ES-DNDC: A Desktop Modeling Tool for Evaluating Greenhouse Gas Mitigation and Nutrient Load Reduction Strategies to Elkhorn Slough NERR

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APPLIED GEOSOLUTIONS, LLC

CICEET (Cooperative Institute for Coastal and Estuarine Environmental Technology)

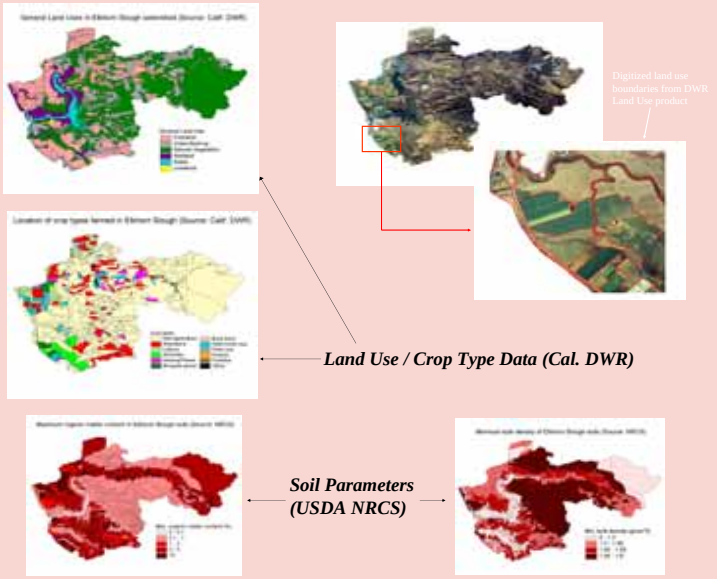
CICEET MISSION: ***To understand and reverse the impacts of coastal and estuarine contamination and degradation through the development and application of innovative environmental technologies and methods***

OUR PROJECT OBJECTIVES:

- **To create a geospatial tool to assess the effectiveness of agricultural management options for mitigating greenhouse gas emissions and reducing nutrient loading in the Elkhorn Slough Nat'l Estuarine Research Reserve watershed**
- **Provide tools and train local stakeholders in the use of the decision support system**
- **Case study in transfer of a research technology to a useful tool for coastal managers**

OUR PROJECT'S FIVE-STEP PROCESS:

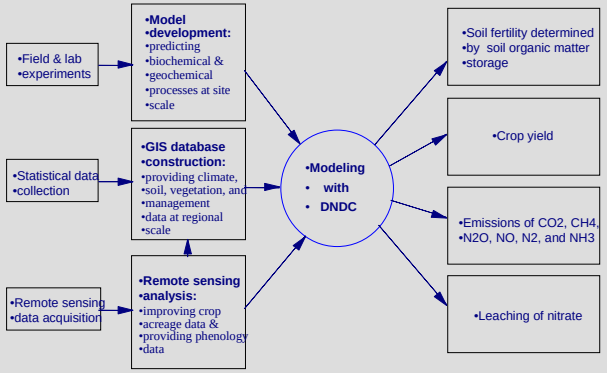
***STEP ONE*: Compilation of data on biophysical properties across Elkhorn Slough watershed and alternatives in agricultural management practices**



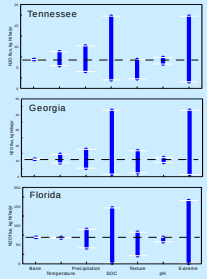
***STEP TWO*: Creation of Elkhorn Slough NERR-specific, stand-alone GIS-based biogeochemical model (ES-DNDC)**

***DNDC (THE MODEL)*:** a linking of ecological drivers that influence C, N or water cycles; note that the 3 elemental cycles are linked to each other through the biogeochemical field (below)

***OUR GEOSPATIAL MODELING APPROACH*:** DNDC model inputs come from a combination of field-derived and lab-derived datasets, GIS databases, and several remote sensing products related to crop management and development (below)



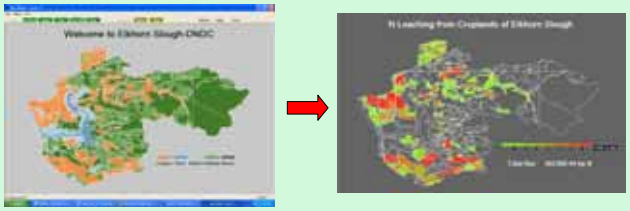
***STEP THREE*: Perform a sensitivity analysis of ES-DNDC to identify major management and biophysical factors that influence trace gas emissions and nitrate leaching in ES-NERR**



➢Running the DNDC model with a range in individual parameter values. For example, maximum and minimum SOC produces a range of N2O emissions, which contains the "true emission" with a high probability.

➢Latin Hyper-Cube Sampling for assessing multi-parameter sensitivity analyses

***STEP FOUR*: Develop a user-friendly interface for ES-DNDC to facilitate easy use by land managers, crop consultants, etc.**



Interface *Sample Output*

***STEP FIVE*: Train a constituency of local coastal managers in using ES-DNDC as a tool for assessing the fate of N applied to agricultural fields; this will be accomplished in workshops**

Purpose of Workshops:

- **to provide an overview of the project and DNDC to potential users**
- **to build an understanding of the management issues facing farmers and land managers in the Elkhorn Slough watershed and to set initial enumeration of said issues**
- **to build working relationships with local stakeholders and potential users**

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