Initial Investments in Adaptation: Building the Future of Conservation
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EXECUTIVE SUMMARY

Adapting conservation to climate change is a new and urgently needed area of activity in the conservation community for both funders and practitioners. The MacArthur Foundation is a leading funder in tackling the issue of adaptation and, through its grants program, is creating a cohort of experts in this nascent field. Indeed, one clear lesson from projects to date is that the need for adaptation is real and grantees are helping to provide for it. Another lesson is that workshops, like this one, are important mechanisms for increasing learning rates.

Some discussion at the workshop centered on the scientific aspects of vulnerability assessment and adaptation. Participants agreed that more effort and funding need to be directed toward monitoring basic climatic and biological variables. This will help evaluate the effectiveness of adaptation work and generate the time-series data that are so crucial to effective vulnerability assessment and adaptation planning. Increased support for data-mining from less traditional sources can also play a valuable role in filling data gaps. The absence of data on the appropriate scale and from suitable locations (e.g., intact vs. disturbed habitat) is currently limiting the usefulness of models of both future climate and species distribution.

Another area of general agreement was the need for more projects aimed specifically at long-term capacity-building in climate change adaptation. Capacity cannot be built effectively as a one-off activity in projects with other aims; nor can the capacity need be filled by projects just a year or two in duration. Many participants also saw a need for projects focused on improved communications and outreach to stakeholders and the public at large; ideally projects driven by a diversity of communicators rather than scientists.

Participants felt that this workshop was valuable. They expressed a strong desire for continued communications and meetings among grantees for sharing experiences, data, and guidance. In addition to funding location-based projects, participants felt the MacArthur Foundation might play a valuable role in contributing to or initiating an adaptation library, database, and other networking tools. Participants noted that there were a number of existing efforts along these lines, but also believed that none at this point met their needs.

The need to adapt conservation to a changing climate will be with us for generations to come. Work by MacArthur Foundation grantees to date has demonstrated both the challenges and opportunities of tackling this need, and the Barcelona workshop has highlighted a path forward.

“It is irresponsible not to address climate change in any long-range conservation program.”
-Anton Seimon, Wildlife Conservation Society
INTRODUCTION

This report presents the lessons learned and suggestions for future climate change vulnerability assessment and adaptation work established at a workshop of MacArthur Foundation climate change adaptation grantees. The workshop was held at the International Union for the Conservation of Nature (IUCN) World Conservation Congress in October, 2008, in Barcelona, Spain. Grantee input was solicited through three primary mechanisms. First, grantees were asked before coming to the workshop to list what had or had not worked in their projects to date. Second, at the workshop, EcoAdapt staff had numerous discussions with grantees during plenary, breakout groups and side conversations. Finally, following the workshop, grantees were asked to respond to a more detailed set of questions, either in writing or over the phone. We organized the “Lessons Learned” section around key areas of input rather than directly following the format of the follow-up questionnaire.

The group that gathered in Barcelona represented several distinct project types. The predominant formats focused on 1) addressing basic biological questions about organisms and their distribution as related to climate change, or 2) regional vulnerability assessments. While there was some overlap in lessons learned and thoughts for the future among project types, there were also clear differences. This report represents input from all workshop participants, although not all information is relevant to both groups.

LESSONS LEARNED

Stakeholder engagement: who and how

Stakeholder engagement was repeatedly identified as a key factor in project success and direction, and was also the most frequently cited success for projects. Grantees used a variety of mechanisms to engage stakeholders and solicit opinions, including workshops, consultation, collaboration on projects, steering committees and advisers, and felt that there was no one-size-fits-all approach to stakeholder engagement. Which engagement mechanisms are most appropriate depend on the types of stakeholders involved (e.g., politicians vs. villagers vs. academics) and the sociopolitical context, although open and honest communications about assumptions, problems, and methods were highlighted as important regardless. Working groups were frequently seen as an effective way to encourage data-sharing, and also as a good mechanism for integrating across sectors. Some

Engaging communities

As part of their project, the Caribbean Natural Resources Institute (CANARI) and project partners presented information on definite or probable climatic changes in the Caribbean to a variety of audiences throughout the region, including policy-makers, NGOs, and members of the media and performance arts. They asked their audiences who needs this information, then challenged them to come up with the best ways to get the information to those groups. Participants developed on-the-spot news articles, drama skits, and videos, and took the show to a local village with great success. This experience highlighted the usefulness of non-scientists in communicating issues surrounding climate change to a public that has generally low scientific literacy as well as a suspicion of science in general. It also allowed CANARI and partners to develop proposals for outreach strategies based on what was most successful in their workshops.
grantees felt that the absence of a common working-group methodology hindered project progress. Regardless of which approach is taken, grantees agreed that doing stakeholder engagement adeptly takes a significant investment of time and travel, more than some grantees anticipated.

1) Key partners

Several grantees mentioned the importance of developing key partnerships, or cited the inability of certain key partners to attend workshops as difficulties they encountered. There was no general guidance on how to identify key partners, although several categories of key partners were listed, such as decision-making authorities, opinion leaders, and representatives of multiple cultural or linguistic groups. A number of grantees commented on the need to integrate communicators such as videographers, writers, or artists more fully into the vulnerability and adaptation process, and to do so early on. Communicators facilitate community engagement and sensitization around climate change impacts and adaptation in ways scientists cannot.

Many grantees indicated that one of the most important elements of project success was engaging trusted individuals and institutions with strong regional track records that could provide visibility and credibility for the project. While some grantees believed that broad-scale participation was important for promoting a sense of project ownership, others felt it was also important to focus on a select group of change agents rather than trying to engage everyone. There was some debate about whether the focus should be on local communities or on regional or national governments. In Madagascar, grantees expressed that early buy-in at the highest levels of government played an important role in the ultimate success of the nationwide vulnerability assessment. Others felt that only by engaging individuals at the village level enabled them to build a strong regional or national constituency.

In either case, it is important to consider the sociopolitical reality of the location, and to build climate change into the discourse that is best suited to that reality. It is also good to have ongoing engagement with governments and communities that gets them up to speed on climate change and helps keep them abreast of new developments. Most nongovernmental organizations (NGOs) working in Madagascar have at least one staff member living permanently in the communities with which the organization works, building trust with locals and providing the NGO with a better sense of village needs and priorities.
One participant who has yet to do a vulnerability assessment said the workshop was valuable for him as it highlighted how the adaptation options arising from the vulnerability assessment process will reflect the perspectives of the people participating in the process.

2) Networks

Several grantees mentioned the positive role played by networks of scientists. Developing close relationships among several groups and individual scientists allowed fuller data sharing, more accurate vulnerability assessment, and more rapid uptake of project outputs. The IUCN grantees indicated that their status as an intergovernmental organization helped facilitate a cooperative network.

Several grantees mentioned the usefulness of partnering with other MacArthur Foundation grantees in the region, particularly those working on climate change, as a means of sharing data and costs. In some cases, it was felt that having multiple NGOs working on related projects with MacArthur Foundation funding created better communication within the region than had been present before. While collaborative work is a key for success with governmental groups, conservation NGOs have not always been able to put aside their differences.

In a related discussion, some grantees expressed concerns that politics rather than biology is often the driver for protected area selection. While this was generally seen as less than ideal, some participants commented that it was most efficient and increased the likelihood of success to start with regions and partner groups that were already primed to take action, even if they were not the most biologically valuable.

One difficulty with networks was how best to create and maintain them in respect to time, budget, and carbon emission constraints. Most grantees maintain that there is no substitute for face-to-face meetings, but, in many cases, technology can facilitate the establishment and maintenance of networks. Some grantees listed online tools and shared databases as successful elements of projects to date. Others believed that technology had not been quite so useful. Teleconferencing is more reliable in some areas than others, and many stakeholders have limited or no access to the Internet. This is another area where participants thought decisions about technology reliance depended on project context. It is also important to realize that decisions about what technology to use can shape which types of stakeholders become most engaged with a project.

3) Integrating livelihood concerns

Several participants commented on the need to incorporate livelihood requirements into biodiversity conservation, vulnerability assessments, and adaptation planning. It increases
stakeholder engagement, and sharing data and models with communities in ways that help address livelihood concerns can buy goodwill for projects more focused on biodiversity. Beyond goodwill, considering human responses to climate change and the implications for biodiversity is an important element of creating robust conservation plans in the face of climate change. In Madagascar, there are already documented shifts of people from farming to fishing in response to climatic change. This has repercussions for conservation and management of the marine ecosystems to which these people are turning. Modeling changes in the distribution and resource use of people in response to predicted climate shifts will allow more robust assessments of ecosystem vulnerability to climate change. Building closer relationships with the development community will also help minimize maladaptation by this group. The nationwide vulnerability assessment workshop in Madagascar included a working group on livelihoods coordinated by USAID. All participants were confident that the presence of this working group added value to the vulnerability assessment overall.

**Project scope: How much is too much?**

Most participants felt that it was important to ensure that project deliverables matched the budget and grant length. Most also believed that grants focused on climate change effects and adaptation should ideally be a minimum of three years in length. Some project members stated that they received good guidance from the MacArthur Foundation; others felt they ended up with grants that promised too much too soon for too little money. In some cases, this was the result of grantees trying to make projects sound important, while in others it was the result of grantees not appreciating how much time and money their proposed projects would take. One grantee stressed that overly broad focus was a problem not just in terms of having overpromised and underbudgeted but also because it meant that project engagement and outputs occurred only on a general level. That is, it was difficult to create concrete and specific plans for action when project focus was too broad. Another participant echoed this concern in terms of the number of species on which a project focused: trying to address too many species at once made it difficult to come up with realistic, effective, and specific plans.

A few grantees commented that they had been pleasantly surprised by the degree of interest expressed in their projects, and in the participation and interest in their workshops. While this was not generally seen as a problem, one grantee suggested that grantees should be prepared to handle large numbers of people asking to be part of the workshop and project.
Act now

One participant commented that focusing only on vulnerabilities or identifying vulnerability hot spots did not translate into conservation. Another added that policy mandates were likewise no match for actually getting your feet wet and putting pilot adaptation projects in place. One grantee stated that in Papua New Guinea, for instance, simply providing information or mandates did not work: you have to take action yourself. Another grantee expressed that for both vulnerability assessment and adaptation projects, pilot sites are needed to turn ideas into reality and to experience the resulting conflicts and uncertainties. Engaging in smaller projects focused on concrete plans and places will create demonstration sites that not only test ideas but sway skeptics, making them realize action is possible.

Many participants expressed a moral imperative for taking adaptation action now. While more data would be useful, it is often best to take action using existing data and to design plans that allow more data to be collected as part of the adaptation plan (i.e., use active adaptive management).

Data: finding it, sharing it, gaps

One of the most commonly cited challenges by grantees was getting adequate and appropriate data for vulnerability assessment and adaptation planning. This included lack of: relevant current-day climatic data; long-term physical, biological, and chemical time-series data; basic information about the distribution and ecology of many species of interest; and information on regional biodiversity overall. Problems with obtaining data fell into three categories: 1) the needed data did not exist, 2) the needed data existed but were hard to find, and 3) the data existed but were difficult to get from those who had them. Key data gaps are addressed in the “Moving Forward” section; the other problems are addressed here.

On a technical level, some participants strongly emphasized the importance of getting a solid handle on current climatic conditions before moving on to climate modeling. Climate models are only as good as the data put into them, and getting sufficient data can be hard. Most of the readily available climate data do not necessarily reflect the reality in areas of conservation interest, as climatic monitoring stations often

Data Mining

Anton Seimon of the Wildlife Conservation Society (WCS) found that there is very little published climate information for the Albertine Rift, and descriptions of its climate were typically vague statements about rainfall seasonality and ENSO-related variability. While climate models are compelling, the WCS team felt that models would not be meaningful if current climatology was not adequately understood. The WCS team has been assembling climate records for the region from a variety of conventional and unconventional sources, and has discovered that the climatology of the region is more complex than previously understood. At many sites, there is considerable intra-seasonal variability that may function as important phenological triggers for flowering plants and migratory species. Had the team jumped straight into climate modeling, they would have completely overlooked what may be a critical feature of the regional climate.
end up near airports or in more urban areas. Workshop participant Steve Goodman cited the often significant differences between data from climate stations within and outside of forests in Madagascar as an example of how misleading climate data can be. It is well worth the investment of time to find a wide variety of less traditional data sources for development of a clear picture of the current climate, and to explore the data carefully. The big-picture view of climate (e.g., monthly average temperature and rainfall, or wet vs. dry season) may not reflect what matters to the biota of the region of interest. The current focus by many on downscaled climate modeling without commensurate emphasis on obtaining sufficient data and understanding significant climate system elements may lead adaptation efforts astray.

In some cases, data of interest are reported in the peer-reviewed or grey literature, but must be obtained from the “owner” of the data. Experiences with data sharing varied tremendously. Grantees felt that scientists were sometimes unwilling to share data because of jealousy or proprietary issues. One group reported easing these problems by diligently developing partnerships and involving the “owners” of important data in workshops. A grantee not at the workshop said that while scientists were initially unwilling to share data, they had become much more interested in doing so after seeing reports that included data from other scientists but not theirs.

**Capacity/consultants**

Lack of capacity, along with lack of data, was the most common challenge mentioned by grantees. Participants cited lack of: staff time; skilled field biologists; understanding of the issues and challenges of climate change vulnerability assessment and adaptation; capacity to create white papers that did more than simply review the literature; and capacity to use climate models to generate scenarios of possible effects as capacity gaps that had slowed or reduced the effectiveness of their projects. Further capacity needs included video production and editing skills; familiarity with the uses and limitations of species models; ability to interpret time-series data; ability to acquire, process, and use species and spatial data to map range changes; ability to understand and model fisheries, sea level rise, and saltwater intrusion; and
ability to assess the dynamics and interactions of policy, institutional, and community as well as ecosystem dynamics in a changing environment.

Many grantees used consultants to fill capacity gaps. This was generally seen as successful in the short term, although international contracts were sometimes difficult. In the long term, building local capacity was seen as preferable to continued reliance on outside consultants, but serious capacity-building fell outside the scope of most projects. While some capacity-building can and has occurred as part of these grants, these efforts are too small scale and short term to fill the need. Grantees believe that capacity-building will not be successful at the scale needed if it is done only as a one-off sort of activity. A related capacity issue was the retention and ongoing support of trained staff. Project-by-project funding of positions does not provide much job security, nor opportunity for professional development. So even when capacity is built, it is not always maintained.

Another capacity issue was simply having enough time to do everything that needed to be done. In many cases, potential partners and stakeholders expressed interest in the project but did not have time to do the work or attend workshops. Similarly, project staff members were often pulled in too many directions due to the common issue of too few people being asked to do too many things. Several grantees also commented that climate change vulnerability assessment and adaptation grants should be a minimum of three years to allow for better stakeholder engagement, follow-up, results write-ups, and monitoring of project implementation.

**Sharing results, generating products**

Many grantees listed project outputs as having “worked well” so far. But it was not always clear whether “working well” meant that project ideas had been taken up by others, that something tangible had been created, or something else entirely. For instance, grantees cited actions such as creating reports or presenting at meetings as successful outputs, but what the presentations or reports accomplished was not discussed. Several grantees commented that the real measure of success would be increased adaptive capacity and projects on the ground, but those are virtually impossible to measure within the framework of a one- to two-year project. Perhaps both grantees and funders should spend time wrestling with the difficult question of how to fund and measure long-term success. Many groups experienced strong interest in their work from many organizations and individuals, and felt they were able to provide valuable input to the growing conversation on adaptation beyond their projects.

“Requests for detailed results of our work by the MacArthur Foundation’s other projects, including those in the Albertine Rift and New Guinea following the Barcelona workshop, have shown us that our results are useful not only on a broad global scale, but also for on-the-ground conservation. We’re proud to be able to help and have already sent detailed species information to our fellow grantees.”

-Wendy Foden, IUCN
Other comments

Grantees raised a number of concerns that apply to conservation work in general, such as funding, civil war, difficulty getting permits, and low governmental adaptive capacity or political will for conservation. One grantee mentioned that often a single person is the government’s point of contact for just about everything. This person tends to have little time to dedicate to any project. Some of these “normal” issues may be particularly challenging for climate adaptation projects, however. Transboundary issues may become even more problematic as climate change reduces flow in international rivers, or causes species to shift across borders. Lack of government policy and experience may be even more difficult for the relatively new issue of climate change, or policies and legal frameworks may need to be updated to address it. One participant commented that policies from different sectors often conflict with each other. For instance, development objectives may be formulated without regard to climate change vulnerability.

Other climate change-specific issues included the difficulty of finding umbrella species that serve as indicators of change; the dilemma in finding climatically appropriate study sites; issues of how to link habitat, climate, and population concerns; and how to make Reducing Emissions from Deforestation and Degradation (REDD) and community adaptation work well together.

“Dwell less on concepts and concentrate more on applications.”
-Karma Tsering, ICIMOD
MOVING FORWARD

Reflecting on their experiences to date, participants in the Barcelona workshop developed ideas for moving forward, whether for their projects, their regions, the MacArthur Foundation, or the conservation community as a whole.

Annual workshops

When asked about the usefulness of grantee workshops, such as the one held in Barcelona in October 2008, the response was strongly supportive. The primary concerns were carbon footprint and time, but funding would become an issue if the MacArthur Foundation did not pay participants’ travel costs. Participants stated the workshop was extremely useful for sharing experiences and developing relationships among grantees and between grantees and the MacArthur Foundation staff. This sense of camaraderie and community can form the basis for an ongoing support network of practitioners and potential collaborators. Several participants felt the workshop provided a supportive atmosphere in which they could get a better feel for what the MacArthur Foundation wanted from them. There were mixed feelings about the appropriate scope, frequency, and participant base for future workshops.

Participant base

Some believed that limiting participation to MacArthur Foundation grantees was important for creating a sense of community, and for keeping the workshop strongly focused on practical action. Others felt that including people who were not funded by the MacArthur Foundation, but were actively engaged in adaptation projects, would better facilitate capacity-building with the grantees and the conservation community in general. One participant suggested at least including some of the MacArthur Foundation’s non-climate-change grantees as a way to facilitate the integration of climate change concerns more broadly into conservation. A MacArthur Foundation grantee-only workshop could help develop stronger relationships between grantees and the Foundation, and allow the Foundation to evaluate project progression. Among grantees, it could also create a sense of belonging to a cohort of experts that can become a core resource for others around the globe.

Scope

Responses were split between those who favored global meetings, such as the one in Barcelona, and those who favored regional meetings. Some participants enjoyed hearing about a broad array of projects and interacting with people working on projects different from their own, while others preferred focusing on projects similar to their own. While some grantees liked the meeting’s global approach, they felt that if the number of grantees grew much larger, they would rather split into regional or approach-based meetings. The extent to which participants’ projects focused on scientific research influenced their preference for global versus regional meetings. Possible breakdowns suggested were
regional, thematic, or project-objective based. Some grantees also suggested that participants be involved in designing future workshops.

Several participants expressed concerns over the carbon footprint and expense of regular meetings, particularly ones that are global in scope. But they also felt that face-to-face meetings provide benefits that are difficult to obtain in other ways. One participant suggested experimenting with new technology, such as conferences in virtual venues like Second Life. Others expressed concerns that technological approaches (e.g., conference calls or Skype) did not always work well in areas with poor telephone or Internet service.

**Frequency and length**

Most participants commented favorably on the relatively small amount of time spent on formal presentations, and would have liked more time for unstructured discussions. Consequently, most participants felt that future meetings should be two or three days long to allow more time for informal interactions outside of discussion groups as well as for formal discussions. Participants suggested annual or biannual meetings, or, perhaps, annual or biannual regional meetings and less frequent global meetings. One participant advised linking an annual workshop with a bigger event, such as the IUCN Congress, the Society for Conservation Biology meeting, etc. Another participant felt this would require grantees to be away from home for too long. One participant suggested that global meetings would be best for developing a strong and ongoing network, and would allow the group to follow through on intersessional tasks, such as developing outreach or communications tools.

There was some discussion on the already-overwhelming number of workshops each year, and what would make these workshops priorities for people. Most participants seemed to value the opportunity for a truly useful working meeting rather than a flashy workshop with numerous lectures and talking heads.

**Sharing information**

Most participants had included the preparation of some type of literature review in their MacArthur Foundation-funded projects. We asked if it would have been easier to have had such reviews readily available. Most respondents indicated that it was useful to read and synthesize the existing literature on their own rather than rely on prewritten summaries, although such summaries are often useful for policy-makers and managers. Nonetheless, there was a positive response to the idea of developing an online adaptation library. While a searchable, annotated bibliography alone would be useful, participants were enthusiastic about the idea of having free, online access to key articles, particularly those from expensive journals. This would greatly speed up the process of accessing the literature. One participant stated it would be hard to create and maintain a library with a bibliography containing specific information for each region, but that even a general-information library would be useful. A compromise could include literature primarily from the MacArthur Foundation’s regions of interest, if the Foundation were to fund the library. Another option might be to fund a permanent librarian position to provide long-term stability, consistency of format, and a point
of contact for direct requests for materials. A possible model for the library is the Pacific Ocean Library created by the Center for Ocean Solutions as part of its Pacific Ocean Initiative (http://www.centerforoceansolutions.org/library/pacific_ocean_library.html).

Several participants said that an online library hosted or sponsored by the MacArthur Foundation could be useful for sharing information from different assessment and adaptation projects, particularly reports from MacArthur Foundation-funded projects.

**Sharing data**

Participants agreed that data-sharing is a good thing, and most felt that the MacArthur Foundation could play a valuable role as the facilitator. Several mentioned that mandating data-sharing for MacArthur Foundation grantees would be useful, at least for data generated directly by grantees. Mandating or strongly encouraging data-sharing could even help create a sense of cooperation rather than competition, although some participants felt that this purpose would be better served by less coercive means. The primary concern about mandatory data-sharing was that researchers and organizations might be more hesitant to share their data with MacArthur Foundation grantees if they were worried this would require them to share their data more broadly. Another suggestion was that researchers be given a grace period of a year or so in which they could keep their data to themselves to prepare it for publication. While some participants said they encountered problems getting researchers to share data, others said that the sticking point had not been willingness to share so much as the ability to negotiate a data-sharing agreement. In this regard, it might be useful for the MacArthur Foundation to create a set of template data-sharing agreements that others could use. The Foundation could then mandate that all grantees opt for one of these levels of data-sharing.

For mandatory data-sharing to work, it would have to be tied to funding. For instance, the United States National Science Foundation (NSF) mandates data-sharing, but has no apparent penalty for not sharing. At least one NSF-funded researcher explicitly refuses to share data generated using NSF funds, and suffers no consequences in terms of getting more funding. Thus, the MacArthur Foundation may require grantees to submit data (or metadata) with final reports, and potentially withhold final payment until data are submitted. Certainly, the MacArthur Foundation could refuse to fund an organization that has not complied with data-sharing rules in the past.

At the very least, participants felt it would be useful for the MacArthur Foundation to make summaries, metadata, and lessons learned from all projects it funds easily and publicly available. Interested parties could then contact researchers or the Foundation to get access to the data itself.

Regarding standardization of data format for a shared database, there were mixed responses. Some believe standardization makes it easier to combine or work with multiple data sets, but makes data-sharing more onerous for grantees. It may also force them to collect data in formats that do not make sense for their purposes. This problem could be partially resolved were the data host (the MacArthur Foundation or its designated data repository) to take charge.
of compiling data and putting it into a standard format. One participant felt it would be important to include quality control on the data, and to include explicit caveats as appropriate.

Examples of existing data repositories include ReBioMa, HerpNet, DataBasin, GBIF, and Google Earth.

Sharing results and building community

Most participants agreed that it was hard to know if results-sharing was being done effectively, but felt it was an important issue to address. One participant said he found the Barcelona meeting successful from the perspective of sharing results in that it would allow him to proceed more effectively on his own project. Suggestions for improving results-sharing included doing careful debriefing specifically around this issue at the end of each project; integrating communications-oriented people more thoroughly into projects; establishing a network of communicators for adaptation; and establishing an online library as previously mentioned.

Resource book

Participant responses were mixed on whether an adaptation resource book would be helpful at this point. Some felt that because the field is still rapidly developing, an open-source journal may be more appropriate, or even an online resource manual or wiki that is updated frequently. From this perspective, a definitive textbook does not make sense until a field is more thoroughly established. Others stated that a resource book would be an effective tool to help get a handle on this rapidly changing field. Some believed there were already abundant available resources out there, while others felt these resources were not readily available. One participant said that while there were many resources, there was an unmet need for modeling standards and a cost-effective framework for integrated modeling of climate change, biodiversity conservation, and ecosystem services.

Adaptation blog, listserv, newsletter, etc.

Participants were lukewarm about these options. Most felt as though they already had too many e-mails and newsletters to keep up with, although they appreciated the potential utility of such mechanisms. A few participants said a monthly or quarterly digest or newsletter could be good. The digest moderator could periodically ask project leads to share information with the group, then compile responses into a single e-mail with multiple links. One participant suggested the Mountain Research Initiative (MRI, http://mri.scnatweb.ch/) as a useful example of sharing information among a community of researchers on an ongoing basis. Another suggested Conservation Evidence (http://www.conservationevidence.com/) as a good model (but note that Conservation Evidence does not include climate change in its list of topics, nor does a search for climate change or adaptation produce any results). The MacArthur Foundation might consider funneling project products into an existing portal rather than setting up a new one. It may also be useful to create a portal for new grantees that provides access to existing MacArthur Foundation grantee information and other key regional resources.
Existing mechanisms for sharing

Participants were aware of a variety of existing mechanisms for sharing information on adaptation and vulnerability assessments (see Appendix A for details). It is interesting to note that no mechanism was mentioned by more than one person, suggesting that there is not yet a single most recognized resource. Most participants felt there was no need to spend a lot of money creating something new, and that it would be more effective to strengthen and improve use of existing mechanisms. On the one hand, the results of this casual survey suggest that creating a new mechanism runs the risk of creating yet another in the long lists of mechanisms that people are aware of. This would add to information overload rather than help create a centralized information source. On the other hand, the results also suggest that existing efforts have not yet done a sufficient job of making their presence known or creating a strong community (at least not within the group present at the workshop). This leaves room for either a new mechanism or a strong push to widen the reach of an existing one.

One participant felt that if a new network or center were created, it should follow the model developed for climate risk management by the International Research Institute for Climate and Society (IRI) at Columbia University. This includes intensive workshops and outreach sessions around the world, visiting scientists programs to bring international scientists to IRI for months or years, and a graduate education program. This participant’s concern with nascent efforts like those by the National Center for Ecological Analysis and Synthesis or WWF and IUCN is that, unlike universities, these organizations do not have the institutional capability to support graduate and post-graduate education and training programs, nor do they have a strong track record for ongoing global capacity-building compared to IRI or similar university-based training programs. These comments highlighted the need for clarity as to the goal of information sharing. If the goal is to make existing information more readily accessible to a wider audience, building on existing mechanisms and working through NGOs may be the appropriate route. If the objective is to build next-generation capacity, creating a network as part of a university-based program might be a more effective route.

Outreach

Although grantees were pleased with stakeholder engagement to date, many felt a strong need for improved experimentation and training around public education and outreach. There was a sense that there needs to be a more coherent effort to understand what really works for building long-term community and government support for adaptation work. This could be approached in a number of ways. Outreach and engagement experts (e.g., community organizers or educators) could receive stand-alone grants, or grants to work in partnership with scientific projects. The MacArthur Foundation or other granting agencies might help to establish regional centers to provide such expertise to their grantees, for instance, providing no-cost outreach support to grantees.
Outreach projects may need to consider implications of climate change for their work and linkages among villages or communities that have not historically interacted. For instance, in Madagascar, there are villages just 50 kilometers apart that may never have interacted. Should outreach efforts aim to create interaction among historically isolated communities? Will such interaction be an important element of adapting to climate change, for example, as plants move into areas where people have no existing relationship with those species? Which conservation goals require community involvement, and which ones do not?

**Data and model needs**

While some participants felt that there were already sufficient data to begin taking adaptation action, others felt that there were not, and all grantees expressed that more data would be useful. Some participants had clear ideas of what data they wanted and how they would use them. Others listed the types of data they would like, but did not specify how they would use them to generate adaptation action, or how those data might change their decisions. To some extent, the responses depended on the focus of the project: those who were focused on species-specific action clearly needed species-specific data. Specific examples were more likely to be linked to vulnerability assessment rather than adaptation. One participant suggested a need for better understanding of the risks associated with various adaptation options.

Several participants called for more funding for climatic and biological monitoring. This included setting up weather stations in project areas and training parks staff and other managers to monitor key biological and climatic variables. Even where baseline data exist, monitoring is an essential element of active adaptive management. Several participants also felt that there were some fundamental research questions relating to species and their responses to climate change that the MacArthur Foundation should fund.

The Madagascar breakout group was specifically interested in how people in other areas have dealt with differences in climate and climate change between intact and disturbed areas. For models to be of use in this country, and in many other data-poor areas of the world, the degree to which climate trends in disturbed areas correlates with those in intact areas must be established. If there is no correlation, models will have less utility for conservation work than they are currently credited with.

Changes in species ranges, phenology, and behavior will be determined not by climate alone, but by the interaction of climate with a variety of non-climatic factors. Consequently, a number of participants expressed a need not just for more refined climate scenarios, but for models of species responses that incorporate non-climate layers such as hydrology, species dispersal capability, and soil type. While some information exists, in many cases a significant effort will be needed to collect non-climate data to predict vulnerability and resilience to climate change. Creating integrated models would benefit from more regular interchange among biogeographers and modelers.
Building capacity

Several groups expressed a strong need for more training courses focused on adaptation and related areas of expertise. A desire was indicated for training programs to be sustained for sufficient periods of time to build a relatively large pool of trained people ready to engage with conservation and management. There was also a call for regional adaptation networking and programs to strengthen government awareness of and will to act on climate change adaptation.

Ideas for long-term training programs included creating or supporting climate change adaptation courses and degree programs for universities; internships or apprenticeships with organizations tackling the problem of adaptation; visiting-scholar programs that fund adaptation experts to spend several months working alongside colleagues in the field; and hands-on training at demonstration sites. The appropriate modality depends on the type of capacity being built and its audience. Training people in practical skills requires a sustained approach to keeping those skills in use. Working to create new attitudes or new ways of doing conservation could be accomplished with less ongoing “face time” once relationships are established. The MacArthur Foundation-funded class put together by the Global Change System for Analysis, Research and Training (START) is one example of focused capacity-building. Another is IRI, which provides online tutorials and climate data, worldwide workshops, a visiting-scholars program, and a master’s degree program. Creating funded, ongoing mentorships between established adaptation experts and those entering the field would also be a way to provide long-term support and capacity-building.

CONCLUSION

This workshop and these projects are just the beginning of a journey to make conservation less vulnerable to climate change. As participant comments highlighted, there is a strong need for ongoing vision and investment in developing the field of climate change adaptation. This includes support for biological and climatic monitoring in the areas where grantees work, for long-term capacity-building efforts, and for the development of effective outreach and communication around adaptation. Due to the progressive nature of climate change and ecosystem responses to it, past approaches to evaluating project effectiveness may need to be adjusted. The payoff from adaptation strategies developed today may not be visible for decades, and we will need to address climate change in perpetuity.

In the face of this challenge, networks of individuals and organizations focusing on climate change adaptation will be essential to provide support, build capacity, share lessons learned, and develop ideas and approaches. The MacArthur Foundation adaptation grantees are a natural cohort through which to develop such a network. Indeed, grantees could form the backbone of regional consortia for coordinated monitoring, data-sharing, and action. This has occurred organically among MacArthur Foundation grantees working on coral reefs in Madagascar. The Barcelona workshop demonstrated the effectiveness of gathering on-the-ground practitioners of climate change adaptation. By continuing to build and support this network, the MacArthur Foundation can provide much needed leadership in the creation of conservation for a changing planet.
Appendix A. Existing mechanisms for networking and information-sharing around adaptation mentioned by participants

Specific to climate change adaptation

Adaptation Learning Mechanism
www.adaptationlearning.net
GEF-funded mechanism for “developing tools and resources to support adaptation practices, integration of climate change risks, and adaptation into development policy, planning and operations, and building capacity.”

Asia-Pacific Network on Climate Change
www.ap-net.org/database/library/09.html

Assessments of Impacts and Adaptations to Climate Change in Multiple Regions and Sectors
www.aiaccproject.org/aiacc.html

Caribbean Community Climate Change Centre
www.caribbeanclimate.bz/news.php

ClimAdapt
www.climadapt.com/tools.html
Private-sector network to “pioneer the incorporation of climate change adaptation management frameworks into host government environmental impact assessments, municipal risk management processes, and industry infrastructure development practices in Canada and internationally.” Has toolkits for incorporating climate change and adaptation into a variety of activities, such as land-use planning and environmental impact assessments.

Climate-L
www.climate-l.org/
A “knowledge-management project for international negotiations and related activities on climate change run by the International Institute for Sustainable Development.”

Consultative Group on International Agricultural Research Climate Change Challenge Program
www.cgiar.org/impact/challenge/cccp.html

International Research Institute for Climate and Society
portal.iri.columbia.edu/portal/server.pt

Vulnerability Network & Observatory
www.VulnerabilityNet.org
Hosted by the Stockholm Environmental Institute. Includes searchable and browsable bibliographies with links to public domain articles, as well as user forums.
weAdapt
www.weadapt.org/
A “collaboration between leading organizations on climate adaptation and includes new and innovative tools and methods, datasets, experience, and guidance.” Hosts WikiADAPT (wikiadapt.org/index.php?title=Main_Page), a wiki with adaptation case history, user guides, climate science, and more.

**Not focused on climate change, but relevant:**

*Global Biodiversity Information Facility*
www.gbif.org/

*ProVention Consortium*
www.proventionconsortium.org/

*World Overview of Conservation Approaches and Technologies*
www.wocat.net/
Not climate-change specific; mission is to “support innovation and decision-making processes in sustainable land management, particularly in connection with soil and water conservation” by “connecting stakeholders, analyzing and synthesizing experiences and setting directions, enhancing capacity knowledge, developing and applying standardized tools for documenting, monitoring, evaluating, sharing, and using knowledge.”