AN INTRODUCTION TO EFFECTIVE SCIENCE COMMUNICATION

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OVERVIEW

• What is the Integration and Application Network?
  – Who are we?
  – 3 Key areas: Report Cards, Integrated Assessment, Science Communication Training

• Science Communication
  – Bit of theory
  – Applications

• About this course
IAN’s aim is to enable better communication to empower change.

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SOLVING, NOT JUST STUDYING ENVIRONMENTAL PROBLEMS

STUDY
• Dispassionate
• Embrace complexity
• Publish & funding via peer review
• Getting it right

SOLVE
• Passionate
• Simplify
• Publish & funding via stakeholders
• Getting it done
IAN PERSONNEL
Recruiting and retaining talented and committed people

• Science Integrators
  – PhD scientists
• Science Communicators
  – MS scientists
• Interns
  – Undergraduate scientists
IAN THEMES

COMMUNICATING SCIENCE EFFECTIVELY

REPORTING ECOSYSTEM STATUS

TEACHING & TRAINING

CATALYZING CONSERVATION OUTCOMES

ADVANCING CHESAPEAKE BAY RESTORATION

BUILDING STRATEGIC PARTNERSHIPS

CREATING GOOD CITIZENSHIP MODELS
COMMUNICATING SCIENCE EFFECTIVELY
Creating innovative ways to visually present science

130,561,7117 images downloaded
COMMUNICATING SCIENCE EFFECTIVELY
Creating innovative ways to visually present science

Image and Symbol Library Users

Date

Total Users

89,543
COMMUNICATING SCIENCE EFFECTIVELY
Creating innovative ways to visually present science

395 communication products

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COMMUNICATING SCIENCE EFFECTIVELY
Creating innovative ways to visually present science

May 1, 2015
Fifteen students, Ten minutes: One humbling education
Rebecca Peters, Aimee Hoover, Emily Russ The birds are chirping, the grass is green, the tourists are out walking the streets, and students are indoors on a Saturday signaling the coming end of another eventful school year: Spring is in the air in Annapolis. On Saturday April 25, 2015 graduate students in the Science for [...] Continue Reading »

April 28, 2015
A report card to tell your mom about: Environmental report cards provide transparent assessments of our aquatic ecosystems
Melanie Jackson, Chih-Hsien (Michelle) Lin, Debra Rosales Students in grammar school and all the way to college have anxiety about receiving report cards, and often times devise plans for the best time to tell their parents about their not so stellar grades. Explaining poor grades to parents can involve tactics such as blaming the teacher [...] Continue Reading »

April 23, 2015
Willamette River Report Card – I can see the light at the end of the tunnel
Developing a new report card is not a trivial business and can take a lot of time and effort on everyone's behalf. The Willamette River Report Card has been no exception with over eight months since start date and upwards of 20 indicators initially proposed by stakeholders from 25 organizations at four workshops. Despite information [...]
What is science communication?

- Successful dissemination of knowledge to a wide range of audiences (science and non-science)
- You are not doing anything if nobody knows about it
Science communication is a balance of quality science and communication.
THE GREAT SCIENTISTS ARE/WERE ALSO GREAT COMMUNICATORS

“Finally when ... barrier-reefs ... atolls... and fringing-reefs ... are laid down on a map, they offer a grand and harmonious picture of the movements which the crust of the earth has undergone within a late period. We there see vast areas rising, with volcanic outbursts; and we may feel sure that the movement has been so slow as to have allowed the corals to grow up to the surface...”

The Structure and Distribution of Coral Reefs
Charles Darwin, 1874 2nd Edition,
revised 1842 1st Edition

Charles Darwin: 119 published books & papers

Albert Einstein: 248 published books & papers

"Make everything as simple as possible, but not simpler." A. Einstein
EMPLOYING DIFFERENT COMMUNICATION TECHNIQUES

Scientific writing

- Providing scientific context (references)
- Text > graphics
- Authorship exclusive
- Focus on results & interpretation

Science communication

- Providing societal context (examples)
- Text ≈ graphics
- Authorship inclusive
- Focus on conclusions & recommendations
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
SYNTHESIZING INFORMATION FOR LESS TECHNICAL AUDIENCES

**Synthesis**
- Interpreted & synthesized data

**Visualization**
- Sense of place: who, what, where, when, how & so that you can tell them why

**Context**
- So what?
JOHN SNOW’S 1854 CHOLERA MAP

- Cholera outbreak in London
- John Snow mapped cholera cases
- Linked cholera cases to pump locations
- Pump handle removed; cholera subsided
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WHAT IS DATA VISUALIZATION?

- The goal is to communicate information clearly and efficiently via statistical graphics, plots, information graphics, tables, and charts
- Effective visualization helps uncover trends, realize insights, explore sources, and tell stories
- It makes complex data more accessible, understandable, and usable.
PRINCIPLES OF ANALYTICAL DESIGN: EDWARD TUFTE

- Integrate word, image, numbers
- Content-driven
- Presentation enables thinking
- Use small multiples (maximize content variation; minimize style variation)
- Know your content and audience
- Use humor and hyperbole

Bad science communication can be tragic (Challenger disaster)
1. Have fun! Remember to play.
2. A hierarchy of information. Don’t forget to structure the visual hierarchy of your image.
3. Less is more. What can you take out?
4. Grids are good. Use a mathematical grid to harmonize your layout.
5. Color, color, color. Draw a color palette from your subject matter.
6. Re-skin the wheel. Don’t throw out pie, line, and bar charts. Just design them better.
7. Make text work harder. Text is a graphical element of your visual too.
### WHAT IS DATA VISUALIZATION?

<table>
<thead>
<tr>
<th>Function</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choose the visualization type that best conveys the characteristics of the data</td>
<td>Apply color, size, fonts, and other design elements to guide the user</td>
</tr>
</tbody>
</table>
WHAT IS DATA VISUALIZATION?

Function & Form

Experimental results

Gracilaria is nitrogen-limited

Response to treatment (% change in productivity)

Chincoteague Bay
Sinapuxent Bay
Newport Bay
Assawoman Bay
Isle of Wight Bay
WHAT IS DATA VISUALIZATION?

Function & Form

Zostera vs Ruppia

Zostera and Ruppia grow fastest in summer

Growth rate (seagrass growth units [SGUs])

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
WHAT IS DATA VISUALIZATION?

**Function**

**Form**

Land use by area

- Deciduous forest
- Evergreen forest
- Shrubland
- Water
- Grassland
- Agriculture
- Woody wetlands
- Herbaceous wetlands

*Developed*
DEVELOPING A VARIETY OF SCIENCE COMMUNICATION PRODUCTS

Newsletters

Science Journals

Posters

Reports

Books
INVEST IN SCIENCE COMMUNICATION

• Building a library of high quality visual elements is an investment that will pay dividends over time
• High quality visual elements can be recycled for various media
• Good science communication ...
  – Helps convey information
  – Helps make a good impression on your audience
  – Helps make a difference
• We want you to succeed and become better science communicators.
• Previous courses have created long-term collaborations and stimulated excellent science communication products.
• We like teaching this course and hope that you both learn a lot and have an enjoyable experience.
THANK YOU!

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