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Opportunities of SEIS and SISE:
Integrating Environmental Knowledge in Europe

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Jiří Hradec, Emil Pelikán, Ondřej Mirovský,
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Integrating Environmental Research Data into the Shared Environmental Information System

P. Mooney^a, P. Corcoran^b, A.C. Winstanley^b

^a Environmental Research Centre, Environmental Protection Agency, Richview,
Clonskeagh, Dublin 14. Ireland (p.mooney@epa.ie)

^b Department of Computer Science, National University of Ireland Maynooth, Co. Kildare.
Ireland (padraigc@cs.nuim.ie, adam.winstanley@nuim.ie)

Abstract: The paper describes efforts underway at the Irish Environmental Protection Agency (EPA) to ensure that environmental research data generated by the EPA's research funding programmes are properly managed with a view of future integration of these data streams into SEIS. The paper argues that the flows of data and information from environmental research will greatly enhance the usage and application of SEIS by assisting European citizens, stakeholders, decision makers, and policy makers obtain access to research data. The thematic, geospatial, and temporal heterogeneity of data and information flows from environmental research will provide SEIS with a rich geoscientific resource.

Keywords: Environmental research data; Environmental information; Shared Environmental Information System;

1. INTRODUCTION

Scientific research is generating vast and ever increasing quantities of information. In the age of the Internet the provision of free and efficient access to environmental information, including scientific publications and original data, will be the key for sustained progress on environmental topics [ERC, 2007]. Universities and public research institutions perform more than 35% of all research undertaken in Europe [EC, 2007]. Research directly connected with environmental assessment and sustainability is a significant part of this output. Access to the outputs of this research is often difficult to obtain. Intellectual property rights (IPR) issues, capacity and resource problems experienced by the researchers technical issues such as interoperability, and cultural differences to sharing and exchanging data, all combine to compound the problem. The European University Association (EUA) responded to the green paper on "The European Research Area: New Perspectives" by stating that the full potential of ICT technologies can be used more effectively to enhance "open access" to scientific results arising from publicly funded research to a wide variety of stakeholders including the public and the research communities. Measures are steadily being introduced to address these issues. For example in August 2008, the European Commission launched an open access pilot scheme for FP7. Under this pilot scheme, grant recipients in seven designated areas will be required to: deposit peer-reviewed research articles or final manuscripts from FP7 projects into an online repository and to make their best efforts to ensure open access to these articles within either six or twelve months after date of publication. Unfortunately this does not include access to the raw data generated by the projects or derived data products. Access to raw data and information related to these

publications is needed not only for independent verification of results but also for secure longer-term preservation and “fresh analysis and utilization of the data” [ERC, 2007].

In February 2008 the European Commission issued a Communication [EC, 2008] entitled “Towards a Shared Environmental Information System (SEIS)”. The purposes of SEIS is to improve the efficiency and streamline the European systems for collecting, analysing, exchanging, and reporting environmental information and data for the design and implementation of environmental policy. An underlying aim of SEIS is to move away from paper-based reporting to a ICT system where information is managed as close as possible to its source as possible and this information is subsequently made available to users in an open and transparent way. While SEIS will predominantly work with data and information products generated by Member States for National and EU level reporting obligations this paper outlines the important advantages of integrating environmental research data products into SEIS.

EPA STRIVE is a €100 million programme to fund environmental research and innovation in Ireland. STRIVE runs from 2007 until 2013. Many different types of projects will be funded ranging from short desk studies to large multi-annual capability development projects involving several organizations. STRIVE is likely to involve over 1,000 researchers and industrial innovators and be highly relevant to the key national and international environmental priorities in Ireland. In following its mission to become a key source of environmental data and information for Ireland the EPA promotes the sharing of the outputs of STRIVE research to ensure that these can be utilized to the maximum possible extent by Irish stakeholders, the international research community, other EU member states, interested parties, and the wide general public. Research data represents one of the fundamental outputs of scientific research. In various contractual agreements with funded researchers the EPA makes their expectation very clear that researchers should make their data widely available as soon as feasible and by placing as few restrictions upon this access as possible.

1.1 Current Status

Currently at the EPA the outputs from the STRIVE programme are managed in such a way that they can be woven seamlessly into the fabric of SEIS in the future. In Ireland environmental research funded by the EPA has played a pivotal role in assisting Irish efforts to meet EU reporting obligations and legislation. Some prominent examples include research projects which:

- Supported the Irish role in the EU Intercalibration exercise of Biological Quality Elements (BQE) for the assessment of water quality in transitional and coastal waters in Europe under the Water Framework Directive;
- Supplied scientific data to underpin appropriate measures or actions that might be used in the implementation of national policy for reducing phosphorous (P) and nitrogen (N) losses to water from agricultural sources;
- Examined the European Regional Air Pollution and Simulation model (RAINS) whose outputs are used in the setting of emissions ceiling targets for 2020 under the EU National Emission Ceilings Directive.

It is important the outputs such as those above *and* the raw data and information that corresponding to them are available to a wide range of stakeholders and policy makers through SEIS. It is also important that they are available for planning and policy making at a regional and local level or for Strategic Environmental Assessment.

To better coordinate the management of research data and information outputs from STRIVE the Secure Archive For Environmental Research Data (SAFER-Data) [SAFER, 2008] has been developed. SAFER-Data is a web-based system providing access to the outputs from the STRIVE programme and from previous EPA funding programmes. The

SAFER system performs a dual role. On one hand it provides the ‘*pull*’ tools for researchers to:

- Securely archive their raw data and information for long-term preservation;
- Document these resources with INSPIRE compatible ISO19115 metadata;
- Manage and update these resources going forward;
- Specify the levels of public access to their resources.

On the other hand it provides the ‘*push*’ tools for the EPA to disseminate these data and information resources to as wide a stakeholder and user audience as possible in a flexible and accessible manner. An in-house EPA team of scientific officers and specially chosen scientific experts review the suitability of data resources and derived information products before they are made publicly available. The data providers and data owners are proactively engaged in this process to ensure that SEIS Principle 6 “Information should be fully available to the general public, after due consideration of the appropriate level of aggregation and subject to appropriate confidentiality constraints, and at national level in the relevant national language(s)” [EC, 2008] is successfully implemented. This principle is particularly important in the case of some Biodiversity projects and projects with a social science aspect where the privacy of endangered species or individuals must be protected. Another key advantage of our approach is that SAFER is not restricted to geospatial data. The EPA look to make non-spatial and non-quantitative environmental research data and information available for the benefit of those who require a range of data types such as Strategic Environmental Assessment.

2. CONCLUSIONS

At this early stage in their evolution it is difficult to visualize the precise “look-and-feel” of the SEIS or SISE (Shared Information Space for the Environment). However given SEIS principles (1) and (2) it is clear that the structural design of SEIS will involve connecting national and regional data providers and data sources through international standards for data exchange and web-services such as Web Map Services or Web Catalogue Services. SAFER-Data shall implement interfaces such as: Open Archives Initiative for Metadata Harvesting; GeoRSS and RSS Feeds; Web Map Services where appropriate; Catalogue Web Services. Some of the international standards for data exchange will involve conversion of certain data resources to KML allowing users to visualize data on platforms such as Google Earth. It will be important to ensure that there are clear and effective procedures in place to determine which data flows and outcomes from the research programme are of the highest value. It is clear that not all of the data generated will have national or EU-level reporting significance. However the actions on environmental research and capacity building outlined in STRIVE [EPA, 2007] will mean that a significant and growing portion of this data will help to inform policy makers and provide information for sustainable environmental management. The authors believe that preparing data and information from the environmental science research community for inclusion in a SEIS would be a significant step towards “stimulating the development of a ‘continuum’ of accessible and interlinked scientific information from raw data to publications” [EC, 2007] while also providing SEIS with access to a rich geoscientific resource. SEIS can be “brought alive” by demonstrating how environmental information and data are used by policy makers and the public. SEIS can add value to environmental research by providing a European wide infrastructure for access and dissemination of research outputs. In return the environmental research community can add value to SEIS by contributing new software tools and methodologies for access to research data while utilising to access other data flows.

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