


Institutional Scientific Challenges in Large-Scale Ecosystem Restoration

Donald F. Boesch

 South Florida ecosystem



GEER 2015

Greater Everglades Ecosystem Restoration

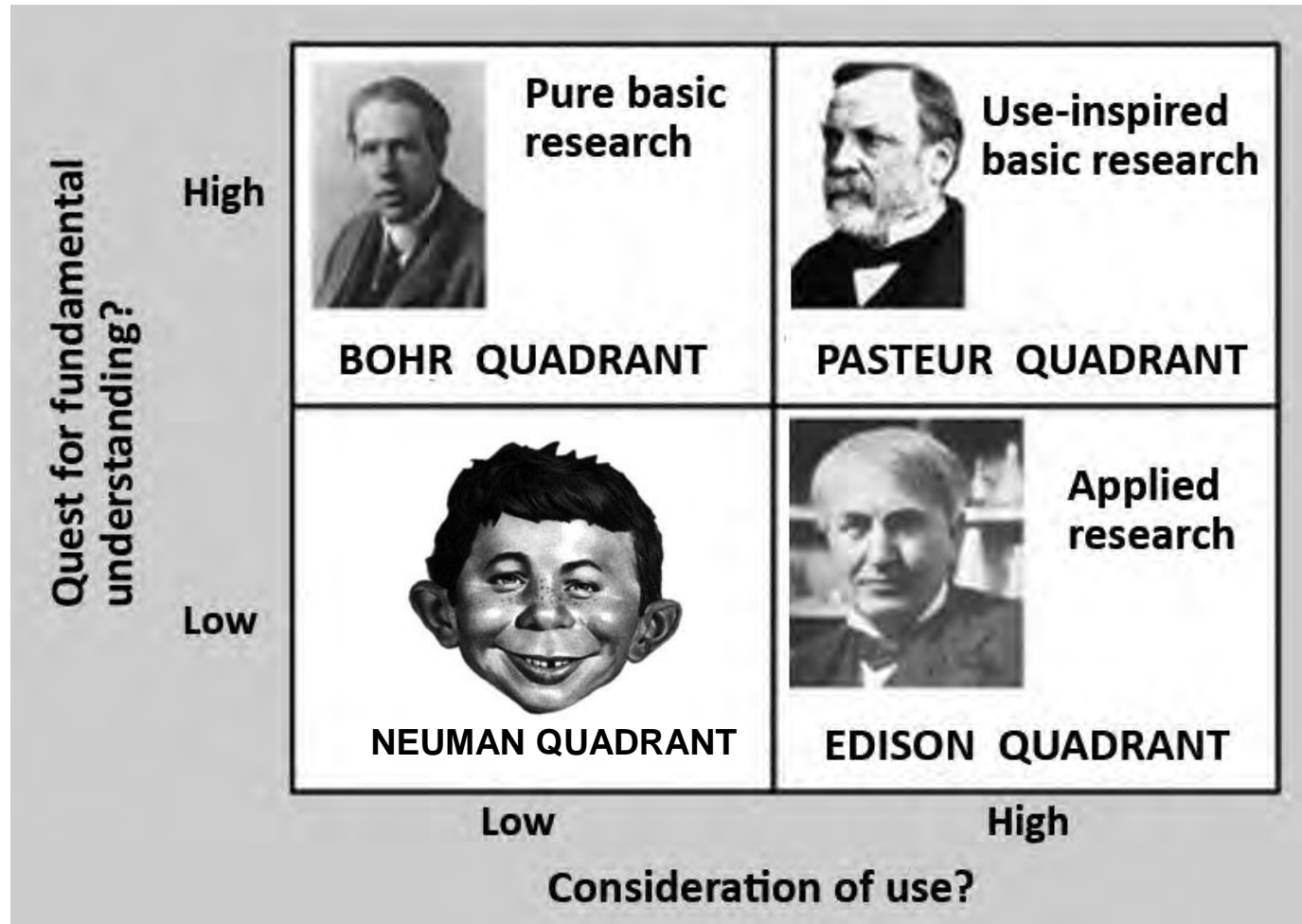


University of Maryland
CENTER FOR ENVIRONMENTAL SCIENCE

Committee on Independent Scientific Review of Everglades Restoration Progress

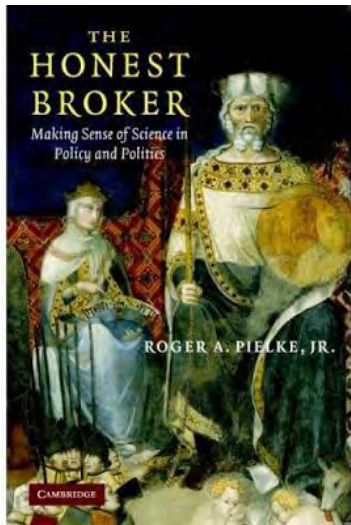


Should we be more like Pasteur?



Donald E. Stokes 1997. *Pasteur's Quadrant: Basic Science and Technological Innovation*

Who are the Honest Brokers?



Four idealized modes of engagement

		VIEW OF SCIENCE IN SOCIETY	
		Linear Model	Stakeholder Model
VIEW OF DEMOCRACY	Interest group pluralism	Pure Scientist	Issue Advocate
	Elite Conflict	Science Arbiter	Honest Broker of Policy Alternatives

Traditional Model of Scholarship



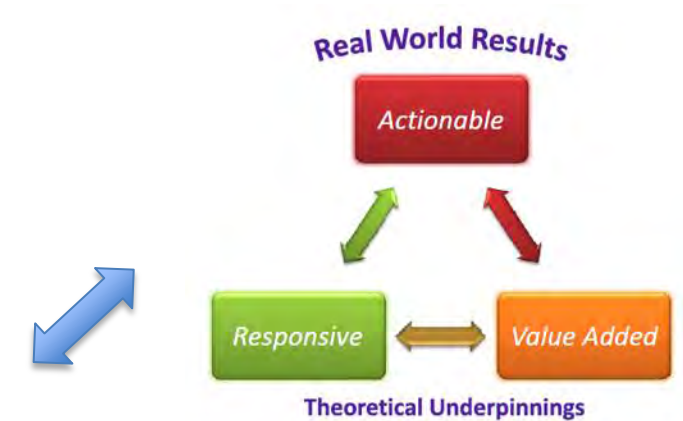
Redefining Scholarship



DISCOVERY



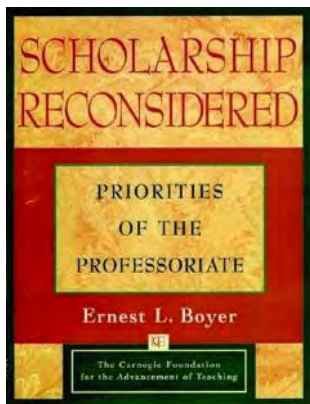
INTEGRATION



APPLICATION



TEACHING

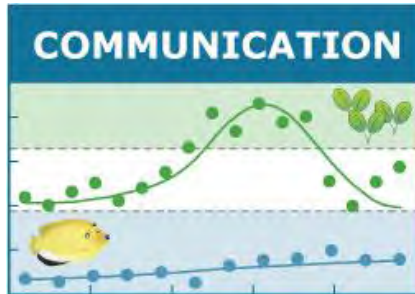


Ernest L. Boyer. 1990. *Scholarship Reconsidered: Priorities of the Professoriate*. Jossey-Bass, NY.



Integration & Application Network

Communicate better. Empower change.



Science communication



Environmental assessment



Capacity building



Rapid, informed response



Integration & Application Network

Communicate better. Empower change.



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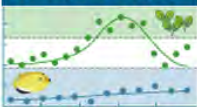
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April 3, 2015

Chesapeake Bay Phosphorus Pollution Is Derived from Land-Based Sources

Donald F. Boesch, Walter Boynton, Jeffrey Cornwell, William Dennison, Michael Kemp, and Jeremy Testa

University of Maryland Center for Environmental Science

Bay Creates Its Own Phosphorus? Amidst the recent controversies regarding proposed requirements to reduce phosphorus runoff from agricultural soils a new article in the scientific journal *Environmental Science & Technology (ES&T)* was published in February 2015 with the title "Organic matter remineralization predominates phosphorus cycling in the mid-bay sediments in the Chesapeake Bay" [1]. Media claims suggesting that the research shows that runoff of phosphorus from land is not an important cause of impaired water quality, including the so-called dead zone, merit the closer examination provided here.

The article was published by researchers from the University of Delaware and two other institutions. These investigators employed isotopic, X-ray diffraction and spectroscopic methods to assess the characteristics of the phosphorus included in sediment cores collected at a site in the Chesapeake Bay east of Prince Frederick, Maryland. From their results they inferred the sources of the sediment phosphorus that leaves the sediment and re-enters the water column. They concluded that recycling of the phosphorus in organic matter—presumably produced by organisms living in the estuary—rather than in mineral matter was the predominant pathway to support primary production in the

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Who ya gonna call? Recommendations for scientists who are called to action in a state of environmental emergency

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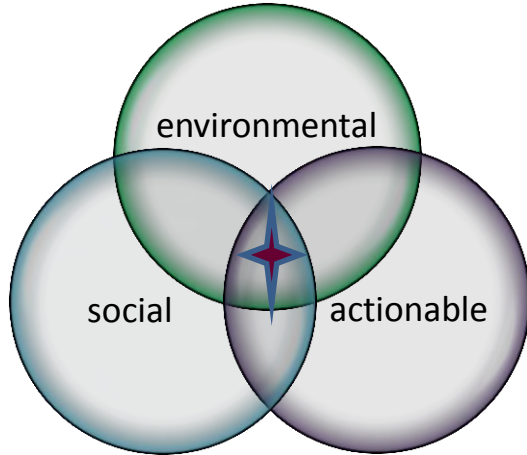
Categories

Environmental Literacy



National Socio-Environmental Synthesis Center

Building capacity to understand the structure, function, & sustainability of socio-environmental systems

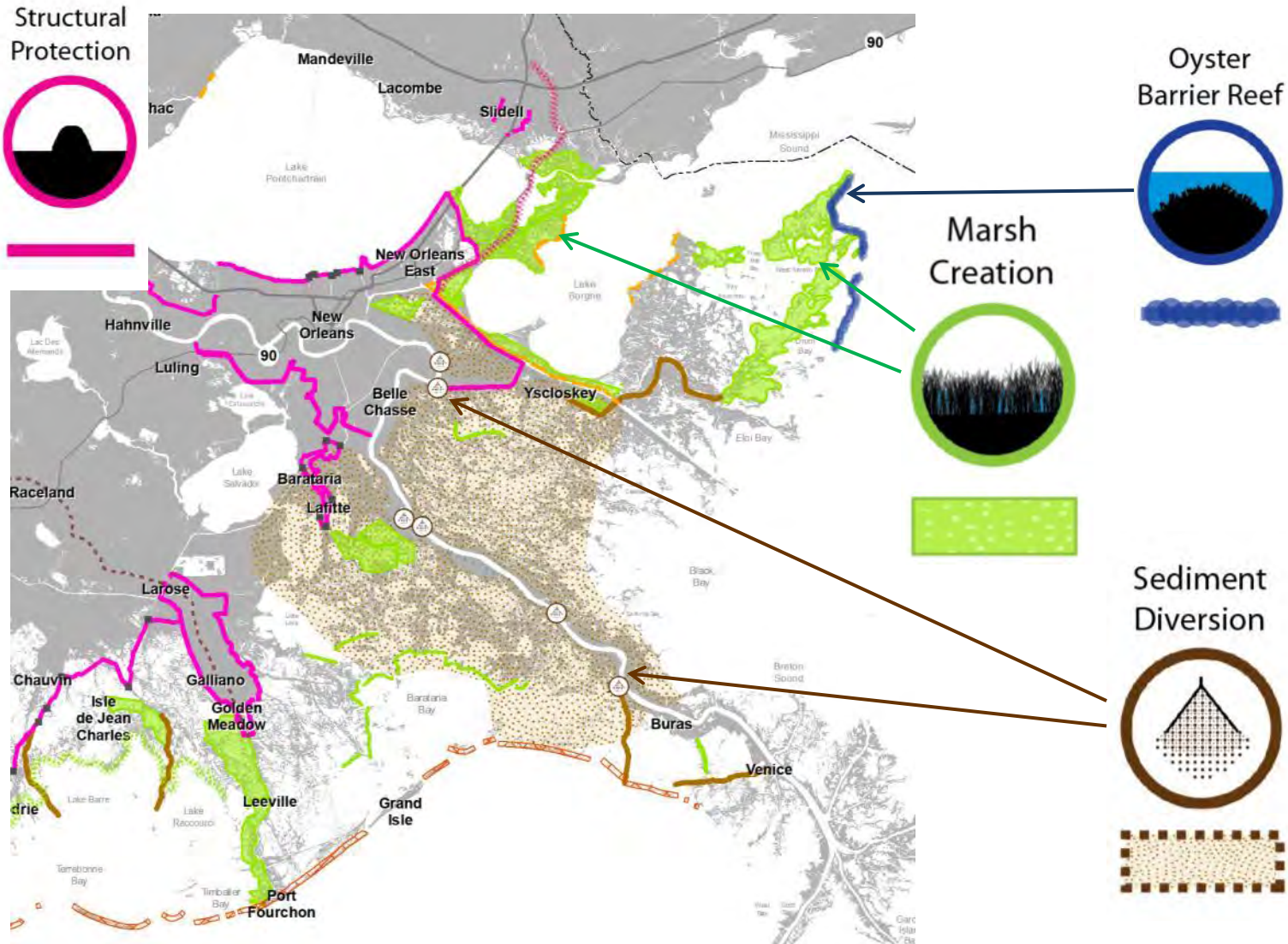


- A focus on the synthesis of diverse forms of knowledge needed for environmental problem solving.
- Active engagement and opportunities for scholars from social and natural science to work with government, NGO and business sectors.
- Processes designed to support for inter- and trans-disciplinary teamwork.
- Cyberinfrastructure to support aggregation, integration and analysis of diverse quantitative and qualitative data.





Louisiana Coastal Master Plan





Independent research program that will:

1. Study effects of *Deepwater Horizon* and similar incidents on the environment and public health and
2. Develop improvements for spill mitigation, oil detection and characterization, and advanced remediation technologies.

The **ultimate goal** of the GoMRI is to improve society's ability to understand, respond to and mitigate the impacts of petroleum pollution and related stressors of the marine and coastal ecosystems, with an emphasis on conditions found in the Gulf of Mexico. Knowledge accrued will be **applied to restoration and to improving the long-term environmental health** of the Gulf of Mexico.

DEEPWATER HORIZON GULF RESTORATION INITIATIVES

Civil Penalties

Transocean (\$1 billion) BP (unknown)

RESTORE

(\$800 m + x)

35% Direct Component

30% Comprehensive Plan Component

30% Spill Impact Component

2.5% Centers of Excellence Grants

2.5% NOAA Science Program

Criminal Penalties

BP (\$2.74 billion) Transocean (\$300 million)

National Academy of Sciences (\$500m)

National Fish and Wildlife Foundation (\$2.54b)

Mississippi \$356m

Alabama \$356m

Texas \$356m

Louisiana \$1.3b

Florida \$356m

Natural Resource Damages

Potentially Responsible Parties- BP, etc

NRDA

Trustee Council

BP Early Restoration (up to \$1b)

Nat. Res. Damages (TBA)



GOALS

1

Foster innovative improvements to safety technologies, safety culture, and environmental protection systems associated with offshore oil and gas development.

2

Improve understanding of the connections between human health and the environment to support the development of healthy and resilient Gulf communities.

3

Advance understanding of the Gulf of Mexico region as a dynamic system with complex, interconnecting human and environmental systems, functions, and processes to inform the protection and restoration of ecosystem services.

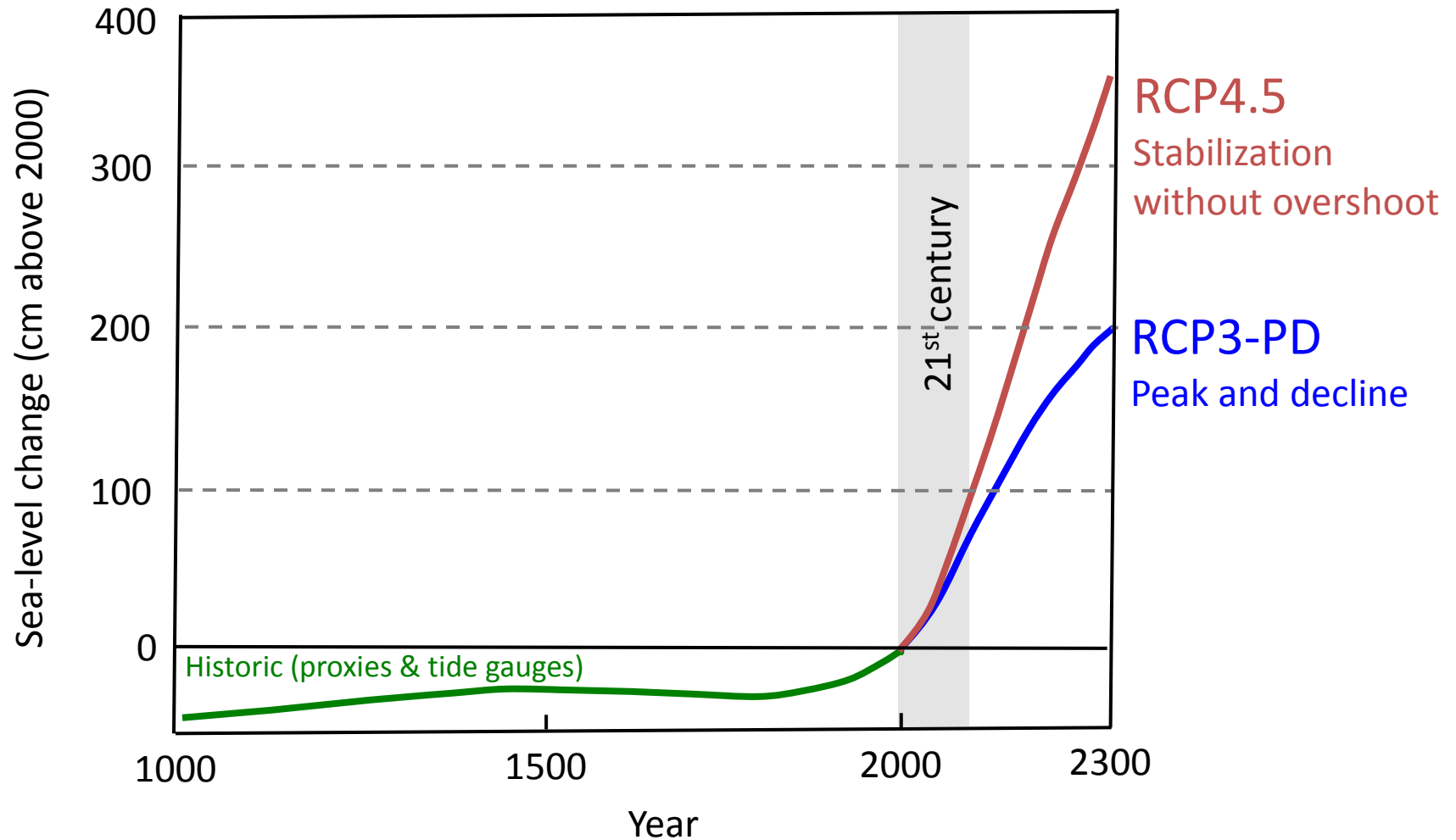
GULF RESEARCH PROGRAM

National Academy of Sciences
National Academy of Engineering
Institute of Medicine
National Research Council

Climate Change



Sea-level rise will not stop in 2100



Adapted from Schaeffer et al. 2012 *Nature Climate Change* 2: 867.

Bringing Rigor to Adaptive Management



Science & Society

Toward a Community of Practice



GEER 2015
Greater Everglades Ecosystem Restoration

Science in Support of
Everglades Restoration

April 21-23, 2015
Coral Springs, FL USA



CEER Conference on
Ecological and
Ecosystem
Restoration

Elevating the Science and Practice of Restoration
A Collaborative Effort of NCER and SER

July 28-August 1, 2014 • Hilton Riverside • New Orleans, Louisiana

#CEER2014



5th World Conference on Ecological Restoration
Madison, Wisconsin, USA • October 6 -11, 2013

Reflections on the Past, *Directions for the Future*