TASK 6 – IMPLEMENTATION GUIDELINES[1]

The recommended methodologies from task 5 were CREAMS-WT and the phosphorus budget. This report describes an implementation plan for these methodologies as well as an explanation for each step of the implementation plan.

Steps for Implementing the CREAMS-WT Methodology

1. Assemble all necessary weather input data for CREAMS-WT, such as rainfall, temperatures, and solar radiation (additional weather data should be added as needed).

   All required data sets should be assembled for a minimum period of 20 years, which captures most of the climatic variability in the Lake Okeechobee watershed. Data sets should be assembled in computer files that are ready to use as input for the model. The District should assemble data from as many weather stations as possible, making available to permit applicants the nearest station having good, long-term records. Prepare a map with the locations of all weather stations, along with other known features, such as counties, roads, streams, lakes and wetlands. Data layers are shown on the map.

   Responsible party: District

2. Develop soil parameters and maps that are necessary for CREAMS-WT.

   Soil is a key parameter when estimating the impact of phosphorus loading due to land use change. CREAMS-WT soil parameters can be determined by District staff using the STATSGO soil database and Lake Okeechobee Agricultural Decision Support System (LOADSS) database. Parameter values should be entered into data files ready for use by the model. CREAMS-WT also uses several phosphorus partition coefficients, saturated hydraulic conductivity, lower zone porosity, deep seepage rate, and profile storage. These are important parameters that govern the movement of phosphorus and should be provided for direct input to the methodology. This information is stored in the LOADSS database.

   Responsible party: District

3. Develop all the necessary land use parameters for CREAMS-WT, which include leaf area index, growth stages, root depth, uptake of nutrients under various growth stages, optimal yield and biomass information, and any other necessary inputs for the methodology.

   A detailed, up-to-date land use map with current and proposed land use parameters should be developed. Land use patterns and model parameter values are stored in the LOADSS database. This information should be prepared in computer files appropriately formatted for easy input into CREAMS-WT.

   Responsible party: District

[1] This report is based on a memorandum submitted as the task 6 deliverable by R. Srinivasan.

4. Develop Soil Conservation Service (Natural Resource Conservation Service) curve numbers (CN) based on hydrologic soil group, land use, and hydrologic condition for all possible current and proposed land uses, as input to CREAMS-WT.

   CN is a sensitive parameter for estimating runoff and is stored in the LOADSS database. These data should be in computer files using an appropriate format for input to CREAMS-WT.

   Responsible party: District

Steps for Implementing the Phosphorus Budget Methodology

1. Develop a spreadsheet or worksheet type approach to calculate the phosphorus budget for all current and expected land uses in the Lake Okeechobee watershed.

   Develop a simple spreadsheet model or detailed worksheet showing how the imports and exports are determined for various land uses along with guidelines to estimate imports and exports for new land uses that may not be in the worksheet.

   Responsible party: District

2. Develop estimates of average annual surface runoff leaving a field, on a unit area basis, for a 20 year period or longer.

   Flow estimates can be taken from the LOADSS database, which contains average annual runoff values for specific land uses. Runoff values are based on 20 year, CREAMS-WT model runs. This information can be entered in a table, listing land use, soils, and corresponding runoff. The table will facilitate a comparison of runoff from two different land uses, which is required by the phosphorus budget methodology.

   Responsible party: District

3. Identify all important phosphorus imports and exports for each land use found in the Lake Okeechobee basin.

   The majority of import and export data can be taken from the phosphorus budget study conducted by Mock, Roos & Associates. Data not available from this study will have to be collected from other sources such as the internet, technical journals, technical reports, local agricultural extension offices, and other government agencies. This information is used to compute net phosphorus imports/exports for land uses, which are required by the phosphorus budget methodology.

   Responsible party: District

Steps for Implementing the Phosphorus Budget and CREAMS-WT Methodologies

1. Develop a detailed user's manual for each methodology;

   The user's manual should contain a detailed parameter list, data preparation procedure, sample input files, and output files. The user's manual should also contain tutorial information on how to setup input data sets and sample applications of the methodology for several land use changes. The

current documentation for the phosphorus budget methodology is limited in scope. The District needs to develop a well-documented procedure and examples of how the phosphorus budget methodology can be used as a tier one application to assess net change in phosphorus loads due to land use change.

Responsible party: District

2. Develop training datasets and materials, or interactive training modules, for the methodologies.

   Develop several detailed training datasets for each methodology with either CD-based or classroom type training modules for potential users.

   Responsible party: District

3. Assemble peer-reviewed documents for the recommended methodologies and provide them to users as references.

   These materials help users understand how the methodologies are applied, which includes developing input parameters, setting up the methodologies for various BMPs, and proper analysis and interpretation of results.

   Responsible party: District

4. Place program source code, executable setup files, sample input files, and other necessary information on a CD-ROM or internet website along with instructions for transfer to a user's computers.

   Responsible party: District

5. Provide users with instructions for compiling program source code.

   Responsible party: District

6. Provide a description of all information, pertaining to phosphorus load estimates that are required by the District in a land use change application. This description should include one or two examples.

   This item is very important in order that users can provide all the necessary information needed by the District to review a land use change request. This includes all necessary input and output showing pre- and post-phosphorus loads due to land use changes.

   Responsible party: District

Steps for Applying the Phosphorus Budget and CREAMS-WT Methodologies

1. Apply the phosphorus budget method as described in the District's phosphorus budget user's manual.

A land use change applicant will develop phosphorus budgets, following user's manual guidelines, which estimate average annual runoff and net phosphorus imports for a specific land parcel under current and proposed land uses. If runoff and net phosphorus imports are less for the proposed land use, the applicant has demonstrated that the proposed land use will generate lower edge-of-field phosphorus loads than the current land use. Methodology results should be included in the application for land use change, using the guidelines provided in the phosphorus budget user's manual. If either runoff or net phosphorus imports are greater for the proposed land use, the applicant has not demonstrated that the proposed land use will generate lower edge-of-field phosphorus loads. In this case, the applicant can use CREAMS-WT to demonstrate that the new land use will generate lower phosphorus loads. If desired, the applicant can skip this step and proceed directly to step two, which uses CREAMS-WT.

Responsible party: applicant for land use change

2. Apply CREAMS-WT as described in the District's CREAMS-WT user's manual.

A land use change applicant will apply CREAMS-WT to a specific land parcel for current and proposed land uses, following guidelines set forth in the District's CREAMS-WT user's manual. Model application includes developing input files, running the model, and evaluating model output. If simulated edge-of-field phosphorus loads are less for the proposed land use, the applicant has demonstrated that the proposed land use will generate lower edge-of-field phosphorus loads than the current land use. Methodology results should be included in the application for land use change, using the guidelines provided in the CREAMS-WT user's manual. If simulated edge-of-field phosphorus loads are greater for the proposed land use, the applicant has not demonstrated that the proposed land use will generate lower edge-of-field phosphorus loads. In this case, the applicant must use an alternative methodology, acceptable to the District, to demonstrate that the new land use will generate lower phosphorus loads. If the applicant does not do this, the District should deny the application for land use change. If desired, the applicant can skip this step and use any method acceptable to the District to demonstrate that the new land use will generate lower edge-of-field phosphorus loads.

Responsible party: applicant for land use change