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science BRIEF

BUILDING A SCIENTIFIC FOUNDATION FOR SOUND ENVIRONMENTAL DECISIONS

Ecosystem Services Decision Support: A Living Database of Existing Tools, Approaches and Techniques for Supporting Decisions Related to Ecosystem Services

Scope and Purpose

Planners and decision makers are challenged to consider not only direct market costs, but also ecological externalities. There is an increasing emphasis on ecosystem services in the context of human well-being, and therefore the valuation and accounting of ecosystem services is becoming an integral component of economic efficiency (Costanza 2003, Millennium Ecosystem Assessment 2005). Depending on the type of decision to be made, associated ecosystem services may be quantified by using a variety of approaches that could consider deterministic physical and chemical processes, known empirical relationships, and/or socioeconomic valuation methods. There are existing lists and directories that emphasize process modeling to evaluate results of water resources decisions, changes in mass and energy budgets, and other direct physical manipulations. These can be found on several governmental and non-governmental websites. In the context of decisions that affect ecosystem services in the more general sense, ecological externalities may be quantified using process models, but there may be tools and techniques that consider broader measures. The Ecosystem-Based Management Tools Network (NatureServe 2008) has developed a database of tools that consider bundled ecosystem services emphasizing coastal and marine systems. The database presented herein augments the scope of ecosystem services in the broad sense of decision support related to the USEPA's Ecosystem Services Research Program (USEPA 2009). The purpose is to provide an evolving searchable database of tools, approaches, and techniques that can be applied in analytic-deliberative decision support processes accounting for improving decisions that may affect ecosystem services.

What Types of Tools are Currently Listed in the Database?

At present (June, 2009) the Ecosystem Services Tools database contains approximately 235 records and this number is increasing. Figure 1 shows the fractions of the total list by tool category (pie chart on the left). The Decision Support System Category is further broken out in the pie chart on the right.

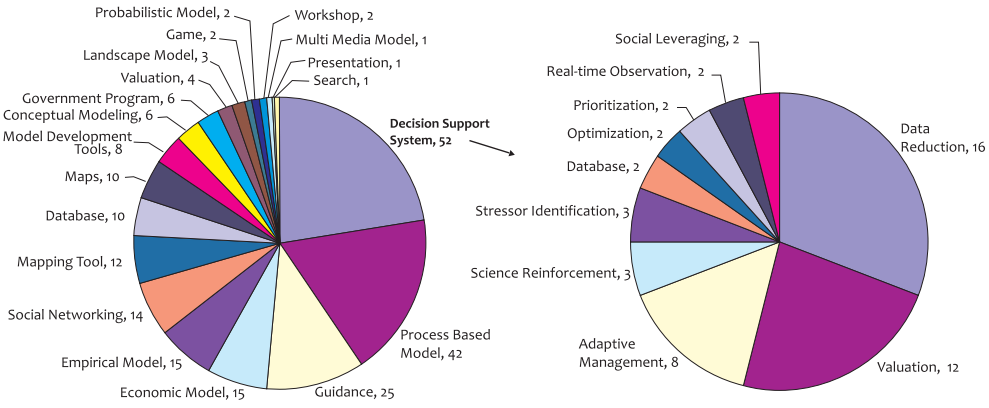

Figure 1. Listing of the categories of tools for the Ecosystem Services Tools database.

Future Directions

The Ecosystem Services Tools database is scheduled to be migrated into the MySQL database management system in September, 2009. In FY 2010 a user interface will be developed to allow users to build a query to find a list of tools that can help meet their decision support needs, based on a series of questions. These will include questions about the type of decision to be made, the category(ies) of tool(s) needed, the temporal and special scales of interest, amount and type of data available, the user's scientific background, and the type of ecosystem being considered.

REFERENCES:

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CONTACTS:

Bart Faulkner
USEPA Robert S. Kerr Environmental Research Center
Ground Water and Ecosystems Restoration
P.O. Box 1198
Ada, OK 74821-1198
or,
Ann Vega
USEPA/NRMRL
26 West Martin Luther King Drive
Mail Code 489
Cincinnati, OH 45268

Table 1. Glossary of terms in the Ecosystem Services Tools database.

Tool Type	Description
Decision Support System	See right side, Figure 1
Process Based Model	Model that uses physical or chemical principles
Guidance	Synthesis of information to aid decision making
Economic Model	Model that focuses on the interaction between the environment, the humans, and our use of goods and services
Empirical Model	Model that uses and tests hypotheses through observation and experimentation
Social Networking	Tool that measures interactions among individuals or groups in decision making
Mapping Tool	Tool or application that builds maps from external information, such as remote sensing images
Database	An organized compilation of data
Maps	Portal for distribution of existing maps
Model Development Tool	Development environment for constructing models
Conceptual Modeling	Tool for building concept maps and models
Government Program	A government agency or program that produces outputs useful for ecosystem services decision support
Valuation	Tool or methodology for quantifying value for economic analysis and decision support
Landscape Model	Models which use landscape metrics for data reduction
Game	Role-playing tool
Probabilistic Model	Model which uses elements of probability theory
Workshop	Product that came from a workshop
Multi Media Model	Model that considers fate and transport among different environmental media (e.g., soil, surface water, air)
Presentation	Presentation that serves as a decision support tool
Search	Search engine

The following individuals have contributed to the content of the Ecosystem Services Tools database:
Noman Ahsanuzzaman, Shaw Environmental
Jane Bare, USEPA
William Barrett, USEPA
Patricia Bradley, USEPA
David Burden, USEPA
Tim Canfield, USEPA
Lisa Costantino, Independent Contractor
Curtis Cooper, USEPA
Rob Earle, Shaw Environmental
Justin Groves, Independent Contractor
Joseph Retzer, USEPA
Betsy Smith, USEPA
Mark Stacy, Shaw Environmental
Tom Stockton, Neptune and Company
Denis White, USEPA