Global-Local-Global Analysis of Agricultural Sustainability

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New Approaches Are Required

GLASS: Global-to-Local Analysis of Systems Sustainability

- Recognizes that global forces are driving local sustainability stresses
- Yet the character of these stresses & solutions vary by locality
- Furthermore, local responses can have global consequences
- Cross-disciplinary collaboration is critical
Alexander et al. 2008
Potential Sustainability Solution: Controlled Drainage

Free Drainage

Controlled Drainage at Low Level (summer)
Reduced:
- Drain flow by 61%
- Nitrate-N load by 51%
- SRP load by 10%
- TP load by 39%

Controlled Drainage at High Level (winter)
Reduced:
- Drain flow by 63%
- Nitrate-N load by 58%
- SRP load by 14%
- TP load by 32%
Potential Sustainability Solution: Managed Wetlands (at ACRE)

28% reduction in nitrate load
The spatial patterns of mitigation are quite different ... as are the consequences for corn production and price.
Analytical Framework for NSF-INFEWS
Challenges and Potential for GeoEDF Contributions

- Each of the four modeling teams have source data sets at different scales; these need to be merged/made consistent.
- Output data (results) from one model become inputs (boundary conditions) to another, e.g. crop production or nitrate leaching.
- *Can the GeoHub act as the glue between these different models?*
- *SIMPLE-G* is the organizing framework and it is *running on the GeoHub* – what about having each group upload the relevant input files to the GeoHub? How should these inputs be archived? How about the ensuing SIMPLE-G model outputs?
- This use case could provide a template for other sustainability analyses (e.g., collaboration with the Natural Capital Project (InVEST models)).
GLASS-NET
A response to the NSF call for accelerating science by linking networks of networks

Figure 1. AccelNet bridging to create the GLASSNET network of networks for converging on best practices for research integration and sustainable development.