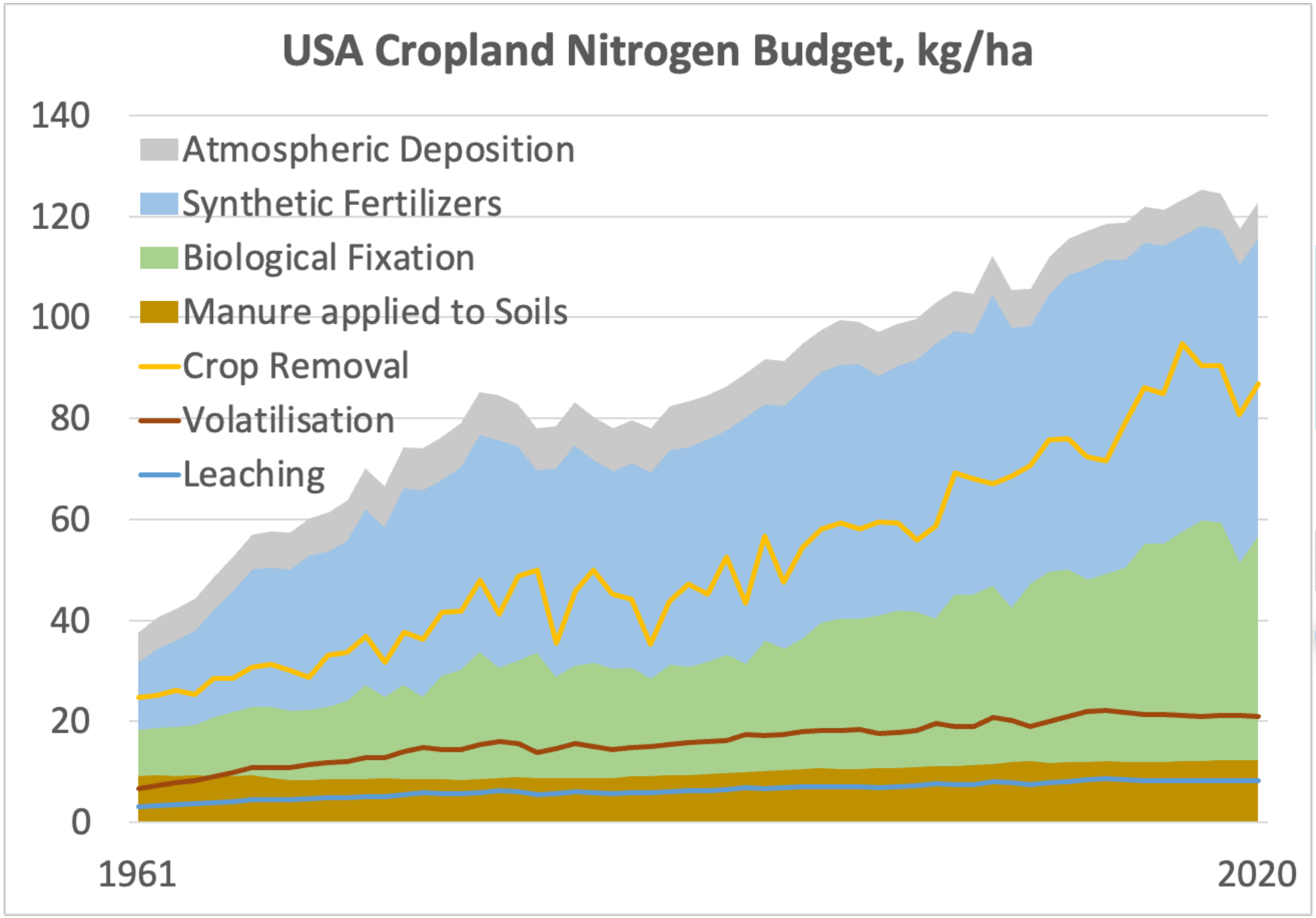

Food and Agriculture Organization of the United Nations

FAOSTAT

Data | Selected Indicators | Compare Data

Cropland Nutrient Budget

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