



Common Ground for Ecosystem Services and Ecosystem-Based Management ACES 2016

COMPASS



Entering the Century of the Environment: A New Social Contract for Science

Jane Lubchenco

As the magnitude of human impacts on the ecological systems of the planet becomes apparent, there is increased realization of the intimate connections between these systems and human health, the economy, social justice, and national security. The concept of what constitutes "the environment" is changing rapidly. Urgent and unprecedented environmental and social changes challenge scientists to define a new social contract. This contract represents a commitment on the part of all scientists to devote their energies and talents to the most pressing problems of the day, in proportion to their importance, in exchange for public funding. The new and unmet needs of society include more comprehensive information, understanding, and technologies for society to move toward a more sustainable biosphere—one which is ecologically sound, economically feasible, and socially just. New fundamental research, faster and more effective transmission of new and existing knowledge to policy- and decision-makers, and better communication of this knowledge to the public will all be required to meet this challenge.

Scientists today are privileged to be able to indulge their passions for science and simultaneously to provide something useful to society. With these privileges, of course, comes serious responsibility. The close of a century and a millennium provides an occasion for reflection on the nature of these responsibilities and an evaluation of the extent to which we are fulfilling them.

The scientific enterprise has provided phenomenal understanding of our bodies, our minds, our world, and our universe. The advances that have emerged from space, defense, and medical research, among many other areas—all of which have depended on basic research across all disciplines—have been astounding. Space exploration, for example, has given us not only new understanding of the cosmos, and wonderful products and technologies, but also a new sense of our world and ourselves: a sense captured forever by that first photograph of the whole Earth taken against the black background of space. Scientific research is advancing explosively on all fronts. The benefits include a dizzying array of new knowledge, economic opportunities, and products—ranging from laser surgery to genetic testing, from global positioning systems to prediction of El Niño events, from the discovery of new drugs derived from natural products to new information systems.

In the United States, much of the in-

vestment that produced this wealth was a result of strong bipartisan political support and popular enthusiasm for science that began during World War II and increased substantially in the 1960s. This support was predicated in part upon an (unwritten) social contract between science and society, specifically the expectation that a substantial investment in research would result in winning the war (initially World War II and later the Cold War), winning the space race, and conquering diseases (bacterial infections, polio, and cancer). The scale of the U.S. investment in science changed dramatically during this period. Investment in science in most other developed nations is predicated upon a similar expectation of a return of knowledge and technology to society. The scientific enterprise that has produced this wealth is widely admired and envied. The question I pose is whether the enterprise that has met these past challenges is prepared for the equally crucial and daunting challenges that lie in our immediate future. The answer that I must give is "no." I assert that the immediate and real challenges facing us have not been fully appreciated nor properly acknowledged by the community of scientists whose responsibility it is, and will be, to meet them.

Part of our collective responsibility to society must include a scientific community-wide periodic reexamination of our goals and alteration of our course, if appropriate. The fact that the scientific community has responded to societal needs several times in the past century—although generally in wartime—provides encouragement that it is possible to mobilize and change course rap-

idly in the face of a crisis. As the geologist Marshal Kay was fond of saying, "What does happen, can happen."

Despite the plethora of reports examining the future of the scientific enterprise (1, 2), I see the need for a different perspective on how the sciences can and should advance and also return benefit to society. This different perspective is firmly embedded in the knowledge of specific, identifiable changes occurring in the natural and social worlds around us. These changes are so vast, so pervasive, and so important that they require our immediate attention. Scientific knowledge is urgently needed to provide the understanding for individuals and institutions to make informed policy and management decisions and to provide the basis for new technologies.

This paper is organized around four key questions: How is our world changing? What are the implications of these changes for society? What is the role of science in meeting the challenges created by the changing world? and How should scientists respond to these challenges? My goal in communicating these thoughts is to stimulate a dialogue within the scientific community on these topics. I hope that the result will be a thoughtful reexamination of our individual and collective priorities and actions.

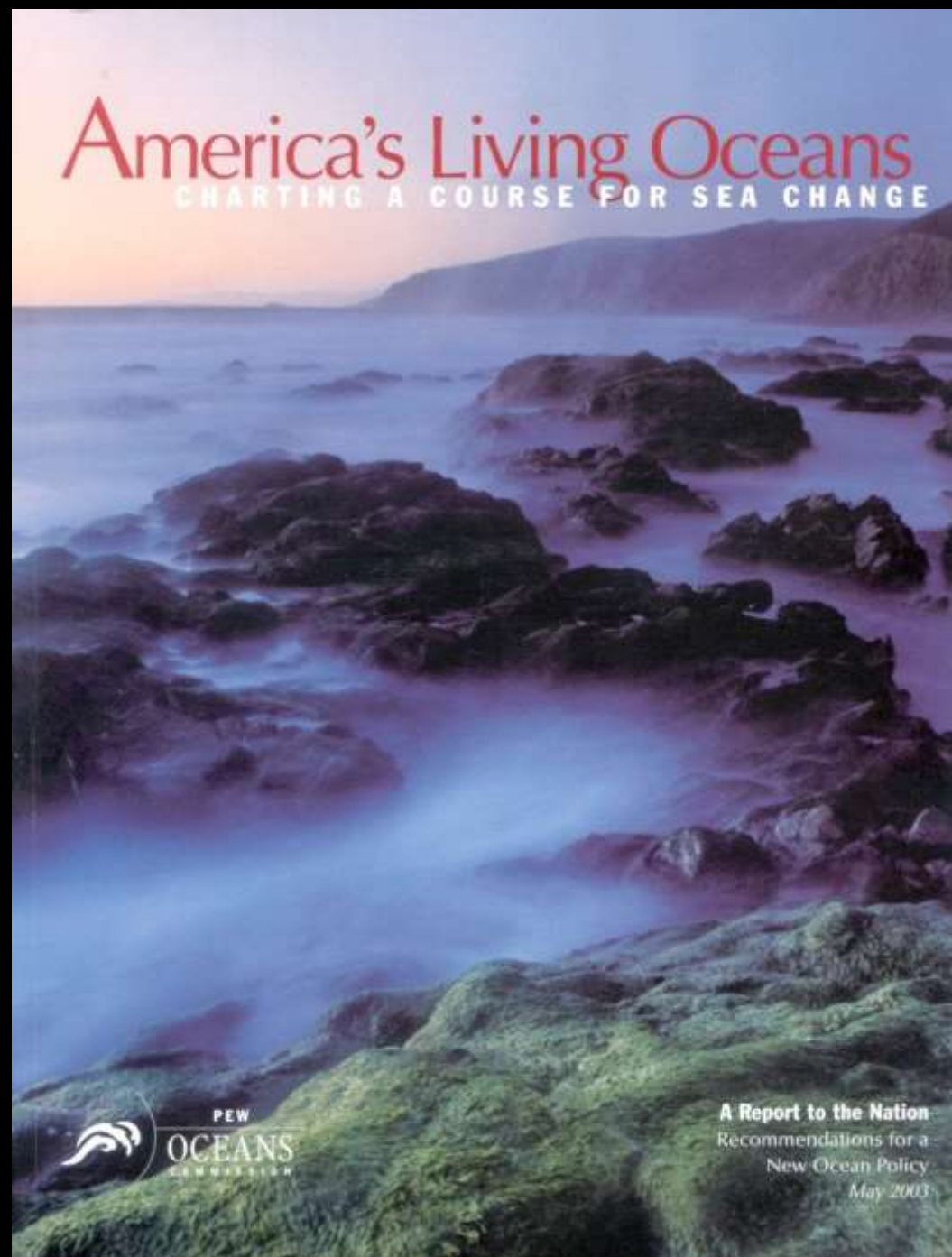
The Board of Directors of AAAS has initiated an electronic discussion of the relationship between science and society. A paper summarizing its deliberations along with comments from a number of scientists are posted to invite an exchange of ideas on the questions posed above. On behalf of the Board, I invite your participation (3).

Global Changes and Their Causes

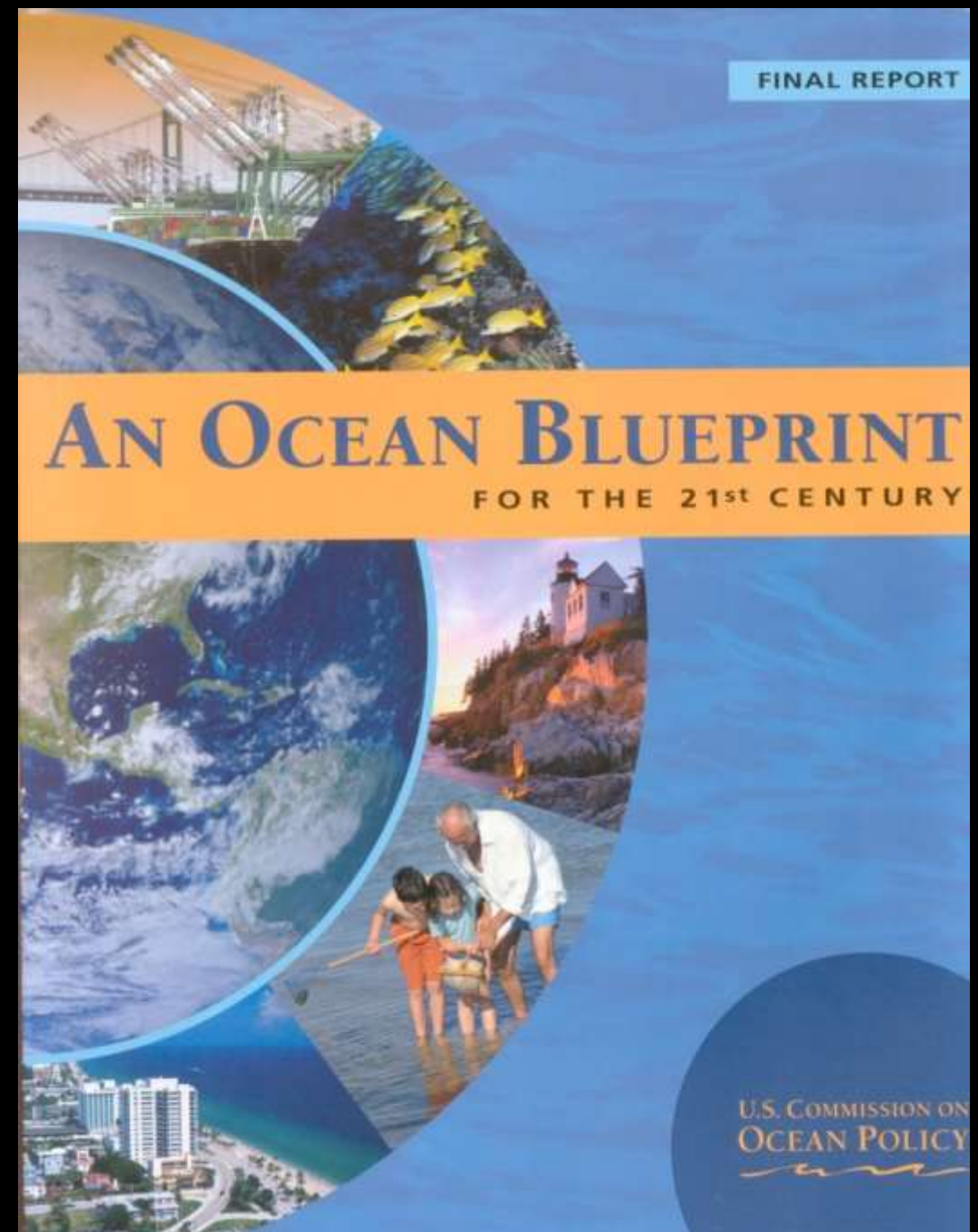
How is our world changing? One major way is that we now live on a human-dominated planet. The growth of the human population and the growth in amount of resources used are altering Earth in unprecedented ways. Through the activities of agriculture, fisheries, industry, recreation, and international commerce, humans cause three general classes of change. Human enterprises (i) transform the land and sea—through land clearing, forestry, grazing, urbanization, mining, trawling, dredging, and so on; (ii) alter the major biogeochemical cycles—of carbon, nitrogen, water, synthetic chemicals, and so on; and (iii) add or remove species and genetically distinct populations—via habitat alteration or loss, hunting, fishing, and introductions and invasions of species (4–6).

The resulting changes are relatively well documented but not generally appre-

The text is modified from her Presidential Address at the Annual Meeting of the American Association of the Advancement of Science, 15 February 1997. The author is in the Department of Zoology, Oregon State University, Corvallis, OR 97331-2914, USA. E-mail: lubchenj@bcc.orst.edu

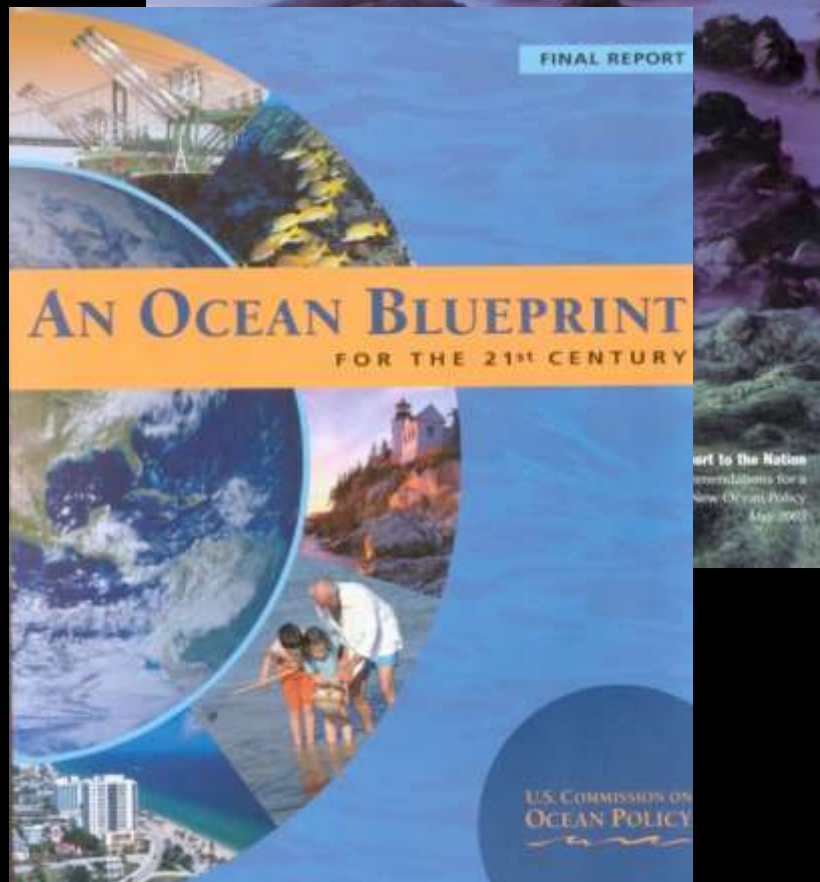


Pew Oceans
Commission 2003



U.S. Commission
on Ocean Policy 2004

Scientific Consensus Statement on Ecosystem-Based Management



- Power of scientists' collective voice
- Catalyst for dialogue among policymakers and within agencies
- Definition incorporated into state and regional policies
- Exact language appears in US National Ocean Policy (2009)

EBM Consensus Statement

Ecosystem-Based Management (EBM) is an integrated approach to resource management that considers the entire ecosystem, including humans, and the elements that are integral to ecosystem functions.

Draft National Ocean Policy Implementation Plan

National Ocean Council



An America whose stewardship ensures that the ocean, our coasts, and the Great Lakes are healthy and resilient, safe and productive, and understood and treasured so as to promote the well-being, prosperity, and security of present and future generations.



REPORT ON THE IMPLEMENTATION OF THE NATIONAL OCEAN POLICY

March 2015





REPORT TO THE PRESIDENT
SUSTAINING ENVIRONMENTAL
CAPITAL: PROTECTING SOCIETY
AND THE ECONOMY

Executive Office of the President
President's Council of Advisors
on Science and Technology

JULY 2011









White House Roundtable on Intersection of Ecosystem Services Science with National Ocean Policy

*A discussion on streamlining federal efforts on ecosystem services, ecosystem-based management,
and climate resilience.*

May 13, 2016

Eisenhower Executive Office Building – Room 472

Goals of the Meeting

- I. Explore how related work streams intersect for ecosystem services, ecosystem-based management, and climate resilience.
- II. Discuss potential benefits of integration.
- III. Identify specific opportunities to integrate approaches (e.g. implementation guidance on ecosystem services, agency practice, NEPA, and performance measures).



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