Building a Strategic Vision for Sustainable Agriculture in the Chesapeake Bay Watershed. Forecasting Agriculture's Future in a Water Quality World

Overview:

Chesapeake Bay restoration requires dramatic reductions in agricultural nutrients and sediment by 2025 through implementation of Best Management Practices (BMPs). Land taken out of production for water quality BMPs plus conversion to urban development could result in a 12 percent loss of farmland by 2025 and 21 percent by 2050. Yet major shifts in markets, technology, genetics etc. that may significantly reduce future ag loads are not being accounted for at present, since, unlike the urban sector, the necessary data and assumptions are lacking.

Future forecasting is a critical tool for the Chesapeake Bay Program (CBP) Partners. Long-term forecasts, i.e., "future scenarios", are needed to account for potential practices and innovations beyond the realm of historical trends and current technologies. Long-term forecasts can inform policy goals and investment decisions that will complement and support Phase 3 Watershed Implementation Plans and Nutrient Trading and Offset Strategies. The absence of such forecasts, and the future assumptions they are based on, handicaps the CBP Partners' abilities to consider the influence of trends, drivers, and innovations on Bay restoration success.

New policies and financial incentives to encourage the development and adoption of innovative technologies and practices will likely be needed to ensure the long-term sustainability of animal agriculture in face of a shrinking agricultural land base. Simulating alternative future scenarios for this sector will provide a means to recognize the potential role and importance of such policies and incentives for restoring the Bay while sustaining agriculture.

Agricultural Forecasting Goal

In the next 8-12 months, the CBP Partners will develop 2-year, 5-year, 10-year, and 20-year forecasts of agricultural land and production based upon an understanding of historical trends, driving forces, and stakeholder visions for the future.

Programmatic Objectives

1. Improve interpolation and extrapolation of agricultural land use and production trends.
2. Spatially quantify the potential relative persistence of farms (i.e., resistance to conversion to development) based on farm demographic, economic, and environmental characteristics.
3. Develop a set of narratives (e.g., storylines) based on stakeholders' input that bound the range of potential and plausible market changes and technological innovations influencing agricultural persistence and production.
4. Spatially simulate future changes to the agricultural land base and production in accordance with stakeholder-relevant scenarios.

Action to date:

1. Building Better Bay Model Conference: engaged industry and other stakeholders .
2. Ag Work Group proposed a Sub Committee for Future Forecasting (AFT& USGS)
3. Submitted grant to Hughes Agro Ecology Center for funding
    a. Scott Malcolm of ERS is Co-investigator along with Gary Shenk
4. Looking for additional funding

Proposed Next Steps

Question

How do we sustain agriculture and maintain the TMDL?

Role for models

To quantify the potential impact of agricultural, land preservation, and urban land use policies and alternative levels of technology investments and adoption on water quality in the Chesapeake Bay.

1. Convene agricultural industry reps, agencies and economists in an AG Futures Group

2. . Collect input from structured interviews and roundtable discussions to:
    a. Obtain data on production trends that will affect nutrient loads to the Bay, e.g., crop genetics, animal nutrition, new technologies,
    b. Identify linkages within production systems (e.g., increase in dairy cows -> demand for silage -> increased precision -> less demand for fertilizer); and,
    c. Identify coherent sets of logical assumptions, that describe and bound the plausible future of agriculture in the watershed and that can serve to motivate discussions on the sustainability of agriculture.

3. Downscale USDA regional agricultural projections to the states and counties in the watershed. The USDA-ERS projections, based on national yield distributions and marketing conditions cover farm commodities, trade, and aggregate indicators of the sector, such as land use for crops, farm income and food prices. The projections are policy neutral and assume that no policy change will occur during the 10-year projection period. The project team will:
    a. Perform a statistical disaggregation of projections for 9 major crop commodities and 6 animal products;
    b. Translate regional commodity projections into estimates of state crop composition/ acres/rotations and animal numbers, based on input from industry and economists;
    c. Allocate the state-level demand projections for crop acres and animals to counties within each state through enhancements to the CBPO Land Change Model.

4. Develop alternative future scenarios

    Host 2 workshops with the Futures Group to identify policies, regulations, and technologies that may impact industry and farmer decisions. The Futures Group will use to develop alternative future scenarios for to explore the sustainability of agriculture. The scenarios combined with the USDA's downscaled data will be used for county-level agricultural forecasts.

5. Evaluate alternative future scenarios

    With the CBPO, estimate nutrient and sediment loads and regional offset capacity associated with each scenario. Review findings with the Futures Group and the Agricultural Workgroup.

6. Watershed Stakeholder review of scenarios and impacts
    a. Host a third workshop of broad stakeholder interests (e.g., land use ., habitat, open space, forestry, water quality) to review the scenarios and potential impacts of policies, markets, and investments. Gain insights into common interests and concerns across sectors and identify the components to support a vision for sustainable agriculture in the watershed.

7. Compile input and write final report with finalized version of the scenario.