LAND-OCEAN INTERACTIONS IN THE COASTAL ZONE (LOICZ)

Core Project of the International Geosphere-Biosphere Programme (IGBP) and International Human Dimensions Programme on Global Environmental Change (IHDP)

Science Communication in Theory and Practice

First LOICZ-IHDP-START-SARCS Training Workshop on Science Communication for Southeast Asia and South Asia

Compiled and edited by
B. Goh, A. Pomsagun, M. Le Tissier, W.C. Dennison, H.H. Kremer and J. Weichselgartner

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The Land-Ocean Interactions in the Coastal Zone Project is a Core Project of the International Council of Scientific Unions “International Geosphere-Biosphere Programme” and the “International Human Dimensions Programme on Global Environmental Change”.

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Cover: The cover photograph shows participants of the workshop in an activity-based learning session on the use of conceptual diagrams in communicating science.

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1. Preface

There is an increasing focus on science being linked to providing practical solutions to environmental problems. Although excellent science can be done, of itself this will not cause change mainly because channels to use this information and create change are poorly developed: This requires broader and more effective communication of the scientific insights being gained. Even where the solutions to environmental problems are clear, management, political, and ultimately public support are needed to institute the solutions. Therefore, utilizing current research effectively requires tools to facilitate effective communication, not only to scientific peers, but also managers, government, and the general public.

The LOICZ/IHDP Training Workshop on Science Communication, held 12-14 September, 2005, in Bangkok, Thailand, brought together 33 people from 10 countries ranging from scientists to environmental management practitioners to project managers (Appendix 1 & 2). The purpose of the workshop was to provide a forum to disseminate principles and practices developed by the Integration and Application Network (IAN) (http://ian.umces.edu). This report provides some background to science communication followed by appendices of a report from the workshop including the materials produced by the participants as part of this capacity building activities. The workshop was financially and logistically supported by LOICZ, IHDP, the Southeast Asia Regional Committee for START (SARCS), and the Global Change SysTem for Analysis, Research and Training (START).

2. Why is effective science communication important?

The essence of effective science communication is the development of content-rich, jargon-free, communication-based materials. Content-rich refers to communication which is replete with data and ideas. Jargon-free refers to the elimination of shorthand notation that scientists use to communicate within their peer groups—this means removing acronyms and maintaining a common language basis for explanation of concepts. Communication-based refers to focusing on the intended audience and providing an even broader base of accessibility for a wider audience. Effective communication is an important part of doing science. There are several ways in which attention to the communication aspects of science can also improve science. Completeness envisions the ‘story’ that is being conveyed and can lead to a more comprehensive research program, in which each element of the story is addressed. Having conceptualized the ‘storyline’ for the science communication product, holes or gaps can be filled-in in order to make the story complete. Context is identifying linkages and developing comparisons that can lead to important insights. The search for explanations of temporal or spatial comparisons often leads to a fresh perspective on the data. Visualization is a powerful communication tool which can provide unique insights. For example, production creating social change and solving environmental problems requires power and knowledge. Scientists have high knowledge but little power, whereas politicians have a lot of power but often little knowledge of many environmental problems. Effective science communication can facilitate this link between knowledge and power, informing and empowering the public to produce social change.
of a map using overlays of different elements can provide a linkage that may not otherwise be obvious. Aerial photographs combined with a conceptual diagram provide another example of individual visual elements that would not be as powerful individually as they are when combined. Synthesis is achieved by combining different data or approaches, which can lead to novel insights. For example, combining all the data on a topic and developing either a mathematical depiction or a correlation with another feature can create important benchmarks.

The essence of science communication

Effective science communication requires attention to the messages that are to be conveyed that depends on the “art” of communication, allowing adequate time to produce science communication products that includes time for feedback and revision. Good science communication requires attention to both the science and the presentation. In general practice, the vast majority of the effort by scientists is in the collection and analysis of data, with little time or resources devoted to the communication of science. Rather than science communication being an afterthought, factoring in the time and resources that are needed for developing a quality communication product is recommended.

3. What is effective science communication?

Effective science communication is the successful dissemination of knowledge to a wide range of audiences, from specialist scientists through managers and politicians to the public. Many scientists believe that doing excellent science is enough and that this knowledge will be found and used at the appropriate time. Unfortunately, the public, politicians, and even environmental managers rarely read journal articles or highly specialized books—so these media alone do not constitute effective science communication. Increasingly, scientists are called upon to comment on current environmental problems and search for solutions—however, they are often left lacking tools to communicate the knowledge that they have, especially in the face of the uncertainty inherent in the scientific process. A scientist usually cannot be 100% certain, which is problematic to those responsible for decision-making. However, with appropriate communication tools, it is possible for scientists to better explain their messages to a broader audience—creating greater understanding and demystifying both scientific knowledge and the scientific process. Only when this is achieved by effective science communication will the relevance of science increase to society in general.

3.1 Providing synthesis, visualization and context

The key elements of science communication are synthesis, visualization and context. Raw data do not provide much insight to anyone except perhaps the investigator collecting the data. Rather, data that have been analyzed, interpreted and synthesized are needed for meaningful science communication products. Visualization is key, as the audience must be able to see the who, why, what, where, when, and how of the data that is used to support the ideas. Making a point with data visualized is very powerful, but the audience needs to be able to see and interpret the data themselves. Context provides answers to the important questions “Why should we care?” or more simply, “So what?” and can include using comparative data so that specific examples can be characterized as ‘high’ or ‘low’ relative to regional or global extremes.
3.2 Simplifying terms, but not content

Don’t dumb it down, but do raise the bar. Assume the audience has very little prior knowledge of the particular study, but also assume that they are intelligent and knowledgeable.

3.3 Assembling self-contained visual elements

Science communication relies on the use of images, maps, photos, tables and figures, video clips and conceptual diagrams. Science communication principles can be applied to proposals and papers published in peer-reviewed scientific journals, newsletters, books, videos, mass media, and effective communication at meetings and conferences. Creating effective graphics and illustrations is often time-consuming, but appropriate use of illustrations will dramatically improve the communication of your story – a picture is worth 1,000 words!

3.4 Conceptual diagrams

Conceptual diagrams are an effective tool to communicate complex messages in a simple and informative manner and help to clarify thinking. Words can be ambiguous but an image commits to the message being portrayed. Use of symbols in conceptual diagrams is an ancient communication technique to depict unequivocal messages. Conceptual diagrams facilitate communication, both one-way (the presentation of the idea) and two-way (idea development). They depict essential attributes of the system and depict processes at different scales as well as evolving to capture an increasing understanding of the system. They can be used to identify gaps in, priorities of, and essential elements of knowledge by communicating concepts, summarizing information, and indicating key processes.
3.5 Satellite photos and maps

These images provide geographic context and are information-rich. Satellite photos provide extra information by showing topography, land use, and clarity, depth, and movement of water. A series of images can be useful in accentuating differences and tracking temporal changes.

3.6 Photographs and videos

Photos provide unique information. Aerial photos can serve as site-scale ‘maps’. Experimental photos can depict methods and display visible impacts of experimental manipulation, especially when taken at different times during a study. Photos can also provide context, help verify conjecture and anecdotal evidence and ‘set the scene’ for research. Such photos are also useful in involving the community by making the public aware of changes in their environment, and can help to determine targets for restoration efforts.

Short video clips inserted into presentations can help to tell a story by capturing motion, perspective and sound. They can be effective to show an organism or habitat that may be unfamiliar to an audience.

What is effective science communication?

An example of using photographs to portray information. The aerial photo on the left provides the larger-scale context by showing the location of the study site, and even the algal bloom is visible as the darker-coloured areas. The photo on the right contains the detail of the algal bloom.
3.7 Data

Data are the backbone of research, and can be displayed in a variety of ways. Graphs and tables are the most common forms of data presentation. Graphs are the most common way of displaying data, and when formatted correctly, are a very effective way of communicating a message. Tables are an excellent way of presenting a lot of data, especially when you are making comparisons between many variables.

3.8 Eliminating jargon, defining your terms and minimizing acronym usage

Science is full of jargon, which Webster’s Dictionary defines as nonsensical, incoherent, or meaningless talk and also as the specialized or technical language of a trade, profession, or similar group. These two definitions immediately illustrate why jargon can confuse or alienate members of an audience who are not familiar with the field of study. Instead of using jargon, translate it into terms that can be understood by somebody who has no background in your field.

An acronym is a word formed from the initial letters of a name, such as WAC for Women’s Army Corps, or by combining initial letters or parts of a series of words, such as radar for radio detecting and ranging (Webster’s Dictionary). Acronyms are very common in science writing and are used to communicate names of organizations, processes and concepts. Every field of science has its own acronyms which are often specific to that field, which can result in a lack of clear communication if an audience is not familiar with the field. The use of acronyms should be minimized to avoid confusion, and if they are used, they should always be defined the first time they are used.

A jargony sentence full of acronyms and unexplained terms might be:

In years of high precipitation, conductivity of Chesapeake reduces and loads of TP, TN and siliciclastic sediments increase. These changes result in HABs as well as reduced DO and Kd which result in reduced growth and spatial extent of SAV.

The translated version, although slightly longer, is much more understandable:

In high rainfall years, more freshwater enters Chesapeake Bay, bringing with it large amounts of nutrients (mainly nitrogen and phosphorus) and terrestrial sediments. This can lead to harmful algal blooms (HABs) in the water, as well as reduction or even of removal of oxygen in deeper water. Algae and sediment in the water reduce the ability of light to pass through the water, and absence of oxygen and light result in reduction or death of aquatic grasses.

3.9 Combining communication elements

Visual elements can be combined to provide unique information. For example, a combination of a photo and a conceptual diagram can effectively orient the audience to your study site, or explain methodology. Photos and graphs together can help with the visualization of your results. Results can be overlaid onto maps, helping the audience envisage the overall context of your results.

In the science newsletter shown below, all the visual elements discussed above—conceptual diagrams, satellite photos, maps, photos, graphs and tables—along with a judicious amount of text, are used to communicate the story about sea level rise and the flooding associated with Hurricane Isabel in September, 2003.
On the front page, the satellite photo gives the big-picture context of Hurricane Isabel over the east coast of the USA. The graph of the storm surge and the photos of flooding tell a more regional story.

On the back page, a comparison between Hurricane Isabel and a 1933 hurricane is given by a table of data comparing the two storms, a map showing the tracks of the hurricanes, and an historical photo showing erosion damage after the 1933 storm.

In the centre spread, sea level rise is addressed by graphs showing projected temperature, sea level rise, and long-term data from a tide gauge in Baltimore. A conceptual diagram with a self-contained legend depicts the processes leading to sea level rise. The local context to Chesapeake Bay is given by a map showing the elevation of the coastal plain surrounding the bay. A historical photo and a recent photo graphically depict the results of sea level rise and erosion in Chesapeake Bay.

4. Conclusion

If scientific knowledge is to be applied to help deal with environmental issues of the real world, then communicating the information effectively is an essential step in the solution. This workshop has highlighted that in addition to acquiring good scientific information, scientists should adopt the practice of using appropriate tools for disseminating the information, as this is also important in the communication process. These simple practices can be applied to make science relevant to a wide audience, from school-going children and the general public to the top decision makers of the country.

5. Appendices

5.1 Workshop report

September 12, 2005

1. Formal Welcome and Opening Session

Prof. Bill Dennison, Vice-president of the Center for Environmental Science, University of Maryland, introduced himself, his team, and the agenda of the workshop.

Participants, representing a good mix of members from both Southeast Asian and South Asian countries, gave short introductions about themselves and their work (Appendix 2).

2. Introduction Science Communication and Principles of Effective Science Communication

Prof. Bill Dennison introduced the objectives of the science communication workshop (Appendix 3). He highlighted that the workshop aimed to:

- Inspire participants to develop and enhance their science communication skills
- Provide some overarching science communication principles
- Introduce participants to conceptual diagrams and resources to help them create effective diagrams
- Review PowerPoint as a science communication tool and provide participants with tips and pointers for presentations.

Ms. Jane Thomas, Science Communicator, Center for Environmental Science, University of Maryland, presented the principles of effective science communication (Appendix 3). The following points were highlighted about effective science communication:

- Provide synthesis, visualization and context
- Reality
- Simplify terms but not content
- Assemble self-contained visual elements
- Consistent style and format
- No jargon
- Define all terms
- Minimize AU (acronym use)
- Engage audience
- Use colour judiciously.

3. Conceptual Diagrams

Dr. Tim Carruthers, University of Maryland, showed tools for effective science communication (Appendix 3). He gave various reasons for using conceptual diagrams, namely, to help clarify thinking, and for effective communication of scientific understanding. He also
gave examples of how conceptual diagrams could be presented in PowerPoint or incorporated into various publications. Participants then worked in groups in an exercise using conceptual diagrams to communicate various scientific themes.

4. Adobe Illustrator Demonstration

Ms. Jane Thomas presented a lecture in the use of Adobe Illustrator.

September 13, 2005

1. Review Group Conceptual Diagrams

Participants presented their group outputs of hand-drawn conceptual diagrams (Appendix 4). These diagrams illustrated various environmental issues pertinent to the Southeast Asian and South Asian regions. Ms Jane Thomas later converted the hand-drawn diagrams into computerized diagrams using the Adobe Illustrator software (Appendix 4).

2. The Art of Science Communication: Giving Effective Presentations

Prof. Bill Dennison gave a lecture on the preparation of presentation materials to communicate science effectively (Appendix 3). Participants then worked in groups to design PowerPoint presentations on computers and presented their group outputs (Appendix 4).

3. Effective Communication Using Posters

Ms. Jane Thomas guided participants on using posters for effective communication (Appendix 3). Participants joined in a group activity to design posters to communicate the findings from a published report entitled: “State of Maryland Coastal Bays, 2004”. In a “role-play” exercise, participants presented their posters before the ‘Governor’ of Maryland, and provided recommendations on the most effective way to utilize funds from the government for the sustainable utilization of the coastal bays of Maryland (Appendix 4).

4. Dumplings in a Teapot

Invited speaker Dr. Pitiwong Tantichodok, Walailak University, presented a lecture on communicating science (Appendix 3). The following examples were highlighted:

- Science communication to the public
- Knowledge and communication
- Communication in integrated coastal zone management
- Setting up a coastal information center
- Nemo project.

5. Individual Projects

Participants were then tasked to design individual presentations to communicate science issues pertinent to their home countries in the form of an oral presentation, written presentation or using conceptual diagrams.
September 14, 2005

1. A Case Study of Effective Science Communication

Dr. Ben Longstaff, Science Integrator, Center for Environmental Science, University of Maryland, presented a case study of effective science communication entitled: “Healthy Waterways Partnership” (Appendix 3).

2. Scientific Documents in Magazines and Handbooks in Thailand

Invited Speaker Dr. Thon Thamrongnawasawat, Kasetsart University, gave a talk on his experience in science communication through magazines and handbooks in Thailand.

3. Individual Presentations

Participants presented their individual projects (Appendix 5).

4. Wrap Up

Prof. Bill Dennison concluded the workshop by presenting a summary of activities and products from the three day workshop.

Participants were invited to provide feedback to the resource team and the workshop organizers on the science communication workshop. It was agreed that the products from this workshop (conceptual diagrams, hand-drawings, posters and PowerPoint presentations) be put up onto the IAMS website for participants to download freely, for their own use and for various reporting mechanisms in their home countries.

It was unanimously agreed that these products would serve as good resource materials not only for the participants, but also for the network of scientists in LOICZ and IHDP. The staff members of IAMS, Center for Marine Science, University of Maryland, would provide a mechanism through which these resources would be made available to LOICZ and IHDP.

Participants thanked the resource team from the Center for Marine Science, University of Maryland, the local organizing team from the SEA START Regional Centre, Thailand, the LOICZ Southeast Asia and South Asia Nodes, LOICZ and IHDP for the delivery of a very relevant, effective and successful workshop.
## 5.2 List of participants

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<tr>
<td>India</td>
<td>Rayadurga Anantha Sreepada</td>
<td>Aquaculture Laboratory, National Institute of Oceanography (NIO) Dona Paula, GOA- 403 004, INDIA</td>
<td><a href="mailto:sreepada@darya.nio.org">sreepada@darya.nio.org</a>, <a href="mailto:sreepada63@yahoo.com">sreepada63@yahoo.com</a></td>
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<tr>
<td>India</td>
<td>A. Nirmal Rajkumar</td>
<td>Research Scholar, Institute for Ocean Management, Anna University, Guindy, Chennai-600025. Tamilnadu, INDIA</td>
<td><a href="mailto:nimalrajkumar@hotmail.com">nimalrajkumar@hotmail.com</a></td>
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<tr>
<td>Pakistan</td>
<td>Samina Kidwai</td>
<td>National Institute of Oceanography, ST 47, Block 1, Clifton, Karachi-75600, PAKISTAN</td>
<td><a href="mailto:niopk@cubexs.net.pk">niopk@cubexs.net.pk</a></td>
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<td>Liyanage Don Chaminda Bhathiya Kekulandala</td>
<td>IUCN Sri Lanka Office, No.53, Horton Place, Colombo 07, SRI LANKA</td>
<td><a href="mailto:cbk@iucnsl.org">cbk@iucnsl.org</a></td>
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<td>Anouckchika Darini Ilangakoon</td>
<td>215 Grandburg Place, Maharagama, SRI LANKA</td>
<td><a href="mailto:anouki@zeynet.com">anouki@zeynet.com</a></td>
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<td>National Science Foundation, 47/5, Maitland Place, Colombo 07, SRI LANKA</td>
<td><a href="mailto:janak@nsf.ac.lk">janak@nsf.ac.lk</a></td>
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<tr>
<td>33 Netherlands</td>
<td>Martin Le Tissier</td>
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<td>m.le-tissier@ envision.uk.com</td>
</tr>
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List of Instructors and Invited Speakers

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<th>Name</th>
<th>Address</th>
<th>E-mail</th>
</tr>
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<tr>
<td>USA</td>
<td>Bill Dennison</td>
<td>University of Maryland, Center for Environmental Science, PO Box 775 Cambridge MD 21613 USA</td>
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</tr>
<tr>
<td>USA</td>
<td>Jane Thomas</td>
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</tr>
<tr>
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</tr>
<tr>
<td>USA</td>
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<td><a href="mailto:ben.longstaff@noaa.gov">ben.longstaff@noaa.gov</a></td>
</tr>
<tr>
<td>Thailand</td>
<td>Pitiwong Tantuchidok</td>
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</tr>
<tr>
<td>Thailand</td>
<td>Thon Thamrongnawasawat</td>
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</tr>
</tbody>
</table>
5.3 Instructor presentations

An Introduction to Science Communication

An Introduction to Science Communication
Bill Dennison
Workshop on Science Communication for Southeast Asia and South Asia
12-14 September, 2006
Bangkok, Thailand

Objectives
- Inspire you to develop/enhance your science communication skills
- Provide some overarching science communication principles
- Introduce you to conceptual diagrams and resources to aid you in creating effective diagrams
- Review powerpoint as a science communication tool and provide you with tips and pointers

The great scientists are/were also great communicators

"Really when, Darwin, reach... and looking... are laid down... may... they offer a grand and harmonious picture of the movements which the root of the earth has undergone within a little period..."..."There was one... with... the tower... to have allowed the... to grow up to the... and... necessary... to have... over the... every one... to... above... is a... to... "A. Einstein

Paradigm shifts occur when scientific discovery is effectively communicated to society

Chemistry, Biology, Physics, Astronomy, Geology

Good science communication can make you a better scientist

Completeness
Envisioning the story can lead to comprehensive research program

Context
Identifying the linkages and developing comparisons can provide important insights

Visualizations
Combining visual elements can lead to new insights

Synthesis
Combining and comparing different data sets or approaches can lead to insights

Good science communication requires attention to both the science and the presentation

"What you've got here, really, are two matters, one of immediate artistic appearance and one of underlying scientific exploration, and they don't match and they don't fit and they don't really have much of anything to do with one another. That's quite a situation. You might say there's a little problem here."
Robert Pirsig, 1974
Principles of Analytical Design: E. Tufte

- “Don’t get it original, get it right”
- Integrate words, images, numbers
- Include documentation (data sources)
- Content-driven, presentation enables thinking
- Full important comparisons adjacent in space
- Use small multiples (maximize content variation, minimize style variation)
- Audiences are precious (know your content; respect your audience)
- Use humor, memorable hyperbole
- Preparation: Practice, practice, practice; develop better content

There are differences between science writing & science communication

- Getting it right
  - Providing scientific context (references)
  - Text > graphics
  - Poor audience
  - Mostly black and white
  - Authorship exclusive
  - Focus on results and interpretation
- Getting it done
  - Providing societal context (examples)
  - Text = graphics
  - Broader audience
  - Full color
  - Authorship inclusive
  - Focus on conclusions and recommendations

Principles of science communication

1. Provide synthesis, visualization & context
2. Get real, relate to audience – big picture to local relevance
3. Simplify terms but not content (don’t dumb it down; do raise the bar)
4. Assemble self-contained visual elements
5. Consistent style and format
6. Lose the jargon, dude
7. Define all terms, e.g. SE = Standard Error
8. Minimize AU (Acronym Use)
9. Engage audience: prepare for and invite questions
10. Use too or, but use it judiciously

The ‘zen’ of science communication

- Enthusiasm counts: get excited
- Give yourself adequate quality time
- Feedback & revision essential: seek it out

The art of science communication

- Conceptual diagrams: context and synthesis
- Maps: geographic context and information-rich
- Photos: describe methods, study site description, processes and relevance
- Video clips: capture system dynamics
- Tables and figures: scientific data

Synthesis, visualization & context are key elements of science communication

Synthesis
- Provide analyzed, interpreted, and synthesized data
- Show them: who, what, where, when, & how & so that you can tell them why

Visualization
- Provide answers for: “Why should I care?” & “So what?”

Context
Good science communication is no JOKE
JOKE = Jargon-Word. Obsolete language that keeps audience entirely ignorant.

Science communication that relies extensively on JOKES is a self-indulgent representation of simple ideas, obfuscated with technospeak to make the scientist appear astute, yet serves to be obtuse and belittles the audience.

Effective communication is two-way
How do you elicit two-way communication?
- Provide feedback opportunities: complete the presentation within allotted time (as even shorter), have evaluation sections on science communication products
- Solicit: at the end of your talk, offer to answer questions, ask for evaluation of science communication products

How do you prepare for questions?
- Anticipate: think about what questions you would ask: use practice sessions to solicit and answer questions: develop FAQ (Frequently Asked Questions) section
- Prepare: have extra material which can be used in the event of questions
- Don't be afraid: it is legitimate to say "I don't know", by what you do know is relevant to the question

Organizing scientific workshops
- Simple logistics: location, location, location (food, transportation, etc.) allow time for breaks (work often accomplished in breaks)
- Focused, peer reviewed questions, set a realistic agenda
- Good communication: phone calls and emails with reminders
- Pre-workshop materials: provide as much as possible BEFORE workshop to save time
- Select group: not too big, skewed for diversity and skills, get the right people into the room, to build that buzz, get involved in recommended alternatives if they cannot attend
- Good facilitator: pre-workshop planning sessions (use video to diffuse potential problems, let hosts rather than opinions drive agenda
- Ground rules: reduce jargon, respect for diverse opinions (non-confrontational), equal time and equal voice
- Clear, pre-determined outputs: time lines and products identified prior to workshop, clear agendas of what does at end of workshop
- With strong differences of opinion, formalize presentations: dubious arguments are often best dealt with in front of your audience

Conclusion:
replaced "motorcycle maintenance" with "science communication"

"Not everyone understands what a completely rational process this is. This science communication. They think it's some kind of a "break" or some kind of "difficulty for machines." in operation. They are right, but the exact is almost purely a process of reason, and most of the troubles are caused by what old-time radio-men called a "short between the spark-plugs." If you want to use the head properly, science functions entirely in accordance with the laws of reason, and a study of the art of science communication is really a miniature study of the art of rationality itself."

Robert Pirsig, 1974

Science communication resources
www.ian.umces.edu
- Powerpoints
- Newsletter
- On line tutorial
- Demonstration Video
- Handbook
- Courses
- IAN Staff
The Art of Science Communication: Giving Effective Presentations

The art of science communication: Giving effective presentations

Bill Dennison
Workshop on Science Communication for Southeast Asia and South Asia
12-14 September, 2005
Bangkok, Thailand

http://Ian.umces.edu

Outline

• Presenting your talk
  – Communicating your message effectively

• Using PowerPoint effectively
  – Hints and tips to maximize PowerPoint’s usefulness

• Components of a good PowerPoint presentation

Presenting your talk

• Number of slides = number of minutes
  – Leave time for questions
• Preparation is the key
  – Slides are your cues
• Arrive early to check equipment and greet audience
• Provide appropriate background
  – Assume naiveté, not ignorance
  – Show data within five minutes
• Orient the audience to each slide
  – Explain graph axes, photos, diagrams
  – "Tell 'em what you're going to tell 'em, tell 'em, then tell 'em what you told 'em!" – George Bernard Shaw
• Every slide should have visual elements

You are giving a talk, NOT reading a speech

• Text can be used to:
  – Remind speakers of the key points of the talk
  – Provide the audience with enough information to interpret graphics

• Text should NOT be used to:
  – Distract audience from the speaker's words (people will read a new slide before listening to the speaker)
  – Replace the need for the speaker to talk by having a complete text provided on the slides

Font size and visibility is important

• 36 pt for titles
  – 20 pt for bullet points (at least)
  – 12 pt or less for details
• Use color judiciously, especially red and green
• Contrast between your background, and text/background is important
• Use system fonts, or embed fonts in your presentation
• Sans serif fonts: Arial, Verdana, Comic Sans
• Serif fonts: Times New Roman, Georgia, Palatino

This is a serif font. Which of these fonts is easier to read?

This is a sans serif font. Which of these fonts is easier to read?

• Sans serif fonts are more readable from a distance

Some color combinations are hard to read

• Some people find red and green hard to distinguish
• Dark backgrounds are harder on the eyes
**Consistency is important**

The art of science communication: using PowerPoint effectively

Jane Thomas

http://www.janeinfo.info

---

**Consistency is important**

Click to edit Master title style

- Second level
- Third level
- Fourth level
- ETP level

---

**Graph formatting makes all the difference**

**Bad (or no) formatting**

- Boxes, gridlines and white background are distracting
- Axes not labeled, y-axis obscuring data
- Boring black and white

**Good formatting**

- Transparent background, no boxes or gridlines
- Large, labeled axes
- Contrast colors

---

**Graph formatting makes all the difference**

**Bad (or no) formatting**

- Boxes, gridlines and white background distracting
- Axes not clearly labeled, too many tick marks on y-axis
- Excel default colors

**Good formatting**

- Transparent background, no boxes or gridlines
- Large labeled axes
- Contrast colors

---

**Get them right in Excel first**

- Use colored background boxes to facilitate color matching
- Remove graph background
- Remove grid lines, borders & unnecessary legends (i.e., if only one data source)
- Clean up extra tick marks and increase intervals between marks
- Label axes with title and units
- Select text and right click to format (subscript, etc.)
- Delete colored background
- Copy from Excel
- Switch to PowerPoint
- Paste Special
  - Picture (Enhanced Metafile)

---

**Try to avoid tables ...**

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* Use PowerPoint’s Insert → Table function

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Isabel surge height

- PowerPoint is all about the visual – there is no excuse for your graphics to not be seen

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Video clips can be effective

---

Video clips can be effective

---
Cropping and annotation of photos can be very informative

Photos that are well chosen, cropped, aligned, distributed evenly and annotated provide information on methods, study site, description & relevance.

Use the crop tool, resize with the mouse, and then use the automatic align and distribute tool in PowerPoint to keep your slides clear and legible.

Crop, align, and label photos carefully

Photos that are well chosen, cropped, aligned, distributed evenly and annotated provide information on methods, study site, description & relevance.

Pay attention to alignment & overlapping.

Clear labeling of photos.

Use PowerPoint's Align or Distribute function

Outline

- Improvements or degradation over time can be highlighted by a series of maps.
- Consistent layout allows comparisons.
- Maps should have scale and compass direction.
- Maps should have a legend that is self-contained & legible.

A map sequence can show temporal changes

Combine visual elements

- Improved with Wanga Vallen Newport Bank
- Amy Banks
Proper use of color is very powerful

- Set up color pattern early on and train the audience

Overuse of PowerPoint effects can be distracting

Focus should be on the content, not on the presentation

Effective use of animation to show steps in methodology

1. Slow release fertilizer (88 g N m⁻², 22 g P m⁻²)
2. Discogastellates are classified, counted, and recorded
3. Discogastellates are washed from the surface of the host
4. High size fraction collected

A map sequence using the ‘animation’ function can be effective

- 20 Jan 2000 - 0.8 km²
- 1 Feb 2000 - 2 km²
A map sequence using the 'animation' function can be effective

13 Feb 2000
4.5 km²

24 Feb 2000
8 km²

Rooftop Expansion Rate = -120 m²/mm²
(Jan 1997 - Feb 24th)

Separate pages for animation often better than 'build' animation

- Builds can get difficult to manage and edit
- Too many separate pages may increase PowerPoint file size

Reduce your file size by compressing your photos

- Photos at high resolution can dramatically increase the file size
- Reduce resolution first
- Use PowerPoint's built-in compression function
- Use NKPowertie – www.nkpowertie.com

PowerPoint presentations can be poorly organized

Title asks a question but doesn't answer
Great photos no captions or explanations

Photos not resized and aligned
Background and sidebar distracting

What is ‘ecosystem health’?
- High proportion of rare and threatened species
- Diverse trees, plants and other organisms
- Good health across the board

Healthy ecosystem
Unhealthy ecosystem
PowerPoint presentations can be poorly organized

- Boiling title gives no clue to slide contents
- Bad font and choice
- Poorly formatted graph

Results

Seagrass depth range is related to water quality

- Active title sets the scene
- Good color and font choice
- Data is well formatted and legible

- Text box aligned properly, good color and font choice

Designing a good scientific PowerPoint presentation

- Title slide – title, authors, affiliations
- Outline of talk – explain organization & preview conclusions
- Body of talk – format consistency, ongoing summaries (e.g. ‘active’ titles)
- Conclusions – take-home messages, stimulate questions
- Acknowledgements – specify roles
- Extra slides for questions

The title contains the most important words of a scientific presentation

Author’s name

- Author’s affiliation can be represented with a logo
- Multiple authors common: each can be noted with affiliations

Title slides: Visual elements can introduce yourself & the topic

Outline slides: An outline can be a guide to the talk and can provide conclusions
Methods slides: Visual elements can describe the experimental approach

Results slides: Data-rich figures can provide both detail and the big picture

Data summary slides: Conceptual diagrams can be used to synthesize data

Conclusions slides: Dot points link to your questions; background photos can be used

Acknowledgements slides: List participants by category or institution
Principles of effective Science Communication

Jane Thomas
Workshop on Science Communication for Southeast Asia and South Asia
12-14 September, 2005
Bangkok, Thailand
j.thomas@umces.edu
http://ion.umces.edu

Principles of science communication
1. Provide synthesis, visualization & context
2. Get real, relate to audience – big picture to local relevance
3. Simplify terms but not content
   (don’t dumb it down, do raise the bar)
4. Assemble self-contained visual elements
5. Consistent style and format
6. Lose the jargon, dude
7. Define all terms, e.g. SE = Standard Error
8. Minimize AU (Acronym Use)
9. Engage audience: prepare for and invite questions
10. Use color, but use it judiciously

Develop a consistent style and format
- Within products, and also between products
  - Newsletters, presentations, websites, books
- Train your audience
- Use Master Slide or Master Page functions to ensure consistency

Typography is the art of words
- Spelling and grammar
- There are two types of fonts – serif, and sans serif
  - This is a serif font. Which of these fonts is easier to read?
  - Sans serif fonts are more readable from a distance

Typography is the art of words
- Text justification depends on layout, how much text you have, and medium (presentation, book, etc.)

Use color, but use it judiciously
- Use color judiciously, especially red and green
- Contrast between your background, and text/graphics is important
- Improper use of color can alienate your audience

Brown
Dark blue
Dark green
Black
Some color combinations are hard to read
- Some people find green and red hard to distinguish
- Green and red are often associated with a subjective value (good or bad), and so are very powerful colors

Proper use of color is very powerful
- Presentation: Early on and train the audience

RGB vs. CMYK
- Red, Green, Blue
- Transmitted light (presentations, websites)
- Absence of color results in black
- Cyan, Magenta, Yellow, Black
- Printed ink (posters, newsletters)
- Absence of color results in black

Use the right resolution
- Resolution differs between different media
- Printed products need 300 DPI
- Presentations and websites need 96 DPI
- Using the right resolution for your communication will ensure your graphics are clear, and will also help with managing file size

Image types and formats
- Raster/Bitmap graphics (photos, scans, resolution-dependent)
  - TIFF: CMYK or RGB, large file size due to lossless compression
  - JPEG: CMYK or RGB, small file size due to lossy compression
  - GIF: RGB, small file size due to less colors used on websites; transparency
  - PNG: RGB, relatively new format; transparency
- Vector graphics (created using software, resolution-independent)
  - EPS: CMYK or RGB, maintains resolution independence

Image types and formats

<table>
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<th>Resolution</th>
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<th>Image format</th>
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</thead>
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<td>CMYK</td>
<td>EPS, TIFF, JPG</td>
</tr>
<tr>
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<td>96 DPI</td>
<td>RGB</td>
<td>PNG, GIF, JPG</td>
</tr>
</tbody>
</table>

It is worth the time and effort to create graphics for both printing and presentation.
- Optimize file size
- Once you have the different formats, you can use them over and over again
Graph formatting makes all the difference

Bad (or no) formatting
- Boxes, gridlines and white background are distracting
- Axes not labelled, y-axis obscuring data
- Boring black and white

Good formatting
- Transparent background, no boxes or gridlines
- Large labelled axes
- Contrasting colors

Get them right in data software first

- Use colored background box to facilitate color matching
- Remove graph background
- Remove grid lines, borders & unnecessary legends (i.e. if only one data series)
- Clean up extra tick marks and increase informative labels
- Label axes with titles and units
- Select text and right-click to format (subscript, etc.)
- Delete colored background

Try to avoid tables ...

... or format them right

- No vertical lines, minimize horizontal lines, use color and fonts to emphasize data

Format maps to include more information
A map sequence can show temporal changes

- Improvements or degradation over time can be highlighted by a series of maps
- Consistent layout allows comparisons
- Maps should have scale and compass direction
- Maps should have a legend that is self-contained and legible

Hurricane Isabel surge height

You + Excel

You + Illustrator

Cropping and annotation of photos can be very informative

Photos that are well chosen, cropped, aligned, distributed evenly and annotated provide information on methods, study site, description & relevance.

Crop, align, and label photos carefully

Photos that are well chosen, cropped, aligned, distributed evenly and annotated provide information on methods, study site, description & relevance.

Combine visual elements

I am here to help you

Jane Thomas
Science Communicator
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Effective Communication Using Posters

**Effective communication using posters**

**Outline**
- Types of posters
- Software and general approach
- General design principles
- Titles and text size
- Use maps and aerial photos for context
- Colors
- Time and handouts
- Essential rules and tips

**Types of science posters**
- Specialist scientists
  - Target audience determines mix of poster elements
- Informed public
- General public

**Formatting tip:** If in doubt, use a plain background.

**Types: Technical/methods**
- Audience – specialist scientists
- Includes – detailed methods
- Capturing attention less important
- Need to justify key elements of techniques
- But... still includes photos/maps/conceptual diagrams

**Types: Informed public**
- Audience – informed public or non-specialist scientists
- Includes – clear syntheses
- Capturing attention – important
- Needs to summarize information
- Conceptual diagrams, maps and photos very useful tools

**Types: General public**
- Audience – general public
- Includes – message, no justification
- Capturing vital attention
- Need to be visually attractive
- So... Good photos are key
Start right — use the right software!
- Adobe InDesign — best...
  - graphics files can be linked
- Adobe Illustrator — good...
  - files get large
- Microsoft PowerPoint — avoid at any cost!
  - inflexible and printing difficulties

Design principles for effective posters
- Balance
- Grouping
- Alignment
- Contrast and emphasis
- Blank space

Balance
These designs are symmetrical
The left design is balanced, the right creates tension

Balance
Dividing in thirds is often more subtle than dividing in halves

Grouping
- Proximity of objects can be used to imply association — whether objects are similar or different

Alignment
- Alignment can be used to help draw a reader through a poster
- Center alignment of text can be difficult to read
**Contrast and emphasis**

**Contrast with color**

**Contrast with TYPE**

**Contrast with SIZE**

**Blank space helps readability**

- No blank space creates a ‘crowded’ feel
- Blank space is easier to read, and allows for flow between sections

**Mock up and review, review, review**

- Start with fundamental message – the title
- A mock layout helps plan balance and flow
- Does it work? Get input from others
- Run the 10 second test (the time available on average to get a reader’s attention)
- Check the required size of the poster

**Use a short, active, large title**

- The one main message of the poster should be summarized in the title
- Title can be a statement or a question
- If you can’t read it from 25-30 feet/10 metres, it is too small
- Use san serif font at 96 pt (2 inch/5 cm high letters)

**Authors and affiliations second only to title**

- Authors’ names should be easily legible
- Put authors’ names at top
- Include relevant, high quality logos (not web grabs)
- Photo of principal author is useful

**Clear large text should be used to support graphics**

- Use a clear, system font (e.g. Arial)
- 0.5 inch/1 cm tall when printed, i.e. approx. 24 pt
- Use bullet points and extended legends (not an essay)
- Include white space to avoid clutter, avoid ‘box-its’
Use photos/maps for context, not decoration!

- Need to provide good context (maps/aerial photos)
- Photos should AT LEAST have a caption, no decoration!
- Distinguish captions from the rest of the text

Use active subtitles

- No editors – no hard and fast rules!
- Replace methods/results/discussion with synthetic active subtitles

Judicious use of color

- Subtle background and one or two high contrast text colors
- Colors and icons can be used to link photos/figures & text

Photo-strips can be effective

But ensure that photos are labeled and relevant

Do you have a week of your life to spare?

3 – 5 days
8 – 10 days
An effective poster takes time, even after all the data is analyzed

Make handouts

- Should be able to read text printed at A4
- Ensure your address is readable
A poster is an advert not a review!

- Title: concise, take home message, large
- Authors, affiliations, acknowledgements clearly legible
- Use self explanatory, stand-alone graphics
- Two or three subtle colors, can use to link elements
- Be aware of audience – importance of attention grabbing
- Think twice before using a photo as background
- Take time to review poster – is everything justifying the title?
- Provide handouts of the poster
- Create the file at full size; use CYMK to print
- Provide PDF as well and all fonts (or use system fonts)
Conceptual Diagrams

Conceptual diagrams
A tool for effective science communication
Dr. Tim Carruthers
Workshop on Science Communication for Southeast Asia and South Asia
12-14 September, 2005
Bangkok, Thailand

What is a conceptual diagram?

‘Concept’ from Latin ‘conceptus’ (meaning thought), something conceived in the mind (Webster’s 3rd Dictionary, 1986)

‘Diagram’ from Greek ‘diagramma’ (meaning to mark out by lines), a graphic design that explains rather than represents, a drawing that shows arrangement and relations (Webster’s 3rd Dictionary, 1986)

‘Model’ from Latin ‘modulus’ (meaning small measure), an abstract representation of a system or process (Turner, Gardner & O’Neill, 2001)

Conceptual diagram = A diagram using symbols that depicts the essential attributes of a system

Why use conceptual diagrams?

- Helps to clarify thinking (words can be ambiguous, an image commits to the message being portrayed)
- Communication (one-way and two-way - idea presentation and idea development)
- Identify gaps / priorities / essential elements
- Develop syntheses (or present synthesis)

Conceptual diagrams provide an interface

Science
Conceptual diagram
Community

Current understanding
Shared vision
Priority & environmental values
Commitment & resources

Good conceptual diagrams are used extensively

Z scheme of photosynthesis
Plate tectonics

Darwin used conceptual diagrams to explain his theory of coral reef formation
Conceptual diagrams use symbols: an ancient technique to depict unequivocal messages

Symbols (icons) are a key element of conceptual diagrams

- Symbol: from Greek 'symbolon' (token of identity) and Latin 'symbolum' (token, sign)
- Icon: from Greek 'eikon' (to resemble), pictorial representation
- A sign that signifies by virtue of sharing a property with what it represents
  - something that stands for or suggests something tangible
  - a visible thing that stands for something invisible or intangible

Symbols used in mathematics (e.g. \( \pi \)), chemistry (e.g. \text{H}_{2}\text{O}) music (e.g. \text{C}) weather (e.g. \( \text{C} \)), religion (e.g. \( \text{C} \)), corporations (e.g. \( \text{C} \)), and organizations (e.g.)

- Symbols can be universal, language independent
- Symbols are scalable: size of symbol can represent relative importance (e.g. \( \text{C} \) vs. \( \text{C} \))
- Symbols can be information-rich: size, shape, color and position of symbols can convey information

Both shape and color of symbols can be important for recognition

Symbols are an important feature of everyday life

Shape, color, and images used for traffic signs

In conceptual diagrams, as in maps, symbols need to be explained in a legend

Conceptual diagrams can depict processes at different scales...
Conceptual diagrams can be nested.

Conceptual diagrams are not...

- cartoons
- model relationships
- colored box & arrow diagrams

Conceptual diagrams are not...

- A REPLACEMENT FOR GOOD, WELL INTERPRETED DATA!

Conceptual diagrams are not...

- model relationships

Conceptual diagrams can augment the effective communication of scientific understanding.
Literature citations can be added

Use of conceptual models facilitates hybrid data/diagrams

Various applications of conceptual diagrams
- Research
- Synthesis
- Monitoring
- Management

Conceptual diagrams can be incorporated into various publications
- Newsletters
- Books
- Journal publications
- Posters

Conceptual diagrams can be used in PowerPoint presentations
- Overall summary
- Component diagrams (nested)
- Question statement
- Question resolution

Conceptual diagrams can be produced in real time to synthesize main messages
- Result of one day meeting into seagrass loss in Western Port Bay
The Ten Commandments of conceptual diagrams...

1. Thou shalt honor thy audience
2. Thou shalt simplify
3. Thou shalt not use garish colors or apply colors inconsistently
4. Thou shalt use legends in thy diagrams
5. Thou shalt not covet a single style
6. Thou shalt not be constrained by geometry
7. Thou shalt use arrows sparingly
8. Thou shalt not be afraid of making new symbols
9. Thou shalt revise and revise and revise...
10. Thou shalt use diagrams for peer and non-peer audiences

Computer technology has revolutionized the way we assemble material

Conceptionary

Concept: Acid rain kills forests
Definition: Acidification of rainfall by emissions kills trees
Keywords: Atmospheric pollution (NOx) Acid rain Tree death

Each person is timed and has to draw the concept for others to guess – all keywords must be written down to finish
Dumplings in a teapot

Science Communication with the public
- One way communication or monologue
  - Information dissemination
    - One to one
    - One to many
  - Putting out information with no expectation of response
- Two or more way communication or dialogue
  - Not limited to face to face conversations
  - One to one
  - One to many
  - Many to many
  - Many to one

Science Communication with the public
- Consultation
  - Seek advice from the public
  - One to one, one to many
  - Public hearing, public meetings
  - Interactive meetings, focus groups
  - Deliberative meetings, consultative panels
  - Consensus meeting, Delphi technique
  - Web board or web discussion
Science Communication with the public

- Two or more way communication or dialogue
- Engagement
- Stimulate the public interest and raise
- the awareness in science or coastal zone issues
- Meetings and debates, lectures
- Events – science fair or festivals
- Museum, Science Centers, Interpretation Centers
- Extension Programs
- Shopping Centers

Science Communication with the public

- Written forms
- Conversation forms
- Paper-based forms
- Electronic forms
- Exhibition, Displays, Campaigns
- Media: radio, T.V., movies, documentaries

Paradigm for community development

- Self dependence
  (people empowerment)
- Sustainability
- Knowledge-based development

Knowledge-based Society

- Learning society
  Life-long learning/education
- Dynamic rather than static
- Knowledge production
  Knowledge management

What is knowledge?

- Body of information that might consists of facts, opinions, ideas, theories, models
  principles, subject matter:
  or
- Acquaintance with facts, truths, or principles, as from study or investigation

The stuff in books, computers, etc is regarded as information or data, but it is stored in peoples’ heads as KNOWLEDGE.
Definitions of terms

Data - facts assumed to be a matter of observation
Information - data communicated or received concerning some facts or circumstance, data that has been interpreted to some extent

Knowledge - acquaintance with facts, truths or principles from study or investigation; implying a level of understanding of the system or issue
Wisdom - knowledge of what is true or right coupled with just (right) judgment as to action; implying capacity to apply knowledge to reach sound judgment

Oceans of data

Rivers of information

Small puddles of knowledge
And the odd drops of wisdom
We are drowning in information

Knowledge can be divided into 2 categories:

Explicit knowledge
Explicit knowledge is systematic and easy to formalize.
Facts, instructions, safety protocols, manuals, data etc.

Tacit knowledge
Tacit knowledge is difficult to say in writing and is acquired through personal experience.
Crafts, swimming, driving, activities, etc
Use tacit knowledge to solve problems.

If you don’t understand the stuff you are reading, then it’s still information, not knowledge.

Knowing that - facts and information
Knowing how - the ability to do something
Explicit knowledge
Explicit knowledge can be handled by technology. Books, web, MIS (Management of information system) etc.

Tacit knowledge
Tacit knowledge cannot be managed and cannot be documented. Transferred through relationship. But we can manage the environment that encourages or facilitates the exchange of information.

Knowledge Management [KM]
developed by business management and organizational practitioners/theorists in early 1990s.

KM is the way that organizations create (knowledge creation), capture (knowledge capture), share (knowledge sharing), and use knowledge to achieve the objectives.

Knowledge Management
- Check stocks of body of knowledge, e.g. indigenous knowledge, existing technology from elsewhere
- Knowledge production/creation
- Knowledge validation
- Knowledge application
- Knowledge transfer or transmission
- Knowledge repatriation
- Knowledge sharing
- Knowledge dissemination

Coastal Zone Management
Identification of problem statements, needs, priority of issues, solution options

Techniques used
Focus Group Discussion, Embedding in the communities, In-depth Interview, Mind Mapping, Card technique

FGD session of rice farmers at Chian Yai, Nakhon Si Thammarat
Ecosystem-based Management

McLeod, K. L., J. Lubchenco, S. R. Palumbi, and A. A. Rosenberg, 2005,

*Scientific Consensus Statement on Marine Ecosystem-Based Management.*

Signed by 219 academic scientists and policy experts with relevant expertise and published by the Communication Partnership for Science and the Sea

Released on March 21, 2005

Coastal Information Center

Ban Don Bay
Coastal Habitats and Resources Management [CHARM] Project
– EU and Department of Fisheries, Thailand

focuses on Ecosystem-based management

Ecosystem-based Management [EBM]

Managing the whole system with multiple interacting parts, not just one part at a time.

EBM depends on best available scientific research and information to determine the ecological interactions and processes necessary to sustain ecosystem structure and function

Preservation of Marine Biodiversity

Co-management and Participatory Governance

Adaptive Management

Coastal Information Center [CIC]

CIC acts as a clearinghouse

a place whose function is to acquire, manage, and distribute or disseminate information to interested parties

Ecosystem-based Management Requires More Scientific Information
Coastal Information Center [CIC]

CIC will be developed as a repository for
- research information,
- local environmental and resource information
- local environmental issues,
- EIA studies, monitoring data
- reports, guidelines, information materials
from resource management agencies, NGOs,
environmental advocacy organizations
- compendiums of symposium, conference,
workshops
- international treaties, conventions, agreements

Coastal Information Center [CIC]

CIC should
- facilitate the transfer of information
and integration of research results with the
coastal management and decision making processes.
- develop a coastal information database
and information management system.
- develop a GIS database and facilitate a GIS access
to assist in integrated coastal zone management

Coastal Information Center [CIC]

CIC should
- facilitate community involvement and educational
outreach programs
- identify stakeholders to be addressed
- determine degrees of understanding the issues
and what information stakeholders should have
- tailor messages to that particular audience

Science Camp: Nemo Project

Sending the right message
- marine conservation
But kids did not get the message!!

Nemo Camp

A program at Walailak University to reach out
young school students in coastal areas
in southern Thailand
- to generate or raise conservation awareness
- to create interest and educate young people in
marine environment
- to introduce young students scientific thinking
and inquiry

Lecture: wow science, wow biology
Language problem in communication?

Use the right kind of utensil to boil dumplings, then we'll have good-eating dumplings.
Case study of effective science communication

Healthy Waterways Partnership

A case study of effective science communication

Ben Longstaff
Science Integrator
(NOAA/UMCES)

and

Eva G. Abel
Science Coordinator
(veabell@unbox.uitr.edu.au)

Presentation Outline

- What is the Healthy Waterways Partnership?
- Communication approaches used by Partnership monitoring program
- Injecting a communication philosophy into the Chesapeake Bay Program

Healthy Waterways Partnership

- Whole-of-government
- Whole-of-community
- Regional
- Partnership

Collaborative approach to understanding, planning for and managing the use of South East Queensland waterways.

Healthy Waterways Vision

South East Queensland, its waterways and catchments will, by 2020, be a healthy ecosystem supporting the health and lifestyles of residents and visitors and will be managed through collaboration between community, government and industry.

Where are we?

The South East Queensland catchment:

- Population: 2.3 million; Area: 25,877 km²
- Fastest growing region in Australia

*Beautiful one day, perfect the next...*

Moreton Bay

- Nepean River
- Mersey River
- Mooloolah River
- Caboolture River
- Pine Rivers
- Deception River
- Bremer River
- Logan/River
- Currumbin River
- Nerang River

Catchment to Bay Ratio: 14:1

Residence Time: Highest in north and western embayment coastal

South East Queensland

Diversity of waterways with complex habitats and associated communities

...and of immense social, economic and environmental value.
A clear identity

- Many monitoring activities
- Many agencies/organizations
- Many funding sources

→ One monitoring program

- Easier to coordinate and manage
- Provide unified communication approach
- Improved public profile

Visualization of results

Sewage treatment plant upgrades

1998 2001 2002 2003

Sewage plume map

Visualization of results

Chlorophyll-a

Local and regional stories

What’s in my backyard (Local)

How does my backyard compare to others (regional)

Conceptual diagrams

Communication products

- Presentations
- Report Card
- Newsletters
- Website
- Posters
Types of audience

- Government (local, state, federal)
- Industry (including peak bodies and corporate sponsors)
- Community (including special interest groups, schools, wider public)
- Researchers (e.g., universities)

EHMP rules of giving presentations

Rule 1
Make the effort – go to the audience
- Upon request
- Annual road show

Rule 2
Tailor presentation to the audience
- Local reference
- Topic

EHMP rules of giving presentations

Rule 3
Be consistent in the message and presentation style

Rule 4
Be enthusiastic and engaged

Ecosystem Health Report Cards

Ecosystem Health Report Cards

How effective was the Report Card?

- Monash water a cultural icon
- Council commits to repairing river

- Water quality a cultural icon
- Council commits to repairing river
Communication central to success

Continual release of communication products
- Keeps stakeholders and community aware of developments
- Increases knowledge of community and stakeholders
- Keep profile of Program raised
- Instigates action (report card)

Other Healthy Waterways communication products

Reports  Website  Monthly data report  Newsletters  Report Card

Applying these principals to Chesapeake Bay Program

Started a proactive communication cycle
- E-newsletters
- Newsletters
- Report card, forecast, updates
- Current, well organized website

Applying these principals to Chesapeake Bay Program

Insisting on well prepared and effective oral presentations
Which one will get the message across?

Consistency in presentation

Considerations

- Audience (technical, mayors, technical officers, interest groups, general public)
- Purpose/objectives/expected outcomes (update, awareness, funding support, showcase, justification for a management action plan)
- Resources available (budget, venues, personnel)
- Timeframe and frequency (as needs basis)
Conclusion

The Partnership has produced information-based outcomes which have led to significant cost savings in water quality management by its stakeholders. This has been achieved by:

- providing a clear focus for management actions that has ownership of governments, industry and community;
- targeted scientific research to address issues requiring appropriate management actions;
- management actions based on sound understanding of the waterways, irrigators' public consultation program and strategy development, incorporating commitments from all levels of stakeholders;
- effective scientific communication.

Overall outcomes: Healthy catchments—healthy waterways vision.

Making it happen...

Healthy Waterways Partners
- Queensland Government agencies
- 19 local governments
- Industry (rural and urban)
- Community
- Traditional owners
- Researchers

Science Program

- Provide effective communication of scientific principles and research results to stakeholders and the wider community, in collaboration with the Healthy Waterways Campaign.
- Ensure communication approaches are relevant to specific audiences.
- Facilitate increased community awareness of waterways and catchment issues so as to generate broad support for the Healthy Waterways/Healthy Catchments vision.
- Target stakeholder action to protect and enhance the health of waterways.
- Increase appreciation of waterways as an important part of lifestyle and culture.

Operating Philosophy

- Adaptive management framework
- Stakeholder involvement
- Implementation of management actions at the most appropriate level within a regional framework
- Continuously improving knowledge for management

Objectives

- Update to stakeholders (newsletters, road shows)
  - enhance their current knowledge and awareness
  - facilitate discussion and solicit issues
  - assist in development and implementation of management actions
  - justify/request funding (e.g., presentations)
- Seek feedback (e.g., peer review process)
- Showcase the Partnership activities (e.g., Riversymposium)
Examples of tools used in science communication

- Conceptual models
- Decision support tools (numerical models)
- Ecosystem Health Monitoring Program
  - maps
  - EHMP Report Cards
- Other products

Value of the tools

Examples of Science Communication: use of conceptual models

- Systematically synthesise both present day and current understanding of the waterways
- Facilitates the prioritisation of issues and consequently, identification of gaps

Initial Stage 2 conceptual model (1997)

Revised Stage 2 conceptual model (1999)

Gaps:
- Freshwater and catchments
- Sources of sediments
- Diffuse load
- Cyanobacteria blooms in bay

Stage 3 tank architecture (1999-2001) - $2.5M

Policy & Planning
South East Queensland Regional catchment Planning

Stage 3 conceptual model (2001)

Implementation of the Plan

Challenges: Link catchment loads (Stage 3) to receiving waters, e.g. Moreton Bay (Stage 2)

Catchment Objectives: healthy catchments

Water Quality Objectives: sustainable loads tolerant

healthy waterways