This document is intended to be a faithful synthesis of presentations and discussions at the Engaging and Learning for Conservation Workshop on Public Participation in Scientific Research, held at the American Museum of Natural History on April 7 & 8, 2011. It is meant to serve as a resource for those who attended, for funders, and for others in the field. It does not necessarily reflect the views of the American Museum of Natural History, the Cornell Lab of Ornithology, the National Audubon Society, or individual meeting participants.

Participant comments have been paraphrased and the sequence of participant remarks has been reorganized. These are not exact quotes, rather they are an attempt to capture the content and meaning of the ideas presented.

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Document Series
This is one of a series of documents about this workshop available as PDF downloads on the workshop website. The series includes:
I. Setting the Stage
II. Challenges and Opportunities
III. Putting Strategies into Practice
IV. Next Steps

Workshop Web Site
http://citizenScience.org/conference/ppsr2011

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Introducing the Design Studio

Putting Ideas to the Test
Jennifer Shirk, Web Content Support
Project Leader, citizenScience.org,
Department of Program Development and Evaluation,
Cornell Lab of Ornithology

Ideas proposed for this design studio session include some compelling and exciting topics. As we began this workshop, I talked about our desire to include discussions about how to move the field forward in topical areas that are meaningful to each of you. We are doing this in a subversive way because we also want to capture some other things in the course of those discussions. I would like to call attention to our workshop goals and objectives for just a moment because this is what we, as a workshop committee, have in mind as we ask you to engage in these design studio discussions.

Our overall goal is to identify best practices, and our second objective is to identify key strategies for developing conservation-related PPSR initiatives that contribute to participant learning and to conservation knowledge. We have worked hard already at identifying some key strategies and best practices, or at least best principles, that we can think about more deeply and complement with actual practices. We have worked hard to come up with the ideas posted in the matrix [see “Challenges and Opportunities”]. Later in the workshop we will be talking about how many of us will be working to deliver those ideas back to you and out to the wider field.

Before we get to delivering these ideas, we would like to explore how they would actually work if applied by somebody who might want to use them. We are going to have you put these to the test in your topical discussions. How do the ideas we have generated so far actually work in practice? As you talk about developing a new, compelling direction in your smaller groups, I want you to keep that in mind. We are hoping these discussions can be as creative and unfettered as possible,

Goal
Identify best practices for engaging the public in participatory scientific research that contributes to conservation action and environmental stewardship

Objectives
1. Share success stories and take stock of progress in linking PPSR and biodiversity conservation
2. Identify key strategies for developing conservation-related PPSR initiatives that contribute to participant learning and to scientific/conservation knowledge for society
3. Generate ideas for promoting communication, networking, and partnerships among individuals and organizations working in PPSR and conservation

Design Studio Proposals
Workshop participants generated and posted a range of proposed topics for this design studio session. Remaining participants were encouraged to sign up for the topic that interested them the most.

Tasks for Design Groups
• Key questions
How do your insights from discussing the key questions yesterday come into play? How should they be considered in the area you have chosen? What do they suggest needs to be done?
• Best practices
What best practices come to mind? What new ideas do you have for steps to be taken in the field? What have you found to be most useful from the previous day’s discussion? What could be put into practice?
• Moving to next level
What will it take to move these ideas to the “next level” of action or implementation? What comes to mind in terms of networking or putting a proposal together? How do we make this happen?
but we would like you to be attentive to some specific things. One is identification of how the ideas and insights we’ve generated are utilized, what works, and what is still missing. The other is to keep conservation at the heart of the topical ideas you will be developing. What is it that needs to be done specifically or differently in practice that addresses conservation?

The Focus on Conservation

Ed Salt, Facilitator
Management consultant, Training Resources Group

Jennifer highlighted the importance of this activity on a number of different levels, one of those being a chance to test out some of the concepts that we worked on during the matrix session in addressing project steps and overarching questions [see “Challenges and Opportunities”].

We want to add one more thing to keep in the forefront of your mind as you do this work. That is a focus on and attention to conservation outcomes. I’m going to turn the floor over to Judy Braus and Robert Petty, who will remind us of some of the things we touched on during the opening phase of this workshop that we want to keep in mind during these design studio discussions.

A FEW REMINDERS

Judy Braus, Project Co-Principal Investigator
Senior Vice President for Education and Centers, National Audubon Society

This workshop is unique because the focus is on the connection between PPSR and conservation and what that looks like. Everyone here has been working on citizen science, PPSR, and many aspects of conservation. As we talk about PPSR and conservation, there are some things to think about as we go into these design groups.

PPSR and Conservation

- Existing projects
- New projects

What are the biodiversity and human welfare targets?

The aim is for all of us to think about the conservation piece in what we are doing. If you are talking about an existing project that may have mostly followed a contributory model with an emphasis on collecting data, think about where that fits in the conservation context. In new projects, think about a conservation overlay on everything we know about citizen science and PPSR. It is people-powered conservation and science that is really important. What we want to highlight before going into these design groups is identification and implementation of best practices and clarity about the link between PPSR and conservation.
In addition, think about this in terms of what you are shooting for. What are you trying to do in terms of conservation? What is your target?

We are gathering data, but to what end? What are we eventually hoping to accomplish? What are the conservation targets and the human welfare targets that go hand-in-hand with that conservation target? We are starting with a topic, but what is the ultimate goal in terms of conservation impact? We want to design our projects with that in mind, and we want to think about that as we go into these design studio groups.

As you think about your target and goals, think about the threats affecting those targets and goals and the root causes and behaviors behind those threats, and think about how PPSR can address any of these. You also want to think about which audiences and why, and what strategies you will use to reach that audience. You are not necessarily going to have a project that gets right to improving biodiversity of species and habitats directly, but what are the steps that get you there?

We’d like you to keep all of this in mind during this design session.
Robert Petty, Lead Advisor
Director of Field Support (Western States),
National Audubon Society

We talked earlier about being exact and clear about what conservation targets are, and the definition below includes key elements to consider.

**Conservation Targets**
Biological or ecological elements that you intend to protect or restore.

- species or suites of species
- habitat
- ecosystem
- landscape or ecoregion

Some of the proposed ideas for the design studio have a very obvious conservation target, and some of them are more abstract—they may be more topical and not have a clear conservation realm. I think for the purpose of this design workshop it would probably be best, even in those abstract conversations, to work through those discussions with a clear conservation target in mind.

In the project case group I was involved in during the matrix discussion, there was a lot of conversation about standardization in data collection. That topic came up over and over again. In the process of conservation planning, that standardization exists. It exists in the form of the Conservation Measures Partnership and the Open Standards. When we work through this we should rely on that tool, which provided a basis for *Tools of Engagement*, and when we work on conservation targets, let’s be very clear about what those targets are. The conservation targets are biological elements, whether they are born out of a concern for human need or born out of a concern for the organisms themselves. They can be species, they can be suites of species, they can be habitats.

**For Example**

- Direct Conservation Outcomes: Citizen science actually improves habitat or helps species directly, such as removing invasives as part of the project.
- Indirect: Addresses a root cause or threat that will eventually improve the biodiversity target, such as research that will change a policy that helps protect a target.
- Indirect: Enhancing stewardship values and # of people taking identified environmentally friendly behaviors.

See pages 172-174 in the *Tools of Engagement*

What we are looking at is that intersection between citizen science projects and these conservation targets. In these design studio groups, start at the very beginning by asking yourself, what is it we are trying to protect, what is it we want people to do in order to
protect that target? As Judy outlined, the process begins with your target and identifying the threats to that target. The threats are human-caused events or changes that negatively impact your targets. Then what are the root causes behind those threats? A simple example where I live in Montana would be a species like pika. Pika are being affected by climate change. The target would be pika. The threat would be the change in the climate as the result of human activity, and that human activity is carbon emissions. How is citizen science going to address this?

The citizen science activity can relate to the direct outcomes of conservation or the indirect outcomes, whether it is the root causes, the threats, or enhancing the stewardship values of the people participating in that activity.

**Dialogue**

Interweaving Eco-and Economic-based Interests

- I never thought I would be standing up and saying this. I come from an academic department that does resource management and also does conservation. There is a huge, persistent conflict between those approaches, stemming from a history of ecology and field ecology, and stemming from a place of more economically and socio-economically-based use of resources. In this century, if we do not figure that out and interweave those two ways of knowing and appreciating the world, we are sunk.

I urge you, in fact I insist, as you think about how to involve the public, take all of the public into account. As we think about the threats facing the things that we love, whether they are individual species, habitats, particular locations, or intersections between species and habitats, take all of the people into account. Don’t put white hats on some and black hats on others or seek to exclude people. Indigenous hunters and fishers may have knowledge, but so do the commercial fishermen and all of the deckhands working in ways that exploit resources. I know that you didn’t mean to exclude them, but when people hear the word “conservation,” they often think about pushing sectors of society away and making them do something different. We need to figure out ways of being inclusive of everybody if we have a hope of saving the world.

- Julia Parrish, Professor of Aquatic and Fishery Sciences, University of Washington

**Logic Models**

- For those of you interested in inputs, outputs and outcomes, and for those of you who love logic models and that type of thinking, pages 172-174 in the Tools of Engagement handbook offer a list of samples illustrating what each of those look like.  

- Judy Braus
and about engaging those communities in actually engineering new kinds of habitats that might reconcile human needs and conservation in ways that we are not often thinking about. That is something that I think we need to keep in mind. • Madhusudan Katti, California State University, Fresno, and Fresno Bird Count

Desired Impact on People

• I would like to piggyback on what Judy and Bob talked about because I think it’s great to think about the outcomes. We have a lot of familiarity with the biological outcomes and what kinds of changes we would like to see regarding biodiversity and all of that. I just want to put a little meat on the bones for the human welfare part. I would encourage us, as we work in our groups, to be thinking about what changes in people we would like to see. We’ve talked a little bit about diversity and inclusiveness, but there are things that we may not be directly targeting that could be hugely important for getting an army of people on our sides. That is entering into the psychological realm.

What kinds of changes are we hoping to see in people’s sense of connection to a piece of land or in the way they identify with the natural world or their feeling that they can do something? We might not have the measures for some of these, but think about what you are hoping will happen to the participants that would be helpful in a conservation way.

• Carol Saunders, Research Faculty, Environmental Studies Department, Antioch University New England

Two Possible Topics

Ed Salt, Facilitator
Management consultant, Training Resources Group

Let us very quickly share the different possible topics for these design groups. What I would like to do is ask the people who put these ideas forward to share why they proposed these topics. What was on your mind?

PHENOLOGY

Abe Miller-Rushing
Science Coordinator, National Park Service, Acadia National Park and Schoodic Education and Research Center

Phenology is the study of seasonal biological effects, like migration, and how we know it’s spring and how we know it’s fall by what is going on in nature. It is the study of the timing of those different kinds of events, and people have been doing this for a long, long time. We could go in a couple of different directions. We could talk about phenology research in general or phenology in a particular science context, such as climate change. Another issue we might discuss involves cutting across scales. There are different questions you might ask in different localities. I work in a national park and we have very specific questions related to phenology in terms of managing our park and our resources, but there are
also statewide and regional questions, and there are national-scale questions. Those questions may be different and may require you to monitor different species and engage different audiences. How do you manage those so that each of the individual projects are complementing each other across those different scales?

**WATER QUALITY**

Candie Wilderman  
Professor of Environmental Science, and Founder and Science Director of the Alliance for Aquatic Resource Monitoring (ALLARM), Dickinson College

Linda Green and I are going to tag-team on this one. My interest here lies in the fact that in Pennsylvania, we have just discovered tremendous gas resources in the Marcellus shale, and we are going through this boom period in which we are basically a gas country open for business. There are a lot of local residents, mostly rural people we would consider under-served, who will be impacted by the Marcellus shale gas extraction, both positively and negatively. There is need for some independent watchdogging of environmental impacts, social impacts, and economic impacts. ALLARM has developed a protocol we are using, but it is very preliminary and we would be interested in exploring ways in which PPSR could make some sort of contribution in terms of conservation in regard to this new extraction industry going on in Pennsylvania. Marcellus shale extraction is also going on in southern New York, although New York is being much more cautious in approaching this, and in Virginia, West Virginia, and Maryland, so it is national in scope.

Linda Green  
Program Director, University of Rhode Island Watershed Watch

One of the issues that is emerging across the country is dealing with blue-green algae (cyanobacteria) blooms and the concern about cyanotoxins that are having tremendous health issues for wildlife, farm animals, pets, and people. Many volunteer monitoring groups across the country have been monitoring algae to some extent, but we are now seeing a huge concern. There are Alzheimer-like diseases in people who live downwind of lakes where they have major algae blooms. There is need for outreach, education, research, and monitoring of these kinds of blooms and their occurrence because the toxins don’t necessarily occur with the blooms, so that is a wide open field for citizen science and PPSR.

**CLIMATE CHANGE**

Philip Loring  
Research Assistant Professor, Center for Cross Cultural Studies and the Alaska Center for Climate Assessment and Policy, University of Alaska Fairbanks

When asked to present a question on a topic that would pose some difficulty, I proposed climate change because it is happening on a global scale and involves slow trends that are hard to pick up on because they are often couched in greater variability, including the
changing of the seasons, and that is one of the big things that I deal with in Alaska—the increased variability in the timing of the seasons and the co-occurrence of events between where birds can be found, fish runs, and so forth. The challenge for me is in thinking about how to monitor some of these slow trends of change and what to pick, what sorts of indicators to choose, when you know there is this variability.

One possibility we have thought about is something like monitoring seasonality because we could get support for that. People in Alaska rely on seasons for subsistence livelihoods. The other thing we’ve talked about are slower trends, such as range extensions of biota and flora and whether fish like sharks, skates and rays are moving into northern waters. What interests me is the question of how to best monitor these slow trends.

SOCIAL NETWORKING

Rosamond Kinzler
Senior Director, National Center for Science Literacy, Education and Technology, American Museum of Natural History

I didn’t recognize that I had championed this idea, per se, but we are interested in using mobile technology and social networking to encourage participation among audiences that wouldn’t necessarily self-identify as being interested in science or conservation or climate change, and so on. That is the idea behind this topic.

INCLUDING PPSR IN OUTDOORS PROGRAM

Greg Wolley
Executive Director, African American Outdoor Association

The organization that I direct is mainly an awareness-building organization, bringing new audiences into the outdoors and increasing their awareness about natural resources and resource issues. We haven’t yet moved into doing any type of PPSR work, investigative work, or restoration work or getting people involved in those. How do we move to that next level? Scientific investigation is very new to this audience. They don’t work in the field at all. My intent is to be able to move them into advocacy and into being able to take some action with this newfound awareness that they have. How can I gain from what all of you are doing and integrate that into the work that I am doing in my organization?

POTENTIAL REVISION OF CITIZENSCIENCE.ORG TOOLKIT STEPS FOR CONSERVATION OUTCOMES

Caren Cooper
Ecologist, Cornell Lab of Ornithology

The current citizenscience.org Toolkit steps were developed for contributory-style citizen science or top-down approaches and, as you may have noticed, don’t hit the mark on everything related to projects dealing with conservation. The point here is to think about those steps and components in a broader way
in terms of conservation PPSR projects and start hashing that out. It will involve looking at different components of citizenscience.org steps, identifying gaps where things are missing, and identifying different approaches that could be used in the Toolkit steps.

TOURIST-BASED MONITORING SYSTEM FOR THE GALÁPAGOS ISLANDS

James P. Gibbs
Professor, Conservation Biology/Wildlife Management,
State University of New York College of Environmental Science and Forestry

The Galápagos is a biodiversity hotspot. It is an archipelago off the Republic of Ecuador that has 150,000 visitors per year and no mechanism whatsoever to involve them in observations. They are a sort of pre-selected group of naturalists. While there is a lot of interest, there is virtually no integrated monitoring that goes on in the Galápagos. That sort of monitoring is too expensive and too logistically complicated. There is a pretty simple decision-making landscape in the Galápagos, with just one entity that makes all of the decisions, and that is the National Park.

There is a lot of interest in this, they’ve been pursuing this for years, and it has finally gotten traction, though the elite scientists of the Galápagos are opposed to public participation for a lot of reasons you are all familiar with. But we are pushing against that and there is actually interest in pulling together a group to talk about this next year and finally make it happen. This is what I would like to discuss in this topic group.

MUSEUMS AS A HUB FOR CONSERVATION PPSR

Lila Higgins
Special Projects Assistant,
Natural History Museum of Los Angeles County

I think museums could offer real help in PPSR and conservation work because we are visitor-focused institutions, so we have the public already coming to us. We also, most of the time, have educators on staff, scientists on staff, IT on staff, and evaluators on staff. And did I mention that we already have the public coming to us? I think there is a lot this group could discuss regarding how to leverage museums for help in conservation PPSR.

SUPPORTING COMMUNITY CAPACITY IN INDIGENOUS COMMUNITIES

Jonathan Long
Biologist/Tahoe Science Program Coordinator, USDA Forest Service Pacific Southwest Research Station; Adjunct Faculty in Natural Resources, American River College

With this topic, I think three themes might be explored. One is considering the cultural context in these kind of communities. Traditional ecological knowledge is going to be central to resolving the dynamic tension with conventional science. Second, we are facing limited resources and there is going to be a lot of
discussion about how to sustain programs and build repositories of information. Third, what conservation actions are going to be relevant to the concerns of local communities, whether you’re dealing with external threats like climate change or more internal challenges? Those are three things we could explore.

ACTIVATING THE INDIGENOUS YOUTH IN COMMUNITY/TECH IN PPSR

Jon Waterhouse
Yukon River Inter-Tidal Watershed Council, Yukon River Water Quality Community Monitoring Program

Across the United States there are over 500 federally recognized tribes, and the Canadian folks have something like 816 First Nations. This means that there is a vast number of people who are disenfranchised and are among the first affected by this climate change that is happening because many of them live out on the land, and they are very interested in what is happening. The idea would be to tap into that vast number of people but also that vast amount of knowledge. Many of them are still gathering on the land, or hunting on the land, or fishing, and they are out there every day.

I think it would be a wise move, especially for PPSR, if we could find some way to activate that network of people, including the youth. With the right approach it could be very successful, and we could build a vast network across the United States and all across Canada. Candie Wilderman mentioned a European model in which they hold a big meeting like this one, with a bunch of scientists, and the community attends and basically shops for scientists who will take on their project. I thought that was a pretty incredible idea.

THINK TANK ON HOW TO ADVANCE THE SCIENTIFIC QUALITY OF PPSR

Finn Danielsen
Ecologist, Nordic Agency for Development and Ecology (NORDECO), Denmark

The idea here is to form a think tank on how to advance the scientific quality of PPSR without losing out on local ownership and social capital. For me, that is something that runs through all of the things that we have been discussing here. It also has to do with linking this very impressive work of citizen science that all of you in this room have been involved with for many, many years with what some of us in other parts of the world are doing in other places.

I myself am involved in a group that is working in developing countries where there is real biodiversity, and where the real cutting edge of biodiversity conservation is happening at the moment. We would really like to see a synthesis of these approaches change reality on the ground for those millions of people dependent on biodiversity and natural resources for their livelihoods, people who are now threatened because of climate change or other environmental changes in recent years.
For example, right now there are market-based initiatives being introduced in the tropical forest, including REDD and the Forest Stewardship Council (FSC). There is even the new Access and Benefit-sharing Protocol from the Convention on Biodiversity meeting in Nagoya last year, where it was agreed that you can’t access genetic resources without the prior consent of the people in the community from which those resources came. How are we going to implement that? You can’t do it without the people living there on the ground. They are the ones who know what is happening in the forest. You need some kind of PPSR approaches, so those on the ground can have an impact.

There is the example of what happened in the Arctic and Greenland and Russia, with people in Russia losing their traditional herding lands to oil and gas development. We need to provide them with tools so that they can stand up against those interests in a data-based dialogue. Let’s try to merge the citizen science approaches, which you here have so much experience with, with these community development and resource management efforts.

The Final List of Topics

In a number of cases potential topics were combined to form final topics.

1. Climate Change, Rural Communities, Phenology, Coordinating Across Scales
2. Including PPSR & Conservation in Outdoor Programming
3. Developing Tourist-based PPSR in the Galápagos
4. Developing Community Capacity in Indigenous/Developing Communities
5. Museums as a Hub for Conservation PPSR
6. Revising CitizenScience.org Toolkit Steps for Conservation Outcomes
A Tourist-based Ecological Monitoring System for Galápagos

James Gibbs, Professor, Conservation Biology/Wildlife Management, State University of New York College of Environmental Science and Forestry

We'll start with some mandatory Galápagos shots. Someone once said the Galápagos are an invention of the Eastman Kodak Company. Most people are surprised that there are human beings in the Galápagos. There are 50,000 of them.

The reason this was posed as a case study is that there is a huge need for information on what is happening in the archipelago, with its magnificent biodiversity. There are a lot of...
Why Galápagos?

- No comprehensive monitoring in place
- Species are distinct
- Diversity is low
- Many of the species are endemics of global conservation concern
- Huge numbers of tourists visit (150,000/year)
- All tourist groups have a trained guide
- Tourists visit year-round
- All tourists “capturable”: pass through two distinct check-points
- Most tourists are competent observers
- All tourists are tracked on fixed itineraries

of reasons to think that citizen science/PPSR could really contribute here in terms of a workable situation. Species are distinctive, so there aren’t a lot of identification issues. Diversity is actually very low, so you don’t need to learn about a whole lot of different creatures. Many of these species are endemics and are of global conservation concern. There is a lot of international interest in what is going on in the Galápagos.

There is a huge pool of tourists, about 150,000 per year, way beyond the official numbers reported. All of these tourists have a trained guide who oversees their activities. These visitors come year-round and visit fixed tourists sites, and those sites may be visited two or three times a day by different tourist groups. All of these tourists are “capturable” because they all have to pass through two pinch-points, the two airports that function in the Galápagos. The average cost to go to the Galápagos is about $4,000 for the whole package, and people are going there mainly to see wildlife, so this is a group of folks who are already interested in this topic.

Best of all, there is already a sampling design imposed on the process because everybody has to go to the same sites—they are fixed itineraries. So you’ve already got spatial structure to the sample, which can be an elusive problem in many of these programs.

We touched on conservation outcomes and these aren’t listed in any particular prioritized order. There are enormous tensions in the Galápagos between the management authority of the park service and the tourism sector, which is carefully regulated by the park. Vast amounts of money could be made in the Galápagos, but that is all determined by regulations regarding berths on ships and how many and when. This might be an area where we could set up a whole new dynamic that doesn’t exist, where tourism gives back to conservation. Right now it’s quite antagonistic, so it would be interesting to think about it from this new perspective.

Regarding the tourists themselves, many of them wish they had a way to contribute. In the short term, that could simply be being able to give their observations, and in the long-term they could see those observations show up on the trend lines for Galápagos Penguins, for example, and know they had contributed.

Conservation Outcomes?

- Improving relationship between park and tourism sector
- Enhance sense of tourists as conservationists
  - Direct
  - Indirect
- Threats monitoring
  - Invasive species
  - Poachers etc.
- Success of conservation zones and other management actions
- Scientific knowledge
- Capturing the unpredictable (e.g., tsunamis)
There are many reasons to have eyes and ears out there, and citizen science tourists could be those eyes and ears. When invasive species show up you need to pounce on them quickly. There are shark finners and tortoise poachers and there is a lot of illegal fishing. You need a detection apparatus and again, eyes and ears are critical.

In the larger scheme in terms of conservation, the Galápagos National Park has divided up the entire archipelago into different management zones for fisheries and tourism. This could go a long way to helping them find out whether this actually works or not.

Then there are a couple of final issues regarding outcomes. In terms of scientific issues, the Galápagos is pretty poorly known from a systems perspective. It’s a place of enormous extremes, with El Niño and La Niña, and we really don’t know what happens to the wildlife during these ups and downs. There is also the unpredictable. The question just came up, what did the tsunami do to the local wildlife? The park service had no idea. They said, “We’ll have to wait until next year for the scientists, if they do that survey and if they get funding for it.” If they had a program like this in place they would already know the answer.

A lot of interesting issues were raised. Clearly, when putting something together in a country like Ecuador, you very quickly need to defer to the stakeholders. This needs to be their program. Anything that has even the perception of being imposed from the outside is dead from the start.

Something that came up in our group that I hadn’t really realized before is that the guides are pivotal in all of this. They interact with everybody. They are working with the tourists, they can make all of this happen in terms of facilitating it and dealing with the logistics. They’re trained by the park and would be the key group to approach, and I think they are all organized in one association. Whether they want to take this on or not will mean the difference between success or failure.

The tour operators are also pretty critical in this. I think many operators would welcome the opportunity to take this on as a way of enhancing the experience and enjoyment of the tourists. Many enlightened tour operators would see this as an augmentation, not as a distraction.

Lastly, we hit on the possibility that because the Galápagos is somewhat unique, you could mandate participation in this, just like fisheries and reporting your catch. It’s easily conceivable that if the park were interested, and if there were consensus on a reporting organ or apparatus, they could simply require this of every visitor and every tour company. We talked about the good and the bad points in this approach. It is obviously a complete and extreme opposite from cooperative, collaborative, and co-created, but it could work, and it could work quite well. We didn’t get into all
In general, we found the seven steps quite useful in thinking through this. I actually think it’s quite useful at this level, thinking about a specific program in a specific place. We were not convinced about the utility of the current order of the steps, but maybe that order isn’t even intended. Our thought was that the “scoping out” phase—the needs assessment and meeting with all of the stakeholders—should really come first, before any of the other issues. On the other hand, it raised lots of issues that we unfortunately ran out of time to deal with. It is a useful tool for this kind of project on this kind of scale.

Our grand conclusion is that operationally, in terms of the mechanics and implementation of this program, it is pretty straightforward and there are many possibilities here, but the larger context is pretty tricky. This is a place of enormous conflict. Clearly there is some good feedback that could go to the managers, who would probably support this, and equally clearly it could benefit the tourists in terms of enhancing their experience. The value to the local community, which is the toughest stakeholder of all, is dubious and we need to be thinking about PPSR programs that would engage them as well.

Regarding other issues, the point was raised several times that you shouldn’t try to solve all problems all at once. There are a number of things that, even though imperfect and non-comprehensive, could still deliver something really useful, really quickly to the park. So it would start with those substantive things and then build.

Given the quality of the data and the scheme of the annual operating plan that drives all decision making in the Galápagos, an annual reporting scheme would work quite nicely.

We also talked a lot about data entry and how you actually capture the data. A lot of tech-savvy folks go to the Galápagos, but the mean age of tourists is 67 years old. Do you rely on Internet-based reporting or “scantrons” within documents, and how do you orchestrate that? That is an important topic to think about, who the actual participants will be.
QUESTIONS AND ANSWERS

Data Collection Issue

- How does it work to collect data in tourist groups that are all going to the same places? You don’t want them all noting, “Lizard, lizard, lizard.” • Caren Cooper, Ecologist, Cornell Lab of Ornithology

- From a visitor perspective, if it enhances the experience of the visitor, why not? In terms of data it is immense redundancy, but you can clean it out if you don’t want it. You can sub-sample it or average it per site, per day, per visit, that kind of thing. I think it would be a fine problem to have. • James Gibbs

Applying the Data to Conservation Outcomes

- Do you think the data would be used by the park rangers, and would the findings be acted upon, or would it just be piling up? Second, this is the kind of thing Earthwatch is doing all the time, so it would be great to link up with them for this one. • Finn Danielsen, Ecologist, Nordic Agency for Development and Ecology (NORDECO), Denmark

- Your first question is a tough one, and all you can do in a situation like this is provide reliable information and the political machinery will do what it does. For example, if you were to show that tourism is having a negative impact on biodiversity, that’s not going to be a popular outcome, but that’s the reality of the Galápagos. Unless you want to get political, the best you can do as an outsider is to provide reliable information, whatever it says. It is their country and their organisms, for the most part, and it’s up to them to take it from there. I think what would work best would be to build this and get this working, including not just data capture but data synthesis and implications in terms of visualizations, and then hand it over. I think that’s the model that has worked best in the last decade, and it would work best for this as well. • James Gibbs
Phenology and Climate Change

Andrea Wiggins, PhD Candidate, Syracuse University, School of Information Studies

This area of conservation holds a lot of potential. The first is low thresholds of engagement. A lot of people make phenology observations without realizing it, and they just don’t record it. This could have immediate impacts, especially on awareness, it can reach diverse audiences relatively easily, and it really resonates with different experiences in the world.

We talked a little about identifying conservation outcomes and instead ended up identifying why it is so hard to identify conservation outcomes. We also talked about trying to match actions to actors, and I will get back to those actors a little later. We talked about issues of mitigation versus adaptation, which I am told mean different things in different communities and depending on where you are from, those two terms may mean opposite things.

There are also issues of prioritization. We can’t do it all and if you try to do it all, you’ll end up just giving up because of the hopelessness of it. Prioritization is really difficult because none of these things are easy to undertake. Another issue is acting across scales. A lot of these projects, and there are a number of phenology projects and climate change projects out there, dovetail quite effectively and could be brought further into alignment. They just haven’t been yet, and it is very difficult to

Networks of observers across Europe show that blooming, leafing, and fruiting of plants is happening earlier and earlier. (Menzel et al. 2006)

Photo: http://www.flickr.com/photos/cocreatr/2290237545/in/pool-whiteground

Phenology and Climate Change group

Group Participants

Abe Miller-Rushing, Instigator
Jennifer Shirk, Facilitator
Felicity Arengo, Notetaker
Andrea Wiggins, Notetaker
Rosamond Kinzler
John Cigliano
Linda Green
Sam Droeger
Alan Berkowitz
Alycia Crall
Nellie Tsipoura
Jake Weltzin
Emily Cloyd
Rick Bonney
Complexity in Identifying Conservation Outcomes:
- Matching actions to actors
- Mitigation vs adaptation
- Prioritization
- Acting across scales
- Can’t do it all

Just since 1974, Christmas Bird Count volunteers across North America have seen many species of birds expand their northern ranges.

http://www.flickr.com/photos/furryscalyman/3840427877/in/set-7215794364089472/

Outcomes on Different Scales, and in Different Domains:
- Temporal (short, medium, long range)
- Geographic
- For scientific data and for actors

On a rainy night in 1970, on her farm in southern Massachusetts, Mrs. Kathleen Anderson heard the first spring peeper calls and marked in her notebook, “March 27th.”

Photo: http://www.flickr.com/photos/furryscalyman/433269300/

make different scales of activity work smoothly together, from your small localized projects, to your regional projects, to your national projects, but there is a lot of commonality, particularly with the nature of the observation itself, that could make it work if we can coordinate effectively.

The major issue in trying to think about the outcomes is that this is so big an issue, climate change in particular, and if you start with what we want to get out of it, it’s unaddressable. We really need to chop it down into different temporal ranges: short-term outcomes, medium-range outcomes, and long-range outcomes. We need to look at different geographic ranges in order to come up with some more useful outcomes. Those outcomes include both the scientific data and the outcomes for actors. We talked a lot about the fact that human social and behavioral outcomes are equally as important as conservation outcomes for this particular domain because you can’t achieve the conservation outcomes without the social change as well.

Regarding actors versus audiences, we brainstormed quite a few different groups of actors and decided it was important to distinguish between actors and audiences because using the term “actors” implies agency in a way that “audiences” doesn’t. “Audiences” implies a passive group. We want to move people from being the audience to being the actors, and this is a continuum that we can shepherd people along.

ACTORS vs. audiences
- Land/resource managers (large or small)
- Policy makers
- Voters
- Consumers
- Educators

(Actors turn outputs into outcomes... can be a continuum determined by agency.)

Observations by Mrs. Anderson and others suggest that species in some places are changing their habits as the climate changes.

Photo: http://www.flickr.com/photos/furryscalyman/353487277/in/set-7215794364089472/
The actors we identified as the most relevant to concentrate on were land and resource managers, large and small. That means individual land owners as well as the Bureau of Land Management, etc. Actors also include policy makers, and we talked a lot about the political end, moving forward some of the larger goals. There are voters and consumers, which covers most everybody in some fashion. Making consumption choices can have a very big impact if you can convince people that they need to go there. And then, of course, there are educators.

There was one more point that didn’t make it onto these slides that we also felt was really important. Ro Kinzler introduced an idea that came from her matrix working group, which involves taking a meta-view when looking at these steps. She pointed out that we can use those six questions about conservation as a rubric to assess the effectiveness of our outcomes.

QUESTIONS AND ANSWERS

Engaging the Private Sector

- I didn’t see the private sector up there as an actor, and I’m wondering if that was discussed. • Mark Chandler, International Director of Research, Earthwatch Institute

- It was. We just got to the point where there were so many groups that we were discussing that we started thinking about which we target first. Corporations were definitely on that list, and the whole area of corporate responsibility is something that would be nice to promote further. • Andrea Wiggins

- At Earthwatch, one of our largest audience segments actually deals with climate change, and companies are very interested in that. We have found that institutions such as corporations are very sensitive to this and act as institutions, whereas individuals have their own personal agendas in terms of where they go. There is a nice TED talk by Jason Clay about who you should engage if you want to make a difference in terms of sustainable agriculture. He makes the point that if you engage the hundred top companies in the world, you affect something like 60 percent of global agricultural trade, and if you want to make a difference, engaging corporations is the single most effective, focused way to begin to make a difference. • Mark Chandler

The Emphasis on Actions

- One of the things we felt most strongly about in this group was not thinking of them as corporations, but in terms of what we expect them to do, so it is putting it in terms of actions. That is the difference between thinking of them as a named audience or a kind of audience, and the type of actions we want. If conservation action is what we want, what actions would you expect a corporate audience to take? Would it be investing?

From Group Notes:

Engaging Individuals, Changing Awareness and Behavior

- Biological goals are good, but we need to bring in the social component, the connection to the information needs to be a goal.

- Changes in phenology affect people: agriculture (planting, spraying), tourism (fall foliage, whale watching).

- We can ask people to monitor changes in their backyard (e.g., the date they can start to wear a short-sleeved T-shirt, bird arrival dates, the date flowers start to bloom) that relate to climate change (Nature’s Notebook, phenology monitoring program). The message is that climate change is happening in one’s backyard.

- Make a connection to a global phenomenon tied to negative effects.

- Education, changing behavior, will be a conservation outcome. For example, have phenology information available to people so they can notice change and can influence behavior.

- It would be good to be able to track people over long periods of time to look for changes in behavior over time. Using the emerging cyberinfrastructure can make this easier.
Would it be voting? Would it be educating? We tried to shift away from this enormous list of potential audiences to what might still be a long list of actors, but maybe not quite as long and maybe this helps clarify what the conservation actions are that you are expecting to see. • Alan Berkowitz, Head of Education, Cary Institute of Ecosystem Studies

About Actors and Outcomes in Practice

• One of the things we found is that when we tried to bend some of our partners or collaborators into particular types of groups and what they are going to need, it was almost impossible. It is multidimensional. Who would have ever guessed that a big bank would come to Earthwatch and work on their Climate Stewardship program? Identifying those top priorities is often difficult.

It wasn’t that we couldn’t identify conservation outcomes in our group, it’s that there were so many, and it’s such a broad opportunity. If we were practitioners and had information, then we could identify conservation outcomes relatively easily if we were on the ground working. This feels a bit disconnected from the world out there in terms of the “what,” so it’s difficult to imagine what those outcomes are going to be. • Jake Weltzin, Executive Director, USA National Phenology Network, USGS

Additional Group Thoughts/Notes

About Phenology and Climate Change

• How much do we know? We have a lot of information on phenology of most species, but the drivers and connection between variables is less known. Effect of changes in phenology and populations changes are less known.

• How does phenology relate to climate change? There is a lot of science going into looking at timing of changes (drivers): rain, temperature, levels of carbon dioxide, etc.

• Why does it matter? Some organisms respond better than others, interactions between predator-prey, pollinators, can break down. Changes in response are not linearly based on climate change.

Global-Local

• Different regions are interested in different species that are of interest, but we need to network to contribute to national, continental, international efforts that are complementary. We also need to do local-level projects that are relevant and resonate locally.

Key Actors

• Natural resource managers:
  - Adapt management practices
  - Inform interpretation and education

• Policy makers
  - Increase awareness (output)
  - Adapt policies to reduce emissions and manage human and natural resources
  - Create policies that facilitate adaptation to climate change

• Jake Weltzin, Executive Director, USA National Phenology Network, USGS
Revising Citizenscience.org Toolkit
Steps for Conservation Outcomes

Karen Oberhauser, Associate Professor, Department of Fisheries, Wildlife and Conservation Biology; Director of the Conservation Biology Graduate Program, University of Minnesota

Being in our group felt sort of like running a Marathon; we worked through lunch and right up to the last minute, so we don’t have fancy slides with pictures. Our task was to think about the PPSR project design steps and how we could adapt, tweak, or completely revise those for conservation. It took us a long time to zero in on how we should approach this question, but during this time of zeroing in, we came up with a lot of points that are important for thinking about conservation and PPSR in general, and we wanted to capture and share those.

First, we spent a lot of time discussing whether we could modify existing citizenscience.org Toolkit steps or create new steps. We didn’t completely resolve this, but we did conclude that it will be important to make some changes to address conservation issues. Next, we felt that PPSR in general is missing ethics steps; this is relevant to PPSR in general, and particularly to projects with conservation goals. For instance, in some cases people go onto private property to collect data. How should this be handled? There is the question of how to attribute the findings of participants. Should they be coauthors? Should they be acknowledged?

We wanted to put the need to think about the ethics of this work out front.

Zeroing in more closely on conservation, we thought that the motivation for people’s engagement in PPSR is often, but not always, conservation. We wanted to recognize the fact that some people might just want to learn and contribute to science. When they do have a particular interest in conservation, we want to acknowledge and take advantage of their motivation to contribute to conservation and biodiversity.

If the goal of a project is conservation, that needs to be an intentional part of the design of the project. It will be important to think...
carefully about the conservation questions and the matrix discussed earlier in the workshop, and how these conservation questions inform the steps of project design. In some cases we felt constrained by the existing structure of the matrix, but we also thought that it served to get us started thinking about these issues.

In choosing topics for study, it is always going to be important in PPSR projects, but especially in conservation projects, that there be very deliberate goal setting that takes into account the potential conservation outcomes of the project. We also felt it would always be best to use a logic model to identify and think about the conservation impacts, the outputs, and the actions that would lead to those impacts.

It is also important for conservation projects to consider trade-offs. People might have different goals in the project. If there are explicit conservation outcomes, it will be very important to think through whether the conservation outcomes of the project are politically realistic. Could there be potential negative conservation/social/economic impacts? Could people use the data that are collected, as Tim Vargo said, for nefarious reasons? Will there potentially be a negative economic or social impact?

In choosing the topics for study of all PPSR projects, the amount of input from the researchers and the public will vary with the topic and inform the choice of the conservation issues to be addressed by the project. We had an interesting discussion of whether it would be more important to have strong community engagement with a PPSR project that has identified conservation as an outcome. There was disagreement in the group about that, leading to an interesting discussion on the relative amounts of input by the researchers and whether it was a top-down or bottom-up project.

It will be very important in choosing the topic for study in a conservation project to consider the end users of the data, to use multiple lenses on the project—educational, conservation, and scientific lenses—and to consider different PPSR models along the spectrum of contributory, collaborative, and co-created.

It will be important to think through likely impacts and outcomes of conservation projects. Overarching impacts that people might want to consider when they are developing a conservation PPSR project include...
Background Notes on Step 1: Choosing appropriate topics for study

• Goal setting needs to be very explicit. Create a logic model for conservation.
  - What will change as a result of program (impacts)?
  - What will be done to cause these impacts?
  - What are immediate outputs that will result in these impacts?

• Consider trade-offs: Is the project politically realistic in terms of conservation/political goals? It may be necessary to change it to make it more politically feasible. Data may be used in nefarious way, or the conservation action may have negative social/economic impacts.

• Chose appropriate topic for study: The amount of input from researcher, public will vary with the topic and will inform the choice of an issue/concern/question. What are the specific conservation impacts? Who are the end-users?

• Overarching impacts include sustainability, biodiversity, stewardship, learning.

• Specific outcomes (need to consider end user of data):
  - Conservation and resource management science—evidence-based management, publishable results.
  - Community level: social/ecological outcomes—social learning, networking, preservation of ecological services, natural resource management actions.
  - Individual level: access to information that will lead to behavior change, empowerment that might be the result of acknowledgement of contributions, knowledge that they are leading to new information, relationship building.

• What is different? Like PPSR in general, there is spectrum of levels of engagement, from co-created to data contributory. There was group disagreement on whether projects with conservation goals will necessarily be weighted at the co-created/community end of the spectrum, and the degree to which community engagement is important. There are many examples of projects with conservation impacts that are contributory.

• Gap analysis for importance of data and kinds of learning: need to be explicit about what happens to the participants as a result of their learning that will lead to conservation outcomes, how the data will support conservation outcomes, and/or how the project will directly support conservation outcomes.
Adaptive Loops
- On part of participants (stewardship actions)
- On part of project
  - How to support conservation outcomes
  - Convening team and developing protocol
  - Flexibility in recognizing unanticipated outcomes

Group Background Notes:
Steps 2 & 3
- Development of procedure and convening a team should also involve adaptive loops, especially when conservation is an explicit goal. The team may need to include different kinds of expertise as the goals and protocol evolve.

Step 6: Disseminating and using results
- There will be a spectrum of local to global projects, and conservation will be best served if we bring together findings from multiple projects that allow them to result in a larger impact.
- It is important to consider end users of data.
- Should always be on the lookout for unintended conservation outcomes, and consider an adaptive management loop that would encourage incorporation of these unintended outcomes into the structure of the project to happen.

Thinking in Terms of Project Phases
- Potentially, some of those steps might be collapsed as phases to acknowledge the fact that possibly the order needs to be different, depending on exactly what your project is doing and what is being accomplished. The potential phases would be planning and development, implementation, and so on.  
  • Ashley Dayer, Chair, Bird Education Alliance for Conservation

I’d like to thank my group. It was exhilarating to be a part of this discussion.
Including PPSR and Conservation in Outdoor Programs with a Focus on Communities of Color and Underserved Groups

Greg Wolley, Executive Director, African American Outdoor Association

Our group looked at how you move a group of folks who are underrepresented in the conservation movement in general from their newfound awareness of the outdoors, and maybe some awareness of environmental issues, to knowledge, awareness, advocacy, and PPSR with conservation outcomes. How do you move them along that spectrum?

If you want to find out where the most toxic and polluting industries are in the United States, all you have to do is look at a census map of places in the country that have the highest concentration of people of color and the highest concentration of people who live in poverty. There is almost an exact match in that overlay. For the single strongest indicator of where toxic industries are in the United States, look at race.

I wanted to plant that in your heads, have you watch the following video, and then we will talk about our project. This video, Black Hiker, injects a little levity into the situation. It’s obviously a satirical piece but the fact is, I’m the only African American out of 60 people at this workshop, and I think we have two Asian participants and a Latino. I’ve been doing environmental work for over 30 years and that ratio hasn’t changed much.

We thought, is there a project we could latch onto that would have a particular attraction to people of color? Looking at the environmental justice issue I mentioned earlier, we thought, how about a brownfield

Group Participants
Greg Wolley, Instigator
Tony DeFalco, Instigator
Robert Petty, Facilitator
Heidi Ballard, Recorder
Michelle Prysby
Madhu Katti

“Hasn’t anybody ever seen a Black hiker before?”

Outdoor Programming group
The Problem

- Toxic brownfields in urban diverse communities and disparity of funding to support restoration?

The Project

Moving Beyond the Stereotype: Engaging African American Outdoor Participants in PPSR & Conservation Action

Engaging members of the African American Outdoor Association in restoring Cully Park restoration of an urban landfill?

The Problem

- Toxic brownfields in urban diverse communities and disparity of funding to support restoration?

The Project

Moving Beyond the Stereotype: Engaging African American Outdoor Participants in PPSR & Conservation Action

Engaging members of the African American Outdoor Association in restoring Cully Park restoration of an urban landfill?

site in Portland, Oregon? Now, the funding for brownfields is also disproportionately allocated depending on where the greatest potential for economic development is per site, so the micro-brownfield sites in poor neighborhoods often tend to be neglected in favor of ones that can be remediated and restored, ones where large development projects can occur that make relatively few people a lot of money.

We zeroed in on a 26-acre former landfill site in Portland. It has been remediated, it has been capped, it has been seeded, and the local community has already been involved in giving input regarding what happens on that site. They’ve been involved in master planning and there have been a lot of community surveys on what they want to see happen on that site.

The neighborhood is low-income and predominantly Latino. The local elementary school has one of the largest portions of English language learners in Portland. One of the things they want is a soccer field—Latinos play soccer. The question is, what sort of PPSR activities could occur on this site? One of our questions was how to engage the African American Outdoor Association (AAOA), which is predominantly African American, in this PPSR activity in a project that would be relevant to them, near or adjacent to the neighborhood.

In terms of local knowledge, we have several people who were growing up in the area when it was a landfill, so they watched all the illegal dumping that went on, they know what’s in the landfill, and they can contribute some of that local history and knowledge to the process as we move along.

To talk about potential PPSR projects, I’ll turn this over to Heidi Ballard.

Heidi Ballard, Assistant Professor of Environmental Science Education, University of California, Davis

The PPSR projects we considered were those we thought were realistic to do on this site, but we would certainly need to consult with the AAOA and the local neighborhood. Those projects involve water quality monitoring and monitoring the methane, which would involve shadowing the city agencies to do the monitoring of the methane. There would also potentially be habitat assessment, and definitely bird surveying, which would particularly interest members of the AAOA, according to Greg Wolley.

We wrestled a long time with the same thing several other groups did, the relationship between the conservation outcomes and the community outcomes, and we talked about community health and environmental justice. Having green space and open space in this

PPSR Components

- Water quality monitoring
- Baseline data gathering of flora & fauna
- Attitudes and behaviors of neighborhood members
urban area would potentially be a conduit for people to appreciate the environment and conservation. There was a little twisting and turning around community outcomes and community health and conservation outcomes. In the end we thought we hit all of the main goals we were aiming for, which was kind of astonishing.

The Outcomes
- Restored urban greenspace
- Improved soil, air, and water quality
- Inspired community members in conservation and PPSR

DISCUSSION
Involving Higher-Ed Students Underrepresented in the Sciences
- You’ve probably already thought about this, but with my university educator hat on, I’m wondering if you’ve thought about interaction between the AAOA and the Society for Advancement of Chicanos and Native Americans in Science (SACNAS). There are chapters everywhere, though they are rooted in some universities more than others. I was just thinking about a way of involving students and increasing the pipeline. • Julia Parrish, Professor of Aquatic and Fishery Sciences, University of Washington
- There is also Mathematics Engineering Science Achievement (MESA), which is an organization that works with community colleges and particularly targets students of color for science. That is something that I have been thinking a lot about, involving them in PPSR projects. But you know how it is when you are wrestling with these huge issues. We just wanted to zero in on one project, so we decided to work with the Black hikers. • Heidi Ballard

GROUP BACKGROUND NOTES
The Big Picture
- We are talking about outdoor programs that promote recreation in the outdoors, but do not necessarily involve conservation as an ethic nor conservation actions. Today we are particularly interested in those programs that appeal to or reach out to communities of color.
- Our goal is to facilitate a movement of some of these people, who are interested in the outdoors and see its value, to both conservation actions and to PPSR projects.

Group Notes: Target Participants
- Greg Wolley’s African American Outdoor Association in Portland, Oregon was the concrete case focused on in this group. How can we move those who are longtime members and are now seeking a way to engage more with the environment into conservation action? About 200 people have gone on hikes and outdoor programs with this group over the last five years, and there are now about 12 people who are interested getting more involved in conservation.
- What conservation issues would be of interest or concern to those 12 interested people in the AAOA that would involve citizen science/PPSR? Greg Wolley had several suggestions:
  - They might be interested in taking political action to protect a place they care about, that they’ve hiked in and enjoyed.
  - They might be interested in helping to restore a place they’ve hiked to that they’ve enjoyed if they are concerned about the integrity or ecological health of the site.
  - They might be interested in helping with bird conservation because they’ve gotten interested in birds while on outings

People in Outdoor programs/Recreation nativo (Specifically, for communities of color and underserved groups)

Conservation Actions

PPSR Projects
Can Human Welfare and Health Really be Considered Conservation Outcomes?

- Several people felt that human welfare and health should be considered conservation outcomes, and that creating green spaces of fields for kids and adults to visit and play in is a conservation outcome because it makes people healthier by spending time outdoors. Others felt human health isn’t actually a conservation outcome and is separate from the conservation outcomes—creating habitat for wildlife in the green space; ecosystem services like cleaned up soils, water quality and storm run-off; air quality with increased vegetation on the site. The group didn’t come to agreement on this, (which is potentially reflective of the whole workshop).

For example, in this case of this brownfields project, the AAOA might help conduct surveys in the neighborhood, including initial needs assessment and a survey to see if there is a change in conservation attitudes in the area over time as the brownfield is improved.

Collecting Social Science Data

- The project might involve the need to collect social science data, something that hasn’t been discussed in the workshop but is a well-known aspect of participatory action research projects. In the workshop we have discussed how to look at the impacts of the PPSR project itself on participants’ learning and attitudes, etc., but we haven’t talked about projects in which the question at hand is a social science question that participants can help address by collaborating on conducting the research, interviewing and designing the surveys, etc.

Group Notes:
Conservation in the Built Environment

- Focusing on brownfields is an exciting idea because it is an example of how the conservation issue doesn’t have to be out in the wilderness. People can be inspired by going hiking outside the city and enjoying the “wild,” but can then come back to work on a conservation issue in the built environment.

- A key advantage of the AAOA working on a brownfield project would be that it involves having people out in the neighborhoods who “look like the people who live in the neighborhood,” who may often be African American as well.

Next Steps: A Brownfield SWAT Team

- This could be a pilot project or an entry point for the AAOA to try out this brownfield restoration and PPSR as a way to take conservation action and contribute to the management of these areas through monitoring. The AAOA could become a SWAT team for monitoring/conservation work on brownfields in the city, moving from one to the next.
Supporting Community Capacity in Indigenous Communities

Greg Newman, Research Scientist, Natural Resource Ecology Laboratory, Colorado State University

Newman begins his presentation with a statement in Amharic.

What that says in Amharic, one of the 80 languages spoken in Ethiopia, is, “Hello, good afternoon, thank you for the opportunity to speak. Do you want a coffee?”

We talked about indigenous knowledge and indigenous communities and were trying to address the challenging, diverse landscape of these communities and how PPSR might bring to bear some of the things we’ve talked about in this workshop in those communities. We defined the problem, which helped us get started.

The problem is that...
- We do not understand how PPSR can best function as a vehicle to improve quality of life and conservation of natural resources for Indigenous Peoples and other local communities dependent on these resources.

This is kind of a challenging problem, and how we approached it was to look at the

Group Participants
- Jonathan Long, Instigator
- Finn Danielsen, Instigator
- Jon Waterhouse, Instigator
- Anne Toomey, Facilitator
- Greg Newman, Recorder
- Karen Matsumoto
- Daniela Soleri
- Stewart Chisholm
- Mark Chandler
- Philip Loring
- Rocio Rodriguez Granados

Community Capacity group
conservation outcomes. From the get-go we were thinking about this a little bit outside of the box, in that some of the conservation outcomes might be human outcomes and might go beyond biodiversity.

Conservation Outcomes

- Outcomes go beyond biodiversity and habitat conservation and include human quality of life outcomes.

For example, in Ethiopia they are trying to preserve the rare mountain nyala, of which there are about 700 left on the planet. That is a conservation outcome, obviously, when we preserve habitat for this species, but the outcomes might go well beyond that. How can we maintain a sustainable, high quality of life for the communities reliant on these natural resources? So it might be an issue of going beyond conservation outcomes to look at human quality-of-life outcomes.

There are challenges in overcoming the reward system inherent in science to get information published. That may not be what the community is looking for. We talked a lot about stories and how the communities themselves may look at an outcome as being a story or song as opposed to an article in a peer-reviewed journal. The question and challenge would be, how do we tailor the processes we’ve talked about, these steps we’ve talked about in this workshop, to problem definition from the community’s perspective, to data analysis from their perspective, to communicating results from their perspective?

Again, going back to the stories that are inherent in these communities, what stories do they want to tell and how do they want to embed those stories to be told in dance, in song, in art? We need to think very creatively about how we look at this.

Challenges

- Data management must balance data sensitivity versus data sharing to ensure cultural sustainability—scale and aggregation of data can be important (e.g., intellectual property concerns).
- Gaps exist in tools to help design programs.
- We must be sensitive and open to new ideas.
- How do we measure/document impacts of success from traditional ecological knowledge (TEK) approaches?
- Challenge to overcome reward system bias against scientists doing TEK approaches and a potential peer review bias and legitimacy concerns in western contexts (how is science defined).
- Tailoring processes for problem definition, data collection, data analysis, and communicating results to unique situations of each community.
The problem with those challenges is that all of the conservation outcomes and all of these applications of PPSR steps were so buried in what I guess is a general rule in ecology: It depends. It depends on whether you’re in the Yukon, working with the Yukon Intertribal Watershed Council, which is one of the stories we talked about, or whether you’re in Colombia, whether you’re in Brazil, whether you’re in Ethiopia, whether you’re in the Galápagos.

We found the importance of stories inherent to the success of these projects, whichever culture you’re working in. A good example came from Alaska, where the health of the salmon runs is a local concern. They came up with a kids’ book as a conservation outcome. That’s a different kind of conservation outcome than we normally think about.

Then the harder question came to bear. How can we apply the PPSR steps and questions we’ve been talking about on our matrix to this process? Here I would pause and say we have been doing a little of this in this workshop by spending time together. We have been establishing relationships throughout this workshop, and we’ve been doing PPSR amongst ourselves throughout this whole workshop. It’s those relationships and what we call “deep hanging out,” hanging out together during our breaks, that is step zero in a lot of these processes. We felt that deep hanging out needs to come with a sense of humility and a sense of de facto learning. How can we learn from these communities when we arrive in them and begin to become immersed in their cultures?

That led us to the question of how to rethink the steps that we have been talking about, which gets back to the idea that it all depends. These steps have value in guiding our work with indigenous cultures, but they can be adapted in unique ways to unique circumstances, and maybe ought to be.

**DISCUSSION**

**Dealing with Erroneous Indigenous Knowledge**

- I’ve been thinking about a few things that might be seen as meta-issues. We have been talking about this humility and letting local stakeholders and indigenous communities drive the process and own the knowledge,
which is a great democratic thing, and I think a lot of conservationists and scientists need to do that. But we also need to remember that science itself is not a democracy. What about the role of science in shaping knowledge where it is erroneous? Indigenous knowledge might be wrong, or it might become wrong with changing circumstances as the world changes. Traditional practices may not work. What is the role of PPSR in bringing about that change? 

Madhusudan Katti, California State University, Fresno, and Fresno Bird Count

A Hybrid PPSR Model

That’s an excellent point. I think “it depends” can play a role in the sense that sometimes there’s a hybrid model in which one of the steps was co-created. Another step involves help from the scientific enterprise based on what has been learned from the literature on how to help the community answer that question. So perhaps a hybrid model might help.

Greg Newman

Example of the Yukon River Project

I would like to give a little background regarding the Yukon River project and the *When Will the Salmon Come?* book. It addresses tensions deep in the literature

Excerpts from Group Notes: Examples and Stories

- Yukon example:
  - Problems with the river, came up with a treaty and now have a water quality monitoring program;
  - Problems driven by mining and military waste and municipal waste; now a removal/control program to address landfill, designed work with military on clean up.
- Salmon runs in Alaska.
- Colombia indigenous peoples.
- Tribal Suquamish high school in Washington (coastal American program):
  - Acidification awareness (done within the tribe versus aquarium coming in and making decisions).
  - How can we facilitate them determining their own future?
  - Empower them with p/a surveys on Olympic peninsula.

Excerpts from Group Notes: Traditional Ecological Knowledge (TEK)

Importance of listening.

- Use local knowledge for decision making.
- Example: fishing tributaries versus main stem as water quality deteriorates.
- They want to possess/control data and control data access.
- They do want folks to help them understand how to learn about their water quality.

- Open source knowledge may run in conflict with need to protect information and maintain cultural sensitivity.
- How can we maintain sense of ownership versus sharing knowledge?
- More aggregated information can be more open.
- Geopolitical power to decide about openness of information.
regarding working with traditional knowledge, and it’s something really important to work on before we get into these collaborations. This idea of verification and validity of knowledge and insensitivity from one knowledge system to another can create a lot of mistrust.

[Loring offers background on the Yukon River project, which engaged indigenous communities, whose food security was threatened by international conservation policies that involved closing up-river king salmon fishing based on scientific observation, in conducting their own observations of the river along with local hunters and fishers. Details can be found in the paper, Food Security and Conservation of Yukon River Salmon: Are We Asking Too Much of the Yukon River, available for download at: http://www.mdpi.com/2071-1050/2/9/2965/pdf.]

This is a good example of some of these issues that we have been discussing. The challenge has been how to look at how these different systems for knowing the river (scientific and indigenous) complement each other. • Philip Loring, Research Assistant Professor, Center for Cross Cultural Studies and the Alaska Center for Climate Assessment and Policy, University of Alaska Fairbanks

Local Sharing of Data in Greenland

• I’d just like to add how we do it in Greenland. This is a kind of verification process. The data collected by hunters’ and fishers’ observations are presented to the whole village at a village meeting. That’s what the social scientists call triangulation. If you say something which is not more or less the truth, you will be told. • Finn Danielsen, Ecologist, Nordic Agency for Development and Ecology (NORDECO), Denmark

Excerpts from Group Notes: Best Practices

• Be sensitive and open to new ideas.
• Shift decision making to co-created.
• Disseminating results can be redefined.
• Capitalize on youth-elder relationships and knowledge.
• Listen to elder stories.
• Make use of new innovative tools.
• Employ “deep hanging out” - do nothing - “step zero.”
• LISTEN.
• Look at outcomes differently. How do we measure mutual trust? How do we measure successful relationship building?
• Collaboratively define goals.
• Create and establish teams and relationships.
Developing Community Capacity and Centrality of Scientists

- Two things really struck me. I don’t work with indigenous communities, but I do work with local communities in Pennsylvania. I was struck by how similar the challenges are. We need to do the same things. They are developing community capacity, especially in underserved communities, but even if they are not underserved communities. I think it’s important to make that connection.

Second, the co-created model involves scientists, that’s why it’s “co”-created. It’s not a hybrid model, just to include scientists, scientists are always part of it. • Candie Wilderman, Professor of Environmental Science, and Founder and Science Director of the Alliance for Aquatic Resource Monitoring (ALLARM), Dickinson College
Museums as a Hub for PPSR

Lila Higgins, Manager, Citizen Science and Live Animals, Natural History Museum of Los Angeles County

How can museums become a hub for PPSR conservation?

- Museums have range of resources, expertise, reputation, access to audiences
- Developing partnerships, internally and externally
- Connection point for local individuals or groups for PPSR opportunities (or linking issues with research expertise)
- Participants see tangible results, “brick and mortar” complement to online engagement

As I said earlier when I did my pitch for this topic, museums have a huge range of resources at their fingertips. They have the expertise, the scientists, the educators, and the IT people on staff, and they also have access to the audience. In many cases museums have already studied their audience, so they already have that data in the building. Many museums are already good at developing partnerships. Sometimes they may actually have to redevelop internal partnerships—not everyone in a museum building is necessarily close to others in that building, and educators and scientists don’t necessarily spend time in the same room. Sometimes that poses a bit of a challenge, but nevertheless they are in the same building, so it can happen. You just have to go out there and identify those with whom you can establish a good relationship and build on that.

We also decided that museums are a great connection point, and local organizations often look to museums as places that have established a reputation. We can leverage that and form links with existing programs happening in the cities in which we are located. Not all museums have conservation in their mission statements so that is going to be a touchy subject, but we can definitely link to other organizations that do have conservation in their mission statements.

Another thing about museums is that we are a tangible space and we have exhibits. Participants in these PPSR projects really like to see their work visible. They like to go to the websites and they like to see their data point, their photograph, their information, up there on the Web. When they see it in front of an audience of other people it can be even more powerful.
We were working outside the matrix in an alternate dimension because the matrix didn’t necessarily apply to the question that we looked at, but we did try really hard to bring it around full circle. We talked about convening a team and the fact that there are multiple disciplines within a museum, and there are definitely complementary interests there. That is something that applies to the matrix.

One other thing that came up is that because museums do have a reputation and a lot of museums have been around for a very long time, sometimes we don’t always have the best relationships with other organizations and prior partners. We don’t want to make assumptions that everyone is willing to work with us or that a group had a good interaction with us last time. Keeping those lines of communication open is really important.

Regarding conservation outcomes, there are so many and it is so varied, it really depends on what projects you want to implement. With a variety of projects, there are going to be a variety of conservation outcomes.

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<td>• Run a variety of conservation projects, promote others, all with their own conservation aims and outcomes</td>
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<td>• Raise awareness that everyone can take part in conservation</td>
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More importantly, with our audience and visitors (our “actors”) we can raise awareness so that people are more inclined to participate in PPSR projects. I remember reading somewhere that most people who interact with PPSR projects are middle-age white women. That is preaching to the choir, the ones who are already participating. We want to get wider participation, and museums are a great way to do that through programming—not necessarily a PPSR program, but something that can draw more people into PPSR.

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<td>• Bringing PPSR into existing museum networks?</td>
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<td>• A PPSR project globally across museums?</td>
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<td>• Sharing ideas on conservation PPSR in a museum context (forum)?</td>
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Finally we talked about a network, and these are our action steps. There is the idea of
bringing PPSR into existing museum networks like the American Association of Museums (AAM). These networks represent a huge resource, and many museums are already participating in these projects. We could bring together a group at an existing conference. Again, we are not reinventing the wheel, but bringing what we have talked about here over the last two days to that audience and seeing who is interested and creating a little subgroup there.

We happened to have at the table four different institutions, one on the West Coast, one in middle America, one on the East Coast, and one in England (and we want to get a museum in Japan). We want to move forward with the idea of having some projects that have a global impact. That’s our big goal.

A Few Excerpts from Group Notes

- The Hall of Biodiversity at AMNH has a section with a local focus, “what can you do,” plus Science Bulletins to keep updated and at the forefront of the news.
- The museum can be a brick and mortar version of science for citizens, as a place for citizen science people to come together.
- Have science educators in galleries to talk to people about what they can do to contribute to conservation, and offer them the opportunities to do citizen science.
- Looking at biodiversity in cities has been around, but hasn’t been a focus, how to leverage the city as a place for that?
- Green space in urban/suburban areas is mainly backyards—inspire people to make changes in backyards to improve habitat.

Bring your backyard to the museum via ID Day. How could that be not an artifact, but some data?

- You can raise awareness of visitors about conservation, but it’s harder to say, “Hey, now you are doing conservation.”
- Is it enough for a museum to be seen as the convener and not the owner of the project? This could be extension to sponsorship of an exhibit.
- The public wants scientists to respond to their data and questions. Younger participants are OK with online interaction with scientist via blog.
- How can we make conservation PPSR central to the museum’s work?
SIDE DISCUSSION:
IS IT A 40-PLUS, WHITE FEMALE AUDIENCE?

• I heard you say something in the museum presentation and I heard it before at this workshop, and I actually haven’t heard it other places. That is that middle-aged, white women are the main group participating in PPSR. In other groups, what I have heard is that PPSR (and I am inflating that to be informal science education (ISE)) is something that is capturing the younger generations through all sorts of after-school and summer programs and museum programs and nature shows on TV, a whole set of things. I am wondering where we are getting this notion that it’s just the 40-plus women and not these other age sectors of society. • Julia Parrish, Professor of Aquatic and Fishery Sciences, University of Washington

• I would propose that someone does the research to find out where this comes from. • Lila Higgins

• We’ve done some of the research, and it’s not that all of these projects have a dominant population of white women, but the majority tend to be skewed female and older. The average age, at least for the Cornell programs, is about 55 to 65, but it depends on the project. For example, eBird is skewed male, while the Great Backyard Bird Count is skewed female. I would say that in general, it does skew female and it does skew older, educated, and upper-middle-class. • Tina Phillips, Evaluation Program Manager, Department of Program Development and Evaluation, Cornell Lab of Ornithology

• Where is your data set from? • Julia Parrish

• We are getting our data set from 40,000 participants that we survey. Are we saying that data is representative of many of the contributory projects? I think they probably are. • Tina Phillips

• It starts at a very young age too. If you work with kids in volunteer monitoring projects out in the field, it’s about two-thirds girls versus one-third boys. Part of it is that there is a social component to it. • Greg Wolley, Executive Director, African American Outdoor Association

• The noticeable difference in demographics is with the online citizen science activity. Galaxy Zoo is a good example—they’re young and they’re male. • Darlene Cavalier, Co-Founder, ScienceForCitizens.net

• I tried to pin this down in a wider literature review, and I think sometimes it depends on how you’re defining things. I think some of the programs that are based at schools or organizations for youth might be missed. But generally, whether you are calling them volunteers or people going on Earthwatch-type things, there is some variation around activity but they are (and I am going to be politically incorrect) what they call “grannies in sneakers.” That is the dominant trend in who those people are. And that is generally supported in a wide literature review across fields. • Lisa Campbell, Rachel Carson Associate Professor, Marine Affairs and Policy, Duke University Marine Lab, Nicholas School of Environment

• I haven’t been in the nonprofit world for a long time, around ten years. Before that I was for-profit and in the military. My experience in the nonprofit world is that most of my staff is female, and that doesn’t come from anything other than the applicants we get. If we put out a call for scientists and it’s a nonprofit organization, I get a flood of applicants who are female. I get very few male applicants and most of them aren’t qualified.

In another aspect of my life, in the Native world, I am seeing a transition from male-dominated tribal councils to female-dominated tribal councils. What is driving all of this? I don’t have a clue. • Jon Waterhouse, Yukon River Inter-Tidal Watershed Council, Yukon River Water Quality Community Monitoring Program

• Women are natural born leaders, maybe that’s why. • Lila Higgins