

Introduction to the Ecoinformatics Initiative

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Abstract

This presentation serves as an introduction to a series of 4 sessions which turn to selected aspects of Ecoinformatics cooperation issues: reporting and information systems, data-exchange networks, environmental web services and elements of the European spatial data infrastructure.

The initiative

“... Despite the introduction of tremendous potential for connectivity using information technology, stovepipes continue to dominate in government. Stovepipes refer to the inability to communicate across boundaries, between bureaucratic organizations or data bases, due to lack of interoperability across hardware, software or data systems. Information technology can be used to facilitate information sharing between entities. The goal of providing centralized access to non-homogeneous distributed data could serve as a mechanism for aligning definitions, terms and content across agencies...”⁴

The US Environmental Protection Agency, the European Environment Agency, the US Geological Survey’s Biological Resources Discipline, the National Biological Information Infrastructure, the UN Environment Programme, the European Commission’s Joint Research Centre, the Global Biodiversity Information Facility and other organizations have joined together to advance Ecoinformatics – the application of information science and information technology to the environment to provide policymakers and the public with information to take responsible actions that result in protection of the environment and health.

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⁴ Jane E Fountain, “Information, Institutions and Governance, Advancing a Basic Social Science Research Program for Digital Government,” National Center for Digital Government, Kennedy School of Government, Harvard University, September 2002.

The goal is to support the individual missions of the organizations – at local to global levels – through stimulation of information science and information technology advances that:

- Enable individuals in every endeavor to make well-informed decisions when taking actions that have an environmental impact. For example, choices of policies, processes and materials to utilize
- Provide decision makers with knowledge products and arrays of information that show measures of progress and effectiveness for environmental programs;
- Enable the integration of diverse information types and datasets, especially geo-referenced sources.
- Integrate environment, biodiversity, health and other related information to create opportunities for knowledge, analysis and prevention;
- Improve the quality of information available to the public and research communities;
- Reduce the cost of creating and reporting environmental information; and
- Improve the accessibility, sharing, comparability, and integration of existing data.

This broader initiative draws together many projects that are researching, developing, demonstrating, piloting and deploying environmental information technologies. This effort seeks to expand the benefits of these activities by deploying knowledge and information systems internationally; sharing the costs and benefits of the development; and publicizing the results.

Major current projects include sharing experiences and results; fostering an ecoinformatics marketplace; cooperating on emerging technologies, and developing key elements for interoperability including data standards and terminologies.

Areas of investigation include:

- Data standards development – this area provides the integration of meaning and definitions across heterogeneous data systems allowing those that use the data to understand the similarities and differences among terms and data system fields. This includes an investigation of environmental terminologies through a subgroup activity known as Ecoterm.
- Semantics and metadata management – this area is increasingly important as new advanced computer science and search techniques based on semantic web technologies make accessing heterogeneous data system holdings more feasible with less need for wholesale redesign of distributed data systems. Advancements rely on International Organization for Standardization (ISO), World Wide Web Consortium (W3C) and other voluntary standards development activities. A specific activity involves the development of metadata registries that describe data elements, definitions, technical attributes of data, etc.
- Messaging and data exchange protocols – this area starts with the international and business commerce developed protocols, particularly development and use

of eXtensible Markup Language (XML) designs, formats and structures for environmental and health data exchange. Aspects of this include geo-location of data for better understanding and utility as well as conveying descriptive meta-data that documents the meaning of data.

- Advanced networking technologies – this area includes an investigation of technologies such as computer grids that will allow the transfer of massive amounts of data and the use of tools and technologies in a virtual environment, resulting in more collaborative workspaces. Similar technologies are emerging to build platforms and services in support of processes around Global Monitoring of Environment and Security (GMES) and Global Earth Observation activities (GEO). GEO will exchange observations recorded from in situ, aircraft, and satellite networks in a full and open manner with minimum time delay and minimum cost. GMES (a European contribution to GEO) is aiming to improve the production and dissemination of information in support of environment policies and security based on earth observation, in-situ and a shared information system. Additionally, the need to increasingly provide public access to spatial data at local and regional levels sets new technology challenges.
- Knowledge management – this is where the techniques and agreements reached in the other aspects of Ecoinformatics come together to support the development, management and use of knowledge and information to help protect environment and health. Indicators, a current focus of this work, represent one way to express and explore the knowledge to be used by policy makers, researchers, environmental decision makers in the field, and the public to assess environmental conditions, to design or participate in effective and efficient interventions and finally, to measure their progress and success.