Using a *Sustainability Science* Frame to Advance Ecosystem Restoration

Dr. Colin Polsky  
Director, CES  
Professor of Geosciences  
4/23/15
I. Problem statement

→ We face an uphill battle to maintain, much less grow, Federal support for (increasingly) complex, large-scale ecosystem restoration projects around the globe.

II. A persistent & counter-productive framing legacy

III. Let’s consider ditching the old frame
Problem 1 \([N = 152]\): Imagine that the U.S. is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed.
The Framing of Decisions and the Psychology of Choice

Amos Tversky and Daniel Kahneman

SCIENCE, VOL. 211, 30 JANUARY 1981

Problem 1 \([N = 152]\): Imagine that the U.S. is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed.

If Program A is adopted, 200 people will be saved.

If Program B is adopted, there is \(1/3\) probability that 600 people will be saved, and \(2/3\) probability that no people will be saved.

Which of the two programs would you favor?

Problem 2 \([N = 155]\):

If Program C is adopted 400 people will die.

If Program D is adopted there is \(1/3\) probability that nobody will die, and \(2/3\) probability that 600 people will die.

Which of the two programs would you favor?
The Framing of Decisions and the Psychology of Choice

Amos Tversky and Daniel Kahneman

SCIENCE, VOL. 211, 30 JANUARY 1981

Problem 1 [$N = 152$]: Imagine that the U.S. is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed.

If Program A is adopted, 200 people will be saved. [72 percent]

If Program B is adopted, there is 1/3 probability that 600 people will be saved, and 2/3 probability that no people will be saved. [28 percent]

Which of the two programs would you favor?

Problem 2 [$N = 155$]:

If Program C is adopted 400 people will die. [22 percent]

If Program D is adopted there is 1/3 probability that nobody will die, and 2/3 probability that 600 people will die. [78 percent]

Which of the two programs would you favor?
“Getting the water right” is not just a Florida problem

- California Central Valley: $8 bil
- Great Lakes: $20 bil
- Chesapeake Bay: $19 bil
- Louisiana Coast 2050: $14 bil
- Florida Everglades: $13 bil
Vannevar Bush, WWII “Office of Scientific Research and Development” for FDR/Truman

- led Manhattan Project, *inter alia*

Seeded NSF & NASA, *inter alia*

- principle that Federal gvt should support science
The fact that the annual deaths in this country from one or two diseases alone are far in excess of the total number of lives lost by us in battle during this war should make us conscious of the duty we owe future generations.

Third: What can the Government do now and in the future to aid research activities by public and private organizations? The proper roles of public and of private research, and their interrelation, should be carefully considered.

Fourth: Can an effective program be proposed for discovering and developing scientific talent in American youth so that the continuing future of scientific research in this country may be assured on a level comparable to what has been done during the war?

New frontiers of the mind are before us, and if they are pioneered with the same vision, boldness, and drive with which we have waged this war we can create a fuller and more fruitful employment and a fuller and more fruitful life.

I hope that, after such consultation as you may deem advisable with your associates and others, you can let me have your considered judgment on these matters as soon as convenient reporting on each when you are ready, rather than waiting for completion of your studies in all.

Very sincerely yours,

/s/

Franklin D. Roosevelt

Dr. Vannevar Bush,
Office of Scientific Research and Development
Washington, D. C.
Bush’s 3-part argument:
1. basic = research performed w/o thought of practical ends;
2. basic research is the pacemaker of technological progress;
3. if basic & applied are mixed, then applied invariably drives out the pure
“It is obvious that most of the basic secrets of nature have been unraveled by men who were moved simply by intellectual curiosity, who wanted to discover new knowledge for its own sake. The application of the new knowledge usually comes later, often a good deal later; it is also usually achieved by other men, with different gifts and different interests.”


“Because the National Science Foundation’s mandate is to support basic research, the NSF Cultural Anthropology Program does not fund research that takes as its primary goal improved clinical practice or applied policy. A proposal that uses anthropological methods to understand a social problem but does not propose to make a theory-testing and/or theory expanding contribution to anthropology will be returned without review.” (http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=50505)
If anesthesia was widely introduced in 1846, then why did cardiac surgery not take off for ~100 yrs?!!
If anesthesia was widely introduced in 1846, then why did cardiac surgery not take off for ~100 yrs?!

Conclusions
The basic-applied binary is:
• not linear & sequenced
• wrong often enough to call into question its validity
• therefore deserves elaboration
Frame-breaking

What would happen if we bent the line?
If anesthesia was widely introduced in 1846, then why did cardiac surgery not take off for ~100 yrs?!

(Stokes, 1997)
General form

(Stokes, 1997)
General form
<table>
<thead>
<tr>
<th>RANK</th>
<th>CITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hong Kong</td>
</tr>
<tr>
<td>2</td>
<td>Singapore</td>
</tr>
<tr>
<td>3</td>
<td>Dubai</td>
</tr>
<tr>
<td>4</td>
<td>Berlin</td>
</tr>
<tr>
<td>5</td>
<td>Stockholm</td>
</tr>
<tr>
<td>6</td>
<td>Brussels</td>
</tr>
<tr>
<td>7</td>
<td>Washington, DC</td>
</tr>
<tr>
<td>8</td>
<td>Hamburg</td>
</tr>
<tr>
<td>9</td>
<td>Munich</td>
</tr>
<tr>
<td>10</td>
<td>Miami</td>
</tr>
<tr>
<td>RANK</td>
<td>CITY</td>
</tr>
<tr>
<td>------</td>
<td>-----------</td>
</tr>
<tr>
<td>1</td>
<td>Hong Kong</td>
</tr>
<tr>
<td>2</td>
<td>Singapore</td>
</tr>
<tr>
<td>3</td>
<td>Dubai</td>
</tr>
<tr>
<td>4</td>
<td>Berlin</td>
</tr>
<tr>
<td>5</td>
<td>Stockholm</td>
</tr>
<tr>
<td>6</td>
<td>Brussels</td>
</tr>
<tr>
<td>7</td>
<td>Washington</td>
</tr>
<tr>
<td>8</td>
<td>Hamburg</td>
</tr>
<tr>
<td>9</td>
<td>Munich</td>
</tr>
<tr>
<td>10</td>
<td>Miami</td>
</tr>
</tbody>
</table>
Sustainability Science?
Sustainability Science?
Sustainability Science?
What kind of a science is sustainability science?

Robert W. Kates
Independent Scholar, Trenton, ME 04605

PNAS | December 6, 2011 | vol. 108 | no. 49 | 19449–19450
7 central research questions:

1. What shapes the long-term trends and transitions that provide the major directions for this century?

2. What determines the adaptability, vulnerability, and resilience of human–environment systems?

3. How can theory and models be formulated that better account for the variation in human–environment interactions?

4. What are the principal tradeoffs between human well-being and the natural environment?

5. Can scientifically meaningful “limits” be defined that would provide effective warning for human–environment systems?

6. How can society most effectively guide or manage human-environment systems toward a sustainability transition?

7. How can the “sustainability” of alternative pathways of environment and development be evaluated?
end

cpolsky@fau.edu
SAVE THE DATE #1
US Geological Survey & Center for Environmental Studies at Florida Atlantic University Present:

*Precipitation Downscaling Technical Meeting*
Mon. June 22 & Tues. June 23, 2015 • FAU Davie Campus

Join us for a scientific meeting for Florida environmental scientists & managers!
in-depth & Interdisciplinary.

How can precipitation downscaling be used to improve Everglades science & restoration?

www.ces.fau.edu/climate_change/downscaling

For more info: MaryBeth Hartman mhartman@fau.edu • Image source: University of Miami
SAVE THE DATE #2
US Geological Survey & Center for Environmental Studies at Florida Atlantic University Present:

_Invasive Species Technical Meeting_

September 2015 ▪ FAU Davie Campus

Still in the early planning stages!
Who should attend: academics, practitioners, scientists & decision makers.

What are the next steps for risk assessment and how do we collectively design an implementation strategy?

www.ces.fau.edu/climate_change/invasive-species

For more info: MaryBeth Hartman mhartman@fau.edu ● Image source: Florida Wildlife Magazine