



# Eco-Informatics for Decision-Makers



## Advancing a Research Agenda

### Problem Areas

- **Policy** – Cross organizational problems arise from use, abuse, lack of IT; need an information-based culture.
- **Data Presentation** – Should reflect data, metadata, and user.
- **Data Gaps** – Missing and bad data will always be with us, but standards and metadata could ameliorate this.
- **Tools** – New data types and data collection methods, and issues of data use and adoption mean we need clearing houses, frameworks, development standards, and metadata tools.
- **Indicators** – poorly defined scientifically and for the public; need to articulate relevance and value.

See <http://www.evergreen.edu/bdei/2003/>

### Abstract

Resource managers often face significant information technology (IT) problems when integrating ecological or environmental information to make decisions. At a workshop sponsored by the NSF and the USGS in December 2004, university researchers, natural resource managers, and information managers met to articulate the IT problems facing ecology and environmental decision makers. Decision-making IT problems were identified in five areas: (1) policy, (2) data presentation, (3) data gaps, (4) tools, and (5) indicators. To alleviate these problems, workshop participants recommended specific informatics research in modeling and simulation, data quality, information integration and ontologies, and social and human aspects. This poster summarizes the workshop findings. The workshop report compares its findings with research that typically falls under the eco-informatics rubric. To download workshop reports see <http://www.evergreen.edu/bdei/>.

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[www.evergreen.edu/bdei](http://www.evergreen.edu/bdei)

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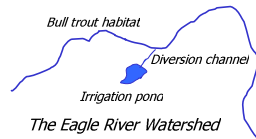
Organized by EPA, NASA, NSF, TNC, USDA Forest Service, & USGS/NBII

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### A Typical Resource Manager's Problem

Karen's Story....



**The Watershed Council's restoration agenda:**

Should they remove a diversion channel to improve bull trout habitat on Silver Creek?



**Karen must present restoration plan alternatives:**

In 3 days she needs: Topo maps, Biome & Hydrology studies, Metadata, Species counts & historical surveys, Modeling, and Visualization strategies for a wide audience



**With current technology, this is unrealistic!**

Karen's data is: Difficult to locate, heterogeneous, voluminous, specialized, & "primary", not easily visualized, and open to wide scrutiny

### What Karen gets in 2010...

**If prior BDEI-recommended research goes well:**

- Fly-over data views
- Data tagged with processes & events
- Hydrology data for sedimentation
- Species information related to place
- Taxonomic browsing adjusted to change
- Summary habitat & adverse habitability periods
- Digital metadata
- Public survey data
- Help in finding and running models

### Additional Research Needs ....

- Visualizations for public education
- Field-to-office collaboration
- What-if scenario modeling
- Place name semantics (geo-location, changes)
- Similarity search on documents – "give me info about places where soil type is like here"
- Natural history collection access
- Augmented reality glasses
- Derived data product definitions

### Recommendations

- Encourage and fund information technology research to solve problems of the resource manager.
- Promote collaboration between government agencies & research institutions.
- Offer 2-year supplements for deploying research prototypes.
- Fund infrastructure for software evaluation, databanks for testing software, & an open-source, flexible re-usable modeling infrastructure, with susataining social practices.

*This proposed research is difficult and very long term but needs immediate attention... our natural resources will continue to decline without adequate data-based decisions.*

### Research Agenda

- **Social and Human Aspects** – Foster collaboration in tool development & information sharing; do HCI; develop management practices, education & training in data management; develop user requirements.
- **Data Quality** – Determine impact on decision-making of uncertainty with multiple data sources, associated error and metadata.
- **Information Integration & Ontologies** – Need multiple ontologies, document modeling, tools for data integrating qualitative and quantitative data, and evaluation of knowledge from non-traditional sources.
- **Modeling** – Experience and tools for coupling, visualization, uncertainty, and infrastructure.

### Workshop Participants



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