2011

Blue Planet Prize

Dr. Jane Lubchenco (USA)

Under Secretary of Commerce for Oceans and Atmosphere
Administrator of the National Oceanic and Atmospheric Administration (NOAA)

Barefoot College (Founded in India)

Wish:

The B1ue Planet we live in called Earth
Is full of life
Filled with prayers of hope
Woven by life longing for happiness of being itself

And we ourselves also
Given life on this Earth
Intone the melodies of prayer
Passing them over
With full of wishes of all the lives
Bred on this B1ue Planet
Breathed on this B1ue Planet
We ourselves also are fulfilled
By the prayers of hope
Of lives longing for happiness of being themselves

To know that the film this time
Came to be of help
For you to listen to the melodies of prayer
Woven, filled with hopes by all the lives
Bred and breathed on this planet of life called Earth
We are more than delighted

Selected from the Slide Show Presented at the Opening of the Awards Ceremony

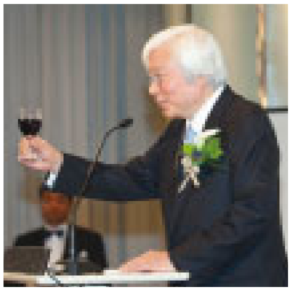
His Imperial Highness Prince Akishino congratulates the laureates

Their Imperial Highnesses Prince and Princess Akishino congratulate the laureates at the Congratulatory Party

The prizewinners receive their trophies from Chairman Tanaka

Dr. Jane Lubchenco

Mr. Bunker Roy,
Founder of the Barefoot College



Dr. Hiroyuki Yoshikawa, Chairman of the Presentation Committee makes a toast at the Congratulatory Party

Mr. John Victor Roos, Ambassador of the United States of America to Japan (left) and Dr. Chadaram Sivaji, Counsellor, Embassy of India, congratulate the laureates

Dr. Yoshihiro Hayashi, Chairman of the Selection Committee explains the rationale for the determination of the year's winners

The prizewinners meet with the press prior to the awards ceremony

Profile

Dr. Jane Lubchenco

Under Secretary of Commerce for Oceans and Atmosphere
Administrator of the National Oceanic and Atmospheric Administration (NOAA)

Education and Academic and Professional Activities

1947	Born in USA
1969	B.S. in biology at the Colorado College
1971	M.S. in ecology at the University of Washington
1975	Ph.D. in ecology at Harvard University
1975-1977	Assistant professor at Harvard
1978-1982	Assistant professor at Oregon State University
1978-1984	Research associate, Smithsonian Tropical Research Institute, Panama
1979	Awarded the George Mercer Award from the Ecological Society of America for the best paper on ecology published in 1978
1982-1988	Associate professor of zoology at Oregon State University
1988	Full professor of zoology at Oregon State University
1989-1992	Chairperson of the department of zoology at Oregon State University
1992	President of the Ecological Society of America
	Pew Scholar in Conservation and the Environment
1993	Elected to the American Academy of Arts and Sciences
1993-1996	A John D. And Catherine C. MacArthur Fellow
1993-2009	Distinguished Professor of Zoology, Oregon State University
1994-95, 1999-2000, 2002-2003	A visiting researcher, University of Canterbury, Christchurch, New Zealand
1995-2009	Wayne and Gladys Valley Professor of Marine Biology, Oregon State University
1996	Elected to the (US) National Academy of Sciences
1996-2006	Member of the National Science Board (Board of Directors for the National Science Foundation); nominated by President Clinton and confirmed by the US Senate
1997	President of the American Association for the Advancement of Science
1998	Elected to the American Philosophical Society
2002-2005	President of the International Council for Science
2002	Elected to the European Academy of Sciences
	Heinz Award for the Environment, Heinz Family Foundation
2003	Nierenberg Prize for Science in the Public Interest, Scripps Insitution of Oceanography
	Highly Cited Researcher in Ecology/Environment, ISI

2004	Elected Foreign Member of the Royal Society (UK)
	Elected Associate Member of the Academy of Sciences for the Developing World (TWAS)
	The Distinguished Scientist Award from the American Institute of Biological Sciences
2005	The Public Understanding of Science and Technology Award from the American Association for the Advancement of Science
2007	Elected Corresponding Member of the Academia Chilena de Ciencias (Chilean Academy of Sciences)
2008	The Zayed International Prize for the Environment, Dubai, United Arab Emirates
2009-present	Under Secretary of Commerce for Oceans and Atmosphere for the National Oceanic and Atmospheric Administration (NOAA)
2010	Peter Benchley Ocean Award for Excellence in Policy, Blue Frontier
	Newsmaker of the Year, the scientific journal *Nature*
2011	Public Understanding of Science Award, the *Exploratorium*

(As of June, 2011)

As a biologist and ecologist, Dr. Jane Lubchenco has contributed a legacy of research that offers profound insight into the way in which marine organisms interact with one another and adapt to their environments. Her outstanding scientific research has demonstrated that human activities have changed the physical structure, chemistry and biology of our planet, and that these changes in turn affect human well-being. She has been a leader in encouraging industries and governments to develop new methods and technologies that will reduce threats to the global environment. Dr. Lubchenco is most widely recognized for her efforts to bridge the gap between scientists and society.

Dr. Lubchenco has left a tremendous impact on the scientific community as well as the general public by showing clearly that while science should be rigorous and objective, scientists must not ignore their responsibility to communicate their knowledge about how the Earth is changing and help develop solutions to minimize adverse impacts. She is an excellent role model, a contemporary environmental scientist of great responsibility, integrity, and commitment.

Dr. Lubchenco was born December 4, 1947, in Denver, Colorado. She entered Colorado College in 1965, where she majored in biology and received her B.S. in 1969. She earned her M.S. in ecology from the University of Washington in 1971 and completed a Ph.D. in ecology at Harvard University in 1975.

Dr. Lubchenco worked as an assistant professor at Harvard from 1975 until 1977. With grants from the National Science Foundation, she conducted research in New England and Panama. She was a visiting professor at the Discovery Bay Marine Laboratory in Jamaica, and a research associate at the Smithsonian Tropical Research Institute in Panama.

In the early 1970s, she married Dr. Bruce Menge, who is also an ecologist. In 1978, Dr. Lubchenco and her husband moved to Corvallis, Oregon, to become Assistant Professors at Oregon State University. They pioneered a novel solution for academic career couples by splitting a single professorship into two half-time, tenure-track positions. This arrangement enabled each of them to teach, do research, and spend significant amounts of time with their children. They have two sons. During this period, she did field research in Panama for six years, which resulted in a number of highly cited papers about the ecology of plant-herbivore interactions, predator-prey interactions, algal ecology and community ecology.

In 1979, Dr. Lubchenco and her husband won the George Mercer Award from the Ecological Society of America for the best paper on ecology published in 1978.

In the 1980s, Dr. Lubchenco became a visiting professor in ecology at the University of Antofagasta in Chile and the Institute of Oceanology in Qingdao, China. From 1982 to 1984, she also served as a council member of the Ecological Society of America. In 1988, she was promoted to full professor of zoology at Oregon State University, where she was chairperson of the department of zoology at Oregon State University from 1989 to 1992. She taught and conducted research at Oregon State University until 2009.

Dr. Lubchenco's highly influential research contributions include topics such as marine ecosystem services, the relationship between biodiversity and ecosystem functioning, causes and consequences of climatic change, the design of marine reserves, aquaculture, dead zones, and the interface between economics and ecology. One of her most important contributions to science is the "Sustainable Biosphere Initiative." This multi-authored report, published in 1991, highlights climate change, biodiversity, and sustainability science as priorities for ecological research because of their relevance to solving global problems.

For her pioneering scientific work and social activities, Dr. Lubchenco has won numerous awards. She was elected president of the Ecological Society of America in 1992 and of the American Association for the Advancement of Science (AAAS) in 1997. In her address as president of AAAS, Dr. Lubchenco introduced the seminal concept of a "social contract" between scientists and society in 1997. She outlined the intimate connections between the environment and human health, the economy, social justice, and national security. According to the "contract," scientists should make a commitment to exert all the power of science to discover new knowledge, to communicate existing and new understanding to the public and policy makers, and to help society transition to a more sustainable biosphere.

Through concepts like the "social contract," Dr. Lubchenco seeks to incorporate sound and clearly stated scientific ecological principles into responsibly enacted public policy. She has shown that the environment is too great an issue for partisanship, because its condition affects us all.

Dr. Jane Lubchenco is now Under Secretary of Commerce for Oceans and Atmosphere and the Administrator of the National Oceanic and Atmospheric Administration (NOAA). She is the first woman and the first marine ecologist to lead NOAA.

NOAA seeks to understand and predict changes in the oceans and atmosphere, to use that knowledge to save lives and property and contribute to the economy, and to be good stewards of oceans and coasts.

Lecture

The Beauty, the Bounty, and the Power of Oceans: Achieving a Sustainable Future for our Blue Planet

Dr. Jane Lubchenco

Slide 1※ - Introduction

It is a singular honor to accept the prestigious Blue Planet Prize. I extend my deepest gratitude to the Asahi Glass Foundation, and I applaud the Foundation's recognition of the importance of science-based environmental conservation for our blue planet. I also extend my heartfelt thanks to the people of Japan for their gracious hospitality, and to all of you for coming today.

Our planet is indeed blue:

- The oceans cover 71% of the Earth's surface and contain 97% of the planet's water ;
- They are the likely origin of life on Earth ;
- They support far greater biodiversity – more different kinds of life – than exists on land ; and
- They regulate our weather and climate and provide life support systems for the planet.
- In short, oceans sustain life on earth.

The blue parts of our blue planet have long served as grocery stores, pharmacies, highways, playgrounds, temples and shrines for people on Earth. They inspire us and offer knowledge for those who choose to listen.

However, misled by their vastness and blinded by their murky depths, humanity has taken the beauty, bounty, majesty and mystery of oceans for granted. Thus far, we have failed to safeguard their future—and, therefore, ours. Those who work on and live near the water have witnessed first-hand the changes unfolding in the places they frequent. But make no mistake: the scale of change is global. Overfishing, habitat destruction, pollution, climate change and ocean acidification have taken their toll, disrupting ocean ecosystems and resulting in depleted fisheries, endangered wildlife, tainted seafood, bleached corals, depauperate coral reefs, blooms of jellyfish, harmful algae, and pathogens. The result is increasingly vulnerable coastal communities, economies and societies.

This depletion and disruption affect our economies, our health, the harmony of life, and our future. We are losing the numerous benefits that healthy ocean ecosystems provide such as food security, jobs, vibrant communities and healthy economies, protection from storms, climate regulation, recreational opportunities and cultural icons. Healthy oceans are the life-support system for the planet. Human societies, economies, and health depend on them.

Few people appreciate the seriousness of the problems. Many people see oceans as

※ There are supplement slides *at the back of* the section.

infinitely bountiful. It is hard for them to believe that something so immense could be impacted in severe, and potentially irreversible, ways. Through advances in science, we know that oceans are NOT infinitely bountiful and resilient. They are fragile and vulnerable to human impacts. Those who see the problems may be intimidated by the challenges associated with transitioning to more sustainable practices and policies.

Moreover, far too many people view environmental sustainability as a barrier to economic progress. In reality, having to choose between the economy and the environment is a false dichotomy. Solutions exist to achieve economic growth while maintaining and recovering the life-support services provided by ecosystems. Scientific information has not only helped us understand the problems, it is providing solutions.

Now is a pivotal moment. Global population is 7 billion and growing, with consequent increasing needs for basic goods and services. The environment is changing rapidly and radically. The accelerating pace of environmental change presents serious challenges – and opportunities – for individuals, nations, and the global community to make a transition toward more sustainable practices and policies.

Fortunately, awareness of the challenges facing our oceans is increasing and science-based solutions are readily available. Protecting and restoring healthy oceans is eminently feasible. Success stories abound, but are not at the scale needed. Now is the time to embrace the opportunity to chart a new course for oceans and ourselves.

Today, I focus on proven solutions that emphasize local empowerment, provide opportunities for industry, align conservation and economic incentives, and are grounded in scientific understanding. They enable us to use oceans without using them up. The goal is simple: healthy oceans and healthy people – major ingredients for a healthy blue planet.

Slide 2 - My Perspectives

My focus is influenced by my experiences — as a person, scientist, academic researcher, teacher, and now leader of a federal agency, the National Oceanic and Atmospheric Administration, or NOAA. NOAA's portfolio includes oceans, coasts, weather and climate. Through science, services and stewardship, NOAA saves lives, creates jobs and enables commerce, promotes healthy oceans and coasts and enables informed decision-making. This last role has given me a keen appreciation for the importance of partnerships in dealing with challenges, especially those involving oceans.

Little did I know that a year and a month into my job at NOAA, the U.S. would face an unprecedented environmental disaster in our waters and along our shores — the Deepwater Horizon oil spill in the Gulf of Mexico. Approximately 4.9 million barrels of oil flowed over three months, affecting much of the Gulf itself and over 1,000 miles of shoreline. NOAA's role was to provide scientific guidance, ensure seafood safety, protect habitats and wildlife, assess damage, enable restoration and share information with a wide range of interested parties.

The generosity and assistance provided by our international partners during the Deepwater Horizon disaster was extraordinary. We greatly appreciate the containment boom, oil skimmers, and technical expertise provided by the Government of Japan.

In the aftermath of this year's Tohoku earthquake and tsunami, it was our turn to offer support and kindness to our friends in Japan. NOAA continues to collaborate closely with both Japanese and U.S. Government agencies to assist with response efforts.

Because we had to address similar issues and use similar tools in response to Deepwater Horizon, we shared the lessons we learned and the science we developed during that disaster to support Japan's response efforts. For example, at the invitation of the Japan Agency for Marine-Earth Science and Technology, NOAA participated in a workshop to compare U.S. and Japanese ocean plume models. We are also working closely with Japan on the issue of seafood safety.

Strong partnerships between our countries are critical during times of crisis. Partners communicate and collaborate, they share information and expertise. And these partnerships do not end when the acute phase of a disaster has passed. Rather, partners stand by each other and help each other along the long road to recovery and in determining ways to prevent or minimize future disasters.

Although the vast majority of the oil in the Gulf of Mexico is now gone, and Japan is beginning to recover from the havoc wreaked by the Tohoku earthquake and tsunami, these disasters provide a stark reminder of the interconnectedness of healthy oceans and the communities and economies that depend on them. While the effects of these disasters will be felt for years, we will not rest until the affected communities and ecosystems are made whole again. These disasters also remind us of the importance of addressing other serious problems that emerge more slowly than an acute disaster.

Taking Stock of the Challenges: What Do We Actually Know?

A brief summary of the problems to be addressed sets the stage for considering solutions. Scientific monitoring tells us that deterioration of our coastal and ocean ecosystems is substantial and increasing. I summarize key physical and chemical changes first, then biological and ecological ones. (Social changes are equally important, but I leave those to social scientists.)

Slide 3 - (A) Physical

Compared to a century ago, oceans are now warmer, higher, stormier, saltier, lower in oxygen and more acidic.

- Global sea surface temperatures have warmed approximately 0.4°C since the 1950s (Levitus et al. 2009) due primarily to the burning of fossil fuels. Sea surface temperatures are projected to increase another 1.8°C to 4.0°C over the twenty-first-century (Solomon et al. 2007). Warmer waters cause coral bleaching, range shifts, altered productivity, and increases in invasive species.
- Increased concentrations of carbon dioxide in the atmosphere (due primarily to burning of fossil fuels) results in increased carbon dioxide in oceans, which causes oceans to be more acidic. Oceans have become approximately 30% more acidic over the past 150 years, and are expected to become more corrosive by the end of this century (Feely et al. 2009). Impacts of this "ocean acidification" will be particularly

severe for calcifying species, including shellfish, corals, and many types of plankton that serve as critical food sources for ocean life.

Slide 3 - (B) Biological

Coastal and oceanic species and habitats have also been significantly altered. Oceans have fewer top predators, more overfished species and more endangered species. There are more harmful algal blooms, more outbreaks of pathogens and pests like jellyfish, more dead zones, more degraded estuaries and coral reefs, and fewer salt marshes and mangroves.

- Fisheries provide food, jobs and opportunities for trade. Although progress is being made in recovering a number of major fisheries (Worm et al. 2009), historic and continuing overfishing on many others puts continued benefits at significant risk. Over 90% of the large, predatory fish biomass in our oceans is gone (Myers & Worm 2003). Thirty-two percent of the world's recognized marine fisheries are overexploited, depleted, or recovering—up from 10% in 1974 (FAO 2010), and these figures do not include the illegal, unregulated and unreported fishing that is suspected of totaling up to 30% of catches in some fisheries.
- All seven sea turtle species are threatened or endangered (Convention on International Trade in Endangered Species of Wild Fauna and Flora), due to a combination of being caught accidentally in fishing gear and destruction of nesting beaches.
- Half of the world's salt marshes, and approximately a third of the world's mangroves and seagrass beds, are already lost or degraded; coral cover has declined by 80% in the Caribbean and 50% in the Pacific (Jackson 2010).
- Increased use of fertilizers, loss of native vegetation along streams and rivers and more concentrated livestock operations have led to increased run-off of nutrients, especially nitrogen and phosphorus. This nutrient pollution causes increases in harmful algal blooms and areas of low-to-no oxygen (so-called 'dead zones'). The number of dead zones around the world has approximately doubled each decade since the 1960s (Diaz & Rosenberg 2008). A recent study identified more than 530 dead zones around the world (WRI 2011).

In short, we have inadvertently altered the chemistry, physical structure and biology of the oceans. The result is a loss of food supply, water purification, pest control, climate regulation and the buffering of coastal areas from storms and tsunamis.

Solutions

Thanks to advances in science, and new partnerships, approaches and policies, creative solutions are emerging to restore the bounty and beauty of oceans. These solutions offer models and hope. I wish to highlight five categories of solutions: (A) ecosystem-based approaches and spatial planning, (B) fisheries management, (C) habitat management and marine reserves, (D) adaptation to climate change and ocean acidification, and (E) greater awareness.

Slide 4 - (A) Ecosystem Approaches and Spatial Planning : A New Conceptual Framework and New Tools.

1. *Ecosystem Approaches.* Historically, different activities in oceans have been managed on a sector-by-sector or issue-by-issue basis. Often different agencies regulate fisheries, aquaculture, oil and gas production, renewable energy production, water quality, endangered species, marine transportation, marine mammals, and undersea cables, etc., with little regard to interactions with other sectors or issues. In the U.S., there are over 140 different laws and regulations that govern ocean policies and practices at the federal level alone. This hodgepodge approach has contributed significantly to depleted and degraded oceans, frequent conflicts among users, uncertainty or endless red-tape for industry, overlapping jurisdictions as well as gaping holes in responsibility.

Ecosystem approaches provide a more holistic method for minimizing adverse environmental impacts and bringing greater predictability and cohesion. An ecosystem approach considers the individual and collective environmental impacts of different activities, and the importance of maintaining basic ecosystem patterns and processes -- the conditions required to ensure a healthy, productive and resilient ecosystem.

Ecosystem approaches consider people as part of ecosystems and enable an overarching focus on stewardship.

2. *Ecosystem Services.* An ecosystem approach focuses on the importance of maintaining the provision of essential ecosystem services. Ecosystem services are the benefits provided by healthy, resilient ecosystems such as the provision of seafood, nutrient recycling, climate regulation, protection of shores from erosion and storms, control of pests and pathogens and more. Each different coastal or oceanic ecosystem – from an estuary to a coral reef, from a kelp forest to the deep sea, from the tropics to the poles – provides a wealth of services. Ecosystem services are a byproduct of the interactions of plants, animals and microbes in an ecosystem.

Some uses of oceans impair the continued delivery of ecosystem services, others do not.

When an ecosystem is converted from one use to another, some services may be lost, and others gained. For example, when mangroves are converted to shrimp ponds, we obtain the service of food production. However, we lose the natural services provided by those mangroves, such as protection from storms, filtration of pollutants, trapping of sediment, production of wood for boats or firewood, and provision of nursery habitat for juvenile fishes or crabs or adult habitat for birds. Typically, decisions to convert a habitat are made without consideration of the tradeoffs – what is lost and what is gained.

3. *Marine InVEST.* Complementing the ecosystem approach are new scientific analyses to evaluate ecosystem services and trade-offs among different uses. Several tools have emerged recently that help. One promising tool is called Marine InVEST—which stands for Integrated Valuation of Ecosystem Services and Tradeoffs. Developed by the Natural Capital Project of Stanford University, The Nature Conservancy, and World Wildlife Fund, in partnership with NOAA, this tool facilitates scientific understanding and communication of ecosystem services through the modeling, mapping, and valuation of ecosystem services.

Marine InVEST allows users to visualize the tradeoffs among environmental, economic, and social benefits that result from various decisions or management strategies. InVEST offers a new approach for incorporating scientific information about ecosystem services into decision-making, spatial planning, and resource management. This tool is particularly effective in the context of coastal and marine spatial planning.

Successful ecosystem approaches focus on maintaining the resilience of the ecosystem, not simply on production of one or more services such as production of food. Innovative efforts are underway to identify indicators of ecosystem health to assist these novel ways of thinking about policy and management.

Increasing demands on ocean space for diverse uses, including tourism, recreation, fishing, shipping, national security, oil and gas exploration, and wave and wind energy, have led to more and more conflicts among users—as well as additional impacts on ocean ecosystems already stressed by climate change and more. Spatial planning is another new tool designed to minimize both conflicts among uses and environmental impacts. Spatial planning considers the full range of possible activities in an area then identifies the combinations of uses that achieve the dual goals. Spatial planning enables integrated, forward-looking decision making. Enhanced certainty and predictability for industry, improved stewardship and sustainable use provide compelling reasons for this more comprehensive approach.

Spatial planning has been practiced on land for centuries but is a relatively new concept for oceans. The first large-scale comprehensive CMSP effort was developed in the 1980s for the Great Barrier Reef Marine Park in Australia. Under the Great Barrier Reef plan, specific areas are designated for different uses, including fishing and tourism, and other areas are designated as fully protected, helping to minimize user conflicts and ecosystem impacts.

Successful implementation of spatial planning depends on accessible scientific information, user-friendly tools and a social process for setting goals and choosing options. Marine InVEST, described earlier, is helping coastal communities understand the trade-offs among ecosystem services that flow from different management decisions. One example comes from Vancouver Island, British Columbia, where communities were considering options for siting a wave energy facility. The communities wanted to evaluate three different locations for the facility to determine which site would maximize energy yield while minimizing impacts to existing activities of importance, specifically fishing.

Using data on wave potential along the coastline, Marine InVEST modeled how much energy generation was possible at each site, calculated the value of that power in dollars, then prepared maps showing the major commercial and recreational fishing areas to determine which site would have the least impact on fishing. The combined findings indicated a specific site that would achieve the dual goals of maximizing energy potential and minimizing impacts to fisheries. Tools such as Marine InVEST are helpful for visualizing scenarios and minimizing user conflicts in spatial planning.

4. *Governance policies enabling ecosystem approaches.* A number of nations and states have recently adopted policies that codify ecosystem approaches and spatial planning into their governance framework. Last year, President Obama signed an Executive Order creating the first-ever U.S. National Ocean Policy that outlines a bold vision for more holistic,

ecosystem-based and science-based management of U.S. waters – management that more accurately reflects the scientific understanding of the multiple and interacting impacts of humans on coastal and ocean ecosystems. The Policy reflects the interconnected nature of humans and oceans – and underscores the fact that our communities, economies, and livelihoods depend on healthy ecosystems.

A cornerstone of the National Ocean Policy is the notion of partnerships at multiple scales. Interagency coordination for ocean management across 24 different federal departments and offices has already improved significantly. Spatial planning will be done by regional planning bodies with membership from local, state, tribal, and regional levels. A number of states in the U.S. have embraced the concepts of marine spatial planning and ecosystem-based management and are in various stages of implementing their efforts.

Slide 4 - (B) Fisheries

Seafood is a critical ecosystem service provided by oceans. For billions of people, seafood means food security. For others and for many coastal communities, fishing is the culture, a way of life, and the tradition. For many communities and nations, it is a source of revenue, a commodity to export or trade. But serial overfishing of one stock after another, aided immeasurably by technological innovation, has rapidly depleted oceans around the global. And certain types of fishing gear have destroyed bottom habitats and devastated many non-target species such as sea turtles, sea birds, and marine mammals. These impacts often cascade through an entire ecosystem, contributing to further depletion and disruption. Even in 'well managed' fisheries, overfishing occurs all too often. But recognition of these challen-ges has stimulated scientific innovations that are revolutionizing fishery management.

Traditional approaches to fishery management often result in a 'race to fish' in which each fisherman, boat or nation catches as much as possible, as quickly as possible, until the entire quota for the year has been landed. In an effort to prevent overfishing in this intense race, fishery managers use traditional tools that restrain fishing effort: specific seasons or number of days that can be fished, types of gear to be used, etc. This in turn often results in enhancement of capacity, with larger, faster boats and improved technology to find fish faster. In extreme cases, the race to fish is so intense that the entire year's allocation for a fishery may be caught in a single day. The overall result is often unintended, but nevertheless real, overfishing , significant 'by-catch' of non-target species, unsafe fishing conditions, poor quality of seafood, low market prices when the market is glutted with a particular species followed by dry periods when none of that species is available.

Clearly, not all fisheries are the same and some nations have been more successful at managing fisheries. In the United States, a law called the 'Magnuson Stevens Fishery Conservation and Management Act,' amended in 2006, is widely hailed as landmark legislation that mandated strict adherence to scientifically determined annual limits on each fishery to end overfishing and firm measures to rebuild depleted fisheries. That legislation requires my agency, NOAA, to have in place by the end of 2011 specific limits on and rebuilding plans for each of the 528 federally managed stocks and stock complexes in US waters. We are on track to do just that. And many previously overfished species are recovering. Since 2000, 21 previously overfished stocks have been rebuilt. NOAA estimates that rebuilding all depleted stocks in US waters could add 500,000 jobs and $32B to the US GNP. Few nations have such strict rules, and they were put in place following decades of overfishing. Moreover, actually implementing these annual catch limits continues to be challenging.

Overall, the economics of traditionally managed fishing favors intense exploitation, overfishing, and negative impacts to other species. Exploitation too often trumps conservation. A focus on short-term economic gain too often trumps economic prosperity over the long term.

A very different approach to managing fisheries, called 'catch shares,' has been adopted in a number of developing and developed countries. One example of a catch share program that is used in the United States, Iceland, Chile, Australia, Canada, and New Zealand is the 'individual transferable quota.' This alternative approach eliminates the classical race to fish that plagues traditionally managed fisheries by allocating a fraction (a 'share') of the total allowable fishery catch to individuals, communities, cooperatives, or other entities. The right to that fraction, let's say 'one percent of the total', persists from year to year. Think of the overall fishery as a pie. A share holder's fraction (in our example, 1%) stays the same regardless of the size of the pie each year. In this system, each shareholder has a vested interest in seeing the fishery be healthy so the amount of fish they are allocated can grow through time. As the health of the fishery increases and the total catch increases (the size of the pie increases), so too does the amount allocated to each share-holder. In this system, conservation and economic incentives are aligned, in contrast to traditionally managed fisheries in which they are in conflict. Catch shares enable a focus on long-term economic prosperity and ecosystem health, not just short-term economic gain.

Another type of "catch share"—one that has been used for centuries in Japan—provides an individual fisherman or group of fishermen with the exclusive right to fish in a given geographic area. Today, we call these types of spatial rights "territorial use rights in fisheries," or TURFs. TURFs provide fishermen with the incentive to harvest sustainably and to keep the habitat within their exclusive fishing zone healthy and resilient. Again, conservation and economic incentives are aligned.

A scientific analysis of the performance of catch share fisheries vs traditionally managed fisheries found that the former are much more likely to result in sustainable fisheries. Catch share programs are not a panacea, nor are they appropriate for all fisheries, but they are proving to be a powerful new tool to end overfishing. Based on the scientific evidence, NOAA is encouraging its fishery management councils to consider catch shares wherever they are appropriate for a particular fishery. NOAA now has a formal policy supporting the use of "catch shares" in appropriate fisheries in the United States.
Efforts are underway to explore ways to use catch share concepts in international fisheries.

Slide 4 - (C) Habitat Management and Marine Reserves

Ecosystem approaches have drawn attention to the importance of protecting habitat and biodiversity to achieving healthy ocean ecosystems and resilient fisheries. New scientific information about the multiple benefits of marine protected areas (MPAs), and especially no-take marine reserves, illustrates just how useful these underutilized tools are to protect and restore ocean ecosystems and achieve sustainable fisheries. An MPA is any area of the ocean that is managed for some conservation purpose. MPAs vary widely from one to another, e.g., allowing all activities except one, or allowing few. No-take marine reserves are areas of the ocean that are protected from any extractive or destructive activities. They prohibit fishing, mining, drilling for gas or oil or dumping, but allow non-extractive activities such as swimming, boating, scuba diving, etc.

Although there are thousands of MPAs around the world, and far fewer marine reserves, most are tiny. Globally, less than one percent of oceans is protected in MPAs and far less than that in no-take marine reserves. (In contrast, between 10 and 15% of the land area is protected in parks.)

Recent scientific analyses of MPAs, but especially of marine reserves, provides powerful evidence that these tools have much to contribute to recovering depleted fisheries and promoting healthy and resilient ocean ecosystems. Around the world marine reserves consistently result in recovery inside the reserve of depleted species, including significant increases in biomass, density and diversity of many species. Much of this bounty also spills outside to the surrounding area. As important as this 'spill over' effect may be locally, the biggest potential benefit lies in the increase in size and thus reproductive potential of individuals within reserves. Larger fish and invertebrates produce many more offspring than smaller bodied individuals. Reserves allow fish and invertebrates to get large. This large size translates into immense reproductive potential. The larvae or young are often transported outside the reserve to varying distances and serve to replenish fished areas. Marine reserves are clearly a powerful but underappreciated tool for which scientific evidence is compelling.

Marine reserves are increasingly seen as good options to combine with other tools such as TURFs or to promote ecosystem resilience in the face of environmental change. Some countries are experimenting with combining marine reserves with TURFs. Fishermen with exclusive access to areas adjacent to a marine reserve reap the benefit of spill over from the reserve. Moreover, reserves may provide significant benefit in protecting biodiversity and contributing to greater ecosystem resilience in the face of climate change and ocean acidification.

Slide 4 - (D) Climate Change and Ocean Acidification

As described previously, climate change and ocean acidification pose some of the greatest threats to ocean ecosystems and the valuable services they provide. The ultimate solution to both is a significant reduction in production of carbon dioxide.

Because non-climatic stressors, such as pollution, overfishing and non-native species can interact with and exacerbate the effects of climate-related stressors on ecosystem services, strategies to reduce pollution, overfishing and invasive species are a sound approach to help ameliorate some of the impacts of climate change and ocean acidification in the short term. In similar fashion, protecting as much biodiversity as possible (for example, in marine reserves) can enhance ecosystem resilience to climate change and ocean acidification.

The tools described above are complementary to one another. A recent study in *Science* offers some solutions for using local actions to buffer coastlines from the impacts of ocean acidification. Land-based freshwater runoff can contain fertilizers and other pollutants that acidify oceans at the local scale. By implementing policies to reduce coastal erosion and runoff and foster sustainable land use, we can decrease the impacts of non-climatic acidification and enhance resilience to climate-related acidification.

Working at the local level can also help sustain ecosystem services in another way: by informing people about how activities in their own backyards affect ocean health.

Slide 4 - (E) Greater Awareness

As described above, powerful new, scientifically based solutions are available to address many of the significant problems facing oceans. Ecosystem approaches, spatial planning, tools to understand and evaluate tradeoffs in ecosystem services, new governance policies, catch shares, and marine reserves all offer significant hope for restoring depleted and disrupted ocean ecosystems and providing long-term benefit to people. However, these tools will not be utilized unless there is greater awareness they are needed and greater public and political will to effect change.

While public understanding of ocean issues has grown, it has not grown quickly enough. Fortunately, new communication tools and champions are emerging. Social media, powerful visualization and sharing platforms such as Google Ocean, and fresh voices offer timely opportunities to raise awareness and share information. Scientists have a key role to play in making their knowledge more accessible, relevant and understandable, embracing new communication tools and nontraditional partnerships, and devising creative solutions to local to global problems.

Moreover, scientists can take heart from the knowledge that despite the immensity of the challenges, meaningful change may be closer than it often seems. Social change is highly non-linear, often characterized by rapid shifts, or "tipping points." Seemingly small changes can trigger abrupt change. Witness the fall of the Berlin Wall, collapse of the Soviet Union or the recent regime shifts in the Middle East. Witness abrupt changes in social attitudes, e.g., toward women's rights or smoking.

The plethora of efforts around the world – through communities, universities, faith-based groups, businesses, non-governmental organizations, governmental agencies, and concerned citizens – are building. The question is: what will it take to trigger more rapid positive change?

Inspiring actions are occurring at local to global scales:

- As consumers make more informed choices;
- As policies and management more accurately reflect our scientific understanding;
- As industries develop commitments to source only sustainably caught or farmed seafood;
- As creative endeavors seek to align economic and conservation benefits.

It is my hope that the Blue Planet Prize can help catalyze more rapid change toward a more sustainable path. Scientists, public servants, citizens, activists, consumers, and environmental stewards all have key roles to play.

Slide 5 - Conclusion

To my hosts in Japan today, I offer heartfelt thanks and a few closing thoughts. As coastal nations, Japan and the United States share a deep and abiding respect for the beauty, the bounty, and the fury of the oceans. We understand the interdependence between healthy oceans and healthy coastal communities, and we appreciate the need to restore harmony to our oceans and coasts. We recognize the importance of balance, and we understand the need to work with nature to ensure that this balance is maintained.

As a public servant, I have worked to implement solutions, raise awareness, and provide people with information to make smart decisions – all grounded in science. As a grandmother, I passionately want to leave a healthy blue planet for my baby granddaughter.

Restoring the health and bounty of the oceans is one of the greatest challenges of our lifetime. It is up to us to shape a sustainable future. The scientific knowledge and tools I've highlighted point the way.

I am reminded of the eloquent words of Dr. Martin Luther King, Jr., who inspired a societal tipping point for civil rights in the United States and around the world. When writing about this great challenge, Dr. King spoke of 'the fierce urgency of now'. In his book, *"Where Do We Go From Here, Chaos or Community,"* Dr. King said:

- "We are now faced with the fact that tomorrow is today. We are confronted with *the fierce urgency of now.* In this unfolding conundrum of life and history there is such a thing as being too late. . . The 'tide in the affairs of humanity' does not remain at the flood; it ebbs.
- We may cry out desperately for time to pause in her passage, but time is deaf to every plea and rushes on. Over the bleached bones and jumbled residues of numerous civilizations are written the pathetic words: 'Too late.'
- We still have a choice today… This may be humankind's last chance to choose…."

If we delay, we risk being "too late." Healthy, productive, resilient oceans are possible with collective and concerted effort. Only by working together as a global community, with a sense of purpose, urgency, and hope, can we achieve the goal of a more sustainable future for our blue planet. I sense the 'fierce urgency of now." Do you?

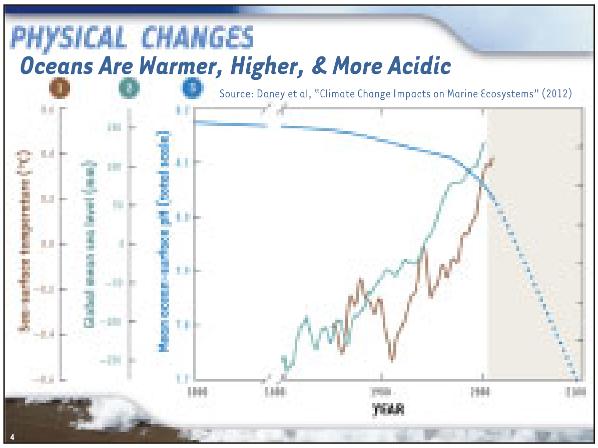
Slide 1
Introduction

Slide 2
My Perspectives 1

Slide 2
My Perspectives 2

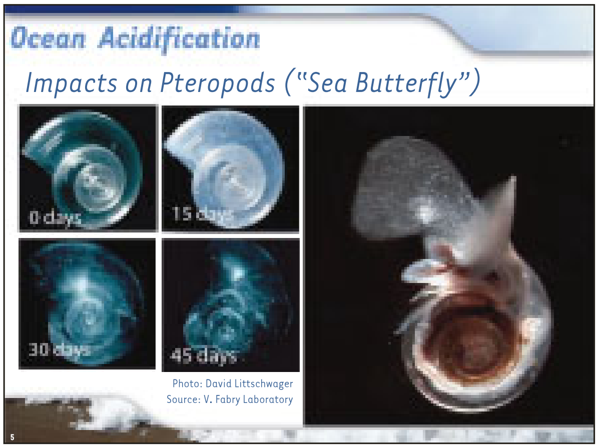
Slide 3-A

Taking Stock of the Challenges 1



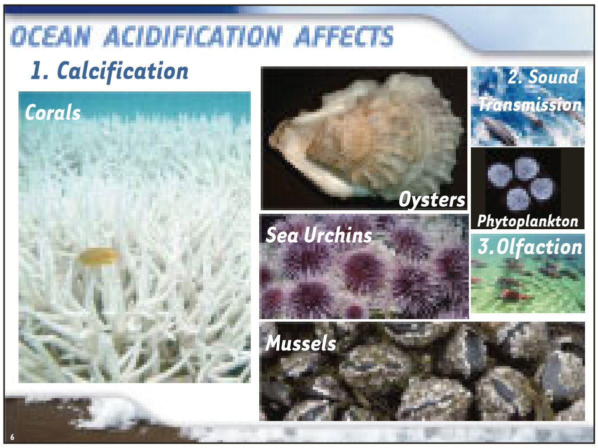
Slide 3-A

Taking Stock of the Challenges 2

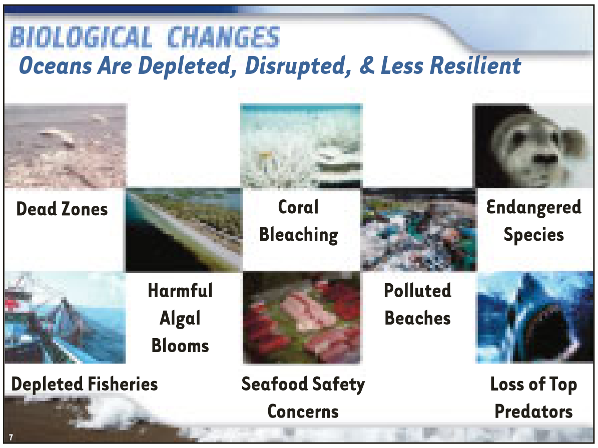


Slide 3-A

Taking Stock of the Challenges 3



Slide 3-B
Taking Stock of the Challenges 1



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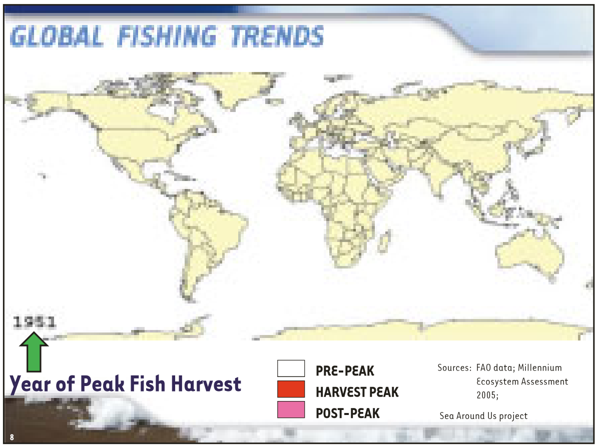

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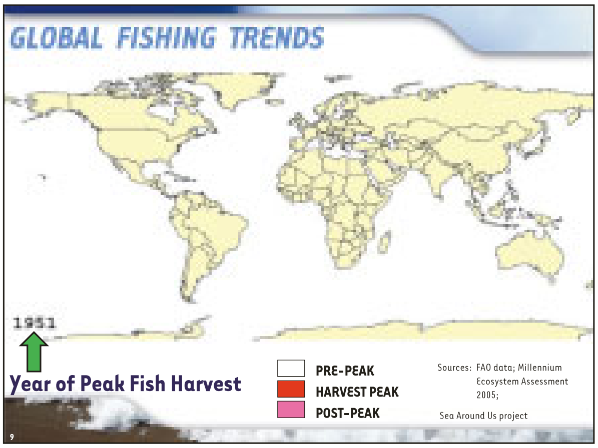
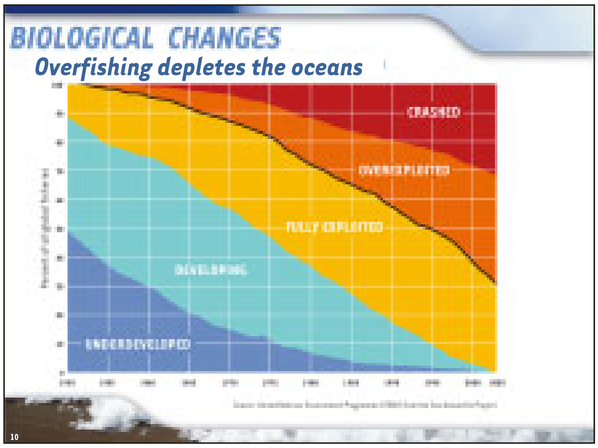


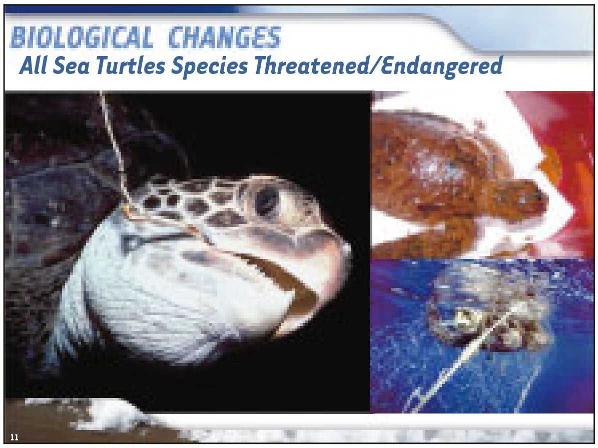
Slide 3-B

Taking Stock of the Challenges 4



Slide 3-B

Taking Stock of the Challenges 5

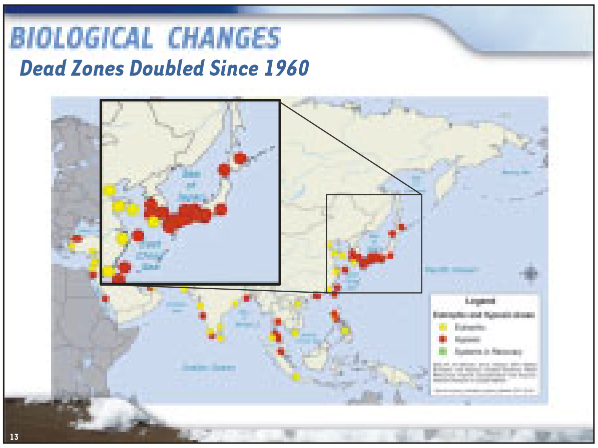


Slide 3-B

Taking Stock of the Challenges 6

Slide 3-B

Taking Stock of the Challenges 7



Slide 4-A

Solution 1

Slide 4-A

Solution 2

Slide 4-A

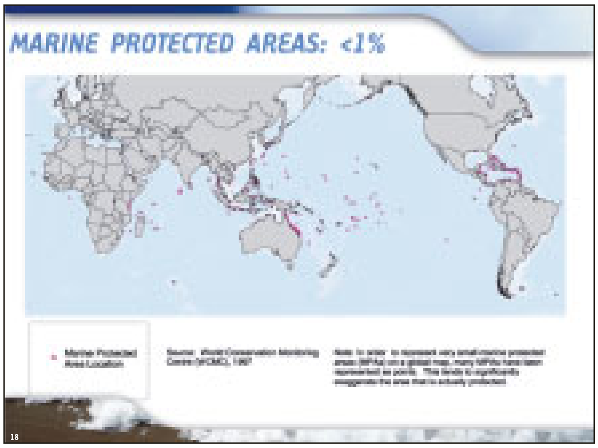
Solution 3

Slide 4-B

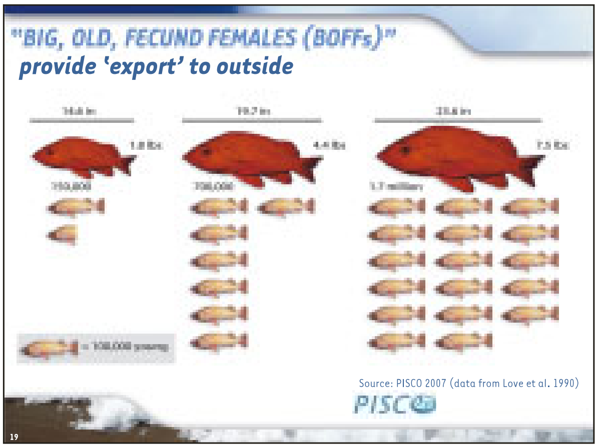
Solution

Slide 4-C

Solution 1

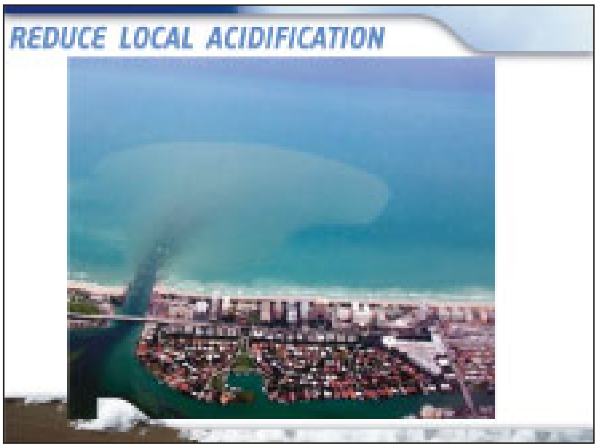


Slide 4-C
Solution 2



Slide 4-D
Solution 1

Slide 4-D
Solution 2



Slide 4-E

Solution

Slide 5

Conclusion