



CEMCAT: Conceptual Ecological Model Construction Assistance Toolbox

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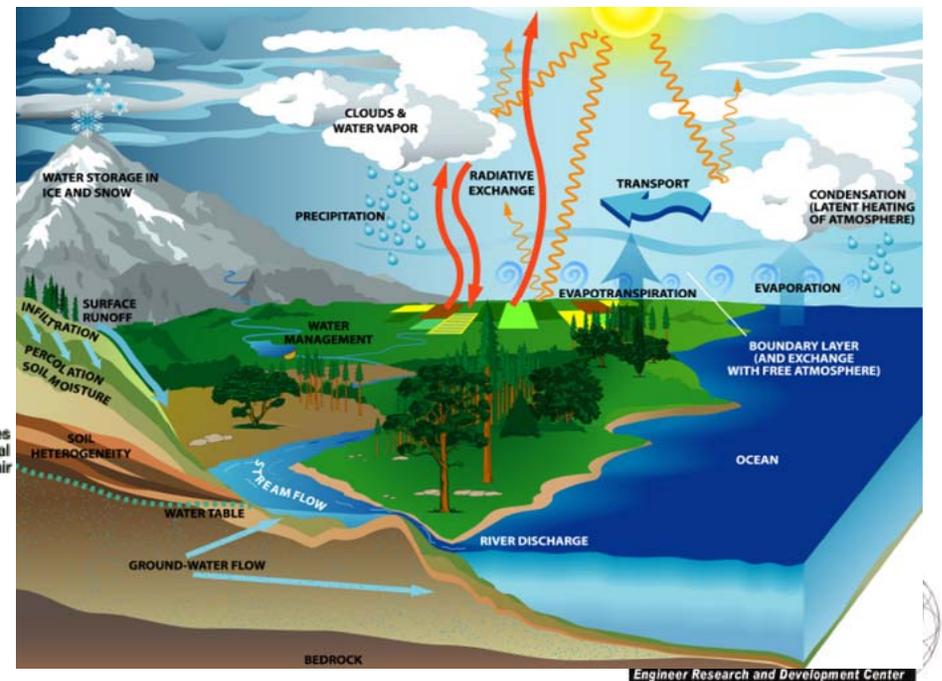
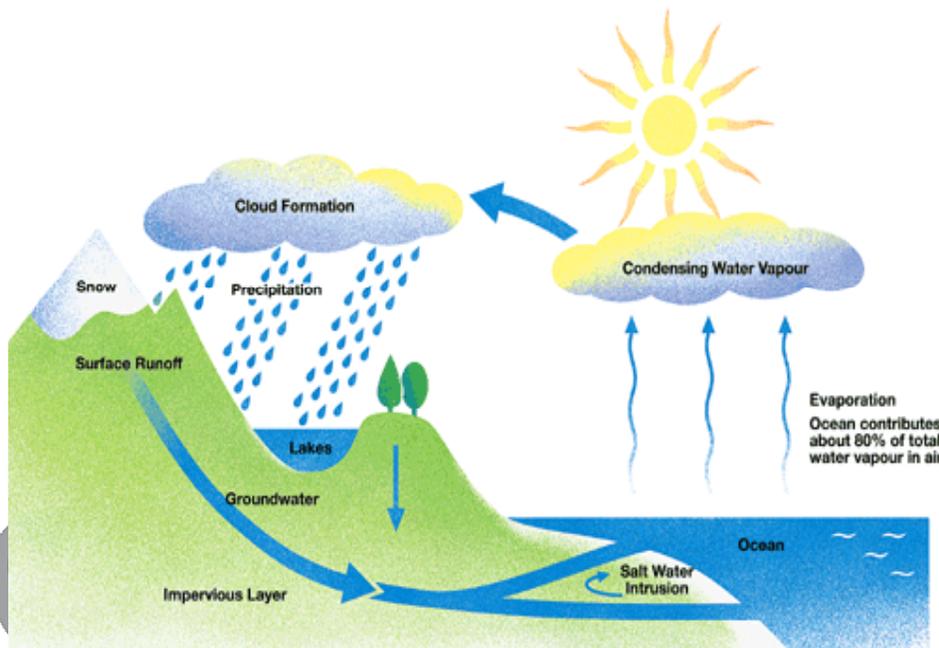
ERDC Environmental Laboratory

A product of the Environmental Benefits Research Program



What is a Conceptual Model? Why Would I Want One?

A conceptual model is a tentative description of a system or sub-system that *serves as a basis for intellectual organization.*



Another Reason to Use Conceptual Models?

Environmental Advisory Board recommended that:

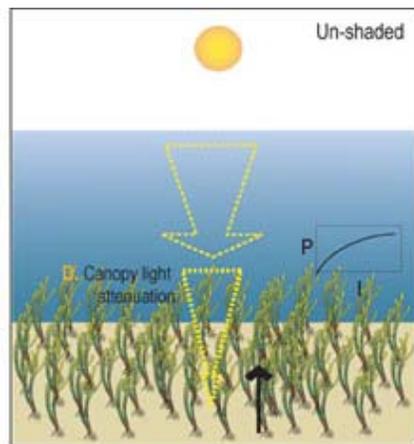
“The Corps should encourage the explicit use of conceptual models to guide ecosystem restoration planning and implementation. Conceptual models should be required as a first step in the planning process, as they provide a key link between early planning (e.g., an effective statement of problem, need, opportunity, and constraint) and later evaluation and implementation.”

(EAB 2006)

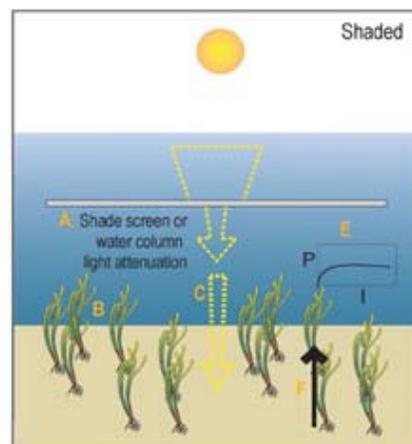


What Are Conceptual Models?

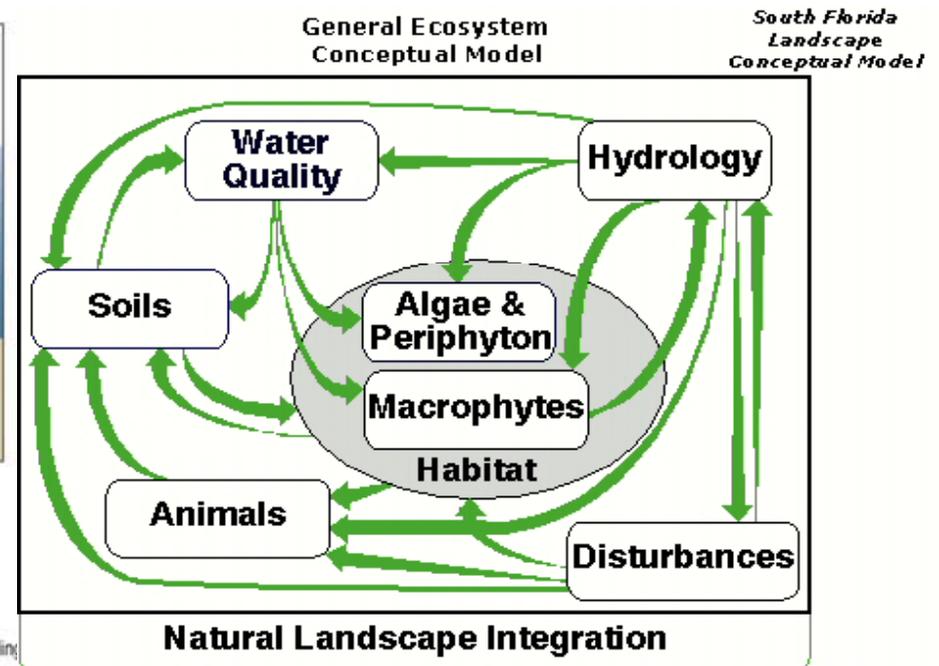
Conceptual models describe general functional relationships among essential ecosystem components. They tell the story of “how the system works.”



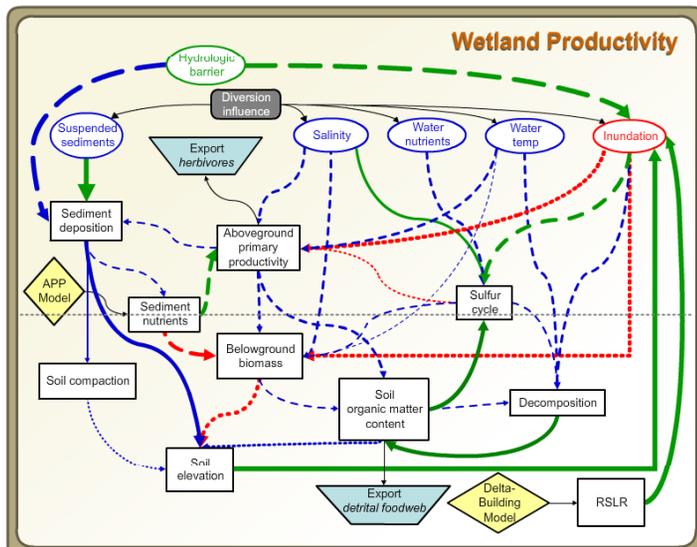
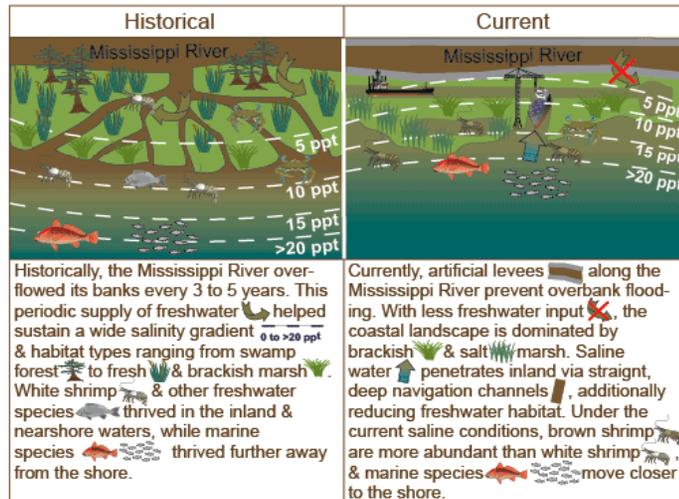
- A. Light attenuation by the water column (or an experimental shade screen) leads to reduced light at the top of the canopy
- B. Shoot density reduces with light availability
- C. Light attenuation by the canopy is reduced allowing greater penetration through the canopy



- D. Light attenuation by the seagrass canopy is higher in dense meadows
- E. Under heavy shade conditions, photosynthetic characteristics are affected
- F. Leaf growth was unaffected by 7 months of shading



Conceptual Models



- Provide a Means of Organization and Communication
- Facilitate Alternative Formulation and Detailed Analyses
- Help Identify Metrics, and Monitoring and Adaptive Management Requirements

Example models from Coastal Louisiana Ecosystem Assessment & Restoration website, http://www.clear.lsu.edu/conceptual_ecological_models/

Conceptual Models are NOT:

- *The truth* – they are simplified depictions of reality
- *Comprehensive* – they focus only upon those parts of an ecosystem deemed relevant while ignoring other important (but not immediately germane) elements
- *Final* – they provide a flexible framework that evolves as understanding of the ecosystem increases



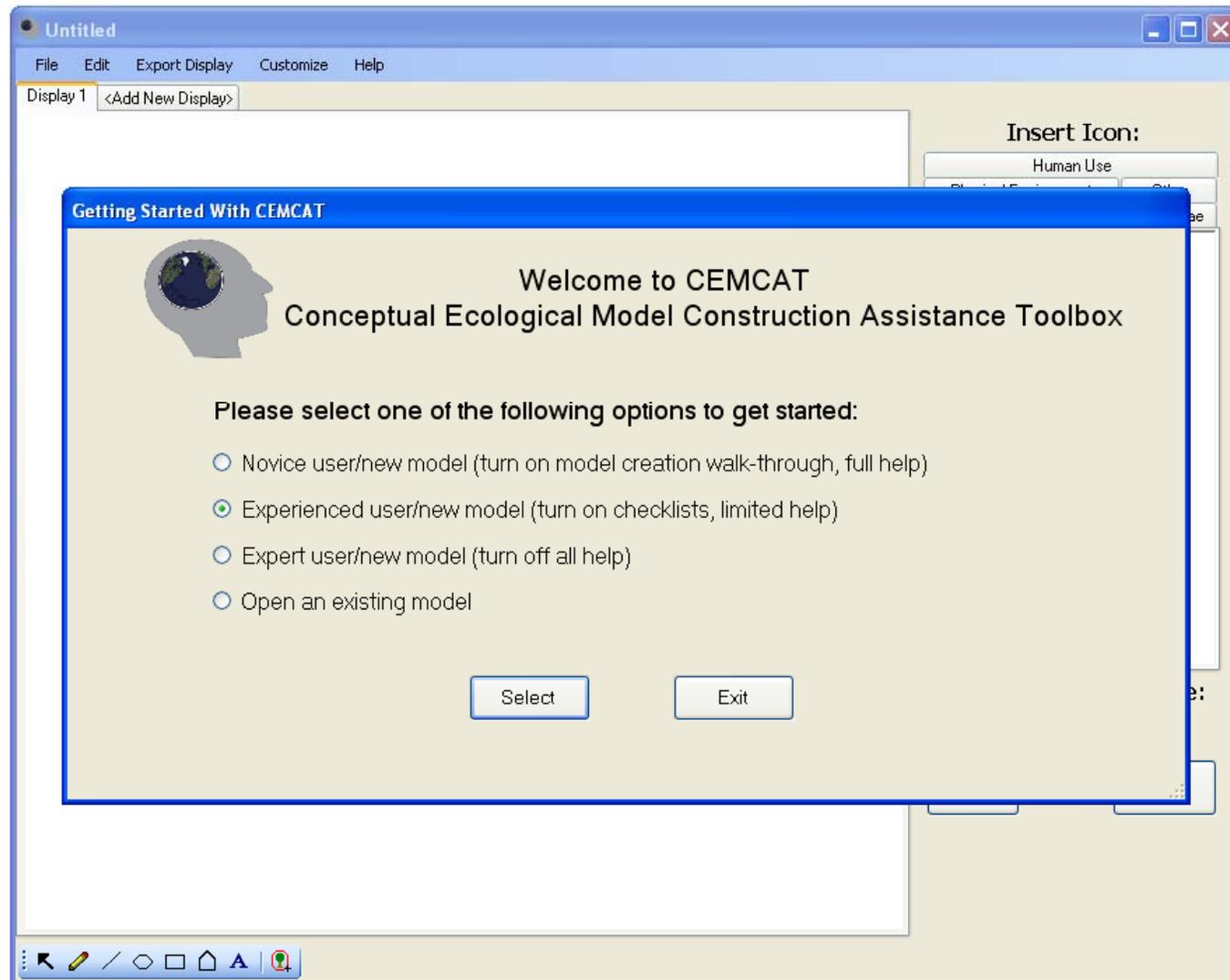
Purpose of Software

- Provide guidance in the creation of the conceptual model itself (“Where do I start?!?!”)
- Facilitate the creation of graphical representations of conceptual models

Provide a **useful** tool for planners to build conceptual ecological models

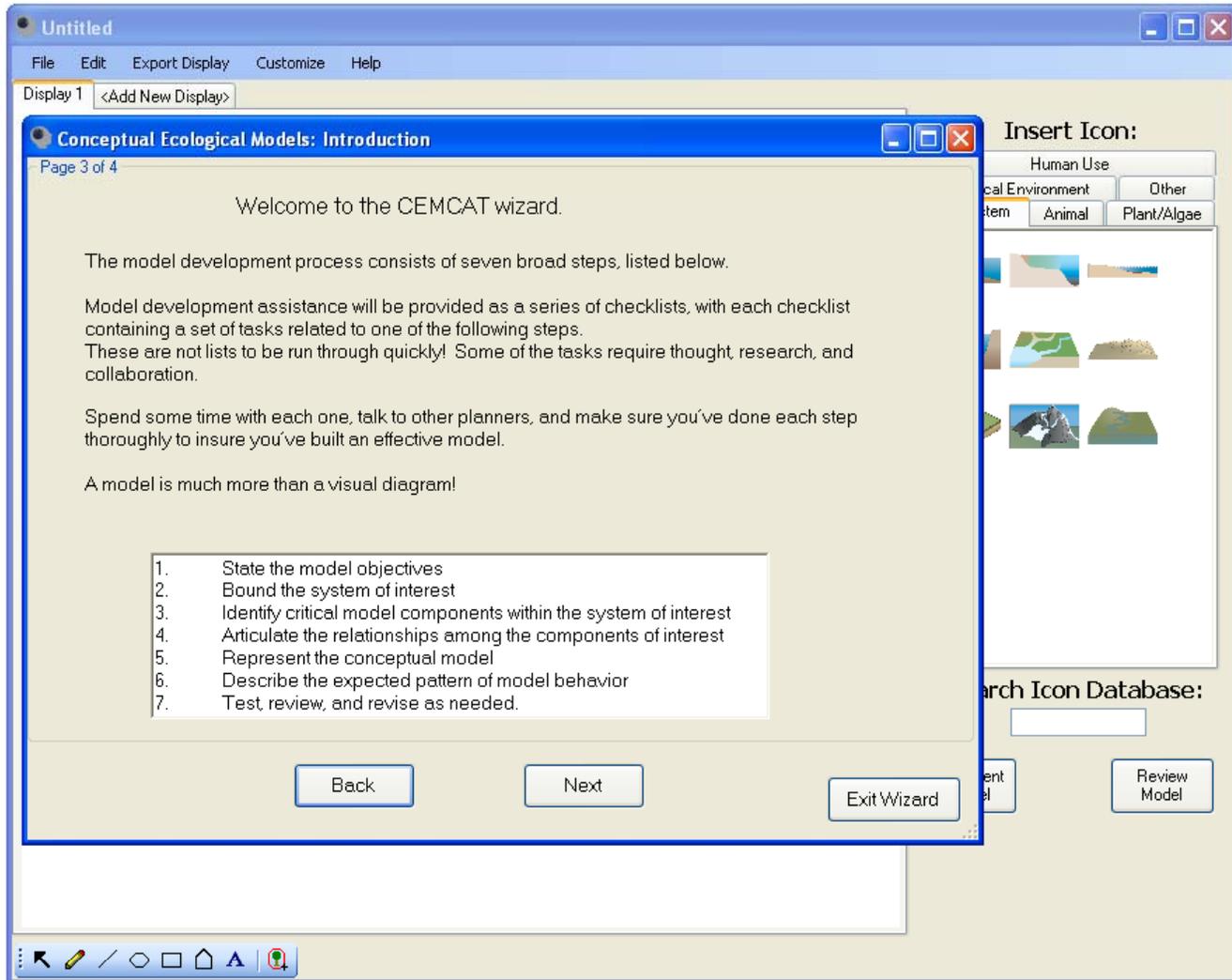


CEMCAT Features: Customized User Level



- Option to choose from three different user experience settings

CEMCAT Features: Assistance Wizard



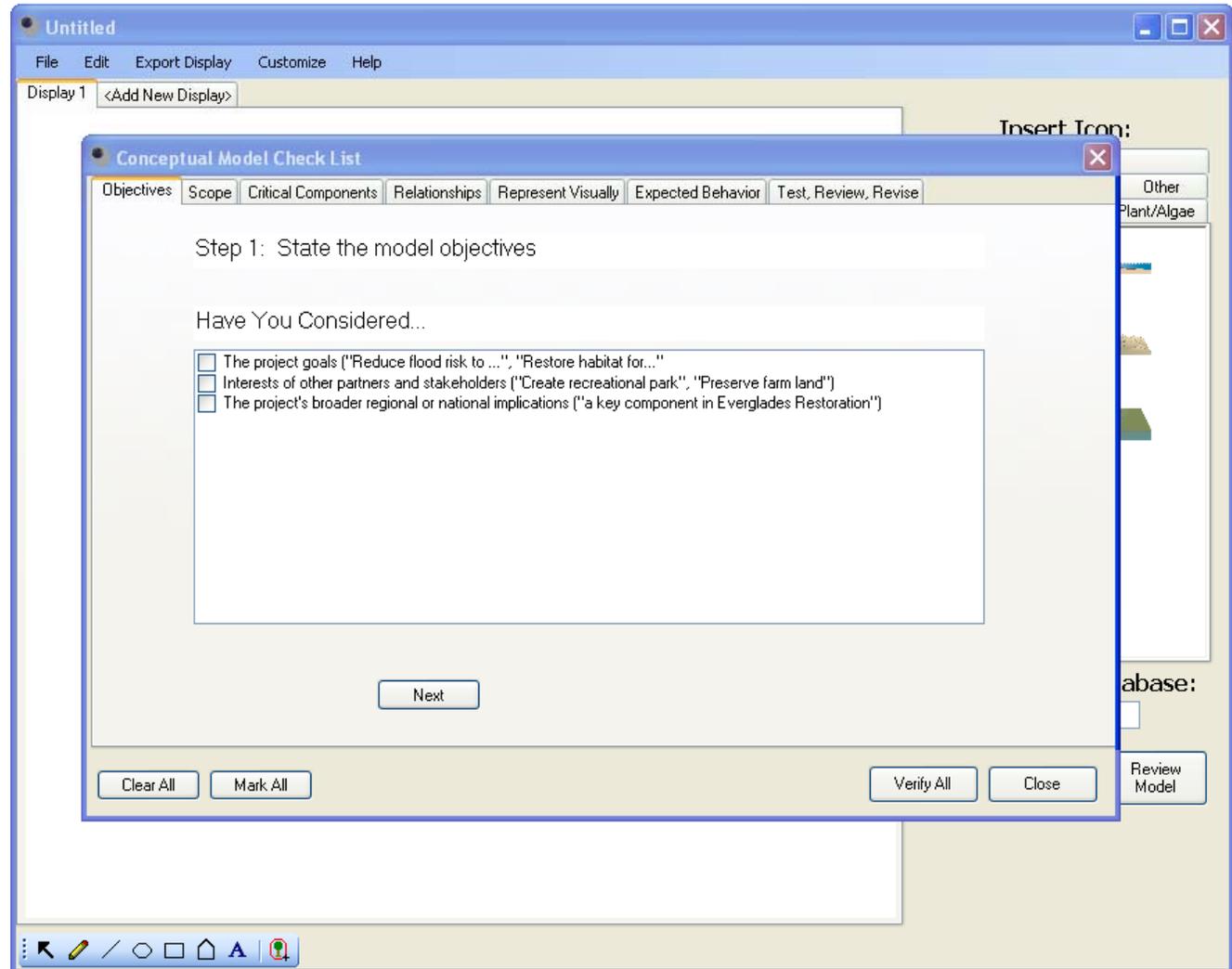
- "Novice" user: wizard provides background on conceptual models and where to go for help



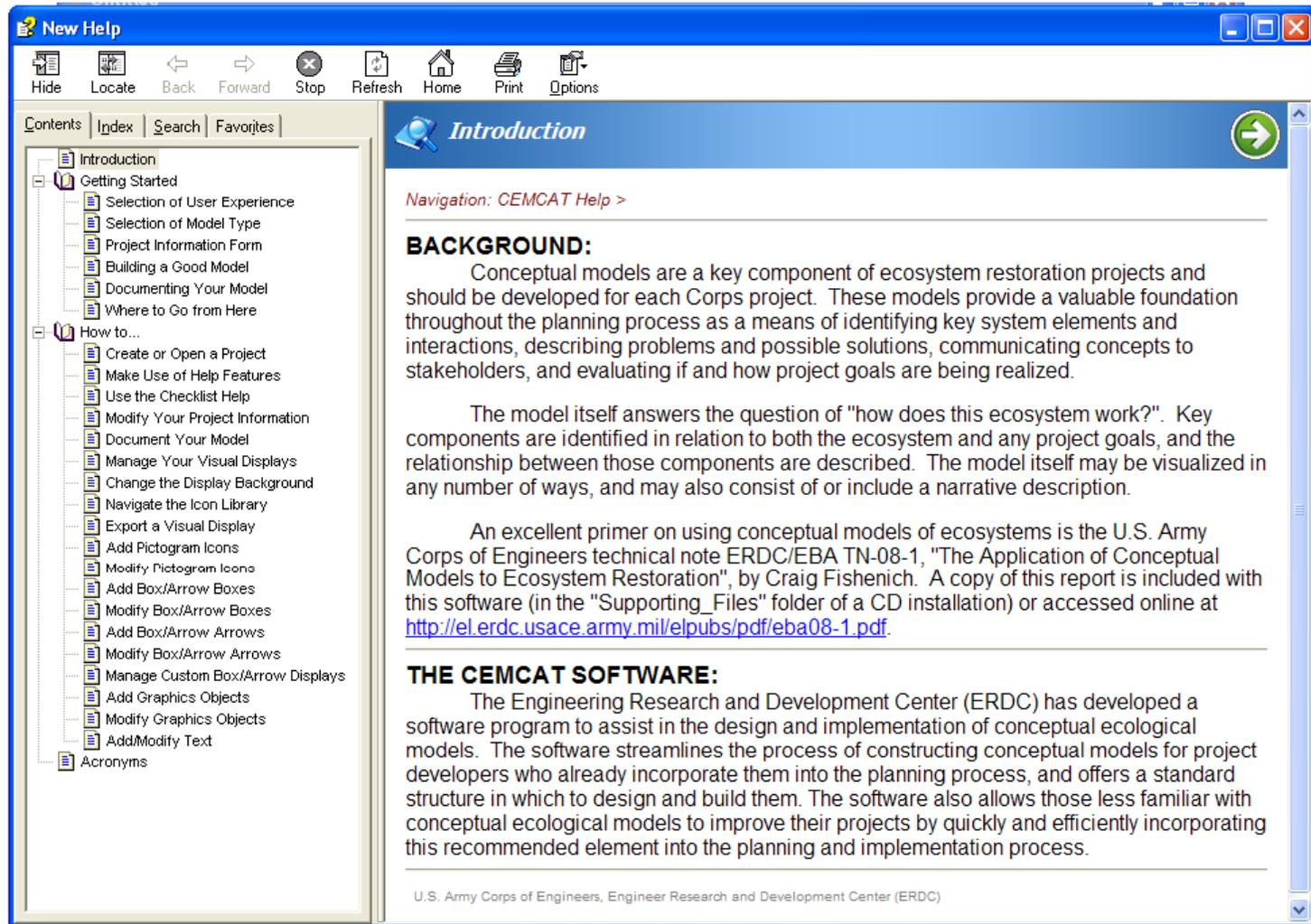
CEMCAT Features: User Checklist



- “Experienced” User: wizard walks the user through development
- Checklist format to mark tasks off as completed



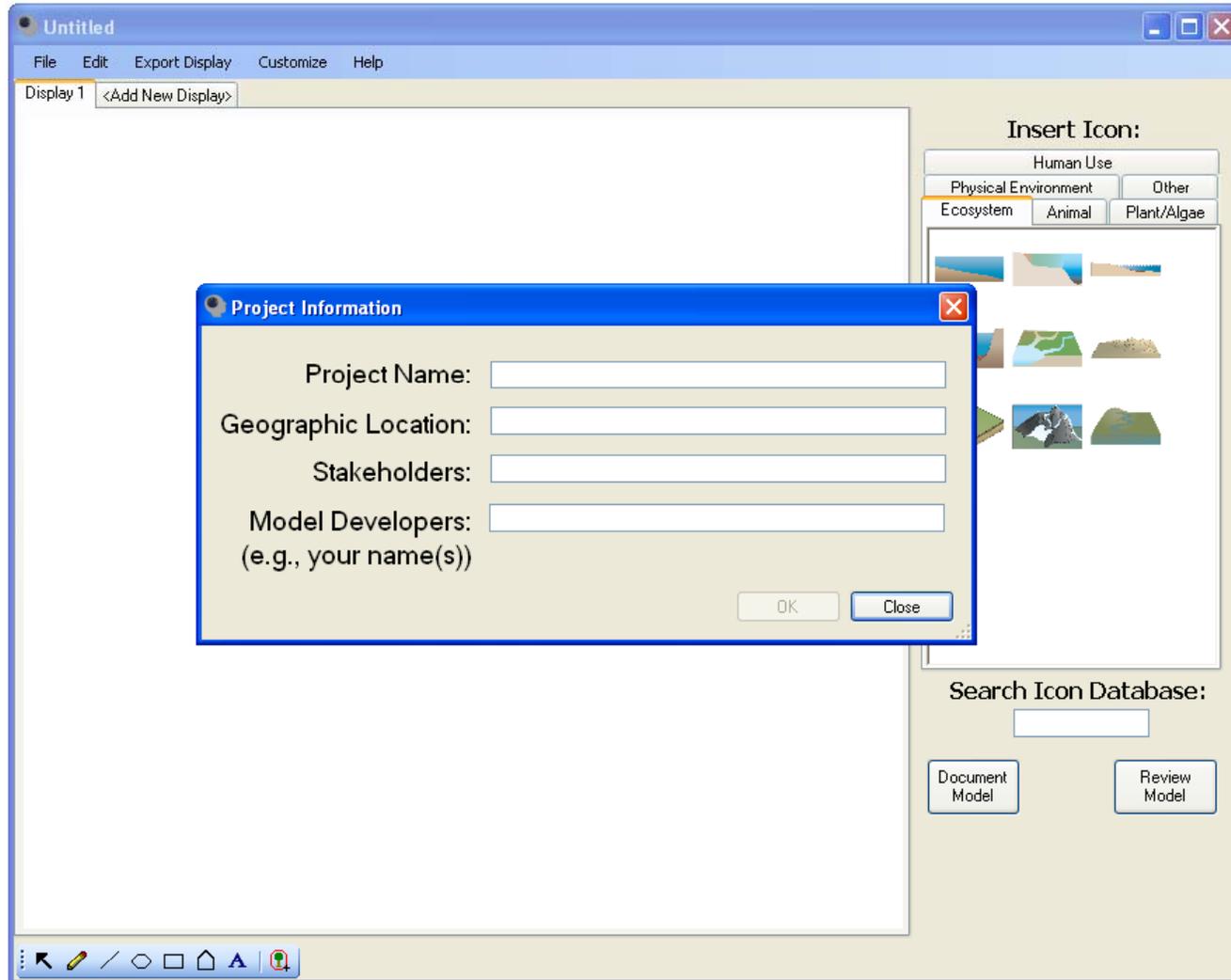
CEMCAT Features: Integrated Help



- Integrated, searchable HTML based help documentation built into the software program



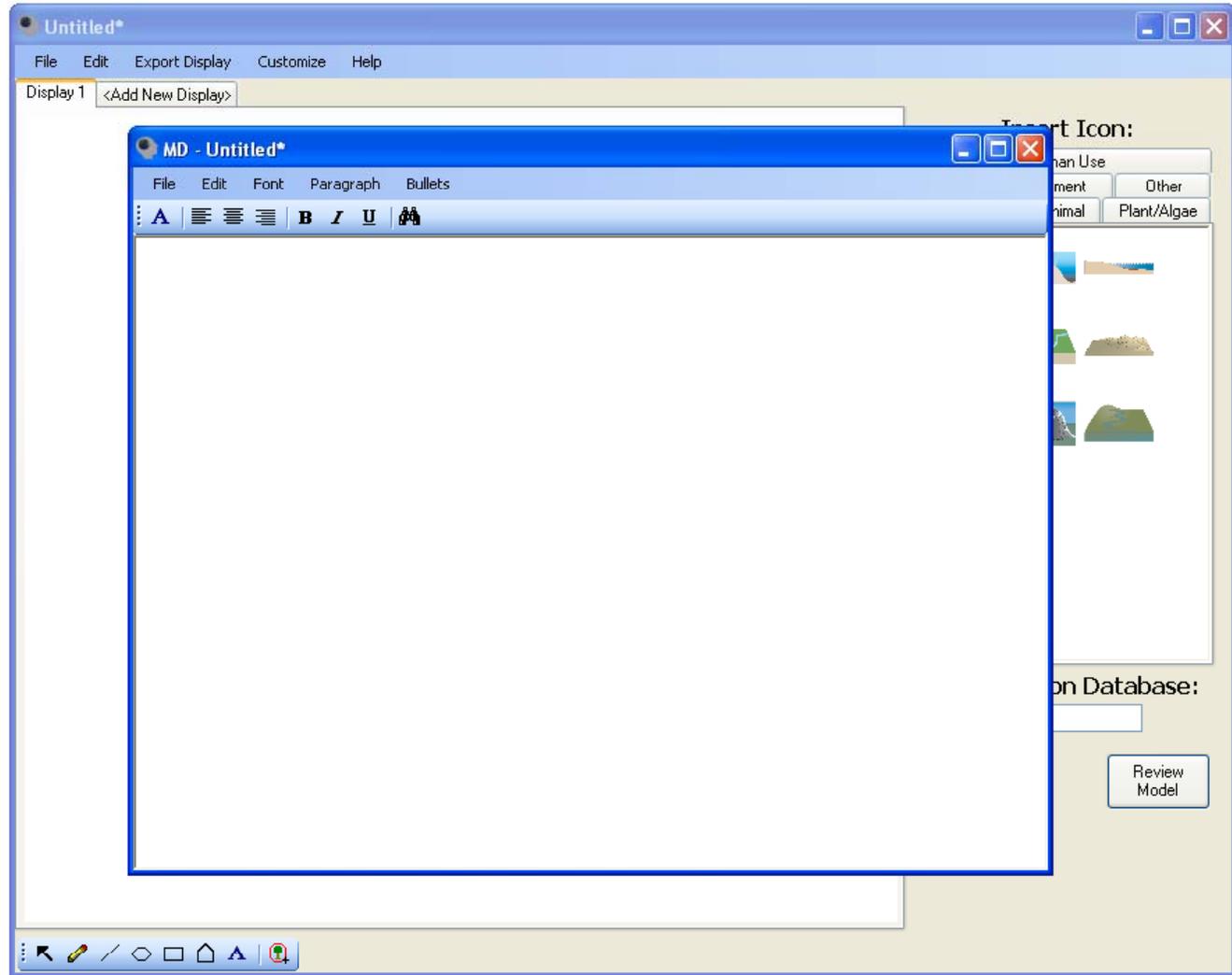
CEMCAT Features: Project Metadata



- Form within program allows metadata about project to be saved within the CEMCAT file



CEMCAT Features: Model Documentation



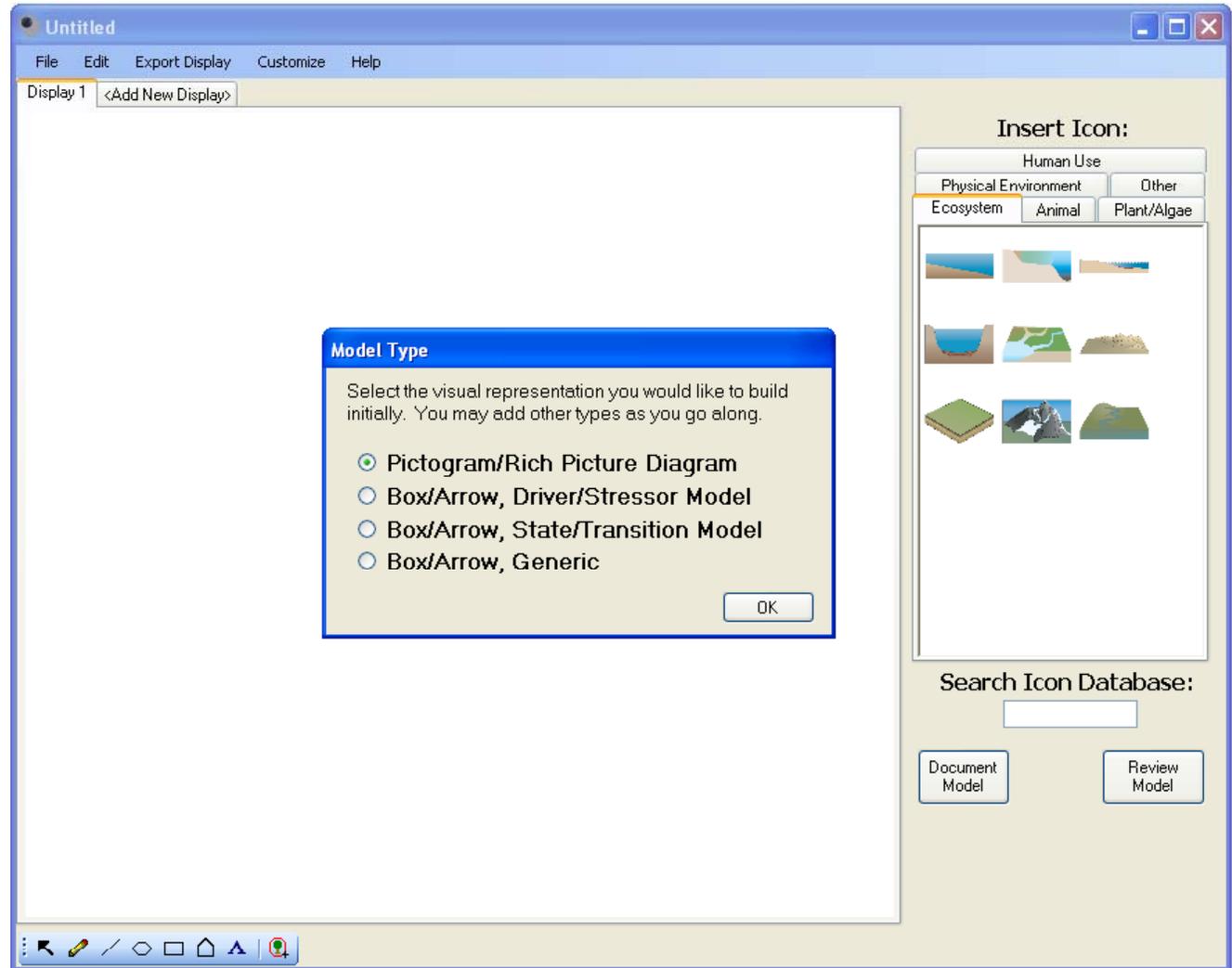
- Built-in text editor allows inclusion of narrative description or development notes



CEMCAT Features: Model Visualizations



- User may select from several visual representations
- Standard as well as customizable format options



CEMCAT Features: Icon Library



The screenshot displays the CEMCAT software interface. A 'Search Results' window is open, showing a search for 'urban stream' with two results. The main window shows a 3D cross-section of a stream channel with a concrete lining. On the right, an 'Insert Icon' window is open, displaying a grid of icons categorized by 'Human Use', 'Physical Environment', 'Other', 'Ecosystem', 'Animal', and 'Plant/Algae'. Below the grid is a 'Search Icon Database' field with 'urban stream' entered and buttons for 'Document Model' and 'Review Model'.

- Searchable library of over 1500 images

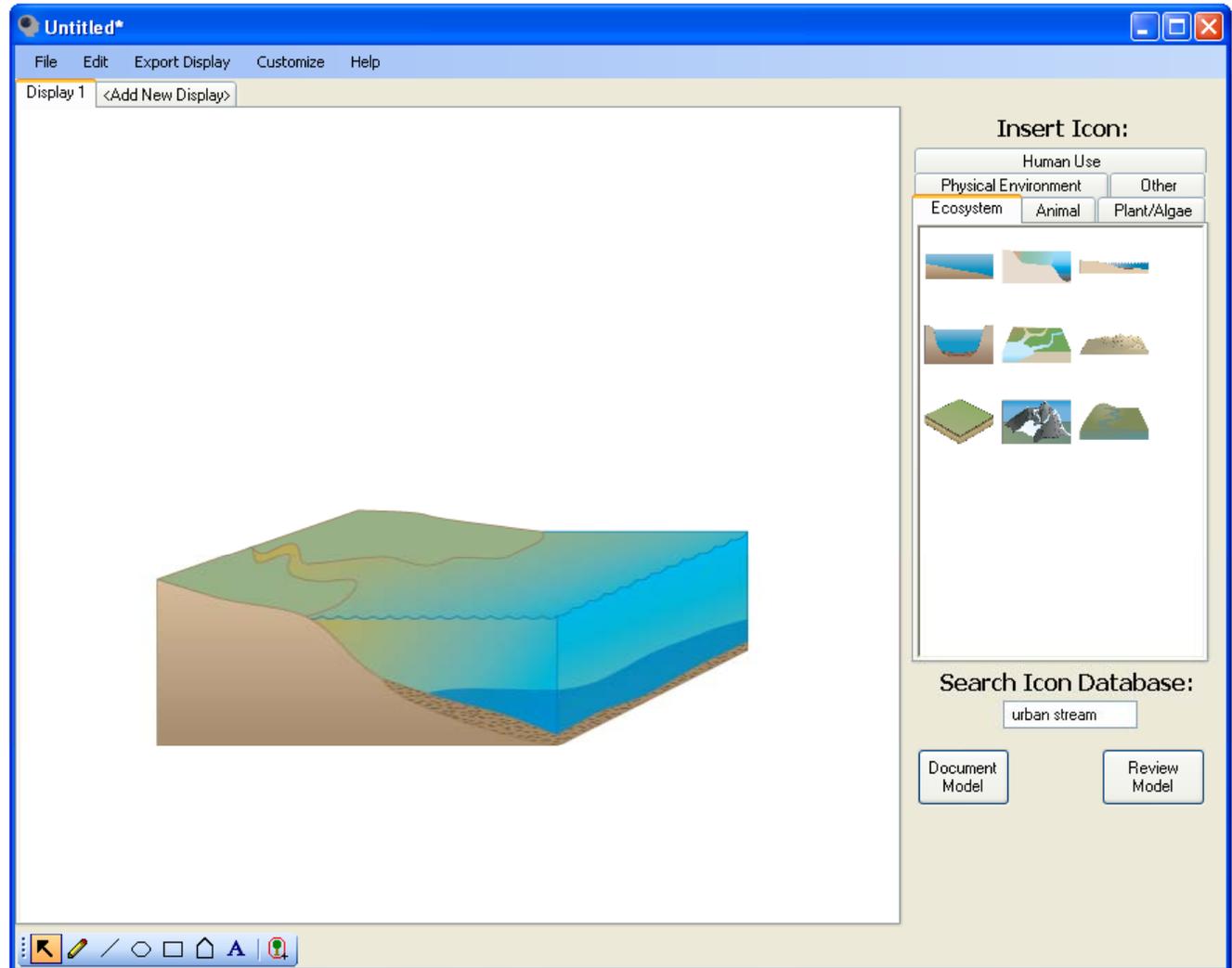
- Users may also insert their own images



Building a Rich Picture Diagram



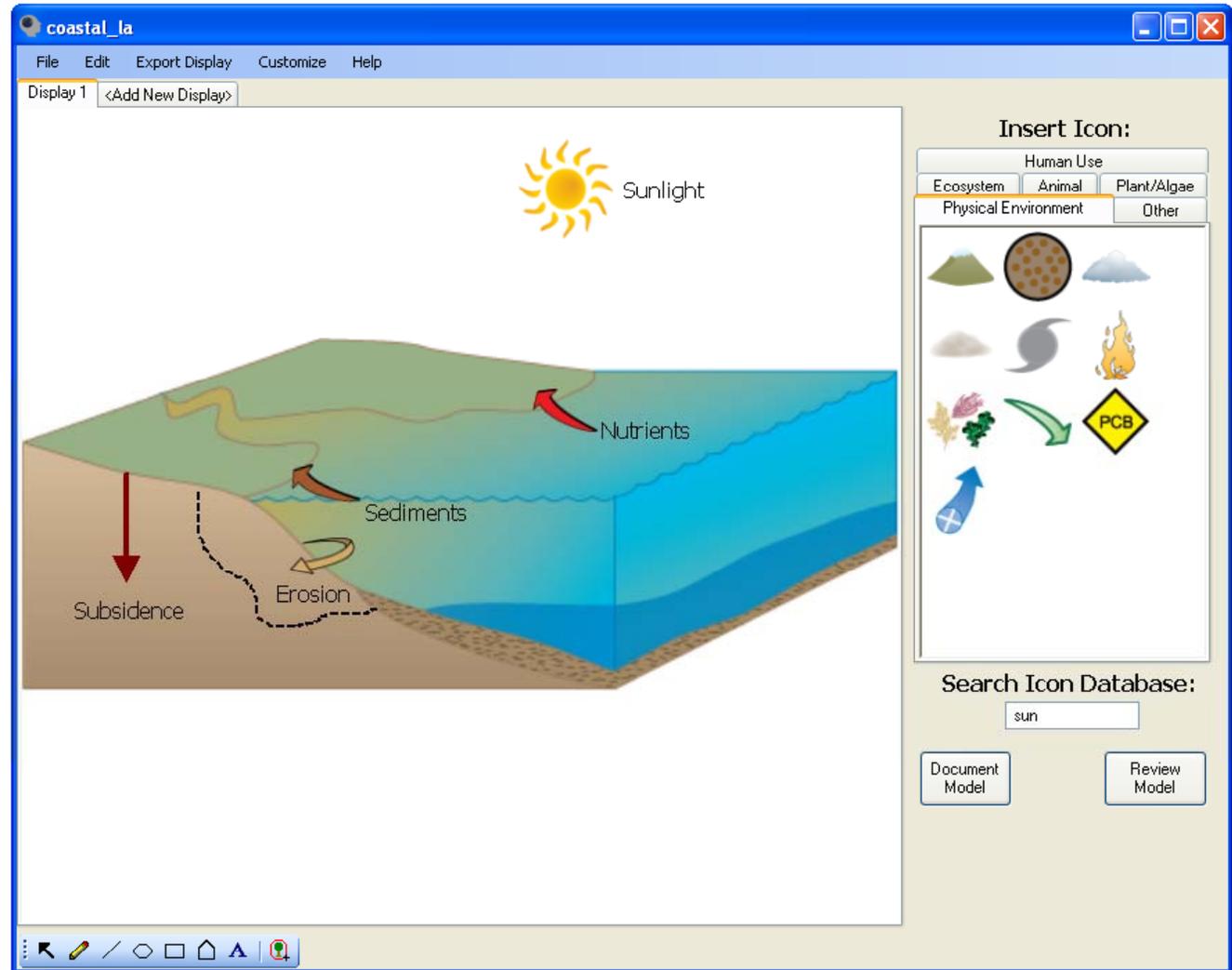
- Select appropriate model “base”
- User may use built-in library, upload cartoon or actual site image



Adding Physical Processes



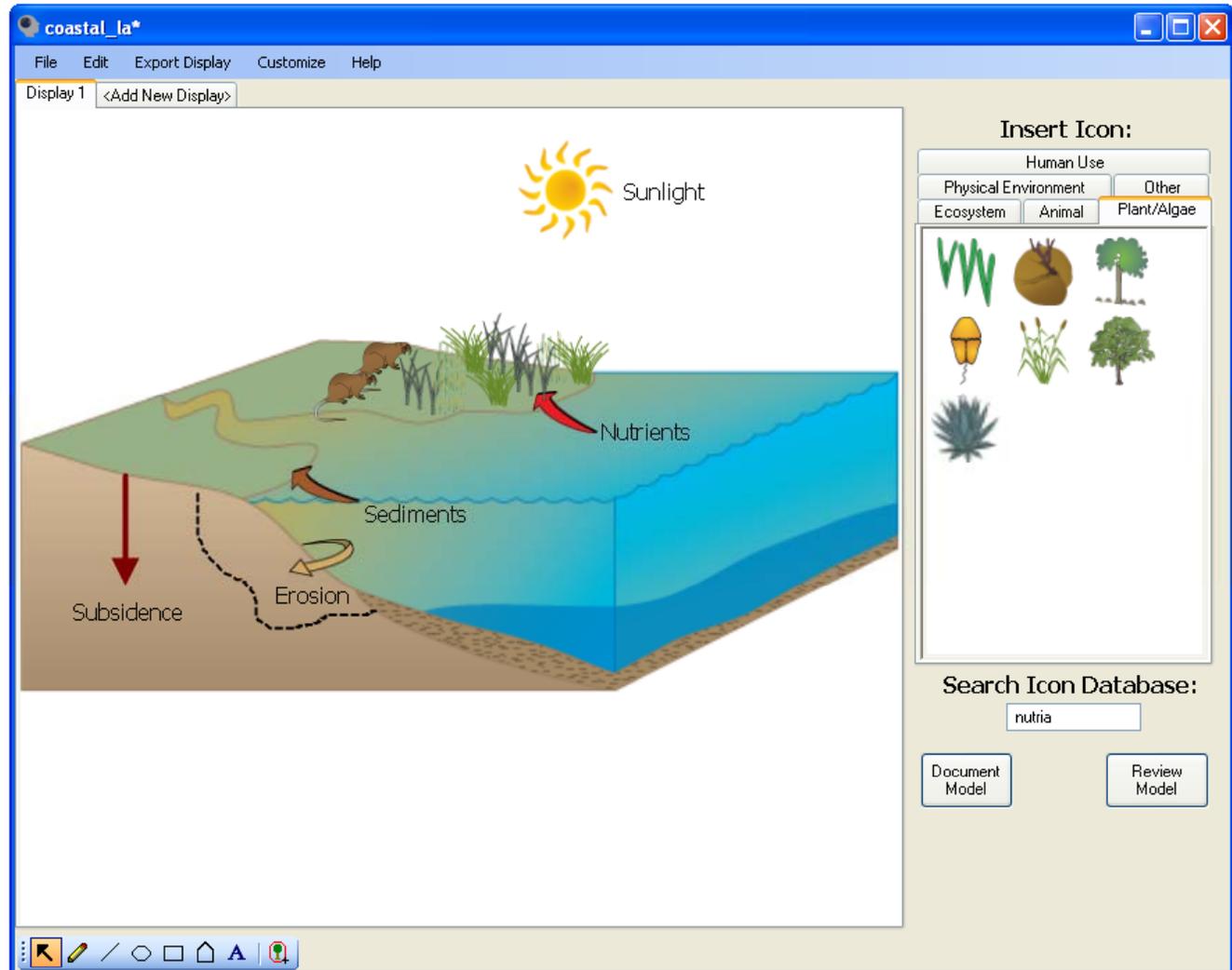
- Library includes representations of various physical processes and features



Adding Biological Components

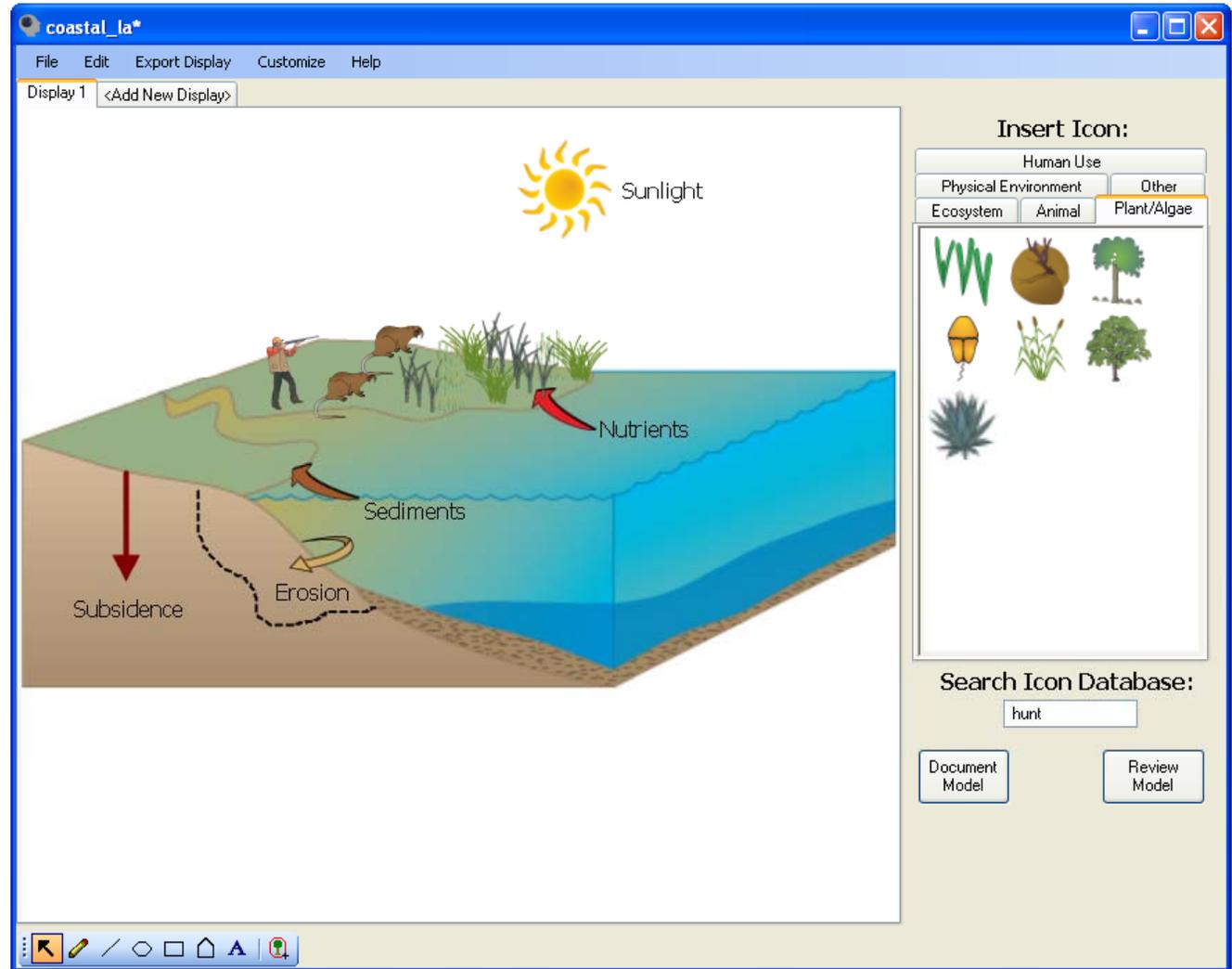


- Flora/fauna relevant to the model should be included



Anthropogenic Influences

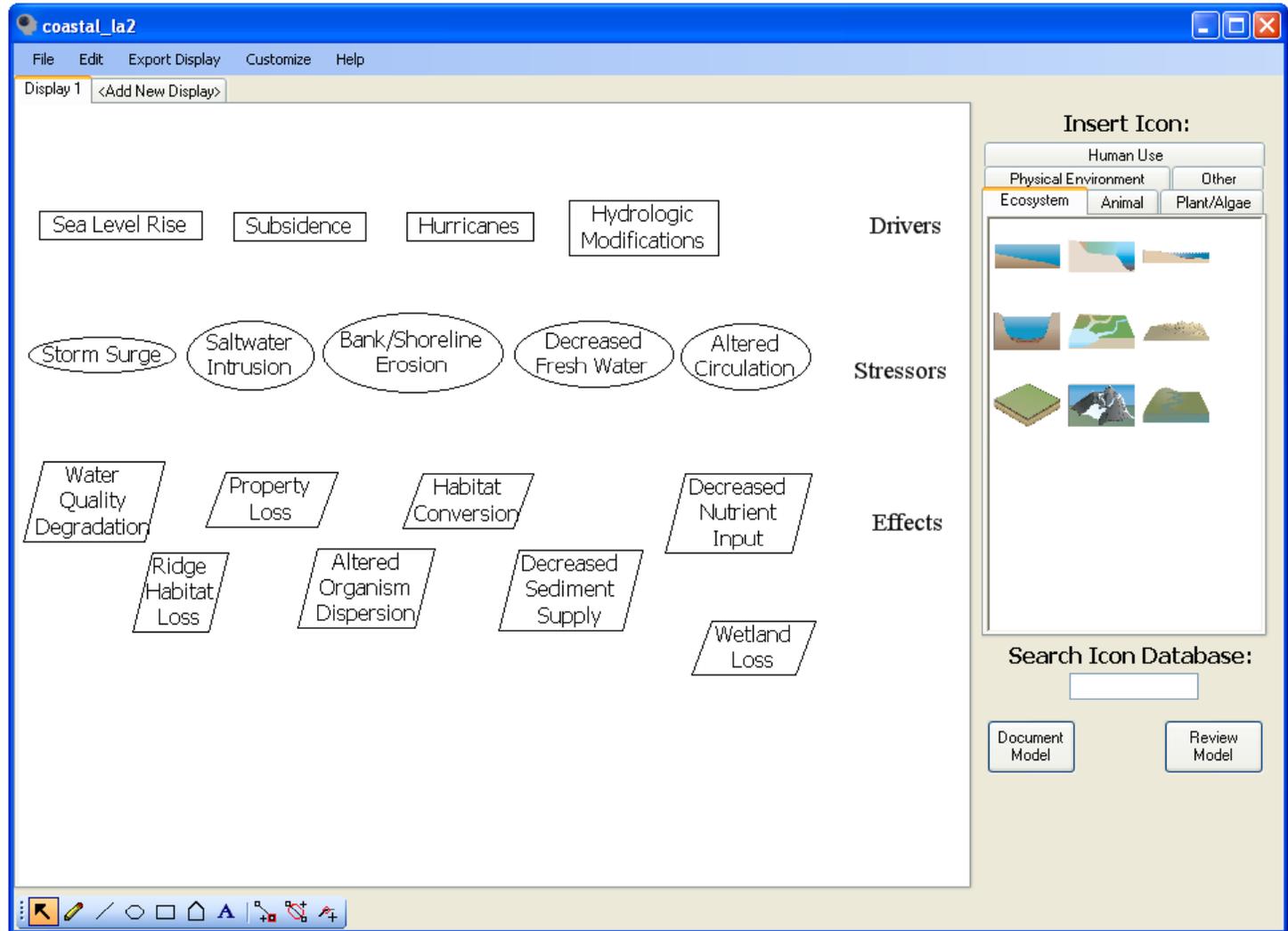
- Might include anthropogenic influences and possible control measures



Building a Box/Arrow Diagram



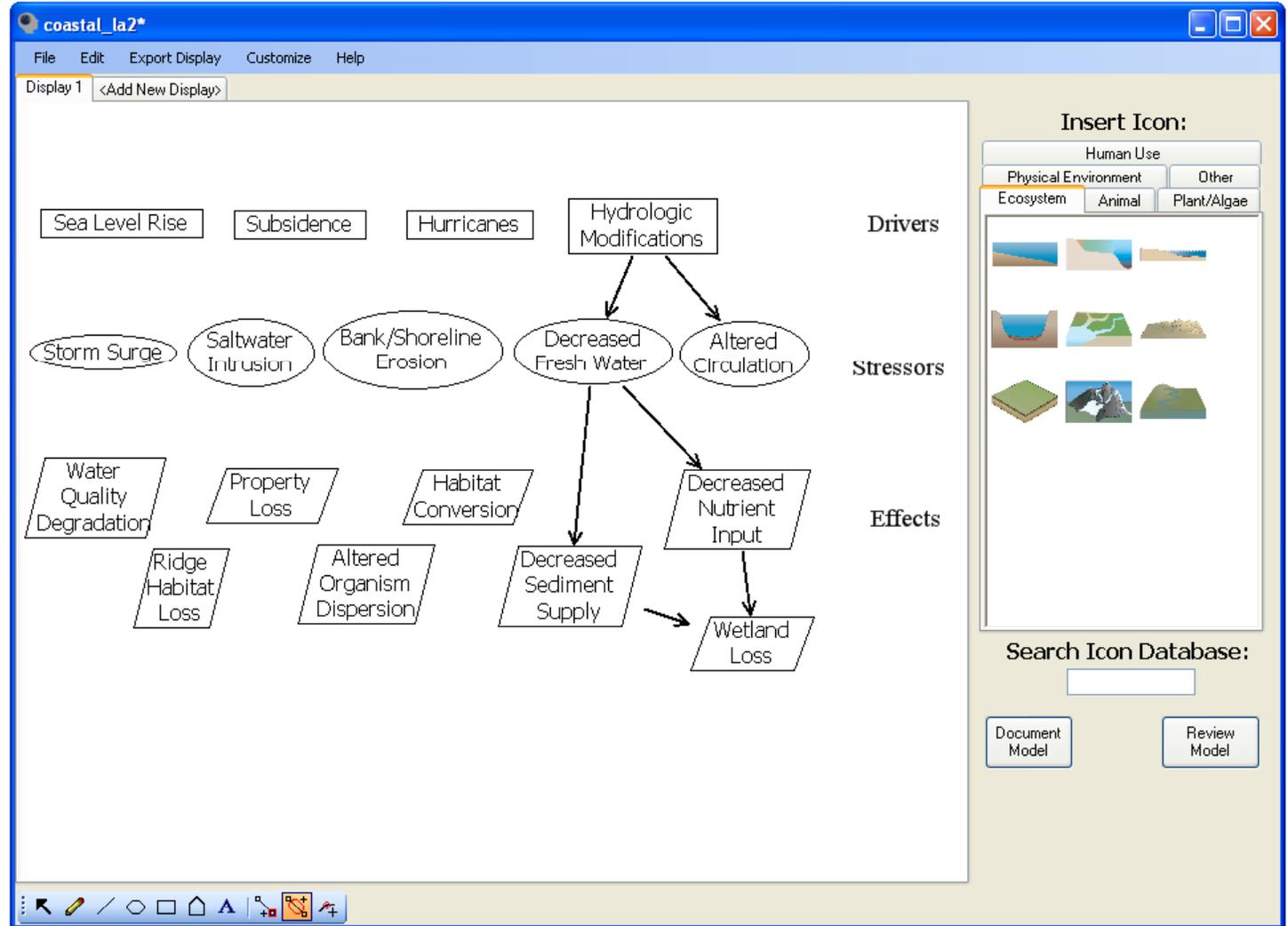
- CEMCAT includes template for Driver/Stressor Model
- Visually distinct model elements



Building a Box/Arrow Diagram



- Features, Processes connected with arrows to indicate relationships



Summary

CEMCAT Software Download at:

<http://cw-environment.usace.army.mil/eba/cemcat.cfm>

Fischenich, C. 2008. *The Application of Conceptual Models to Ecosystem restoration*. EBA Technical Notes Collection. ERDC TN-EBA-1. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

www.wes.army.mil/el/emrrp.





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