Building Climate Solutions

Report of the 14th National Conference and Global Forum on Science, Policy and the Environment

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Peter Saundry and Lilah Sloane, Editors

National Council for Science and the Environment
Improving the scientific basis for environmental decisionmaking

About NCSE

The National Council for Science and the Environment brought together scientists, hazard experts, planners, and decision-makers to address how climate change and its responses (mitigation and adaptation) can be viewed in the context of multiple hazards and develop new tools and approaches to integrate them. The collaboration explored how each sector frames the climate challenge, solutions, and with whom they engage. This report documents and summarizes the findings, highlighting synergies and potential conflicting approaches.

The vehicle for the project was the 14th National Conference and Global Forum for Science, Policy and the Environment: *Building Climate Solutions.* The three-day event brought together the project participants and provided the framework, logistics, facilitation, and connections to new and continuing initiatives.

The National Council for Science and the Environment (NCSE) thanks all conference session organizers, notetakers, and participants for their time, creativity, effort and commitment towards developing and advancing climate solutions.

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Outcomes

1. What Makes a Climate-Smart City and How Can We Build Them?

(Partners: World Wildlife Fund U.S. and United Nations Environment Programme)

This session discussed the unique capacity and responsibility of cities to adopt both climate mitigation and adaptation solutions in order to become climate-smart cities. The focus was on best practices for renewable energy and ecosystem-based adaptation, and the ways those best practices are accessed by cities. Cities access the practices through the technical guidance from organizations like UNEP and through networks of peers developed by organizations like the World Wildlife Fund, C40 Climate Leadership Group, and others.

Participants focused their discussion around three questions:

- What is working and what needs to change in climate adaptation/eco-system based adaptation (EBA) and in renewable energy/mitigation?
- How can use of rooftop solar be dramatically expanded in a city?
- What policy reforms are needed to most effectively promote resilient, resource-efficient cities?

Next Steps:

1. Frame issues effectively and determine what cities, regions, and practices are successful. For example, urban forestry has proven to work. Using this information, invent a world-wide index (like the STAR community rating system) and create a sustainable city network to share with them. Increase the investment in staff resources and capacity so this is possible.
2. Integrate policies by reaching out to both top-down leadership and bottom-up community organizations. Disseminate information such as who is getting subsidies, which areas are being evaluated differently by insurance companies, and what funding opportunities are available for cities.
3. Research and write a comprehensive study within cities to determine the locations of the best buildings and structures for solar power.

2. Hazard Mitigation and Climate Adaptation

(Partners: Carnegie Mellon University and Natural Hazard Mitigation Association)

Participants explored the challenges of fostering connections between hazard mitigation and adaptation communities of practice, and the challenges of communicating with different communities. The goal was to improve the understanding of information, policy, and technical assistance communities need to integrate climate adaptation and hazard mitigation efforts.

A core area of focus was the Community Rating System developed by the Federal Emergency Management Administration (FEMA). It encourages community floodplain management activities that exceed the minimum National Flood Insurance Program (NFIP) standards by offering incentives, such as reduced insurance rates and free technical assistance. Reinsurance, floods, and damage were also addressed.

Action Items:

1. Investigate the relationship between President Obama's 2013 Executive Order on "Preparing the United States for the Impacts of Climate Change" and President Carter's 1997 Executive Order 11988 on Floodplain Management. Distribute the statement through the NHMA LinkedIn site.
2. Investigate how to improve the process of buyouts. A resultant statement should include attention on: [a] how to discourage bad developments; [b] how to provide communities with accurate and useful information so they can understand and chose smart options; and [c] the issue of transfer of development rights. Stanford University, among others, will contribute a statement on this issue.
3. Develop a clearinghouse of best management practices for hazard mitigation. NHMA agreed to seek funding to host a clearinghouse or find an organization willing to do it.
4. Conduct a cost-benefit analysis of the federal discount rate.

Representatives of six organizations committed to work together following conference:

1. National Hazard Mitigation Association
2. Stanford University
3. Pew Charitable Trusts
4. U.S. Air Force
5. Federal Alliance for Safe Homes
6. E.P. Systems Group, Inc.

3. Preparing Campuses and Communities for a Changing Climate

(Partner: Second Nature)

Participants addressed the challenge of developing partnerships across higher education institutions and with their respective communities in order to accelerate integrated risk assessment and resilience activities. These assessments and activities include financial, socio-economic, infrastructure, educational, human capacity, safety and productivity, and ecological vulnerabilities.

Participants developed a vision for a new Alliance for Resilience Campuses with the following characteristics:

1. Different types of schools and communities in different parts of the country will develop an understanding of their shared vulnerabilities. The network of communities will develop sustainable/resilient campuses/communities and best practices of wide interest and value.

2. Campus-community partnerships should be undertaken within the context of environmental geographies such as watersheds, airsheds, and ecoregions.

3. While service learning and community partnerships are often based on perceived community need, the relationship is based in shared vulnerability and strength and can be seen as a "reshuffling" of the community partnership deck with universities and colleges. It can also be viewed as learners working with their communities to transition from a problem-based mindset to a solutions-based approach.

4. The Alliance will record lessons, hands-on projects, and indicators of resilience from when communities do well in crises or when catastrophes occur, for e.g. strong social connection/engagement.

5. The Alliance will work with cities to understand their sustainability goals.

Outcomes:

1. The Alliance for Resilience Campuses (ARC) was launched by Second Nature.

2. A partnership was established between Second Nature/ARC and the Resilient Communities for America (RC4A), a national initiative that is mobilizing local elected officials from cities, counties, and towns in pledging to create more resilient communities. RC4A is a joint campaign of ICLEI-USA, the U.S. Green Building Council, the World Wildlife Fund, and the National League of Cities.

   ARC and RC4A will work together to encourage strong partnership between communities and campuses, and to share tools, information resources, and successes to support and highlight improved resilience.

   The partnership was publicly launched on May 5, 2014.

4. Nature as a Source of Innovation for a Sustainable Metropolis

(Partners: CNRS, France and Université du Québec à Montréal)

This session brought together researchers, public decision-makers and professionals, including participants from: New York City Panel on Climate Change, the New York State's Adaptation Report, University of Paris, CNRS, Université du Québec à Montréal, City of Montreal, UNESCO, International Research Development Research Center, Ecocity Builders, ICLEI, and C40.

Participants shared knowledge and experience on nature-inspired innovations to build more resilient cities with reduced ecological footprints. Issues addressed included:

1. Develop networks of groups of scientists (natural and social), architects, and urban planners to work with city governments
2. Provide ways to expand the process through coaching/sharing
    - Listserv networks, social networks
    - Increase outreach, training, co-construction
3. Strategies to integrate carrying capacity into urban plans and development
4. Examples of green infrastructure (GI), best practices and guidelines that include scientific analysis
5. Metrics and other ways to quantify this concept so it can be better understood and applied in best practices and guidelines
6. Have the workshop organizers hold a webinar to see/hear of prototypes in action from both inside and outside the group. Bring in contacts from the outside to give a global dimension
7. Develop contacts and pioneer relationships with emerging countries
8. Link GI to people working on disasters and with climate scientists
9. Involve universities and their students in experimentation projects and living laboratories in cities
10. Identify sources of funding for research (public and private entities)

Outcomes:

1. At the COP21 (2015, Paris), the Urban Climate Change Research Network (UCCRN) will organize an event with pertinent organizations.
2. UCCRN will involve NCSE with the World Conference of Mayors for Climate Change, UNEP, etc . to reinforce funding research in the fields of climate change, biodiversity, agriculture, eco-health, and cities at the global level.

5. Linking Global, Regional and Local Perspectives for Climate Solutions

(Partners: Pacific Northwest National Laboratory and Oak Ridge National Laboratory)

Participants addressed tools for developing an integrated approach to assessing climate impacts, adaptation strategies, and mitigation through a framework of agriculture/land use, water, energy, transportation/physical infrastructure, and vulnerability to hazards. A new Regional Integrated Assessment Modeling (RIAM) Framework was explored for lessons and insights.

The goals for such an approach include:

1. Understanding the consequences of potential actions by regional stakeholders
2. Understanding interdependencies among human and natural systems in the context of climate change
3. Supporting integrated decision-making at different geographic scales

Participants addressed how to:

1. More explicitly incorporate more and different technologies (e.g., co-generation, waste management, etc.) into integrated modeling frameworks that are relevant to greenhouse gas emissions and/or adaptation strategies.
2. Enhance representations of urban areas and processes into integrated modeling frameworks, to enhance the connectivity of large-scale trends, processes, and decision-making with local-scale ones.
3. Interact with the National Climate Assessment leadership and stakeholder to ensure that integrated modeling results are useful to ongoing assessment processes. Specifically, think about how to synergize geographically-based "regional" analyses and perspectives with system or process-based perspectives (which are also often regional in nature, yet do not always follow geographic boundaries).
4. Continue to increase the involvement of decision-makers and other stakeholders into model development and applications to ensure modeling results are germane to decision-making. (Among other benefits, this will help ensure transparency of modeling activities).

6. Use of Ecosystem Services Framework to Look at Adaptation

(Partners: U.S. Geological Survey and USDA Forest Service)

Participants addressed the key issues relating to application of an ecosystem service framework to addressing climate change adaptation. They reviewed what changes need to be made to explicitly consider human responses in planning and making adaptation decisions.

The intent of the session was to initiate an effort to advance the use of an Ecosystem Services Framework in adaptation, and give energy to the effort. Ultimately, the organizers will synthesize rather than have three separate communities, have a common approach, and break down key questions and challenges.

Three working groups were formed to identify major objectives and topics that need to be addressed:

1. Valuation working group
2. Indicators working group
3. Policy working group

The objectives and topics that need to be addressed in the community include:

- The need for a well-done production function to support valuation;
- How to include and inform non-monetary as well as monetary values;
- How to handle and convey uncertainties;
- How to deliver useful information to the policy process;
- How to review whether or not the adaptation actions were successful;
- Focusing on the local regional level to build support for valuation activities among local policy makers;
- Determining which organizations are active in ecovaluation;
- The need for project specific and broader scale indicators of processes and outcomes;
- Driving indicators useful for decisionmaking, think through policies and show where the framework would be useful;
- Linking indicators to valuation, and make sure they are the right indicators for that purpose;
- Looking at frameworks through a climate lens;
- Watching for traps that would lead to the misuse of ES frameworks;
- The role of socioeconomic players, urban systems, governments, and other leadership groups in the ES framework; and
- Creating a common framework of incentives and disincentives when creating ES policy.

Outcome: In December, 2014, there will be a conference in Washington, DC on Ecosystem Services. The organizers are using the information and suggestions gleaned from the *Building*

Climate Solutions conference and are organizing it into a framework that can be used to develop a plan to move forward.

8. The Arctic – Changing Climate, Socio-Economic Implications, and Strategic Mitigation

(Partners: SCS Global Services, the Climate Institute, and NORC at the University of Chicago)

During this workshop, participants discussed the scale of response needed to slow climate change, the importance of applying updated climate accounting metrics that integrate the latest climate science, the potential benefits of various mitigation options, and the countries and sectors in which concerted action can be most effective.

The session participants made six major recommendations:

1. **Climate account reform:** We recommend that the new climate metrics, once finalized through ANSI, be adopted on a voluntary basis by the US government for climate policy analysis, development, purchasing, contracts, and other applications. Pilot projects using the metrics should be initiated. In addition, these metrics will be useful to the US negotiating team in ongoing international climate negotiations (COP) and standards revisions under the International Organization for Standardization (ISO 14000 series standards).

2. **Engage intergovernmental bodies:** We recommend that the Arctic Council adopt aggressive goals to reduce their climate changing emissions by 50% within 20 years. In addition, the US should evaluate options within the Arctic Council context to stimulate action toward this goal.

3. **US leadership:** Given the degree to which US emissions are contributing to the accelerated warming in the Arctic, we recommend that the Office of the President, the EPA and other agencies, and the Congress raise this critical issue to the highest national security priority.

4. **Carbon registries:** We recommend that: 1) registries adopt the updated climate accounting metrics, which will provide incentives for a much wider range of mitigation efforts; 2) registries set mitigation goals tied to the near-term global mean temperature anomaly thresholds of +1.5°C, as well as to the +2°C threshold; 3) registries focus their efforts on types of project that, given sufficient scaling, can have a demonstrable influence on slowing Arctic warming; and 4) countries provide the funding needed to create the registry methodologies required to register projects and offset credits under the expanded metrics.

5. **Research:** We recommend that research funds be allocated to restore the historic natural Arctic Vortex through enhanced cooling technologies and activities aimed at helping to keep the Arctic cool

6. **Education and Outreach:** We recommend that greater emphasis on key aspects of our climate challenge — the importance of addressing climate change in the near-term and the risks of not doing so, the policy-setting and international negotiation frameworks currently in

place, the contribution of various climate forcers to the problem, and the types of mitigation opportunities that could be harnessed at a sufficient scale to make a difference — be integrated into educational curricula for lower grades through university level. And we recommend that educational outreach to journalists as they put the climate challenge and opportunities before their audiences.

Action Items:

1. Publication of the LEO-SCS-002 Draft Standard by Leonardo Academy (*Expected to occur in 2014)*
2. Conduct briefings for:
    - US Technical Advisory Group to TC 207 *(March, 2014)*
    - Relevant ISO-14000 (TC 207) Committees meeting in Panama *(May, 2014)*
    - Additional scientists and other stakeholders *(2014)*
3. Identify projects that can be sufficiently scaled and affordably implemented to make a meaningful difference to Arctic and global change in light of the 1.5° and 2° GMT anomaly thresholds. *(Currently underway and ongoing)*

Additional Potential Steps to Advance these Objectives include:

1. Conducting briefings for the US Representative to the Arctic Council, the US EPA , the White Office Council on Environmental Quality, and other congressional staffers.
2. Demonstrate the value of the updated climate metrics by identifying pilot projects under the Draft Standard and developing a registry funding mechanisms for projects evaluated under the updated climate metrics.
3. Offer seminars for educators to use at their schools.

9. Reducing Emissions from Deforestation and Forest Degradation (REDD+)

(Partners: World Wildlife Fund International and REDD+ Specialists)

In this session, participants analyzed the critical outstanding issues surrounding REDD+ efforts that must be resolved between now and 2015 in order to ensure that REDD+ becomes a reality as an integral part of the global climate change agreement anticipated at the 21st Conference of the Parties to the UN Framework Convention on Climate Change.

Participants addressed the need to:

- Come to a consensus on measuring carbon in tropical forests

- Share the knowledge as well as the physical apparatus when bringing technology to potential REDD+ markets
- Convince countries to properly allocate funds and other sources to REDD+ efforts
- Increase transparency in REDD+ negotiations to make sure all of the money allocated to REDD+ is being given to those organizations.

10. Managing Marine Fisheries in a Changing Climate

(Partners: NOAA Fisheries Service)

Participants discussed how information on climate change should be incorporated into all aspects of fisheries-related jobs at all levels of management: data collection, modeling, review process, and management advice. They addressed three key questions:

- What tools can be used for fisheries managers to effectively maintain *living marine resources* in the face of a changing climate?
- What does fisheries management need to do to effectively evolve *fisheries (i.e. the human component)* in the face of a changing climate?
- How can we better *partner* managers, scientists and fishermen over these common goals?

Next steps were categorized into four topics:

1. Changes in Distribution
    - Assess best practices from outside the US.
    - Assess vulnerabilities of species, fisheries, communities.
    - Determine whether a program like REDMAP would be useful for the US[1].
    - Reexamine regulatory frameworks and permit processes.
    - Run pilots to test regulatory flexibility.
    - Increase work on and use of management strategy evaluations.

2. Habitat Changes
    - Identify all the players and improve coordination across groups. Within each group, identify the main issues and gaps, conduct a review of best practices, improve

[1] http://www.redmap.org.au/

information sharing, and determine whether certain management actions incentivize stewardship.

- Develop a tool box for decision making in a spatial framework. Increase the flow of information, define essential habitats, increase information sharing, and connect impacts across multiple scales and environments.

3. Changes in Abundance and Productivity

- Create a checkbox for fisheries scientists and managers that requires them to consider environmental conditions and climate change in the fisheries management process.
- Include environmental assessments into stock assessments.
- Increase and improve monitoring that is relevant to management.
- Build resilience into fisheries and the social systems that rely on them.
- Expand ecosystem assessments to include input from stakeholders, academia, NGOs, etc.

4. Changes and Interactions due to By-catch

- Improve communication and collaboration across groups via workshops on climate change.
- Understand current fishing activities such as the number of fishermen, where they fish, etc.
- Streamline management and permitting processes.
- Explore technology transfers (gear, bycatch reduction) as species move into new areas.
- Examine the utility of time and area closures.

11. Building the Climate Change Education and Communication Collective

(Partners: Earth to Sky Interagency Partnership, NASA Innovations in Climate Education (NICE), and TERC)

Working from an existing document (found at http://tinyurl.com/mzy8v4w), this session explored the notion of developing a collective impact model for climate change education across many sectors. The goal was to enable society and the next generation to understand, address, and solve pressing local to global challenges presented by climate and global change.

Outcomes:

1. The Draft Vision to Address Enabling Collective Impact for Climate Education will:
    - Connect with how humans create a better relationship with the earth that sustains them.
    - Identify a mission statement that explains the overall goal of the organization.
2. The Needs a Backbone Organization will help:
    - Determine where there are needs not already being met and financed by other organizations.
    - Create a database where resources can be pooled such as books, research, curricula, and online interactions.
    - Provide technical training and expertise, IT support, and public relations.
    - Suggest teaching methods on how to take issues/impacts in a specific region and teach it locally.
    - Consolidate different funding sources to create a longer lived and more effective organization.
3. Sustaining the Community/Collaborative will fill the need for:
    - Funding.
    - Compiling and exchanging resources.
    - A space where organizations can converge to figure out what the next steps are.
    - Forming smaller groups, identified by their audiences, to work on identified projects.
    - Provide various forums to increase network communication.
    - Organize face-to-face meetings to refine the document that would ultimately become a business plan for the backbone organization.

12. Sustainability for the Nation: Resource Connections Governance Linkages

(Partner: The National Academies)

Participants discussed a report by the National Academies, published June 2013, that identified the linkages among areas such as energy, water, health, agricultural production, and biodiversity that are critical to promoting and encouraging long-term sustainability within the federal policy framework. The goal was to ensure that the report findings and recommendations are widely and effectively communicated to interested parties by engaging members in an ongoing dialogue

with policymakers, federal government officials, academia, and the nongovernmental and private sectors.

Next Steps

The National Academies will continue public-private partnership discussions of these topics at future Roundtable meetings.Topics that will be discussed include:

1. Sustainability Challenges:
    - Connections among food, energy, water
    - Diverse and healthy ecosystems
    - Enhancing the resilience of communities to extreme events
    - Human health and well-being
2. The Federal government should work better across agencies and with state and local governments.
3. The National Sustainability Policy should be based at the national level in order to engage the agencies so they can make necessary changes to operate sustainably. Policy, coordination, implementation and action do not need to be located in the same place.

13. Identifying Security Risks and Opportunities from Climate Change

(Partner: Globalint)

Participants addressed how climate impacts affect human and national security interests, and how such assessments can be used to shape policy. They sought to identify both challenges and opportunities for policy solutions, using vulnerability frameworks developed for security assessments.

Participants focused on three areas:

1. Critical uncertainties in forecasting and preparing for hazards are exacerbated by climate change in areas such as water quality and access, forecasting precipitation and drought, and disease dynamics.
2. Climate migration in North America, Arctic (Alaska and Canada), and Pacific Islands; how to identify vulnerable populations; and how to make their communities more resilient or assist them when they move.
3. Policy Suggestions:

- The National Intelligence Estimate (NIE) needs to collect necessary information about climate change intelligence to gauge what the community knows and to enable actionable tasks that can come out of that information.
- Direct more research to critical uncertainties in areas of climate, impacts, and policy.
- Direct future National Climate Assessments to border issues and potential scenarios.

Outcomes:

1. A follow up meeting with the National Disaster Preparedness Training Center at the University of Hawaii occurred at the Pacific Risk Management Ohana (a coalition of organizations with a role in hazard risk management in the Pacific region) in March, 2014.
2. A collaboration was launched between Globalint, Virginia Tech, Johns Hopkins University and University of Colorado to form a research network on coastal resiliency. (A proposal for $12 million/five years to implement this network was submitted to NSF in early May.)

14. Taking Eco-Districts to Scale

(Partners: Portland State University and Ecodistricts)

Participants explored how to scale up neighborhood "eco-districts" and build "district-scale" initiatives to address climate change mitigation, adaptation, and broader community resilience efforts and to support community resilience goals internationally. Participants presented case studies from Portland, Oregon, San Francisco, Vancouver, and elsewhere. Participants also presented efforts to develop assessment tools, scalable project financing, and public policy support. Issues addressed included:

1. Integrated planning
2. Nested scales (neighborhood, city, region) applied to different issues (water, energy, transportation, etc.)
3. Flexibility and adaptation for diverse communities in terms of priorities, actions, language/communication, social and economic equity
4. Metrics to measure success and failure
5. Anchor institutions and the kinds of leadership they can provide
6. Funding and revenue models
7. True inclusive engagement verses "consultation"
8. Co-benefits of climate-related efforts, such as walkability, green infrastructure, etc.

9. Food systems and community gardens as an "entry point"
10. Policy issues and other obstacles (ownership, liability) to using underutilized property
11. Tradeoffs of population density
12. Maintaining the "long term" perspective
13. Behavior changes
14. Open space
15. Lifecycle approaches

Outcomes:

1. Advanced a network of practitioners and researchers engaged in understanding the potential for district scale development to help address climate change mitigation and adaptation and broader community resilience efforts.
2. Established an ongoing effort to share information and foster innovation at the neighborhood scale in urban communities, which would seed a community of interest and practice around these efforts.
3. Informed regional and national policies that can more effectively foster innovation at this scale.

16. Monitoring and Measuring Greenhouse Gases in Cities for Decisions

(Partner: National Institute for Standards and Technology (NIST))

Participants discussed a range of questions aimed at assessing how well the GHG measurement and modeling community is developing tools that the user and policy communities really need. While it was broadly agreed that climate solutions will be and are being developed at the local community and urban scale, these efforts are occurring organically, simultaneous with co-benefits (e.g. economic and infrastructure development, quality of life) in mind. Thus, approaches that are occurring, or are envisioned, often do not occur with hard targets (emissions reductions and deadlines) in place. The absence of hard targets then make it difficult for the scientific community to know what the measurement needs are; e.g.

- Do we need to make city-wide CO2 emission rates to 50% uncertainty, or 30% or 5%?
- Do we need these numbers to be sector-specific (mobile vs. stationary sources, waste management, electric power, etc)?

- Do we simply need models that are evaluated against measurements, for case-study cities such as Indianapolis?

Since the answers to these questions were not immediately apparent, it was clear that the scientific community is not appropriately and regularly/effectively connected to city planners, managers, sustainability directors, and to the policy community, so that these questions can be pursued iteratively, and within a reasonable time frame. We agreed that if we are going to have emissions reductions targets on a time scale of say 2020, this situation must be rectified immediately.

Action Items

1. Communities should connect with academic policy analysis communities and local government official organizations.
2. NIST will host a workshop involving representatives from selected city-oriented organizations, state-level organizations, and the pertinent measurement science research community.
3. Participants will investigate the new ICLEI platform vehicle as a means of communication among stakeholder communities. The World Bank is developing a similar platform internationally.
4. INFLUX, a public information-friendly communication outreach mechanism, should be fully developed and disseminated.

17. Goldilocks and Climate Adaptation: The Regional Approach is 'Just Right'

(Partners: University of California – Davis, Bay Area Joint Policy Committee, San Diego Foundation, Governor Brown's Office)

This forum advanced a better understanding of climate adaptation from a local and regional perspective, drawing upon the lessons learned from the California Alliance of Regional Collaboratives for Climate Adaptation (ARCCA). ARCCA includes regional collaboratives around San Diego, Los Angeles, the Bay Area, and Sacramento, which formed in early 2012.

Members ARCCA shared a draft set of "Elements of a Regional Collaborative" and engaged participants in a discussion on how to develop a Regional Collaborative, focusing on three key elements:

1. Key communication principles:
    - Tell the story visually, make it local, and put people in it
    - Bring in new messengers. (e.g. American Red Cross, utility executives, etc.)

- The importance of "the Value Proposition" to the partners from their perspective
- Provide solutions immediately (scaled to the local region)
- "How can *we* help *you*?" and "Help us communicate your stories."

2. Building partnerships with key communities:
    - State & federal agencies
    - Local universities
    - Local business and enterprise
    - Key members of the media
    - Key champions in leadership roles across all sectors

3. Getting into action:
    - Identify:
        - High priority issues
        - Key leadership stakeholders
        - Actions with immediate/quick positive returns
        - Multi-stakeholder benefit (wins for many)
    - Focus on empowering local partners through collective, collaborative and coordinated actions – i.e. joint action with multiple partners
    - Building Knowledge Transfer Networks, data, and best practice sharing systems, etc.
    - Conduct 2-3 early stage activities that will show progress and build trust

18. Creating Resilient Rivers for Sustainable Cities: The Urban Waters Federal Partnership

(Partners: U.S. Geological Survey and U.S. Department of Interior)

Conference participants discussed how to conserve urban rivers as more ecologically and socially valuable and less risky parts of cities under future climate change. They did this through a discussion on the Urban Waters Federal Partnership, which reconnects urban communities, particularly those that are overburdened or economically distressed, with their waterways. The Partnership improves coordination among federal agencies and collaborates with community-led revitalization efforts to improve their water systems and promote economic, environmental, and social benefits.

Participants discussed what makes their cities different in regards to climate change, and how

their jobs changed due to climate change in four key areas:

- Water Quality
- Living Resources
- Human Dimensions
- Green Infrastructure

19. Preparing US Agriculture to Manage Climate Change Risk: Building Effective Climate Change Partnerships and Networks for Agriculture

(Partners: Cornell University and U.S. Department of Agriculture)

The goal of the symposium panel and workshop was to explore the experiences of university researchers and extension staff, U.S. government regional initiatives, and corporate and NGO partners to help build effective climate change partnerships and networks for agriculture, and provide recommendations for the establishment and operation of the new USDA regional climate change hubs, to help the agricultural sector reduce its impact on climate change, and prepare for increased climate variability and change.

Recommendations for Structure and Governance of the Regional Hubs:

1. Ensure interagency coordination between hubs and other federal regional initiatives
2. Governance structure: Ensure that all seven regional hubs are operating with the same structures
3. Clarity of the role across all agencies: Ensure consistent message from federal agencies
4. Address larger issues facing the regions: how to educate extension staff to reach out to farmers; role of extension as a climate change educator

Partnerships:

1. Reach out consistently to multiple partners, including land grant universities, private sector, state agencies, experiment stations, extension staff, NGOs, tribes
2. Establish consistent means for stakeholder involvement with partners (regular meetings, listserves)
3. Communicate across the seven hubs about the partners involved
4. Work with corporate partners (Monsanto, Pioneer, John Deere, IBM, etc.) to ensure that the tools they are developing address the needs of farmers in the region.

Education, Training, and Teachnical Support:

1. The role of the Hubs is to provide support and usable information.
2. Knowledge Management Role of Hubs: serve as a network - need to connect information flowing between researchers, managers, farmers, and extension.
3. Conduct assessments in each region of who has already been trained in extension/partnering agencies on climate change and agriculture; identify a climate change and agriculture point person(s) for each land grant university/extension office.
4. Conduct assessments of the undergraduate course offerings on climate change and agriculture issues at land grant universities; and promote courses and sharing of curriculum.
5. Work to educate and train cooperative extension agents (or other similar organizations) to serve as intermediaries to get information out to farmers
6. Incorporate climate change into train the trainer and certification programs (e.g. for volunteers such as Master Gardeners)
7. Don't overload stakeholders or farmers with information – ask them what concrete information they need, and give them concrete guidance and tools.
8. Provide a toolkit of concrete training: utilize webinars and smart phone apps to get information out to educators and farmers with limited travel budgets and limited time

Assessments and Forecasts:

1. Ensure that regional Hubs utilize existing assessments before undertaking new ones – any new assessments should involve stakeholders (farmers)
2. Ensure the assessments are being done systematically across the region
3. Make sure that any assessments with downscaled climate models are relevant, output is well explained, and uncertainties of output are well characterized

Data Infrastructure and Decision-Support Tools:

1. Provide infrastructure to help agencies meet mission statements with input from stakeholders in the face of long term climate change impacts
2. Ensure that the Big Data coming from USDA/NIFA funded research projects is accessible and well managed and shared for use by partners in the regional hubs.
3. Data access should be Open Source and compatible: USDA should provide funding and tools to help researchers manage data

4. Farmers need Decision Support Tools – there are more tools available in some regions then others; and they should not all be corporate tools (need research-based, land grant mission in providing guidance and recommendations)
5. New tools being developed in New York, Midwest, Southeast: USDA needs to conduct an assessment of what has been developed in each region
6. Ensure that information and tools are being shared (like regional weather and climate data)
7. Don't duplicate efforts

Funding Opportunities:

1. Clarify where funding will come from: include reference to Hubs in NIFA RFPs
2. Need advocates to support agency programs
3. Reference partnership with hubs in USDA National Institute for Food and Agriculture (NIFA) proposals
4. Leverage state funding, Foundations and Public/private partnerships

21. Managing Risk and Resilience to Climate Change in Forests

(Partner: U.S. Forest Service)

Participants addressed how to integrate diverse stresses and risks impacting forests into a holistic "systems" view supporting effective practices to achieve sustainable and resilient forests in a changing climate. Participants explored a number of initiatives being undertaken by the U.S. Forest Service (USFS) and others to integrate diverse uses, stresses, and risks to develop new forest management tools. Issues addressed included:

1. The need for well-documented and diverse case studies for model validation
2. The need to better share resources, tools, and information
3. Interagency cooperation and successes

Outcomes:

1. Develop management questions that focus on interagency cooperation, a common interest to bring people together, and have a regional focus
2. Host a webinar series on climate change

3. There is a need for more vulnerability assessments and dynamic models (not just individual species niche models), though they are hard to get
4. Find scholarships to get graduate students involved
5. Communicate with university programs about research needs (with or without funding)
6. Create a database of research needs
7. Connect federal agencies and research needs (for example, CESU Cooperative Ecosystem Studies Unit network)
8. Develop a list of future research and monitoring needs for integrating climate change and forest functions to be developed into a plan of action.
9. Identify strategies to address identified research needs.
10. Build a community of practice.
11. Organize future workshops.

22. Natural Capital and Information Networks for Adapting Coastal Communities to Climate Change

(Partners: NOAA and Florida Atlantic University)

Participants addressed the challenge of ensuring that natural capital is a viable option in future coastal redevelopment. The focus was placed on the Eastern Seaboard and the Gulf of Mexico. The Everglades Restoration was particularly noted as a good model which can be utilized in other areas.

Participants explored the kinds of integrated information urban coastal planners and decision-makers need, in terms of natural capital and ecosystem services, to be able to incorporate it into the broad decision making process. It was recognized that this challenge involves many complex problems which should be the focal point for partnerships. Some of these partnerships already exist for other purposes and can be leveraged.

Outcomes:

1. A recommendation to create an Information Exchange Network built as an expansion of the existing Florida Atlantic University Information Exchange Network. The Network will communicate:
    a. Scientific information and data
    b. Stories, case studies, experiences and solutions

c. Policy connections at all levels of government (from local to federal)

d. Connections to businesses

2. The Network would engage and catalyze action among:

   a. The scientific community

   b. The business community

   c. Government agencies such as NOAA

   d. Public sector

   e. Academia

3. In the longer term, the partnership would also evaluate this mechanism, i.e., whether/how partners are better incorporating these values into their decision making processes.

23. MomentUs: Building a Movement for Climate Action

(Partner: ecoAmerica)

The goal of this session was to create solutions rooted in shared American values that effectively address climate risks. Participants reviewed past social change movements, contemporary public mobilization efforts, and climate change solutions in order to create a tool kit with resources and best practices to embed climate change solutions in their networks. The solutions needed to:

1. **Create a positive energy future:** Climate change solutions should promote abundant, clean energy, avoid costly carbon pollution from dirty fuels, and provide choice in affordable energy. Solutions should help Americans save money by making our homes, buildings and transportation more energy efficient.

2. **Improve people's health:** Solutions must clean the air, improve land and water quality and provide healthy food choices to nurture people's bodies and spirits. These solutions must combat the devastating health impacts of climate change, reduce injury and illness and extend the quality of people's lives.

3. **Build shared, sustainable prosperity:** Climate solutions should create good American jobs and a sustainable economy that supports better lives and livelihoods today and for generations to come.

4. **Prepare for harmful impacts:** As we reverse the climate crisis, restore our natural environment and build a better future, we must protect our families, our communities and our livelihoods today from the harmful impacts we are already experiencing from climate change.

5. **Engage all Americans:** Each of us must have a say in decisions that affect our lives. Special efforts should be made to include vulnerable communities in crafting solutions and setting policy.

Suggestions for future action included:

1. Use of social movements to create powerful cultural changes. Focus on creating movements at a local level, which will eventually combine into a nationwide change of perception.
2. Movements should strengthen the ideas people already hold, not make them feel as if they need to separate from beliefs they already hold.
3. Once a cultural change has been established, transform this into a change of policy. This can also be most effective when started at a local level. Doing so empowers people by making them realize that actual change is possible.
4. Create a change in higher education so that students are not continuing upon a path that will lead to more environmental degradation. Encourage schools to pursue a carbon-neutral environment.
5. Use language to correctly communicate the desired message. For example, using climate disruption instead of climate change more accurately conveys the effects we are working to minimize.
6. Do not attempt to "sell" a message to citizens; it is more effective to begin by investigating an individual's concerns. By doing so, individuals are more likely to engage in collective action.
7. Adapt the language of climate change so that it becomes relevant to whichever group is discussing it, whether that be the health industry, a faith community, higher education, etc. By doing so, social movements can be designed from the ground up to resonate with specialized groups.
8. Do not begin by identifying a solution. First figure out how to get others to support the solution. Connecting to individual values is most important, because this connection is most difficult for opposition to break apart.
9. Create a positive narrative that displays how mitigating the impact of climate change and improving the economy can occur simultaneously through creative planning.
10. Ensure that principles apply to mainstream citizens, not only those already participating in the climate change movement. Target Americans without alienating the global community.
11. Promote the intergenerational importance of this movement, as it will affect our children and future.
12. Incorporate a sense of urgency reflective of the risks of climate change.

25. Climate Change: Every Place has a Climate Story

(Partner: U.S. National Park Service)

The workshop focused on effective storytelling using the **ABT** (**And, But, Therefore**) narrative format because narrative can be one solution for addressing climate change. Stories are powerful **and** affect our lives, just like climate change. Stories can serve as a bridge between the scientific community, the public and decision-makers who can effect climate change policy. **But**, stories are not yet as commonplace or widely used as they could or should be. **Therefore**, the National Park Service and Randy Olson teamed up to showcase place-based storytelling and provide training.

Results are as follows:

- The 40 attendees in the workshop learned about the structure of a good story **and** used the **ABT** methodology to construct stories. They showed tremendous interest in the technique**, but** realized that it takes time and significant refinement to create a good story. **Therefore,** they vowed to spend time crafting their own stories to create effective messaging about threats of and solutions for adapting to climate change.

- They identified the qualities of scientific messaging and the lack of narrative in their presentations, **and** they considered how climate change stories can turn people off. **But** they learned that a key ingredient to telling an effective story is creating a voice that is likeable and trustworthy. **Therefore**, they developed tales that established their credibility and that of the information they wanted to transmit so that their voices would be heard.

- The workshop attendees contemplated how they could use the ABT storytelling methodology in their communications work **and** asked questions about how to adapt it for particular audiences, **but** the workshop organizers wanted to get a feel how effective the workshop was. **Therefore**, the organizers asked for feedback and learned that attendees wanted to create stories, share them and receive critiques.

- The participants were very interested in taking the technique further **and** many of them downloaded the Connection Storymaker app. They wanted to practice the technique **and** share it with their colleagues, **but** there was no more time to do so during the conference. **Therefore,** they are creating the ABT Share Social Media Project to continue discussing and refining their climate change messaging.

Outcome: The following Facebook page created by Randy Olson is a direct product from this panel session on storytelling: https://www.facebook.com/ABTshare.

26. National Climate Assessment: Innovations in Science and Engagement

(Partners: University of Arizona and Susanne Moser Research and Consulting)

The main theme of the NCSE sessions on the National Climate Assessment was on lessons learned over the last four years, including a focus on building the scientific components of a sustainable process, partnership and evaluation. The results of these sessions are being compiled into a special issue of the journal *Climatic Change.*

1. **Sustainability -** What makes a successful, sustaining process? What would be a success?

    a) **Regional and sectoral coverage -** One contribution to success would be consistently strong regional leadership and ways to support regional and sectoral teams that are outside of the federal government

    b) **Openness and Flexibility**– Another important component of sustainability is ensuring timely and responsive products that meet the needs of decision-makers. This requires facilitating communication between a wide range of actors and government agencies.

    c) **Transcending** – Inter-disciplinarity and boundary-spanning are critical components of successful assessments, especially since risk management in the climate context requires a combination of physical and social science. Work across regions, topics, generations and professions is also needed. Communication and engagement with international groups needs to be expanded.

    d) **Leadership** – Successful assessments need strong leaders, and there is a need to build the next generation of leaders, especially through learning by doing.

    e) **Resources** – Adequate funding is always crucial to the success of assessments. Although the NCA3 is a project of the 13 agencies of the USGCRP, there are budget lines for assessment in only two of them, and there is a constant threat of losing what resources and staff are now in place. NCA3 depends heavily on the work of volunteers from academia, NGOs, the private sector, and state and local governments – but there needs to be a way to reward these efforts more consistently, sustainably and creatively.

    f) **Broad ownership** – Expanding the transparency and access to data of assessments has been a major success of the NCA3, and the engagement strategy has involved over a thousand direct contributors, but there is still a need to expand the sense of ownership across the US. This includes work on the "cloud" through citizen science and working with universities.

2. **Partnerships -** How can we create lasting partnerships that are based around rigorous data collection and analysis using consistent and well documented processes? How can we ensure that the information that is produced is used and useful? How can we sustain the exchange of information as more information comes out about climate change?

    a) **Focus on the people** – Engagement and empowerment of the people involved generated the energy, creativity, commitment and innovation that made the NCA3 successful. Context and (organizational) culture must be carefully taken into account. Key suggestions emerged:

- Extend the length of time and the number of people involved in assessment processes so that the timeframe is more reasonable and people don't "burn-out".
- Have several regional climate scientists who support the ongoing assessment process as well as local decision-makers – their work can be harvested for the next NCA.
- Engaging policy-makers is crucial.

b) **Citizen Science** – Efforts like the National Phenology Network, the Globe Program, etc. are potential resources and increase shared ownership, though there needs to be a rigorous QA/QC process.

c) **Informality** – Creating a community between scientists and decision-makers, and helping people engage through more informal venues is helpful.

d) **A compelling story** – Creating common ground through a compelling narrative, especially case studies, has proven invaluable in attracting partners into the assessment process and to communicate the findings. Show the public/policymakers how this will affect them and what they can do is crucial.

3. **Evaluation**–An important part of assessments is evaluation of the state of knowledge, and evaluation of future impacts requires knowledge of the effectiveness of climate adaptation efforts. This is a critical knowledge gap for a number of reasons, including lack of data, poor research design, and scale, timing and institutional issues. Suggested guidelines for expanding the capacity for rigorous evaluation include some of the following ideas:

a) **Simplicity and Universality –** Use language that everyone can understand and measure only the things that matter that everyone can agree are priorities (i.e. food security). Be sure to actually define "adaptation" and "vulnerability" and use terms consistently.

b) **Experimental Designs –** There is a need for better use of social science in research design. For example, methods such as triangulation (to ensure research findings are robust) can generate rich insights. Need to set standards that will be rigorous enough for scientists and understandable for practitioners.

c) **Clarity on end users –** Different decision-makers (e.g. in government, in the private sector) make different kinds of decisions. Evaluation should be geared toward their needs to ensure that they will be used. For example, in the private sector, managers make a lot of the decisions that affect risk and vulnerability, and have a great deal to gain from adaptation knowledge.

d) **Define Baselines and Successful Outcomes –** Have a vision that people can get on board with, and be clear about objectives and baseline conditions, against which progress can be assessed.

28. Connect the Dots - Climate Adaptation and Mitigation Synergies

(Partners: Center for Clean Air Policy (CCAP) and U.S. Global Change Research Program)

The Climate Adaptation + Mitigation Synergies sessions were designed to identify innovative partnerships for the implementation of Adaptation + Mitigation (A+M) pilot projects in 2014. Together we Asked the Climate Question: How can we maximize the return on our infrastructure and climate investments – mitigation and adaptation – while also maximizing the economic, social, and environmental benefits?

The Climate Adaptation + Mitigation Synergies ("A+M") sessions enabled local practitioners and decision makers at all scales to learn about best practices and discuss opportunities for achieving synergies among actions that both cut carbon pollution (mitigation) and prepare for and respond to climate impacts (adaptation). Panelists (1) reviewed the current and planned state of practice on integrating mitigation and adaptation, (2) identified actionable research and information needs, and (3) explored policy and implementation opportunities.

Included here are brief highlights on pilot project and policy opportunities; key lessons learned; research and capactiy building needs; and stakeholder enegagement recommendations.

Pilot Project Opportunities

The following project opportunities rose to the top as areas ripe to pursue in Washington, DC and Boston, MA:

1. Adding resilience measures to green building projects, codes and policies.
2. Installing Combined Heat and Power (CHP) in "Meds & Eds" community (hospital & university campuses) as a first step toward microgrids.
3. Targeting green infrastructure and cool roofs to maximize cooling and water capture.

Policy Opportunities – The group highlighted four main policy opportunities:

1. White House Council on Environmental Quality (CEQ): assess and provide input on A+M in the Resilience Toolkit and the Climate Preparedness Task Force;
2. Federal Energy Regulatory Commission (FERC) and International Organization for Standardization (ISO): modify policies to facilitate microgrids;
3. Property Assessed Clean Energy (PACE): integrate resilience into PACE (Connecticut is starting this); and
4. Stormwater fees and trading facility: follow DC's model to raise funding for green infrastructure.

Key Lessons – The group discussion focused on four key lessons learned:

1. Speak in terms people understand:
    - "Green" and "Resilient" is less wonky than "Mitigation" and "Adaptation".
2. Follow the money:
    - Ask the Climate Question for your next major investment: does it help to cut carbon pollution while also preparing for and responding to climate impacts?
    - Connect the dots: if you're investing in mitigation consider how you can increase adaptation benefits; and vice versa in order to increase return on climate and infrastructure investments and maximize co-benefits.
3. Understand drivers and barriers:
    - Learn why decisions are being made (regulations, markets, competitiveness, quality of life).
4. Look for maximizing "Accidental" and "Intentional Resilience":
   Clay Nesler's memorable phrase "Accidental Resilience" illustrates how many solutions aren't driven by climate concerns, for example:
    - DC Water is installing CHP for environmental compliance, but will enjoy major cost savings, increased energy resilience and enhanced reliability.
    - CHP and building efficiency measures motivated by cost savings can lead to energy resilience.
    - "Intentional Resilience", on the other hand, is when we plan ahead and use common sense to avoid conflicts and maximize synergies.

Research Needs: the group underscored three main research needs:

1. Broad economic analysis that includes business continuity benefits, energy savings and ecosystem services.
2. Measuring resilience at different scales: building, neighborhood scale, infrastructure, and city.
3. How to scale up from pilots to city-wide and regional resilience.

Capacity Building Needs: during our session and workshop we heard two main needs:

1. City governments need energy planning experts for future resilience ; and
2. Foundations could support embedded staff in city agencies and community groups.

Communication and Stakeholder Engagement: the group discussed three stakeholder engagement recommendations:

1. Make the business and economic competitiveness case for resilience supported by economic data and success stories.
2. Local power generation and microgrids can "empower" communities.
3. The incremental cost of good design for new construction is often minimal, whereas the opportunity costs of not preparing are high.