

“Towards a Sustainable Future: Reasons for Urgency and Hope”

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Thank you, President Angel and Directors Johnston and Gomes. I bring greetings from CSLG and the 12,800 employees of NOAA. And thanks to Clark University, and the Marsh and Mosakowski Institutes, for your leadership on environment and sustainability. It is an honor to deliver the Geller Endowed Lecture today.

Your dedication to fostering leaders in sustainability and advancing use-inspired science is of vital importance. Your faculty and students have pioneered advances in the human dimensions of sustainability science. It's been a treat to spend a little time with them today, and to learn about some of Clark's sustainability initiatives, such as the Climate Action Plan and the creative “green building” projects.

Today, I wish to share how you and others' efforts are influencing the Federal Government, and how we view some of the daunting challenges of transitioning to sustainability.

As you are well aware, the environment is changing rapidly and radically, with profound consequences for humanity. The accelerating pace of change presents serious challenges – and opportunities – for individuals, communities, universities, businesses, nations, and the global community to make a transition toward more sustainable practices and policies. The magnitude of this challenge requires an unprecedented level of coordination, cooperation, and creativity from all sectors.

I am encouraged by the progress that has been made to address sustainability challenges through the actions of business leaders, government agencies, scientists, non-governmental organizations, journalists, and individual citizens. However, far too many Americans still view concerns about the environment as a barrier to economic progress.

Choosing between the economy and the environment is a false dichotomy. Long-term economic prosperity will require healthy ecosystems. We need solutions for achieving economic growth, while maintaining and recovering the life-supporting services provided by ecosystems.

Through advances in science, we know that the depletion and disruption of our ecosystems is leading to the loss of valuable services on which humans depend – services such as water purification, control of pests and pathogens, buffering of coastal areas from storms and tsunamis, and the provision of food. One need look no further than the Deepwater Horizon tragedy for stark evidence of the interconnected nature of humans and ecosystems. We witnessed heart-wrenching proof of how the vitality of coastal communities and economies depend on the health of their coasts and oceans.

I am proud of the role that NOAA played to provide scientific guidance to the response, ensure seafood

safety, protect habitats and wildlife, and now assess damage and enable restoration. The oil has stopped flowing, but our work continues. We remain fully engaged and committed to a complete recovery of the Gulf ecosystem and its communities and economies.

The Deepwater Horizon disaster dealt a serious blow to Gulf Coast. However, a transition to full recovery and sustainability must address not only impacts of the spill, but a plethora of other problems that began long before the DWH disaster began.

The Gulf of Mexico is a microcosm of the global sustainability challenges we face today. Prior to Deepwater Horizon, chemical and nutrient pollution, habitat destruction, overfishing, climate change, and invasive species had already taken their toll on the health and resiliency of Gulf Coast ecosystems. Depleted and disrupted ecosystems cannot provide the suite of benefits that people want and need – in this case, seafood, opportunities for recreation, inspiration, and education, speed bumps for hurricanes, and more.

Now is a pivotal time not only for the Gulf Coast – but indeed for the entire planet. Actions taken now and in the next few years will determine the future health, prosperity, and well-being of people around the world – whose lives and livelihoods depend on healthy, productive, and resilient ecosystems.

Despite the many challenges we currently face, there are reasons for hope, including: advances in our scientific understanding – natural and social sciences; improved incorporation of science into policy; creative new solutions and partnerships; increased public awareness of sustainability issues; and engagement of the business community, faith leaders, and youth – you students!

You know full well of many of the scientific advances, so I'll touch on them only briefly before transitioning to some federal actions underway.

Twelve years ago, the National Academy of Sciences published its landmark report ***Our Common Journey: A Transition Toward Sustainability***. I had the pleasure of speaking at the symposium to launch the report, and I used the occasion to make a birth announcement: the birth of a new science: sustainability science. That baby has grown and thrived, and is now flexing her muscles and influencing her surroundings.

Six years later, the ***Millennium Ecosystem Assessment*** provided an international assessment that continued to connect the dots between environmental change, ecosystem services, and human well-being.

Over the past decade, thanks in part to leaders like some here at Clark University, there has been an explosion in the field of "sustainability science," with significant developments on multiple fronts: the Resilience Alliance, an international and interdisciplinary research organization dedicated to developing scientific advances, as well as guidance and best practices for decision makers; the National Academies' Science and Technology for Sustainability Program, established to encourage the use of science and technology to achieve long-term sustainable development; a new section of the Proceedings of the National Academy of Sciences on sustainability science; a new home for sustainability science at AAAS; new academic programs and curricula; and international networks of scientists and practitioners developing methodologies and models, and much more. These efforts, have contributed to heightened awareness and understanding, including a Nobel Prize to Lin Ostrom, as well as on-the-ground action.

One new initiative for strengthening the science-policy interface at the international level is the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (or IPBES). IPBES provides an ongoing mechanism for a Millennium Ecosystem Assessment-like international scientific assessment. It is being designed to enable the translation of scientific knowledge into specific policy actions for conservation and sustainable use of biodiversity and ecosystem services.

So is all of this science changing anything at the national level? A resounding yes!

Sustainability and improved integration of sustainability science into policy-making are priorities for the Obama Administration. Here are five specific actions that demonstrate this commitment.

The newly renamed White House Committee on the Environment, Natural Resources, and Sustainability, is one reflection of this emphasis. The phrase “*and Sustainability*” was added to the name of this existing Committee in order to reflect the understanding that sustainability provides the goal and the overarching umbrella for all activities under the environment and natural resources portfolio.

A specific action that will have far reaching consequences relates directly to NOAA’s mission. Last July, the President signed an Executive Order establishing the Nation’s first-ever Ocean Policy, which clearly states that healthy oceans matter and that policies must focus on long-term sustainable use, not just short-term exploitation. The Policy outlines a bold vision for more holistic, ecosystem-based management of our oceans – management that reflects our scientific understanding of the multiple and interacting impacts – and dependencies – of humans on coastal and ocean ecosystems. The Policy establishes an interagency mechanism to implement this vision, coordinating the 26 different agencies and offices that use or affect oceans. I’ll say more about how we are implementing this Policy shortly.

A third example: in October 2009, the President signed an Executive Order known as “the Sustainability Executive Order.” This document reflects the critical role of the Federal Government in “leading by example” through reducing greenhouse gas emissions, increasing energy efficiency, and reducing waste. The Department of Commerce (DOC) and NOAA are changing practices accordingly. For example: A 21% reduction target has been established for direct and indirect greenhouse gas emissions by Fiscal Year 2020, relative to a Fiscal Year 2008 baseline. By Fiscal Year 2013, 7.5% of DOC’s electricity will come from renewable resources.

This sense of commitment was also reflected last week, when the President released his Blueprint for a Secure Energy Future. In the *Blueprint*, he reiterates the State of the Union energy challenge to grow clean energy sources, with the goal of 80% of the Nation’s electricity coming from renewable sources by 2035. The President has emphasized that as we work to reduce our dependence on foreign oil and build investment in renewable energy, our overarching goals are security and sustainability.

The fifth example: In addition to championing efforts to reduce greenhouse gas emissions, the Federal Government is also advancing efforts to prepare for the impacts of climate change. In 2009, the Interagency Climate Change Adaptation Task Force, including over 23 Federal agencies and White House offices, was created to strengthen the Nation’s capacity to understand and prepare for climate change. Through topic-based working groups, and over 35 listening sessions and outreach events, the Task Force developed a set of recommendations that were communicated to President Obama and to the Nation in its Oct. 2010 Progress Report. As a result of the Task Force’s work, all Federal agencies are now required to develop, implement, and evaluate climate change adaptation plans. In addition, the US Global Change Research Program has established a new Adaptation Science program to strengthen science in

support of adaptation decisions at all scales.

Let me now transition to NOAA-specific actions.

NOAA's roles in sustainability reflect the priorities of the Obama Administration, our agency's mission of science, services, and stewardship, and our vision of building resilient ecosystems, communities, and economies. NOAA contributes to sustainability in three primary ways: NOAA scientists, in concert with our partners, advance scientific understanding through research, observations, monitoring, modeling, and assessment efforts. We communicate scientific knowledge broadly and provide science-based services to inform societal choices. We use our knowledge to "lead by example" through our own sustainability initiatives and to be good stewards of oceans and coasts and through our policies and management practices.

Here are several areas where NOAA is providing leadership in informing or implementing sustainable practices: climate services, spatial planning, and on-the-ground sustainability initiatives.

Few environmental changes affect our economies, ecosystems, and livelihoods more than climate variability and change. At least one-third of the U.S. gross domestic product is directly influenced by weather and climate. Information about climate change is essential to smart planning. As we seek to grow our economy and achieve sustainable use of ecosystems, we must make decisions based on the likely conditions of tomorrow, not yesterday or today.

2010 was tied with 2005 for the warmest year on record. More and more, Americans are witnessing the impacts of climate change in their own backyards. These impacts include longer growing seasons, increases in heavy downpours, drought, earlier snowmelt, changing patterns of precipitation, and many others.

As a result of these impacts, individuals across widely diverse sectors – from agriculture to energy to transportation – are increasingly asking NOAA for information about climate change in order to make the best choices for their communities and businesses.

Last year, Commerce Secretary Locke and I announced the intent to form a Climate Service within NOAA to meet the rising tide of requests by bringing together the agency's strong climate science and service capabilities. The Climate Service, modeled in part after NOAA's National Weather Service, would allow NOAA to provide a single, reliable, and authoritative source for climate data, information, and decision-support services and to more effectively work with our Federal and non-Federal partners. The President's FY 2012 budget includes a detailed reprogramming proposal to establish this Climate Service. Building upon our accomplishments and momentum gained over the last year, we will continue to engage with Congress in the coming year to seek approval of the proposed reorganization. Following Congressional approval, NOAA will move quickly to implement the proposed re-organization.

In the meantime, NOAA is working with our partners and stakeholders, and operating within our existing organizational structure, to provide the critical information and services that support efforts to reduce the impacts of climate change to infrastructure, ecosystems, and human health and welfare. For example, NOAA currently works with a diversity of local business partners - from commercial oyster hatcheries in the Pacific Northwest, to Kona coffee farmers, to ranchers in the West - to provide timely climate science and services in support of decisions that minimize risk and maximize opportunity in the face of climate change.

Three years ago, NOAA's Coastal Services Center launched the "Digital Coast" initiative to address timely coastal issues, including climate change. One of Digital Coast's tools, the Sea Level Rise Impacts Viewer, creates visualizations of the potential physical, ecological, and socioeconomic impacts of sea level rise in order to inform the planning efforts of community officials and coastal managers. These tools are currently being applied in Texas and Mississippi and are serving as the basis of a new partnership with the Department of Housing and Urban Development to better understand and prepare for the potential impacts of sea level rise on vulnerable populations, infrastructure, and ecosystems in Galveston, Texas.

A second arena in which NOAA is focusing its sustainability efforts concerns fostering sustainable uses of coasts and oceans. The Nation's economic vitality depends on healthy oceans. America's productive coastal regions and waters contribute tens of millions of jobs and trillions of dollars to the national economy each year. To improve understanding and decision-making in coastal and ocean areas, the Federal Government is currently pursuing a systemic and comprehensive approach for effective ocean management under the National Ocean Policy.

A major priority of the Policy is a framework for coastal and marine spatial planning (or CMSP), a stakeholder-driven management tool for minimizing conflicts among users and reducing impacts on ecosystem functioning. 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 already stressed ocean ecosystems. CMSP is a process that enables integrated, forward-looking decision making through an ecosystem-based, spatially explicit approach. The focus on stewardship is intended to enable a vibrant suite of sustainable uses for generations to come. In short, while it is OK to use oceans and coasts, it is not OK to use them up.

Massachusetts is a national leader in CMSP. Three years ago, Governor Patrick announced the Oceans Act of 2008 to initiate the development of a comprehensive spatial plan. The planning process involved 18 public listening sessions across the state and hundreds of meetings with stakeholders, including fishermen, NGOs, and academic scientists. On Dec. 31, 2009, the Commonwealth became the first U.S. state to release a comprehensive ocean management plan for its 1,500-mile coastline. The creativity and initiative shown by the Commonwealth of Massachusetts inspired other states and the Federal Government to pursue marine spatial planning.

The importance of partnerships is a theme that carries over to the science necessary for successful implementation of CMSP. A promising new tool called Marine InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs) has been developed by the Natural Capital Project, in partnership with NOAA, to facilitate scientific understanding of ecosystem services in support of CMSP. InVEST is used to model and map the delivery, distribution, and value of ecosystem services in a specific place. This tool allows users to run multiple scenarios associated with potential decisions and management alternatives, visualizing tradeoffs among environmental, economic, and social benefits. InVEST offers a promising new approach for incorporating scientific information about ecosystem services into decision-making, spatial planning, and resource management.

Here's an example of how the Marine InVEST tool is helping coastal communities understand trade-offs in ecosystem services. Communities in Vancouver Island, British Columbia, are considering options for siting a wave energy facility to harness power using the Pelamis wave capture devices pictured here. These communities wanted to evaluate three different locations to determine which site would best

meet their desired outcomes. Their concerns were twofold: maximizing energy yield and minimizing impacts on existing important activities, specifically fishing. Using data on wave potential along the coastline (green depicts the lowest wave potential, and orange the highest), Marine InVEST models how much energy generation is possible at each site, as well as the value of that power in dollars. The first finding was that Site #1 generates the most power. Using InVEST, we can now overlay the major commercial and recreational fishing areas to determine which sites would have the least impact on fishing areas. The combined findings indicate that Site #1 may be the best site for achieving the dual ecosystem services goals of maximizing energy potential and minimizing impacts to fisheries. This is one example of how tools such as InVEST are helpful for visualizing scenarios and minimizing user conflicts as we implement CMSP.

I also want to mention another scenario-generating tool (developed here in the Clark Lab) called IDRISI, which models land use change and will soon be linked to InVEST. Tools such as IDRISI and InVEST are key to informing sustainable planning and management.

The investments and improvements articulated in the National Ocean Policy, and implemented through CMSP, will advance the Nation's economic and environmental interests through:

- Advancing sustainable and productive ocean uses;
- Fostering partnerships at all scales (e.g. Regional Planning Bodies)
- Improving capacity to address the long-term impacts of climate and other environmental changes;
- Providing a lasting foundation for improved stewardship; and
- Enhancing the many vital benefits that the Nation derives from coastal and ocean ecosystems.

The third and final way that we advance the sustainability agenda at NOAA is by using our knowledge to “walk the talk” through integrating sustainability into our daily operations. For example, the construction of the new Southwest Fisheries Science Center Laboratory in La Jolla, CA is rapidly progressing with funding from the American Recovery and Reinvestment Act. This facility is expected to earn a LEED Gold Level Certification through the design that includes photovoltaic cells, elaborate water retention systems, recycled materials and green roofs planted with California coastal chaparral. NOAA also spearheaded a Green Ship Initiative to convert all of our research vessels in the Great Lakes from petroleum-based fuels and lubricants to biofuels and bio-lubricants. This initiative produced the first Federal vessel to run completely on non-petroleum products, leading to an award from the Department of Energy. The entire Great Lakes fleet is now “100% petroleum-free” (operating on soy biodiesel) and has lowered emissions, decreased costs, and created healthier conditions for the ships’ crew and scientists. Similar innovative approaches will be necessary for making progress on sustainability.

Let me review the items I’ve highlighted concerning what the Obama Administration and NOAA, in particular, are doing to enable sustainable practices and policies.

The Administration has made sustainability an overarching theme in its White House Committee on Environment, Natural Resources, and Sustainability, declared the first National Ocean Policy, issued an Executive Order on Sustainability and a *Blueprint for a Secure Energy Future*, and created a Climate Change Adaptation Task Force. Progress is being made as part of a transition to sustainability.

NOAA, too, is embracing sustainability across its science, services and stewardship roles. The process is encouraging and is durable.

However, the challenges loom large. While international and Administration actions and public understanding of sustainability opportunities and challenges have grown . . . they have not grown quickly enough. While we have made progress on sustainability efforts, further progress could be hindered by the current economic crisis, the looming deficit, pending Congressional budgetary decisions, and lack of awareness of the problems, consequences, and opportunities for alternatives.

Continued progress is key to future sustainability and for economic recovery. Innovative approaches to find and enable environmental and economic synergies are needed as the new “business” model. But despite these challenges – and they are very real, there are strong reasons to be hopeful.

Social change is highly non-linear – it is characterized by thresholds and tipping points. Witness the 180-degree shift in public attitude toward smoking or drunk driving. Witness the fall of the Soviet Union or the regime change in Egypt. Change often comes in bursts of activity. Seemingly small changes can interact and multiply and trigger abrupt and significant change.

So take heart that progress is being made through the efforts of many – communities, universities, faith-based groups, businesses, NGOs, and governmental agencies. Inspiring actions are occurring at local-to-global scales:

- As industries develop commitments to source only sustainably caught or farmed food
- As consumers make more informed choices
- As creative endeavors seek to achieve the “triple bottom line” of “people, planet, and profit” – not just “profit.”

I’ve witnessed significant changes in the attitudes and actions of federal agencies. If they can change, anything is possible. Seriously, though, change is afoot. Restoring the health and bounty of our planet’s life-supporting systems and transitioning to sustainability are some of the greatest challenges of our lifetime.

Your challenge – you students – is how to accelerate and harness that change. New knowledge, new tools, new demonstrations of potential are needed. So, too, is new energy and passion. The world needs you.