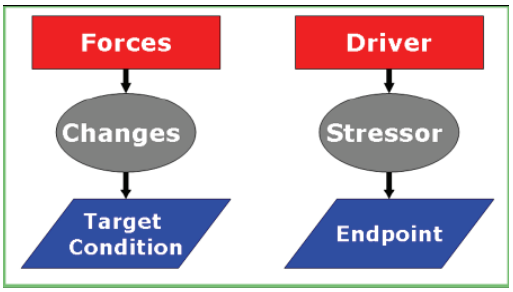
Applying System-Wide Approaches to Water Resources Management
Water Resources Depot
https://swwrp.usace.army.mil/

System-Wide Water
SWWRP
Resources Program

Template for Conceptual Model Construction



Description: Watershed and other system-wide actions are complicated by interacting resources, numerous stakeholders, and increasing demand for water resources. The requirement to incorporate human, hydrologic, geomorphic, and ecological subsystems in a watershed approach has proved challenging. The basis of conceptual models (CM) is to understand how the subsystems interact, and to identify system forces, changes, and target conditions. This enables the study team to organize the components in a manner that enables communication and system simulation. Conceptual models have demonstrated capability and flexibility in meeting the challenges of system-wide organization and communication.

Template for conceptual model construction: A template for conceptual model construction was developed under SWRRP, building on the experience of previous CM efforts. The template assists the development process by identifying CM components (drivers, stressors, endpoints) and categories for the components. Six steps are recommended to guide the user through CM development. Examples of each of the CM components help a project team determine the configuration of their system, deciding the specific components that fit their project, watershed, or system. The template expedites the CM construction process by providing examples and experience from previously developed CMs.

Applications: Overall, uses of conceptual models fall into three broad categories**:**

- System representation
- Simulation and assessment
- Sensitivity analysis and hypothesis testing

Using the template, models were recently developed to:

- Provide the initial identification of system-wide ecosystem objectives or target conditions, based on input from agencies with partial or focused authorities, objectives, and missions in the system.
- Match potential watershed projects with the Federal and local agency with authority for implementation; identifying the projects consistent with agency evaluation process (e.g., Corps Planning's significant resources), improving the agency's proponent capability (see other side).

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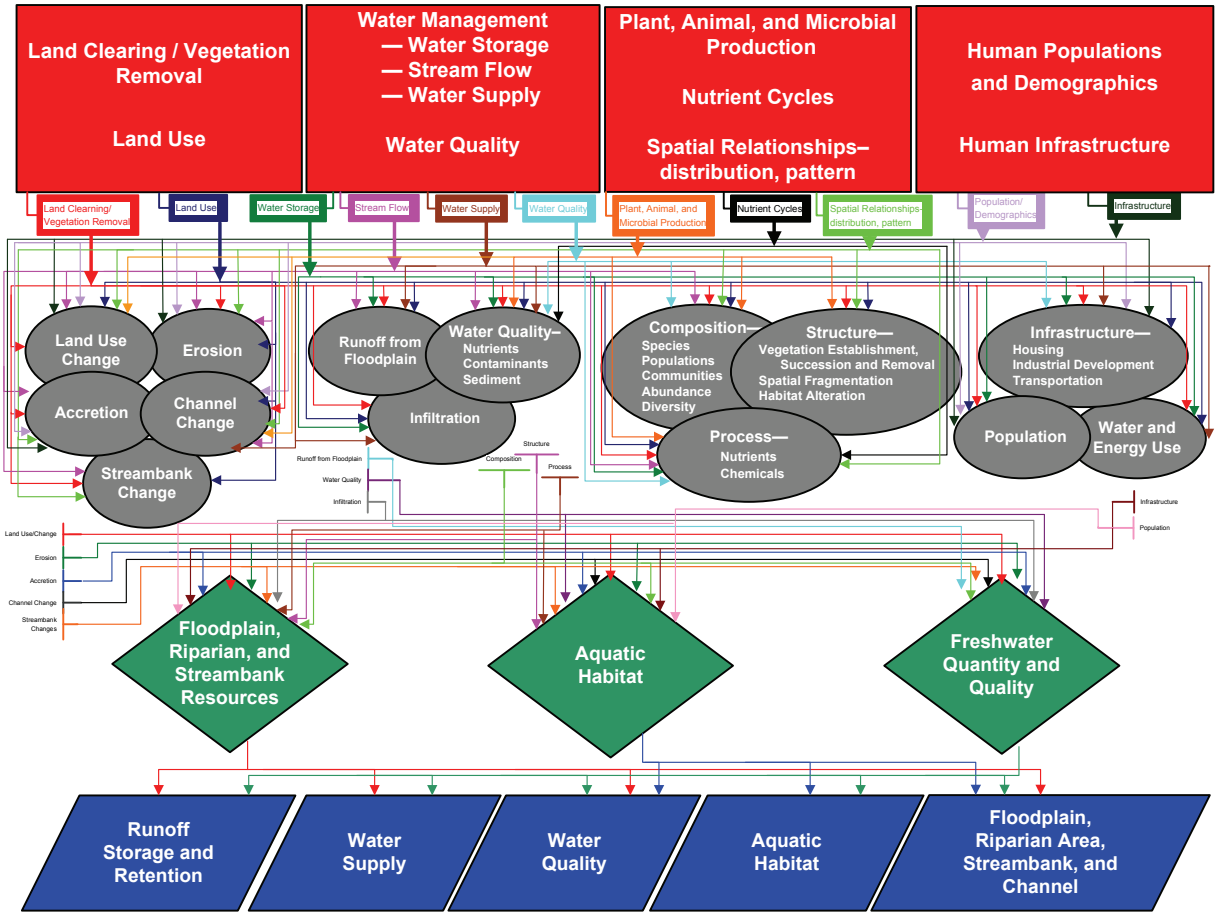
Model Developed Using Conceptual Model Template



Benefits: The benefit of the template for conceptual model construction is to expedite conceptual model construction, thereby improving the execution of system-wide projects for the Corps. The common structure provided by conceptual models enables the integration of the hydrologic, sediment, geomorphic, and ecological functions required in a system-wide approach.

Future Capabilities: In cooperation with selected District personnel and their partners, conceptual models will be developed for major USACE environmental activities in planning, regulatory, and operations. Selected topics include invasive species, endangered species, adaptive management, ecosystem restoration, decision-making, risk and decision analysis, and monitoring plan design. In the future, we will develop software to assist Districts in constructing models.

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