

# **But What Does It All Mean? Distilling the Science for Use on a Local Management Scale: Observations, Recommendations, and Examples of Information Sharing Tools**

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## **INTRODUCTION**

The Southwest Washington Coastal Erosion Study (SWCES), initiated in 1996 and now in its fifth and final year of activity, has generated an unprecedented amount of data and information on the coastal processes and geology affecting the portion of the Washington and Oregon shorelines extending from Point Grenville, Washington in the north to Tillamook Head, Oregon in the south.

Given that the Study is in its final year of activity, there is now a pressing need on the part of the Washington State Department of Ecology and the United States Geological Survey (co-sponsors of the project) to generate from this extensive information, a series of final products that can be used at the local community level by coastal managers and the general public to assist in making coastal zone management decisions that are required to address a range of issues in the future.

To facilitate this activity, the author was invited to attend the fifth SWCES Workshop held November 15-17, 2000 in Olympia, Washington and to observe the type and level of scientific investigation being carried out and to provide comments, suggestions and ideas for translating or "distilling" this data into acceptable information tools or products.

## **OBSERVATIONS FROM THE "OUTSIDE"**

What follows below are a series of observations made during the workshop that focus primarily on the level of science being carried out and on various issues relative to the sharing of the data being generated. They are considered "outside" observations, as the author has not been previously involved in the SWCES prior to this workshop, and thus brings what is hoped to be a "fresh" perspective to the study. They are neither right or wrong, but are simply meant to initiate thinking on how the data being developed in the Study can be used effectively.

### **The Science is Amazing!...But...**

From a scientific perspective, the level of investigation and the quality of data and information that has been generated over the five years of the Study has been incredible and has focused on "state-of-the art" studies into coastal processes and geology. All investigators should be complimented on this, as the scientific base upon which to make coastal management decisions is now much greater than it was five years ago.

Yet, from a local community perspective, this type and level of research can be overwhelming and complex. It may, at times be difficult for the local community to understand why some topics are being investigated in such a great level of detail and why others are not. It is important for us, as scientists, to provide clear and understandable linkages between our research topics, and what it is that a shore property owner, for example, observes in front of their house.

### **The "Devil is in the Details"**

As more and more research is conducted, more and more questions are raised, which then leads to more research, which leads to more questions, and so on. This was evident from many of the presentations at the workshop, where, even though this is the last year of the study, more questions on a number of detailed scientific topics were continuing to be raised. As scientists, we could spend our entire careers answering all of these more detailed questions for this section of coastline (not necessarily a bad thing), but at some point we need to ask ourselves when we draw the line and start providing some sound results and data that the local management community, or CZM policy makers can "hang" management decisions on?

### **Have Confidence in the Data**

It is likely that we could continue to study this coastline for another 20 years and there still would never be enough data to make 100% *accurate* coastal management decisions. However, there certainly should be enough data generated and available now to help make *confident* coastal management decisions. If one looks at management of any type and at any level (e.g., corporations, department stores), it is common that management decisions are often, if not always, based on incomplete information. And so it should be here, although there seemed to be an underlying feeling at the workshop that we should not distribute the data generated in the SWCES until additional questions are answered.

As long as the data we are generating is scientifically defensible and has suitable caveats and limitations put upon it for data we feel is not yet complete, then we need to share that data with the local community and the policy makers. We also need to ensure that we work closely with them, so that they can accurately interpret the data and incorporate it into any policy decisions that need to be made. We should not be afraid to "draw a line on a map" and let the local communities know what potential impacts they may face in the future, no matter how severe they may seem to be.

### **Data Changes...Policy Objectives Don't**

As highlighted above, we could focus forever on the science forever, but we risk doing this at the expense of providing results that are useful for making management decisions. It is important to remember that while the "numbers" (i.e., specific data) may change with continued research, the basic premise behind any management strategy will remain unchanged. For example, if we develop a policy based on existing data that states "we shall manage the sand supply to the system to maintain beaches in their natural state," then it is likely that new and more detailed data will not change that overall policy, but

may change the way in which the policy is carried out. In those cases where additional research results *does* result in new policies, or in the change of a policy, it is assumed that some type of formal 5 or 10 year policy review process would be in place to capture these situations. Again, don't be afraid to share data now, so that it can be used to formulate basic policies.

### **Let Local Communities Decide Their Own "Degree of Risk"**

The "degree of risk" a community is willing to take relative to flood and erosion hazards is important. As such, we need to provide these communities with enough information so that they can adequately assess how much risk they are at and how much potential risk they are willing to live with. Again, it comes down to a focus on the initial impetus for the Study, the local communities. If we conduct infinitely detailed research on topics and issues that they can not relate to or understand, then the study, while greatly advancing the science of the coast, will ultimately be a failure at the local community level.

### **SO WHAT DO THE COMMUNITIES NEED TO KNOW?**

In the 15 years that this author has been dealing with property owners and local communities faced by flood and erosion hazards, the things that the average shore property owner wants to know come down to a series of basic questions. These include: What is this? Why is it happening? Why is it here? Where did it come from? Why is it important? Why are you studying it? Perhaps most importantly, how does it impact me or my property (both from the financial and emotional perspective)? Finally, what can I do now or in the future?

As scientists, we need to be able to "distill" the detailed science and data we are producing and provide simple answers to these questions, so that people in the local communities can assess the impact on their property and make their own decisions on what they want to do to mitigate these impacts.

### **HOW CAN WE DISTILL OUR WORK?**

The following are some suggestions on how we can begin to provide the answers to these questions. Again, these are neither right or wrong, they are simply meant to get everyone thinking about how we can provide the necessary information to the local communities in an effective and easily understood manner.

#### **Step Back and Extract**

We all need to step back from the detailed science we are conducting and extract the key items within our research that are applicable to coastal zone management. Ask yourselves why this research is important to coastal zone management and then answer this in the simplest manner possible, without jargon, and without raising additional questions. Perhaps a suggestion is that everyone add an additional paragraph or two to

their extended abstracts for this workshop, under a title, "Implications for Coastal Zone Management." Another suggestion might be to take your present abstracts and write them as a newspaper article for a local newspaper, or as a 5 minute story on the television news. This may sound overly simple, but it forces us to step back and capture the basic, salient points of the work we are doing and thus answer the "so what?" that will ultimately get asked down the road.

### **Establish Linkages**

Clear and easily understood linkages need to be established between what you are studying and what a property owner observes in front of their house. As an example, a person who sees their beach rapidly disappearing, may not understand why you are studying sediment trapping behind dams 50 miles upstream in the Columbia River, unless they are made aware that the sand entering the shore zone from the river is what helped form their beach in the first place. The same applies to the level of detail or complexity in the science. For example, most property owners will not have any idea why, as an example, detailed 2D and 3D Ground Penetrating Radar examination of sediment structures in the beach and nearshore is important.

### **Involve the Communities in the Science**

The local communities should be involved in the science. This goes beyond simply presenting your work at public open houses and workshops. While such open houses are sometimes helpful, they are often too late, because if community members don't like what you've done, or how you've done it, they will view things negatively. If however, they have been involved in the project from the beginning and have had an active role in setting the research priorities or doing the field work for example, then they have a sense of "ownership" of the research and will be much more receptive to the final outcomes. It also forces us as scientists, to slow down a bit and clearly explain to them what the work will accomplish and why it is important.

While the opportunity for this level of participation in the *science* aspect of the SWCES may be past, there is still an opportunity to involve the local communities in defining the final study outcomes and products. Get back to these communities and ask specifically what it is they would like to see come out of this work. Ask the town planners and policy makers if there are any specific tools they need to help them make decisions. Ask them the type of data and the format of data they need to help them make good policy decisions.

### **Develop a Communications Strategy**

Different target audiences will require different levels of information from the Study. For example, the type of information that a State policy maker requires to make policy decisions will differ dramatically from what a non-shoreline property owner with a passing interest in the Study requires. A good "communication strategy" is needed to start defining these "target" audiences, and then define the communication "vehicles" appropriate for each target. The level of detail that is appropriate for each target audience

also has to be considered when developing the communication vehicles. For example, while a single, comprehensive web page may be the communication vehicle of choice, if it contains only detailed scientific data and information, it may only be suitable for a select few target groups. Given this, such a web site may have to be structured so that there are different "layers" of information that can be accessed by the various target audiences as needed.

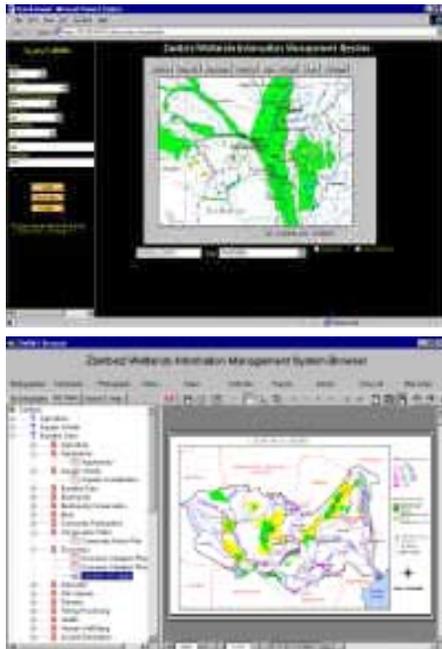
## INFORMATION PRODUCTS AND TOOLS

There are a multitude of communication tools or vehicles that can be used for this study, some of which are already being employed. These include: CD-ROMs (for data, reports, maps, etc.); CD-ROMs (multi-media, interactive learning tools); paper atlases, maps, and reports; fact sheets, news articles; web pages; visualization tools and animations; information management tools; document management tools; and GIS analysis tools. As mentioned, a good communications strategy should be developed to clearly define which of these tools will be appropriate for use in the SWCES.

### Examples

Presented below are some examples of "high-tech", yet still user friendly information management tools that have been used on other large-scale, environmentally based data collection activities. These examples are meant to illustrate some alternative ways of making large amounts of information available to the various interest groups who require it.

### Zambezi River Wetlands Information System (Z-WIMS)



Z-WIMS is an Internet and CD-ROM based mapping and multi-media information system designed for IUCN (The World Conservation Union). The system allows users such as project managers, funding agencies, stakeholders and the public, to easily query the extensive database and view IUCN activities across the entire Zambezi River Basin in Southern Africa. Users can select to view interactive web maps, videos, photographs, reports, articles and newsletters, all relating to work in the Zambezi River Basin of Southern Africa. In both the Internet and CD-ROM versions, the query interface is located in a frame on the left of the screen, while the query results are displayed in a browser on the right hand of the screen (Figure 1). Details on the background and impetus behind ZWIMS can be found in Law et al., 1999.

**Figure 1 - Z-WIMS Internet Browser (top) and CD-ROM Browser (bottom).**

## Recession Rate Analysis System (RRA)

In 1997 and 1998, the U.S. Army Corps of Engineers initiated an intensive coastal data collection and modeling activity of Great Lakes shorelines, beginning with Lakes Michigan, Erie and Ontario. A wealth of information is being collected including kilometer-by-kilometer data on recession rates, land use, land use trends, shore type (geology), type and quality of shore protection, offshore geology, and bluff characteristics. To manage and analyze this data, a Recession Rate Analysis System (RRA) was developed. The RRA is a flexible and customizable program that integrates a relational database management system (FoxPro) with a dedicated GIS package (Quikmap) that allows basic reporting, mapping and visualization of all query results (Figure 2). Users can construct queries using all data types and combinations thereof. Details of the RRA can be found in Stewart (1999a and b), and on the web sites of the Lake Michigan Potential Damages Study (<http://huron.lre.usace.army.mil/coastal/LMPDS>) and Lower Great Lakes Erosion Study (<http://www.cjscons.com/LGLES>).

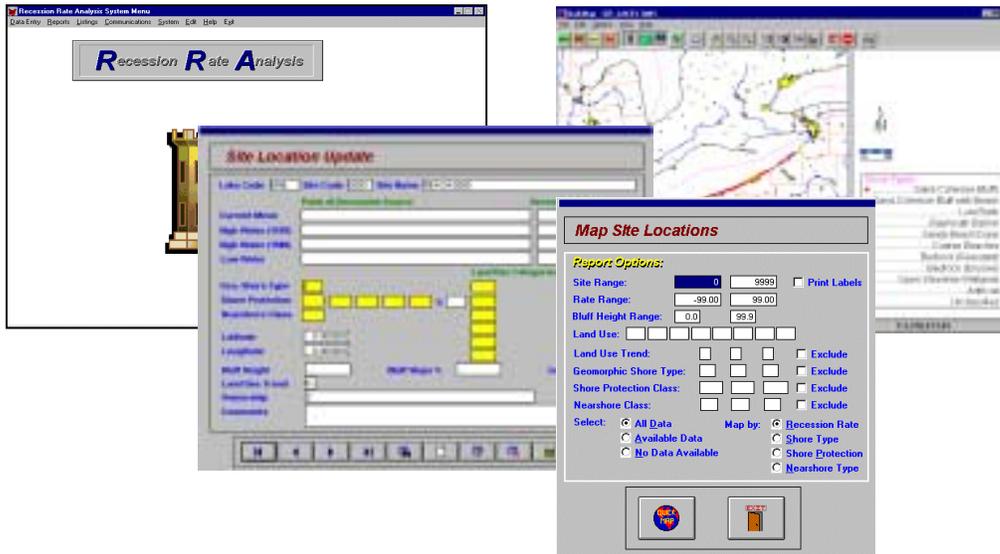


Figure 2 - The Recession Rate Analysis System

## The Flood and Erosion Prediction System (FEPS)

As part of the Lake Michigan Potential Damages Study being carried out by the U.S. Army Corps of Engineers - Detroit District, a Flood and Erosion Prediction System (FEPS) is being developed by Baird & Associates (Nairn et al., 1999) in order to predict potential flood and erosion damages associated with possible future hydrologic scenarios. FEPS includes: a coastal data base, graphical user interface, data processing and analysis tools, a 2D coastal process model, and custom ArcView GIS tools (Figure 3). It is a loosely coupled system developed with Visual C++ and Avenue (ArcView) and has links to various numerical models including those for cross-shore profile determination and

wave run-up. The system allows users to create "projects" for studying any specified section of shoreline using the built-in data and coastal process modeling tools. More information on FEPS can be found on the web sites of the Lake Michigan Potential Damages Study (<http://huron.lre.usace.army.mil/coastal/LMPDS>) or the Lower Great Lakes Erosion Study (<http://www.cjscons.com/LGLES>).

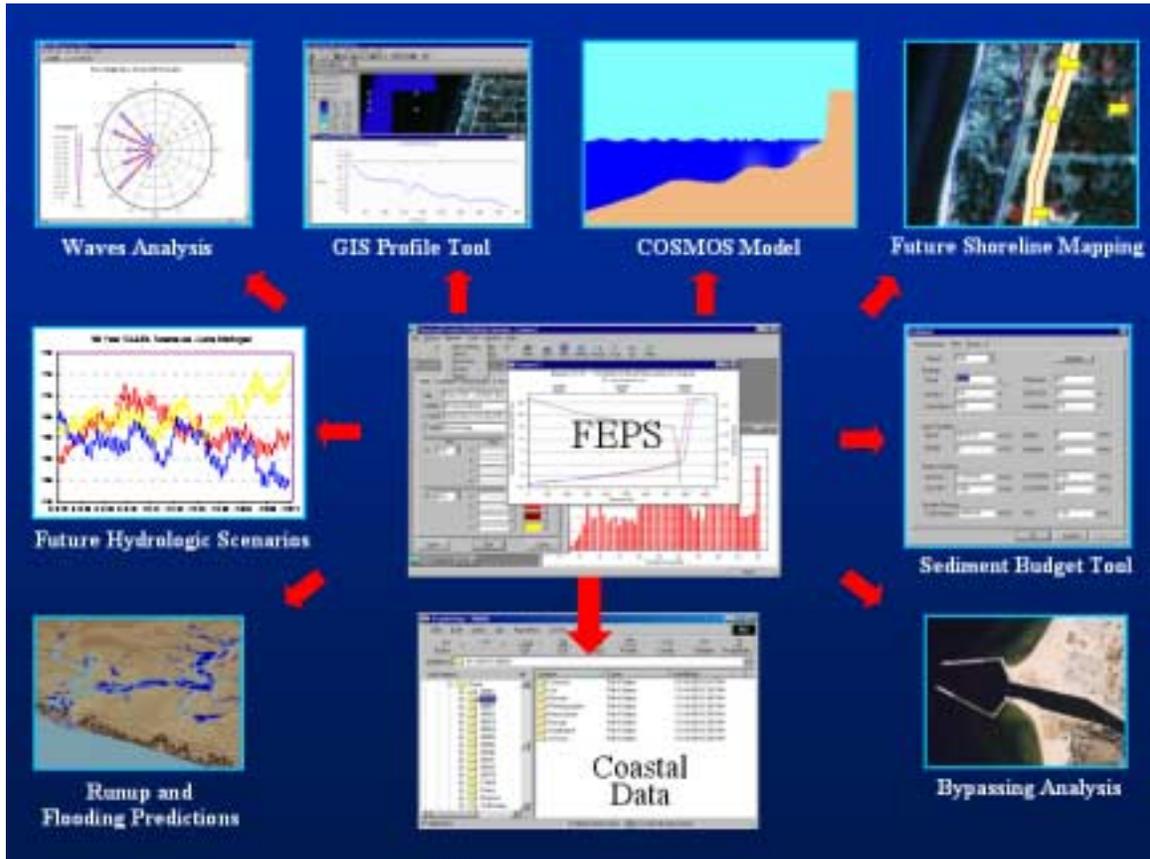


Figure 3 - The Flood and Erosion Prediction System.

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