FRAMEWORK FOR ADAPTATION PLANNING IN CONSERVATION AREAS:

BASIC GUIDANCE AND PRACTICAL EXAMPLES

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A Report prepared for WWF
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EXECUTIVE SUMMARY

Conservation of the world's precious ecological heritage and humanity's essential foundation for survival and wellbeing is getting harder. Persistent poverty, social injustice, unplanned urbanization and rural to urban migration, population growth, even while some regions experience disease- and degradation-driven declines, rapid industrial development, historical variability in climate and associated extreme events, and even civil unrest and war are among the great challenges that have always beset conservation efforts. Now, climate change – driven by the emissions of heat-trapping gases into the atmosphere from a wide range of human activities (transportation, electricity production from fossil fuels, industrial processes, agriculture, and deforestation) – is making many of these existing challenges even more difficult. In some instances climate change aggravates existing stresses; in others it adds new stresses. Conservation practitioners must not only deal with these new and additional challenges, but find ways to integrate information about the changing climatic conditions and resulting environmental and social impacts to sustain conservation successes, adapt ongoing projects, and inform the selection and approaches guiding future projects.

This report provides an overview of key issues and broad rationale and guidance for approaching adaptation to climate change in conservation areas across the world. For the purposes of this framework, adaptation planning is focused on the community level in the context of other stresses and concerns, focusing on the nexus of community livelihoods/wellbeing and the environment. Its emphasis is on engagement processes, on the complementarity of vulnerability and adaptation needs assessment and climate scenario-driven risk assessment, on the process of realizing and implementing adaptation actions on the ground, and on how to establish ongoing, learning-oriented adaptive processes.

This report provides scientifically founded background information with the goal of being general and explanatory, offering clear rationales, but without being overbearing with theory detached from reality. Numerous concrete case studies illustrate how the general guidance is being implemented in different conservation contexts and regions of the world. Conservation practitioners will find general principles complemented with examples of how different tools and activities were used "on the ground" (e.g., Fiji, Philippines, Mesoamerica, Thailand, Nepal…). The printed document will be augmented and kept "up-to-date" over time with more case studies and experiences (from inside and outside WWF) at a dedicated website [insert url when available].

The report also offers a wide variety of sources to support conservation practitioners in their efforts to initiate, plan, and carry out adaptation efforts where they work. In addition to the case examples given throughout, the appendix to the report provides printed resources, web-based resources, links to tools and guides for participatory engagement, risk and vulnerability assessment, adaptation planning, as well as a wide range of data portals to support their efforts. Several of these involve networks and communal projects that conservation practitioners are encouraged to join, participate in and contribute to in order to build the knowledge base for adaptation in the conservation context.

Intended audience: Conservation practitioners (field staff, project managers, etc.) and the people they work with: local government officials, NGO representatives; interested or affected individuals, community leaders, development and disaster risk reduction organizations, health providers, and other NGOs. It is assumed that some have, and many others have not yet begun thinking about community-based adaptation. While anchored in the relevant science (with references in Endnotes), the text will not be overloaded with scientific detail, jargon or references to retain readability.

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1. INTRODUCTION

Conservation of the world's precious ecological heritage and humanity's essential foundation for survival and wellbeing is getting harder. Persistent poverty, social injustice, unplanned urbanization and rural to urban migration, population growth, even while some regions experience disease- and degradation-driven declines, rapid industrial development, historical variability in climate and associated extreme events, and even civil unrest and war are among the great challenges that have always beset conservation efforts. Now, climate change – driven by the emissions of heat-trapping gases into the atmosphere from a wide range of human activities (transportation, electricity production from fossil fuels, industrial processes, agriculture, and deforestation) – is making many of these existing challenges even more difficult. In some instances climate change aggravates existing stresses; in others it adds new stresses. Conservation practitioners must not only deal with these new and additional challenges, but find ways to integrate information about the changing climatic conditions and resulting environmental and social impacts to sustain conservation successes, adapt ongoing projects, and inform the selection and approaches guiding future projects. [photo(s) of degraded and/or pristine environment]

This report provides an overview of key issues and broad rationale and guidance for approaching adaptation to climate change in conservation areas across the world. As a document providing guidance on adaptation in very different contexts across the globe, this manual does not try to be prescriptive or comprehensive, but to outline essential elements of the adaptation planning process, offer guiding principles, and provide important background that ought to be considered in any adaptation process, but then must be tailored to local circumstances. Many practical, place-specific examples are provided to illustrate how the general guidance and broad principles have begun to be translated into action.[1] [this refers to what WWF staff will add]

This guidance documented is targeted – broadly – to conservation practitioners (including but not limited to conservation field staff and regional directors) and the people they work with (e.g., local government officials, NGO representatives of other conservation, disaster risk reduction, and development organizations; interested or affected individuals, community leaders, and other interested parties). While not focused on development and disaster risk reduction efforts per se, this report recognizes that climate change adaptation in conservation practice will need to take into account the multiple non-climatic stresses that communities face. Some of the conservation practitioners and their colleagues already have, while many others have not yet, begun thinking about community-based adaptation and the related challenges for conservation. Thus, this manual aims to provide a basic foundation for all, while reflecting early experiences through case examples.

Proactive planning allows communities to create their future, rather than just cope with it.

Conservation practitioners already understand that merely reacting to new circumstances and added challenges once they are apparent is not nearly as effective as proactive conservation planning. Forward-looking conservation planning provides a wider range of options, tends to reduce or altogether avoid conflict among stakeholders of a project, and ultimately has a greater chance of success. In short, proactive planning allows communities to create their future, rather than just cope with whatever unfolds.

The same is true for adaptation planning. To minimize the risk of potentially devastating losses, degradation of the environment, and difficult-to-overcome obstacles for sustaining local livelihoods, adaptation planning in conservation involves:

- understanding the risks and vulnerabilities communities and conservation areas face already

[1] To keep this manual fresh, current, and up-to-date, additional case examples will be added over time on the WWF website. [add url]

- collaboratively assessing how climate change aggravates (or maybe in some instances alleviates) them
- carefully evaluating the options for reducing and managing these risks
- removing any barriers to implementing adaptive actions, and
- remaining vigilant as changes unfold so that practitioners can learn and adjust policies and practices over time.

This manual suggests ways to begin this proactive planning for adaptation to climate change now, and should be considered an essential companion to other conservation tools.

In Section 2 below, we discuss in more detail why adaptation planning is needed in conservation practice and what it can help practitioners achieve. Sections 3 then provides a big-picture overview of the basic components of careful, deliberate, and proactive adaptation planning, with Section 4 providing a more detailed discussion of basic components, guiding principles, and important considerations, together with a range of practical examples from different regions around the world. The concluding Section 5 points the way forward in adaptation planning in the context of conservation practice. The appendices provide a diversity of practical tools and overviews of conservation projects where adaptation planning has already begun.

2. The Need and Purpose of Adaptation Planning

> "Another serious concern is loss of biodiversity, which is occurring at an unprecedented rate within and across countries. Worrying in its own right, this trend also severely undermines health, livelihoods, food production, and clean water, and increases the vulnerability of populations to natural disasters and climate change."
>
> Kofi Annan (United Nations 2005)

Adaptation as the New "Best Practice" in Conservation

With the 2007 comprehensive review of the state of climate change science by the Intergovernmental Panel on Climate Change (IPCC) (Parry et al. 2007; Solomon et al. 2007), several key conclusions have become widely accepted in the relevant scientific community and in international policy circles. First, warming of the global climate system is unequivocal, with conclusive evidence culminating from observed changes in atmospheric chemistry, global and regional air and ocean temperature records, sea-level measurements, observations of loss of sea ice, snow cover and mountain glaciers, changes in precipitation patters, and increases in various weather extremes.

Warming of the global climate is unequivocal.

In addition to the changes observed in physical systems, there are also a wide range of ecological changes observed in virtually all marine, freshwater, and terrestrial groups. Species are changing their ranges to cooler climates at higher elevations or latitudes and have begun changing their behavioral patterns (earlier egg laying, changed migration patterns, earlier leaf-out, etc.). Especially species that are restricted in range (e.g., endemic species or polar and mountain-top species) show severe range contractions as a result of warming; temperature sensitive species (such as coral reefs and amphibians) have been affected the most. Some species in the range-restricted group have even gone extinct due to recent climate change (Parmesan 2006; Fischlin et al. 2007).

Most of the warming since 2050 can be attributed – with more than 90% confidence – to human activities.

Second, most of the observed warming since the second half of the 20th century can very likely (>90% confidence) be attributed to the observed increase of greenhouse gases in the atmosphere due to human activities (Solomon et al. 2007). The ecological changes already observed are in many instances correlated and consistent with the concurrent regional temperature changes, and a growing body of field and laboratory experiments, physiological research, attribution studies, and underlying theory suggest that many of the observed changes are driven in significant ways by human-caused climate change (Parmesan 2006; Fischlin et al. 2007; Rosenzweig et al. 2008).

Climate change is progressing faster than anticipated and impacts are unfolding sooner than projected.

A third finding, based on the 2007 IPCC synthesis and scientific evidence accruing since, is that human-caused climate change appears to be progressing much faster than previously projected (Kerr 2009; Rahmstorf et al. 2007; Raupach et al. 2007; Smith et al. 2009). Thus, impacts are emerging sooner than anticipated, and the specter of more dramatic, even abrupt climatic shifts is a rising concern among scientists and some in the policy arena (e.g., Alley et al. 2003; Clark et al. 2008; Schneider 2004; Steffensen et al. 2008). Moreover, climate change cannot easily or quickly be reversed even with stringent emission reduction measures (e.g., Meehl et al. 2005; Solomon et al. 2009; Wigley 2005).

Detecting Climate Change Impacts on Species & Ecosystems

Climate change effects on ecosystems have been successfully detected In the Northern Hemisphere in response to rising temperatures (especially for species where low temperature limits control the response).

Insert photo(s) of bird, plant or butterfly

Dense observation networks, long time series of observations, and a stronger climate signal all make detection and attribution easier.

Detection is more difficult in southern Africa and other tropical regions because many species and ecosystems are primarily controlled by water/drought or fire, and some observed climate changes have not yet clearly emerged from the historic variability or have not been attributed yet to human causes. Systematic data gathering has also been more limited.

The improved ability to model past climate variability and change has given scientists greater confidence in the projections of future climate and related impacts. While there remains much uncertainty for projections at the regional and local scales, the public and policy debate has markedly shifted with these overarching conclusions of the IPCC. Thus, from the findings summarized above, it is clear now that a comprehensive climate policy must encompass two fundamental approaches: *mitigation* to minimize future risks by significantly reducing the emissions of greenhouse gases and *adaptation* to prepare for and manage the climate-related risks that cannot be avoided. Both must be embedded in the larger context of development, poverty reduction, disaster preparedness, and sustainability, if there is to be buy-in, commitment, and ultimate success. Yet, while mitigation policy has been on the political agenda for years, the need for adaptation – at any level of government from the local to the international – is only beginning to be recognized as an equally important aspect of comprehensive climate risk management.

For the next several decades, there is already a commitment to additional warming and climatic changes because of emissions already released into the atmosphere, an inescapable result of the time lags built into the climate system. This commitment of additional warming over the next 30-40 years could be on the same order of magnitude *per decade* (~0.2 °C) globally as has occurred from 1990-2005 alone (Solomon et al. 2007). Many

countries and regions are already dealing with the challenges of present-day climate variability and extreme events, often inadequately addressed and thus undermining ongoing development, poverty reduction, and conservation efforts. With additional climate change, these existing challenges are set to increase.

The world is already committed to additional warming and climate change impacts due to past emissions.

Moreover, the relatively limited climate change to date is already having serious impacts on individual species, conservation areas, and protection efforts (Fischlin et al. 2007). For example, it is increasingly challenging to maintain local biodiversity when individual species respond differently to regional warming, begin to migrate outside of protected areas, or change their behavior and thus change interactions among species. For example, "predator-prey and plant-insect interactions have been disrupted when interacting species have responded differently to warming" (Parmesan 2006). Ecosystems are being "disassembled" in this way, affecting the goods and services they have historically supplied (Millennium Ecosystem Assessment 2005). [opportunity for a textbox with one or more local examples of this happening]

Even the limited climate change to date is making conservation more challenging already.

For threatened endemic species, it may be particularly challenging to survive if their habitat shrinks or is altered. For example, conservation areas may be altered or lost due to sea-level rise, coastal erosion, and saltwater intrusion into coastal and near-coastal habitats. Climate changes may also affect conservation goals indirectly: with climate change and changing variability making it more difficult for local farmers to grow their crops, and thus to sustain their food production and meet basic needs, pressures on food security and livelihoods may force them to encroach on protected conservation areas to compensate for inadequate harvests. Or: climate-related health threats, for example the spread of malaria into higher-elevation areas previously spared by low temperatures, may affect local communities such that their ability to provide for themselves and remain engaged in conservation efforts is undermined.

It is not yet clear whether unassisted species migration will keep pace with the rapid change in climate, but in many instances scientists assume that natural reproduction and spread will be slower than climate change. Similarly, it is unclear to what extent natural evolutionary adaptation (through genetic modification) to warmer conditions can prevent species extinctions. Some adaptations have been observed – such as genetic evolution in the interiors of species' ranges, and rapid evolution of species' resource use and dispersal behavior at expanding range margins, "but there is little evidence that [these changes] will mitigate negative effects at the species level" (Parmesan 2006).

Climate change is not a fictitious scenario of the future, but highly relevant to, and deeply interrelated with, ongoing conservation and development issues today.

These brief examples illustrate that climate change is not a fictitious scenario of the future, but that it is highly relevant to, and deeply interrelated with, ongoing conservation and development issues today. They also illustrate that integrating climate change in ongoing conservation efforts is absolutely essential to sustain conservation successes and to be able to continue to protect species and habitats in a very dynamic environment. Thus, making climate change an explicit and deliberately addressed issue in ongoing conservation practice is a "best practice" in and of itself.

Changing the Conservation Paradigm

Conservation – much like planning and resource management – originally developed under the assumption of a more or less stable climate. As a result, much conservation has been concerned with preserving the status quo, i.e., the species and ecosystem that exists at this time in a particular place, typically with boundaries demarcating that which will be protected from that which won't. Within the protected areas, conservation practitioners often identified particular species or habitats as conservation targets and aimed to keep those pristine, i.e., unimpeded by human use (or overuse) and uncontaminated from pollutants, alien invasive species, or even just neighboring populations to maintain genetic "purity." Typically, the larger changes outside the protected areas were seen as threats to the ecological treasures within the boundaries, and thus resisted or protected against, rather than integrated into conservation management and planning. Climate variability and change is a case in point. Until very recently, conservation assumed a static climate and did not plan for and with changing climate conditions.

Adaptation to climate change will require a radically different paradigm in ecosystem management and conservation, as the assumption of stationarity (i.e., the past being a good guide to the present and the future) simply no longer holds (e.g., Glick, Staudt and Stein 2009; Betancourt REF, Milly et al. 2008; Wilby 2008a,b). The use of static protected areas alone will not suffice as species and ecosystems change in response to the changing climate. Rather than trying to stem *against* the tide of change, conservation must find ways to achieve its goals working *with* change. Thus, a more dynamic conservation paradigm is needed, in which

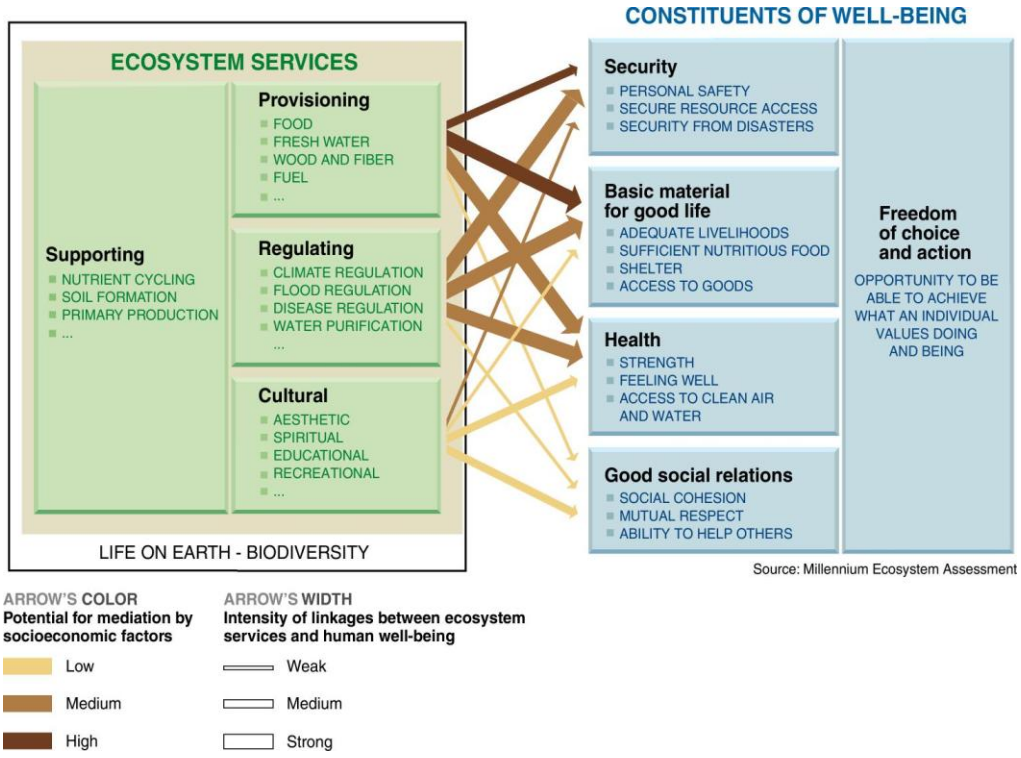
- Protected areas are connected through corridors [aerial photo of visibly connected habitats?]
- Species migration is anticipated, directed, and maybe even assisted
- Many migrating species will become "alien" novices in new habitats, requiring conservation practitioners to rethink how to deal with "invasives" and how to protect existing species
- Landscape diversity is maintained or "engineered" to provide for a range of habitats and ecological niches
- Ecosystem succession may need to be created to prevent regional synchroneities
- Buffers around critical conservation areas will become more important than ever
- Resilience is enhanced through reduction of non-climatic stressors
- Restoration and creation of new habitats are actively pursued

Climate change may force conservation practitioners to rethink their goals even more fundamentally, shifting the emphasis away from individual species and specific habitats to preserving ecosystem functions and protecting biodiversity broadly, and thus to sustaining the widest possible range of ecosystem goods and services.

From this perspective, climate change is often viewed as a threat, and these threats are indeed real. At the same time, conservation practitioners have an enormous opportunity to reduce the adverse consequences of climate change through adaptation strategies. Species and ecosystem conservation will not only be important in its own right for the inherent value of preserving the biosphere, but it will be a critically important aspect of sustaining agriculture, forestry, water resources, fisheries, and other critical resource uses by maintaining the resilience of ecosystems, building adaptive capacity, and offering additional economic opportunities for communities (IUNC 2008; WRI 2008). Therein lies an important opportunity for building alliances with those interested in development, disaster risk reduction and even those previously uninterested in ecosystem conservation. In addition, conservation practitioners also have an opportunity to engage with those primarily concerned with climate mitigation and adaptation policy to further conservation goals. In short, climate change, while posing real threats to conservation areas and local communities, requires and offers new opportunities for collaboration with others to achieve mutually beneficial goals. The table below illustrates just a few examples where conservation and climate policy overlap and can mutually support each other.

Climate change, while posing real threats to conservation areas and local communities, offers new opportunities for collaboration to achieve mutually beneficial goals.

Linkages Between Conservation and Climate Mitigation and Adaptation	
Mitigation of Climate Change (Emission Reductions)	**Adaptation to Climate Change (Impact Reduction)**
Afforestation and reforestation **–** Increasing and preserving biodiversity while rebuilding terrestrial carbon stores in soils and biomass	***Maintaining and restoring native ecosystems*** **–** Preserving biodiversity and habitats, eliminating invasive species, while building buffers against the impacts of climate change (e.g., in coastal areas).
Preventing deforestation **–** Preserving biodiversity and sustaining ecosystem goods and services from forests	***Increasing landscape connectivity*** **–** Enabling species to move to new areas as the climate changes by linking protected areas and establishing migration corridors.
Maintaining peat lands, marshes, wetlands, coral reefs – Preserving habitat, including for endangered species, and sustaining ecosystem goods and services while increasing carbon storage	***Adaptation in agricultural landscapes*** **–** Maintaining biodiversity near cropland, improving soil fertility and water retention capacity benefit human livelihood, food security, biodiversity and habitat protection.
Restoring grasslands - Preserving habitat, including for endangered species, and sustaining ecosystem services while increasing carbon storage	***Adaptation in marine and coastal areas*** **–** Protecting coral reefs and coastal wetlands provide protection from coastal storms, maintain marine and coastal biodiversity, and help sustain local fisheries.
Investing in small-scale, local renewable energy **–** Protecting forests, peatlands and other woody fuel sources while improving locally needed energy supplies	***Sustainable land management*** **–** Employing best practices in land management improve habitat conditions and increase resilience to climate change.
Growing biofuels for renewable energy **–** Increasing renewable energy sources if they do not undermine food security, food prices, or lead to unsustainable farming practices.	***Improving water services*** **–** Improving water use efficiency, preventing leakage, increasing water conservation, and preserving water quality protect against weather-related water scarcity and meet ecological water needs.



As many of the examples in Table 1 illustrate, many strategies to address conservation concerns can also be beneficial with regard to meeting climate mitigation and adaptation goals, and vice versa. In fact, conservation areas, in many instances, will be critically important to preserve some of the world's precious biodiversity by buffering against losses that would occur if there were no "safe havens" for species. Moreover, there sometimes can be positive synergies between mitigation and adaptation options that also meet conservation goals. These potential mutual benefits can be used to engage and foster interest among those involved in conservation planning. In some instances, the options for mitigating and adapting to climate change require innovative partnerships, financing mechanisms (incentives for desirable practices, disincentives for undesirable practices) and maybe institutional changes to meet both climate-related and conservation-related goals. It is thus part of proactive adaptation practice to help people not just minimize the negative impacts of climate change, but also to help them make the most of the beneficial impacts of climate change and of the opportunities that arise from mitigation and adaptation. [could be a place to include a box on REDD or other mechanisms that address climate and biodiversity goals].

Proactive adaptation means helping people not just minimize the negative impacts of climate change, but helping them make the most of the beneficial impacts of climate change and of opportunities that arise from mitigation and adaptation.

In many instances, collaborative approaches that address climate, conservation, development, and related goals can draw on important local and indigenous knowledge (borne from a long history of people interacting with their dynamic natural environment). They can also be beneficial to indigenous populations and help achieve greater gender equality (IUNC 2008; Larsen and Springer 2008). Existing capacities are typically the starting point for developing appropriate adaptation actions to protect people and biodiversity, and by employing them, these capacities are built further.

3. Critical Components of Effective Adaptation Planning

How, then, can conservation practitioners begin adaptation planning? What are the elements that need to be considered? This section provides a first big-picture overview of critical components of adaptation planning. These components may best be described as philosophical underpinnings, rather than merely action items (which are described in more detail in Section 4). These basic elements correspond with the basic philosophy underlying the "gold standards" of conservation project and programme management (e.g., WWF 2008?; TNC or IUNC guidelines?). They reiterate the basic assumptions and underlying principles of empowering, inclusive, iterative, learning-oriented, place-based, and well-informed conservation planning.

Visioning

The basic principle underlying the notion of visioning is: Aim high! Visioning of a desirable future and ideal outcomes of conservation efforts is already an integral part of many local ecosystem management and development practices. For example, WWF's ecoregions have 50-year visions; and visioning is an integral part of WWF's project management standards (www.panda.org/standards). Visioning is also a common tool in participatory rural appraisal (e.g., Mikkelsen 2005; see tools in Appendix) and emerging more generally in efforts to move toward greater sustainability.

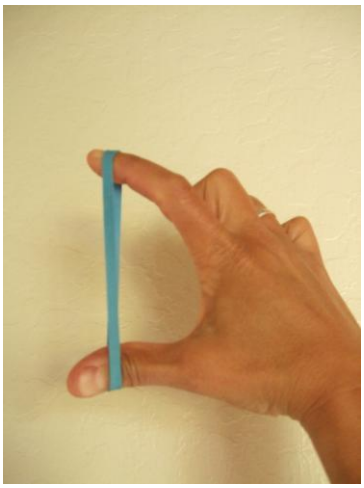
In essence, visioning is a process of harnessing the collective imagination of a group of people to create images of the future that can serve as goals or guides for making decisions. It also is essential to generate and sustain hope. In planning adaptation to climate change, the idea of visioning the future may seem strange, as the word "adaptation" often implies something more "reactive" than "proactive," an adjustment to what is given or what is coming,

The process of visioning is a way of breaking out of common habits of thought, empowering people to imagine and "own" the trajectory of their lives.

rather than actively shaping the future. Moreover, scientists and many policy-makers frequently replace the idea of visions with "scenarios" or projections of a "plausible future" given certain assumptions about social, economic, technological development and environmental constraints. All too often, even without the mental constraints of "scenarios" or science-based projections, we confine our thinking about the future by historical experiences, patterns, and trends. The process of visioning is thus a way of breaking out of common habits of thought, and to empower people to imagine and "own" the trajectory of their lives, rather than submit to externally imposed trends. There is something fundamentally enlivening, empowering, and engaging for people to participate in a communal process of envisioning what kind of community and environment they want to live in and create for their children.

Visioning in the context of adaptation planning should involve all aspects of a desirable future – a clean, healthy, productive, safe, and beautiful environment; a vibrant, active community; rich and equitable social relationships; and diverse, secure, and sustained livelihood opportunities. Developing a vision of such a resilient community is a vital part of adaptation planning.

Fundamentally, visioning can be approached in an evolutionary way by exploring 'the best of what is' (through processes such as Appreciative Inquiry, see Appendix) as a foundation of imagining 'what else could be.' Alternatively, participants could be invited to suspend or transcend their existing reality to free their creative imaginations from the constraints of 'what is' and instead dream up 'what could be' (Frantz 1998). In either case, a creative tension will build between the current and the envisioned situation – similar to the tension in a rubber band extended between two fingers – powerful enough to propel people forward to realize that dream. Importantly, the tension in the "rubber band" between the current and the envisioned situation can be relieved in two ways: the vision of the desirable future could gradually be diminished and brought down to the less desirable status quo, or – the more empowering and hopeful option – the current reality can be brought closer and closer up to the envisioned dream. To do so, the other components of an effective adaptation planning and implementation process must be put into place and brought to bear for success.



Broad Participation

The basic principle underlying the notion of participation is: Be inclusive! Critically important as a condition for moving toward a more desirable future is that the vision is created and owned broadly by the community. At least since the late 1980s, conservation and development practitioners have recognized the value of community participation in ecosystem and resource assessment and management. Lack of participation and broad ownership of decisions in externally-imposed, top-down approaches had often lead to disappointing and often counterproductive outcomes (Chambers 1983, 1997; Ellis and Biggs 2001; Keough 1998; Mayoux and Chambers 2005). There are several rationales for why participation should be part of any community development, conservation, or assessment process, including the following:

- *Rights (or normative) argument*: participation of the poorest, most marginalized, most vulnerable is a human right and an inherent and indivisible component of pro-poor development, resource management and empowerment.
- *Effectiveness (or substantive) argument:* Participation of key stakeholders increases the accuracy of information and the relevance to the realities of peoples' lives and to policy decision and implementation processes. The implied assumption is that decisions are in some sense better as a result of participation.
- *Cost-efficiency (or instrumental) argument:* Involvement of key stakeholders increases ownership of the development, conservation, risk or resource management process, improves the use of resources, and

mobilizes local resources to augment or even substitute those from outside. While time-consuming in the short-run, participation can reduce the cost of decisions and implementation in the long-term.
- *Process argument:* The participatory process, through building understanding, skills, capacities, networks, and trust contributes in itself to pro-poor development, better decisions, improved environmental conditions, civil society, and empowerment.

This report assumes there is merit to each of these arguments, at least in principle, and the benefits can be realized if participatory processes are implemented well (see review in Moser 2007). So, even though participatory approaches also involve challenges and risks and sometimes are far from the ideal they are hoped to be, they are nonetheless viewed as much preferable to any interventions that do not actively involve the people that are being affected by them (Chambers 1994a,b,c; Cooke and Kothari 2001; Hickey and Mohan 2005; Williams 2004). In many instances it will be necessary to involve actors not just from a local community, but from a broader region and from higher levels of decision-making to ensure that policies and strategies are coordinated effectively across scale. [photo of people engaged in participatory process]

Participation in the adaptation planning and implementation process is just as important as in development and conservation planning. The specific benefits may include

- a broader knowledge base about the community and environment in general;
- a better and common understanding of the specific systems likely to be vulnerable to and affected by climate change, and likely to be in need of adaptation;
- a better and common understanding of the potential adaptation options, capacities, and barriers to adaptation;
- communal learning;
- greater transparency in the planning and decision-making process;
- greater buy-in in the pathways and options chosen;
- enhanced accountability; and
- greater likelihood of success in implementing adaptation decisions.

To harness these important benefits, conservation practitioners must design participatory processes carefully, facilitate them effectively, use participatory processes judiciously, and sometimes navigate challenging social relationships. Overuse or unskilled use of participatory processes can lead to fatigue among participants, burn-out among the process initiators and facilitators, excessive costs, and unproductive time spent in group discussion (see Section 4 and the Appendices for additional help and resources).

Broad participation can help ensure that adaptation planning in conservation actually meets the needs of the poorest, the most marginalized, and the least empowered stakeholders, including women and indigenous peoples. The most marginalized, least empowered, and poorest members of a community are often those who are most vulnerable to the impacts of climate change: they often live in areas most exposed to climate-related risks; they frequently are most dependent on natural resources and ecosystem goods and services for their food security and livelihoods; and they often have the fewest options and adaptive capacity to deal with additional stresses. Thus, without addressing their needs, adaptation strategies are likely to fail to protect local communities and the environments they depend on.

Without addressing the needs of the poorest and most marginalized, adaptation strategies are likely to fail to protect local communities and the environments they depend on.

Poverty, marginalization, social exclusion and inequities often have deep historical roots in structural and cultural causes. Thus, it can be challenging to achieve broad and equitable participation. A combination of approaches, skilled facilitation, policy interventions at higher levels, and in some instances outside assistance with conflict prevention and resolution may be needed to begin to address the deeper causes of vulnerability and limited

adaptive capacity (Sidaway 2005). Thus, participatory processes must be employed judiciously and in combination with other approaches not only to avoid reinforcing preexisting power imbalances, but instead to correct them so that all community members are able and empowered to fully engage in adaptation planning.

KNOWLEDGE-BASED ADAPTATION

The basic principle underlying the notion of knowledge-based adaptation is: Knowledge is power! Developing and using the best available knowledge is one of the most powerful resources for adaptation planning – and that often means: a combination of scientific and local and/or indigenous knowledge. Adaptation planning is more realistic if it is informed by the best available science about existing conditions and potential climatic futures. In many instances a regionally integrated perspective on climatic and environmental conditions and changes is best provided by modern scientific tools. Clearly, however, not only climate or environmental information is needed to prepare adequately for climate change impacts. To contextualize conservation efforts in the local socioeconomic, cultural and institutional context, information about economic activities, opportunities and constraints, social and demographic trends, educational levels and technical capacities, infrastructure, public health, and other aspects of the local circumstances must inform the assessment of community vulnerabilities and adaptation needs. These socio-economic conditions are intimately linked to the state of the natural environment, the protection status of various species and habitats, and any historical trends in land use and land cover. In short, adaptation planning is best informed when there is a multidisciplinary, multi-sectoral array of data available to assess the status and change in the community and region of concern. [photo of locals gathering data] [possibility for a textbox example]

Of course, in many understudied, remote areas of developing regions of the world, a significant challenge persists with lack of scientific data, short observational records, or unreliable data. In those instances, adaptation planning often has to begin with gathering at least a baseline of necessary data and generating some fundamental knowledge. Again, this can and often should be done in ways that engage community members (as co-researchers empowered to help direct the research focus, shape methodologies and approaches, and conduct some of the data collection and analysis). This co-production of knowledge helps to legitimize the knowledge base, engaged and educates community members, increases buy-in, and creates vested interests in beneficial outcomes. In cases, where scientific knowledge already exists or is generated by experts, it must be made accessible, understandable, and salient to local decision-makers and community members' concerns (e.g., Jasanoff and Martello 2004; Lemos and Morehouse 2005; Pohl 2008; Reid et al. 2007), to ensure that it is the most relevant information needed for adaptation planning.

In many instances, it will be extremely useful to draw on and carefully integrate, where possible, local and indigenous knowledge as those who are deeply familiar with the local environment and with any changes therein often hold valuable knowledge that can inform the understanding of past changes and future options to respond to climate change (e.g., Huntington 2000; Krupnik and Jolly 2002; Reidlinger and Berkes 2001). This integration of scientific, and indigenous knowledge is not always straight forward or easy, but when it is feasible, it can help advance the understanding of local changes and increase the legitimacy of both types of knowledge among all involved. In short, a systemic approach to gathering all available sources of knowledge about past and current physical, ecological and socio-economic trends, future climate projections, and community vulnerabilities and adaptation options and barriers should be used. [picture of Arctic scene, illustrating indigenous knowledge contributing to the understanding of Arctic climate change]

BUILDING CAPACITY

The basic principle underlying the notion of building capacity is: Enable participation and action! Adaptation planning cannot be done in the manner described here if those potentially involved do not have the capacity to participate effectively. In fact, lack of capacity can lead to significant frustration, loss of trust, and reinforcement of preexisting power imbalances, and thus should be carefully examined early on, so that any capacity needs can be addressed proactively. "Capacity" as used here involves a wide range of skills, dispositions, availability of time, geographic accessibility, awareness, interest and relevant knowledge, and the ability to identify, make, and

ultimately implement adaptation decisions. Clearly, these capacities are not just important for the adaptation planning process, but are likely to improve community conditions more broadly.

Components of Community Wealth

- ***Individual capital*** is the stock of skills, physical health, and mental/spiritual well-being of people; it can be built through education, training, mentoring, guidance, health maintenance and improvement.
- ***Social capital*** is the stock of trust, relationships, and networks that support communities; bonding capital strengthens relationships within groups, bridging capital creates connections between groups.
- ***Intellectual capital*** is the stock of knowledge, innovation, creativity and imagination in a community; it is created through education, research and development, and support for activities that engage the imagination, as well as the diffusion of new knowledge and applications.
- ***Natural capital*** is the stock of unimpaired environmental assets (e.g., air, water, land, flora, fauna), including non-renewable resources, renewable resources, and ecosystem services; people depend on it and can maintain and restore it, but can't create it.
- ***Built capital*** is the stock of fully functioning constructed infrastructure, buildings, and technology; it increases through construction, care, renovation, and maintenance and is an essential support of financial capital and economic activity as well as people's livelihoods.
- ***Financial capital*** is the stock of unencumbered monetary assets; if managed well, it generates returns that can be used for further public or private investment in other forms of capital or for consumption.

(Source: Adapted from Ratner and Moser 2009)

People's capacities constitute an important aspect of the "wealth" that exists within a community. They can be thought of as "assets" that can be invested in the community adaptation process. They also allow other available assets, such as interpersonal, technical, infrastructural, natural, and economic assets, to be employed effectively. Differently put, the range of capacities of participating individuals is the lynchpin of community wealth. They help enrich, maintain, and use wisely the other assets that a community may have.

It is important to consider both the capacities among conservation practitioners as well as among community members and other collaborators involved. Capacity – and perceived capacity – will affect potential participants' belief in the usefulness of a participatory research and planning process, and hence their interest and willingness in contributing (and remaining engaged over time). Where capacities are generally low or vary markedly among participants, such participatory processes may be hampered and/or require additional time. Thus, to increase the likelihood of success, capacity needs to be built before adaptation planning can be begun; in others the adaptation planning process will serve as the vehicle to build that capacity. Importantly, participants' self-perception of their skills and capabilities, their level of understanding of an issue, and their sense of empowerment are important in determining whether they are interested in engaging, what benefits they perceive, and whether or not they are ultimately willing to participate in the process. Finally, if there is significant turn-over among conservation practitioners or others involved in the adaptation planning process, there may be an ongoing need for refreshing, rebuilding, or even completely reestablishing capacity of relevant skills. In this case, it may be exceedingly helpful to identify a few, relatively stable contacts inside or outside the community to anchor institutional memory and provide continuity over time. [could include a textbox of an example where capacity was built]

EMPOWERMENT

The basic principle underlying the notion of empowerment is: Facilitate people's emancipation from dependency! Some view empowering people to act as an aspect of capacity building, but it is singled out here and emphasized because it is so important to actually realize the potential that exists (e.g., Narayan 2002; Jentoft 2005; Lim and Spanger-Siegfried 2005). Having the skill or capacity to do something is no guarantee that it will be used. Individuals may need to be encouraged, or even persuaded to employ their skills and capacities. This may be particularly so in cases where certain members of a community (e.g., women, children, older or disabled people, members of certain religious groups or otherwise marginalized people) have traditionally remained on the

sidelines of active involvement and decision-making. Maybe speaking up and making decisions on their own was outside the cultural norms or traditional roles. In some cases, institutional changes, legal assurances, social backing, or financial support is required to empower individuals or groups of people to act. [great opportunity for a textbox example of empowerment, maybe focused on women]

Empowerment is crucial in the process of adaptation planning and implementation, as well as in participatory processes more generally. Lack of capacity and lack of a sense of power can easily reinforce old dependencies or create new ones. Moreover, actively and creatively engaging and empowering participants will allow them to take on progressively more responsibilities, e.g., to guide community processes, identify research priorities, and make decisions about their communities, resources, environments, and lives. By building, in a self-reinforcing way, people's confidence, skills, and sense of living self-directed lives empowerment eventually leads to emancipation. This in turn can initiate deeper social, cultural, and economic changes that can positively affect development and living standards. [photo of women taking leading role in some community-level activity]

Commitment and Accountability

The basic principle underlying the notion of commitment and accountability is: Make it happen! Visioning and planning without action can be deeply frustrating, disappointing, and ultimately disempowering. Disillusioned and disenfranchised individuals or groups within the community are unlikely to support future adaptation actions, and in the worst cases, may sabotage the process altogether. Thus, real actions must follow the initial participatory planning steps to demonstrate that decision-makers are serious about moving forward in the desired direction. This will be easier if the planning process involves breaking down big strategies into clear and manageable action steps, with assigned responsibilities and timelines. Publicly made commitments with a stated responsibility to report back on actions taken will illustrate to all involved that progress is being made. Participants in the adaptation planning process should also discuss and communally agree on mechanisms of accountability. Commitment and accountability create momentum and help ensure that great visions and plans don't just "fizzle out" and fall by the wayside. [textbox of an example?]

Commitment and accountability create momentum and help ensure that great visions and plans don't just "fizzle out" and fall by the wayside.

Learning – Observing – Adjusting over Time

And finally, the basic principle underlying the notion of learning is: Stay open and flexible! An indispensible element of good adaptation processes is a fundamental openness and desire for learning. Because climate is no longer stationary and both environmental and socio-economic conditions will continue to change along with the climate, adaptation is not a one-time activity, but an ongoing process that can only succeed if community members and conservation practitioners remain vigilant, observe both the environment and the impacts of their decisions, and – when and if necessary – revisit the strategies, policies, and actions to adjust them as the newly emerging circumstances require.

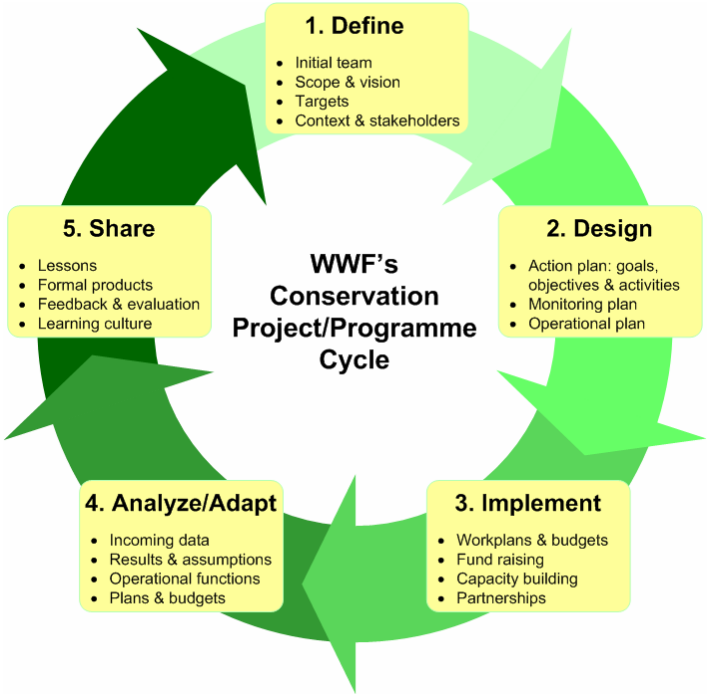
Conservation practitioners should expect – and convey to all involved – that decisions will need to be made in the face of considerable and sometimes irreducible uncertainty. In many instances, the available information is inadequate; in other situations even the best information cannot predict the future with confidence given the inherent dynamics of the systems in question. All involved therefore should expect that adaptation will require a willingness to engage in "adaptive management" – that is in a deliberately learning-oriented approach of trial and error and subsequent adjustment, followed by continued observation and reassessment of the situation. In some instances, decisions will need to be made that are essentially irreversible – such as in cases of quasi-permanent land use changes, relocation of buildings or entire villages, large-scale structural changes. These types of decisions

are typically more expensive and require much deliberation and community involvement. Many decisions, however, will have smaller costs and impacts and/or can be adjusted over time (e.g., land management or land use decisions, efforts to protect public health, smaller investments in particular species or habitat protection measures). For these cases, conservation practitioners and community members should commit to setting up ongoing observation and monitoring initiatives and deliberately assess the effectiveness of the implemented actions. For example, are the desired or intended goals being achieved? Is the action moving the community in the direction of achieving its vision? If not, why not? Are there any unintended ecological, economic or social consequences? Are the adaptation actions positively contributing to conservation goals, to other climate policy goals, to development and poverty reduction goals? [not sure whether we need to expand on decision-making on uncertainty, the types of uncertainties?]

Depending on available capacities, conservation practitioners should set-up achievable monitoring efforts – maybe including community members as observers and recorders of changes – and determine reasonable intervals for revisiting adaptation plans. Initially the frequency may be more frequent than over time, but this decision has to be made in light of capacity, the pace of climate change, and non-climatic changes. The goal, in any event, is to set up a sustainable system of continual observation – reassessment – analysis and learning - adjustment of plans, policies, strategies, and actions that allows communities to make flexible adjustments in their adaptation efforts. Given the irreducible uncertainties in both the climatic, environmental, and human systems, more rigid, ad hoc, and reactive systems are likely to be less effective in preparing for and responding to changes as they unfold.
[textbox of an example where such an adaptive management approach has been set up, even just elements of it]

4. Planning and Preparing for Climate Change Impacts

After laying a foundation with the basic philosophy and guiding principles underlying good adaptation planning, here now we turn to the practical matters of adaptation planning: realizing the ideals on the ground in the most appropriate, feasible, and culturally acceptable ways. This section provides rationales (based in practical experience and scientific study), guidelines, checklists of considerations, and real-life examples of how certain aspects of the adaptation planning process have been realized and adapted to different local circumstances. At least fundamentally, the steps suggested here match quite well the cyclical Standards of Conservation Project and Programme Management (WWF 2008?) or those described in similar frameworks (e.g., one specifically proposed for adaptation planning, Lim and Spanger-Siegfried 2005), and others commonly in use in disaster reduction and development planning. Practitioners should view these fundamental steps essentially as common and best practices that need to be adjusted as local circumstances and historical context demand. Differently put, it is less important that the steps described here – or in any other framework – are followed in the particular linear fashion in which they are listed here, but that they are considered in and adapted to whatever extent in a given context.



Getting Started: Assessing the Initial Situation

Conservation practitioners may face a wide range of different situations in the particular contexts in which they work. While this guidebook cannot anticipate all possible situations, it does recognize that situations may vary significantly from the outset. It is therefore critical that the individuals who are ready to initiate an adaptation planning process begin with an assessment of these initial conditions. This should include, but not necessarily be limited to, the following questions and considerations:

Availability and Interest of Possible Collaborators

Conservation practitioner interested in beginning to plan and prepare for climate change in a particular region or community will sometimes be the sole initiators of such an effort. In many instances, however, there will be other colleagues within the organization, collaborators from other NGOs, or community leaders who may share their interest and concern and thus be willing to be part of a team that will initiate a community-wide process.

In most situations it will be preferable to share responsibilities with others. If potential collaborators don't know each other well yet, it is advisable to begin with a less ambitious effort. A small but successful effort is always easier to build and expand on than a huge, but less successful one. To initiate a process, however, it is often advisable to begin with fewer collaborators than with a large number. The goal initially is to form an initiating core team that can help shape and launch a well-thought-out process. Over time the number of involved individuals of course will, and should, increase.

Thus the key question early on is: who are the best individuals to include in the initiating/planning process to guarantee an inclusive, legitimate, credible, carefully considered, and effective adaptation planning process? Considerations may weigh such issues as

- knowledgeability about the community, different resources/resource uses, ecosystems, climate, institutions, policies and laws, etc.
- representation of different community groups or interests (e.g., gender and ethnic equity, different economic sectors/interests, different livelihoods or socioeconomic status)
- geographic representation (e.g., low-lying/mountainous regions, urban/rural, coastal/inland)
- social connectedness within and across groups
- perceived respect in the community
- perceived influence, power, and authority
- perceived reliability and effectiveness for different aspects of the planning/implementation process (e.g., group facilitation, communication, decision-making)

Once potential candidates have been identified, invited and brought into the initiating process, a broader knowledge base has been assembled to continue the baseline assessment of starting conditions. [could be a place for a short textbox of how this was done/what choices were made in a particular case]

Availability of Resources

A second important consideration at the outset of adaptation planning is what resources are available for the process itself. Resources to consider here include the following:

- Financial resources
- Staff/human resources
- Time
- Communication resources
- Any other constraining factors

Financial resources are almost always limited, and often severely so. This can undermine people's motivation to even want to begin thinking about climate change, as they perceive climate change as an additional challenge to deal with. It may take some persuasion and creativity to make the case for why preparing for climate change impacts cannot be postponed or avoided, and how it actually can be a great opportunity (see Section 2).

The issue of financial support is important however from a very practical point of view. Bringing people together for participatory processes may require travel assistance, incur expenses while hosting people, or entail costs for materials, facilitators and so on. A lack of financial support to cover these expenses thus can undermine broad participation. If financial resources limit support from staff or key organizations, planning and implementation could also be undermined. In this way, financial and human resources are closely linked: who is available to take on which tasks? Who can contribute resources? Are there any obvious gaps, and if so, how can they be filled?

There may be important time constraints as well. At certain times in the year, community members may be preoccupied with planting, harvesting, fishing, or hunting that cannot be postponed. During certain seasons travel may be restricted. Even daily work patterns and priorities can place constraints on who can participate (wood and water collection, cooking, schooling etc.). Competing demands on people's time and temporal constraints should be carefully considered, as processes that ignore such issues may be perceived as exclusionary. It is often useful to use times and gathering places where and when community members already come together to initiate discussions about engaging in adaptation planning. Maybe most importantly, if key leaders or participants can't give the effort sufficient time, or the entire process is allotted only a very brief period, the resulting frustrations and substantive shortcomings may undermine the success of the entire effort. It may thus be more important to begin with a manageable smaller effort and build on it iteratively over time. Clearly, adaptation to climate change will be an ongoing process from now on. [photo collage of scenes showing seasons, situations, circumstances that affect people's ability to travel, convene, participate]

Begin with a manageable smaller effort and build on it iteratively over time. Clearly, adaptation to climate change will be an ongoing process from now on.

Communication resources can be critically important in some instances, especially where great distances may need to be bridged – such as in small island regions. Availability, accessibility, reliability of communication technology and networks are important considerations. Equally important here to consider are issues related to different languages among relevant participants, the relative importance and perception of written, web-based, and spoken communication, the perceptions of scientific knowledge versus indigenous knowledge, and the persistent importance of the oral tradition.

Existing Knowledge Base

At the outset, the initiating team should collect what is known about climatic trends, and about the environmental and socioeconomic conditions in a community, region or for particular ecosystems and conservation areas. A careful search may range from organizational records, to reports on dusty shelves in local and regional offices, to carefully kept historical records in a library or other relevant institution, or studies undertaken by experts at a local university, to web-based data portals. In some instances, this may reveal a fairly solid knowledge base; in others, practitioners will identify significant gaps. Projections of future climate may also be limited and only available at a relatively coarse resolution or for general, average climatic variables (see the appendix for additional information sources). It is quite likely that additional knowledge sources may be identified at a later stage in the adaptation planning process, when more people get involved. Whatever the initial assessment of the knowledge base reveals will be critically important to the scope and initial goals of the adaptation process (see below). What is known will also be important to share with other participants in the larger adaptation planning process to peak their interest and engage them, educate them, and show the relevance of the effort.

Preexisting Levels of Awareness and Interest

The initial adaptation planning team should also informally gauge the level of awareness and understanding of climate change, and the level of interest in adaptation planning. This may be known already from informal conversations, or could be assessed by team members through focused conversations with key community leaders or representatives of particular groups. Maybe a recent climatic event (an unusually persistent drought, early onset of spring, a series of flooding events, or extreme heat) has raised concerns and can be used to initiate the conversation. Frequently, experiences with extreme events and climate variability that have exerted significant stress on a community or region will increase interest, but non-climatic stresses may serve the purpose of a "conversation starter" just as well. Significant stresses from whatever source may make a community or region more vulnerable to additional stresses. In those instances, the initial conversation may focus primarily on reducing vulnerability, increasing resilience, or generally fostering development and improving livelihoods for people and the condition of the natural environment to support their livelihood, and will only at a later stage include consideration of climate change. [picture of a recent climatic event and how it initiated interest in adaptation]

Hotspots of Concern for Conservation

Conservation practitioners – together with other members of the initiating team - will be able to identify particular hotspots of concern from a conservation perspective. Loss of critical habitat or species, problems with invasive species, development trends precluding habitat connectivity, degradation of natural resources and ecosystems from human (over)use, ongoing coastal erosion or soil erosion, deforestation trends and so on are among the common challenges already experienced in many regions of the world. Practitioners may have observed certain trends over time, may have noticed or systematically observed changes in the local climate and environment, may be familiar with scientific projections, or may suspect where and how climate change may be particularly challenging to the existing ecosystems and species. These "preexisting conditions" may become the principal focus of the adaptation planning process (though once more community members become engaged, priorities may need to be adjusted).

Other Concerns and Current Challenges in the Community or Region

A final aspect should be carefully considered in the initial assessment, and that is non-climatic, non-environmental challenges that a local community or region faces that may affect concerns, vulnerabilities, priorities, interests, and capacities. The range of issues that may be relevant here is diverse and involves all relevant aspects of the larger context that will factor into adaptation planning:

- the socio-economic condition of the community and the larger region,
- the level of poverty and development,
- resource and land conflict,
- human health concerns,
- demographic trends (including population growth, age distribution, migration),
- linkages to urban centers, regional and global markets,
- cultural changes,
- governance issues,
- political stability,
- civil unrest, war, peace, and security issues, and so on.

All these conditions shape people's and ecosystem's vulnerability, a community's adaptive capacity, the feasibility of certain adaptation options, the real and perceived barriers to adaptation, and the impacts of climate change themselves, as current problems may be aggravated by climate change. [photo of war-torn and drought-stricken region?]

Now What?

At this point, there is an initial team of collaborators, the available resources have been critically assessed, the team has assembled a first overview of the current knowledge base and the level of awareness, understanding, and interest in climate change and adaptation planning in the wider community, and a preliminary list of conservation concerns has be established, fully cognizant of the other challenges and concerns that the community faces at this time. Where to go from here?

As the initial team begins to plan the next steps, maybe sets some preliminary goals, and chooses a set of activities or processes, it is important to balance staying open and flexible with appearing focused and committed to producing results. This will engender trust and respect, but also interest and a sense among members of the wider community that they have a voice in shaping the process as it unfolds. Critically important will be how to open up the process to the wider community, who to engage, and how to engage individuals to achieve different results. The next section thus offers some important insights into designing effective participatory processes.

Creating the Conditions for Successful Engagement of Stakeholders

Section 3 above established how critically important it is to be inclusive and engage the community or at least key representatives of relevant groups and interests in the adaptation planning process. Here, the focus is more concretely on critical aspects that should be considered to create an effective participatory process. Clearly, stakeholder engagement, already an element in many conservation projects, is considered an essential and integral part of "good practice" in place-based research, assessments, planning, development projects, and decision-making more generally. But what does participation or engagement actually mean, when and to what ends is it useful, and how can practical and philosophical challenges be overcome to implement participatory processes well?

Identifying Stakeholders: Broadening Participation

Beyond the team that initiated the adaptation planning process, who should be involved? Here we leave the strategic and feasibility (e.g., time and resources) considerations aside, and consider the question who might have a stake or interest in adaptation planning. There are some obvious, and some less obvious answers, thus how to broaden participation should be considered carefully (see also Golder and Gawler 2005; and http://wikiadapt.org/index.php?title=Stakeholder_analysis_and_engagement).

Generally speaking, any individual or representative of an organization who may be affected, or whose interests may be affected by, climate change or by the actions taken to prepare for climate change impacts should be considered a "stakeholder" (e.g., Newig, 2007; Glicken, 1999; Beierle, 1998).

This broad definition does not imply that stakeholders are aware of the issue that could affect them (e.g., many individuals in fact are ignorant of the future risks they face), nor does this definition imply that a stakeholder is only one if he or she cares enough or is interested, willing, and capable to make his or her interests known in public. In turn, those who do speak up (i.e., generally the active members of a group) are usually fewer than the total number of (potentially) affected stakeholders. Moreover, neither the interests, nor the perception that one's interests are affected, are necessarily stable over time. Thus, the range of stakeholders is likely to change over time as some emerge and others disengage, and thus, the question of who to involve should be revisited occasionally.

There are many reasons for being or feeling "affected" by climate change and adaptation, including

- one's geographic proximity or exposure;
- the economic interests one has in an asset, resource, piece of land, the outcomes of a decision, or the financial risks that arise from a particular process (e.g., climate change);
- non-economic benefits from the use of a resource or asset, including rights of way, amenity values, vistas, status, etc.;

- the socio-cultural implications or meanings of an issue, including issues of justice, welfare, health, tradition, and religion;
- concern for environmental issues, including protection of the environment for its own right, sustainability, and subsistence;
- one's legal or professional obligation, interest, and authority to be concerned, investigate, or make decisions about an issue (e.g., as a land manager or scientist); and
- other values reflected in ethical and moral concerns (see also Ewing 2003).

Frequently, these substantive interests are interwoven with broader and in some sense issue-independent concerns relating to political process, issues of power, social status, personal or institutional rights and responsibilities, and so on. Thus, a person may not be particularly concerned about (or objectively affected by) a given issue at hand, but still claim a "stake" in it, because he or she cares about public participation processes or "local control" as a matter of principle.

Identifying potential stakeholders should also consider why some individuals – even though they have a "stake" in an issue, may choose not to make their interests known or decide against participation. There is always a danger of overlooking these individuals or their interests. The reasons why people choose *not to participate* may include the following (Ewing 2003; Mascarenhas and Scarce 2004; Newig 2007; Seixas 2007; Shackley and Deanwood 2002):

- lack of time and/or financial resources to participate effectively
- lack of understanding of the issue and the stakes
- lack of interest in issue or process (general or relative to other pressing issues)
- subjective or objective lack of expertise (technical, procedural, legal etc.)
- lack of mandate to participate
- objective lack of opportunity for the participatory process to make any difference to research or policy agendas (e.g., as a result of bad timing, lack of institutional link to the locus of decision-making)
- an underlying disbelief that process will lead to beneficial outcomes, such as various personal gains, social benefits, influence on decisions, policy changes etc.
- an underlying distrust in the sponsoring organization or process leader
- disappointing past experience with participatory processes
- dislike or distrust of, and/or conflict among, participants; (perceived) lack of involvement of key players
- shyness to engage in public

This list of reasons makes clear that not publically claiming a stake, not expressing one's views and interests, or not participating in a process does not mean one is not a stakeholder. Lack of motivation or any number of barriers can prevent engagement, and to the extent possible, the initiating team should strive to help people overcome them as they will affect the community's perceptions of fairness, legitimacy, salience, and credibility of the entire effort (e.g., Clark et al. 2006; Mascarenhas and Scarce 2004). [textbox of an example case of identifying stakeholders, including some not so obvious, or hard-to-get ones?]

In summary, because of people's self-selection bias, the relatively stable and sometime exclusionary nature of social networks, and the many reasons one may or may not feel affected by climate change and adaptation decisions, those initiating and maybe leading the participatory processes should carefully review their reasons and procedures for identifying and reaching out to different individuals.

Engaging Stakeholders: The Meaning of "Participation"

The literature uses "engagement" and "participation" for a wide variety of processes, some of which are not very involving or interactive at all. It is thus useful to clarify what participation means. Because the focus in adaptation planning is ultimately on making decisions that should be informed by the best available knowledge – a combination of scientific and local/indigenous knowledge (see Section 3), it is useful to distinguish different degrees and types of engagement by looking at information flow.

A fairly minimal form of engagement occurs in *information dissemination*. Here, those who lead an adaptation effort essentially just inform a community of what is happening. They may also educate the community about risks, vulnerabilities, and adaptation strategies. This one-way communication may involve spoken or written communication, but does not involve a two-way exchange of views or experiences. It can be very important when the goal is to reach large numbers of people (e.g. informing about the result of a decision, an early warning system, regular updates on the status of a project).

At the next higher level of engagement, those who initiate a process may call on the community for a *consultation*, i.e., a limited dialogue with affected stakeholders on a specific issue. In this case, the community has an opportunity to respond to an initiative or provide input into a process, but still does not have full control over it. Consultations may be the most time- or cost-effective approach to gathering additional input (e.g., through surveys, interviews, or public meetings) when the project is already well underway, or when choices have already been narrowed down and simply need refinement.

Finally, in the most intense, two-way form of engagement, *participation*, those who initiate a process and those affected by climate change or adaptation – over time – become partners in the process. Community members are actively involved in setting the agenda, gathering information and exchanging knowledge, forming policies and making decisions. Information flows in both directions. This level of engagement is often least predictable and least controlled by those who initiated it, but if facilitated well, can engender the greatest level of interest, sustained engagement, buy-in, and ownership of the outcomes.

All three levels of engagement may be useful at different times in the adaptation process. What specific activity or engagement mechanism to choose can vary widely and the choice depends on several factors, including:

- purpose and ultimate desired outcome
- the number of people to reach and engage
- the capacity and skill of facilitators
- the capacities and skills of participants
- available time and resources
- the stage in the process (quality of relationships established, stage in adaptation planning process, etc.)

Researchers of participatory processes have distinguished more than 100 specific types of engagement processes or mechanisms (e.g., Rowe and Frewer 2005); many of these are already common in conservation and development planning practice (see the Appendix for numerous resources). Examples may include community resource or hazard mapping, transect walks, compiling seasonal calendars, ranking exercises, discussion forums, focus group discussions and other approaches common in participatory rural appraisal. Community members may also become involved as "co-researchers" in gathering, analyzing, interpreting, and integrating data about the community, resource base, or the ecosystems of concern. Participants will also be involved in various ways in decision-making, monitoring the impacts of those decisions, learning, and adjusting adaptation strategies over time.

Generally, the degree and type of engagement requires different types of knowledge, skill levels, and capacities, but also helps build them, and thus becomes part of fundamental capacity building in the involved organizations and the community (see also Jugnarian 2006). To the extent there is frequent turn-over among the participants, it will be important to continually pay attention to the level of capacity, and – where necessary – to spend sufficient time on maintaining and rebuilding it.

Managing the Risks and Benefits of Participatory Processes

As discussed above (Section 3), there are many good reasons for broadening participation, but engaging a wide variety of people can also involve challenges. Thus it is not surprising that there is an ongoing debate over the

value, need, and roles of participatory processes. This debate stems in part from the fact that even professionally conducted (i.e., selected, planned, and implemented) engagement processes can involve risks and result in unintended consequences. The most common challenges include the following:

- *Participant fatigue* – Ongoing and/or lengthy participatory processes can be exhausting due to the extensive learning, patience, and number of meetings often required before useful results can be achieved. Occasionally, participants view the outputs or outcomes as disappointing. Even in the most productive cases, it is important to remember that participants also have other obligations and accountabilities beyond their commitments to the adaptation planning process. If participants are community leaders, they may have been asked repeatedly to partake in different efforts. Any single stakeholder process may not present a problematic burden on individuals, but collectively, they may exceed people's good will and ability to participate.
- *Burn-out of the process initiator/leaders* – Just as participants may get fatigued, organizer may burn-out from processes that require ongoing, repeated, or simply too much energy. Planning, organizing, and leading effective participatory processes are centrally important, challenging and time-consuming tasks, not ones that should be conducted in a rushed or capricious manner. If and when participatory processes are used, they should have purpose, meaning, and a clearly defined timeline.
- *Costs* – Participatory processes can sometimes involve considerable cost. Sometimes it is worth paying for a trained, effective facilitator; other times it is worth investing in training of existing staff first. As mentioned already, attendance of participants can add substantial to the overall costs. Depending on the activities chosen, costs can be very low to significant.
- *Potential for increased conflict or distrust* – In the context of adaptation to climate change, where vulnerabilities, adaptive capacities, and climate change impacts vary across regions, communities, and even within communities, dialogue and/or input in decision-making about possible response strategies will naturally involve the risk of disagreement, polarization, or even deepening of rifts and conflicts rather than better mutual understanding and relationships. While some of these disagreements may be temporary and subside over time, others may persist. This risk underlines the need for skilled facilitation, and a commitment to an ongoing process.
- *Reinforcement of uneven power relationships* – It is important to consider the relationships among those potentially engaged in the process. Stakeholders often have different or conflicting interests. Relationships between different groups may be antagonistic and power struggles may precede or emerge in a participatory process. All these preexisting interests and relationships are "imported" into the process, or – by virtue of excluding some interests – perpetuated or even aggravated. For example, when highly vulnerable (often poor, less educated, less trained, or isolated) individuals or communities are not brought into a participatory process, their vulnerability may not be lessened through the adaptation strategies selected.
- *High opportunity cost* – There is no guarantee, ultimately, that intended outcomes of the participatory process will be achieved. Thus, there is always a risk of wasting time and money and losing people's trust. To the extent stakeholders can clearly see why engaging is in their interest, help identify and negotiate realistic goals, and come to a full understanding of the process, possible pitfalls, and the need for their full engagement, this risk can be minimized, but never be eliminated.

To avoid these challenges and minimize the inherent risks of participatory processes, several guidelines should be carefully considered (see Appendix for additional resources and guidebooks):

- Carefully select the type and number of participants (e.g., avoid overtaxing particular individuals, skill level, representation, existing relationships, range of interests; inclusion of facilitators, inclusion of outside experts)
- Carefully consider and help overcome contextual constraints (e.g., stakeholders' capacities to participate, geographic constraints, leadership, clear articulation of participants' commitment, financial resources)
- Carefully match engagement mechanisms and goal(s) (e.g., use of audience-relevant and appropriate materials for education and training; full understanding of the decision-making context, variation in use of different activities and approach)

- Clear articulation of goals and realistic assessment of feasible achievements (e.g., co-production of knowledge, vulnerability assessments, adaptation needs, options and barrier assessments, adaptation decisions, establishment of monitoring programs)
- Realistic assessment of time requirement (e.g., careful selection of meeting times, setting appropriate expectations among stakeholders about frequency and length of engagement)
- Effectively implement the process (e.g., appropriate identification or selection of stakeholders, selection of engagement activities, effective facilitation)

The potential risks involved in participatory processes should rarely detract from conducting a process at all, but rather help redefine, reshape, or refine what those who organize these processes intend to achieve with them (Welp et al., 2006; Hickey and Mohan, 2004; Cooke and Kothari, 2001). [textbox of how these issues were handled in a particular case?]

VISIONING

> "Pondering the forecaster's question—where are we going?—has led us not to clear answers about the global future, but to disquieting uncertainties. … But humans are travelers, not lemmings, who can ask the traveler's question—where do we want to go? Vision and intentionality is the freedom that draws us forward as surely as the past pushes us onward."
>
> Raskin et al. (2002: 31)

Paul Hawken, one of the leading US environmental thinkers and chronicler of the worldwide efforts toward sustainability, stated in a speech in 2009 "If you look at the science about what is happening on earth and aren't pessimistic, you don't understand data. But if you meet the people who are working to restore this earth and the lives of the poor, and you aren't optimistic, you haven't got a pulse." Indeed, the trends observed by scientists can easily constrain one's perspective of what is possible. Adaptation in this constrained perspective rarely means more than "coping." The discourse is colored by fear; the outlook easily becomes one of loss and conflict.

By contrast, visioning helps communities break out of these perceptual constraints – not to build any false hopes, or to put on "rose-colored glasses" that misrepresent the true condition of the planet or any one locality. Instead, visioning helps people break out of limiting habits of thought that constrain them unnecessarily. Visioning, as systems thinker and sustainability activist Donella Meadows once said, "is [imagining] *what you really* want, not what someone has taught you to want, and not what you have learned to be willing to settle for. Visioning means taking off the constraints of 'feasibility,' of disbelief and past disappointment, and letting your mind dwell upon its most noble, uplifting, treasured dreams" (Meadows et al. 2004: 272).

Visioning taps into people's most powerful desires and emotions, engages the best in them, and draws out their strengths, rather than their fears and smallness. Visions allow people to participate in something bigger than themselves. Shared visions, in particular, can be deeply empowering. Whether it is a personal or a communal vision, the image of the future created in the process of visioning always defines a big goal, it sets the compass, and then helps people align their actions so that they begin to move in the direction of that ultimate goal. People guided by vision inspire the kind of hope that Paul Hawken refers to, because they generate a power that can help them overcome challenging situations, find creative ways to overcome barriers, and even encourage them to transcend conflicts, disconnects, and painful experiences of the past.

Tapping into the power of visions thus can be enormously helpful for the adaptation process. A vision guiding people who have set out to plan and prepare for climate change turns adaptation into an opportunity to put communities on a more sustainable pathway, to create a more desirable future rather than just cope with whatever will come.

A number of visioning activities and tools are available (see Appendix; see also the insightful description of a visioning process described in Meadows 1994). A few additional considerations are offered here to supplement commonly available tools.

- *Inclusivity* – For visioning processes it is particularly important to be inclusive to ensure that all perspectives are represented in the process.
- *Youth and children* – Consider including the younger generation in the visioning process, or to do separate visioning exercises, where older community members get to hear the visions of the younger members of the community. This can lead to a very inspiring dialogue across the generations. Obviously, the stake of the younger generation in a future marked by climate change is even bigger than that of the adult generation. Thus creating an opportunity for young people to be heard is very empowering.
- *Respect and caring* – Visioning for many people is an uncomfortable or at least an unfamiliar process. One's deepest hopes and dreams about the future are more commonly "private matters", shared at most with one's most intimate relations. Visioning exercises thus should be created in a safe, inviting, open, and respectful manner. Facilitators should be at once caring and encouraging participants to leave aside any worries about feasibility. Practicality will come later.
- *A powerful question* – Visions can be focused on personal futures or the community or the world. To make it relevant to the adaptation planning process at the scale at which it is focused (a community, region, conservation areas etc.), it is useful to initiate the visioning process with an evocative, open-ended question. For example, "What would our community look like if everyone had a secure livelihood?"; "What would our region look like if everyone – people and nature – had 'enough'?" and so on.
- *Mix of approaches* – Some people are comfortable speaking out in groups, others are less so. Particularly when a group is unaccustomed to visioning and still unfamiliar with other members of the group, give people an opportunity to vision in a variety of ways – writing, drawing, sitting in silence, dialoguing in pairs, later on sharing in the larger group. Use a variety of methods and allow sufficient time for people first to gather their own dreams, and then to bring participants' visions together to blend individual visions for their community into a shared community vision.
- *Creating safety* – Participants may resist the notion of visioning at first, or feel it is unnecessary or useless given "reality." People tend to feel free to share their cynicism, complaints, and frustrations, but generally are hesitant to share their dreams. Often, once people have shared all their resistance and feelings about why visioning is a waste of time, they quite readily engage in the process. It is important for facilitators to not get defensive, but to invite all comments and feelings, and retain an inviting atmosphere, encouraging participants to try it, but not force them. Those who do not want to engage in the practice can be invited to simply observe.
- *Increasing specificity* – Invite people to become more and more specific in their vision. Move from grand statements and value statements to specific situations, images, relationships, places.
- *Positive language* – As the facilitator, pay attention to the language people use. Whenever participants use phrases that speak to avoidance of a negative situation, suggest turning it into a positive phrase ("avoiding loss" becomes "sustaining"; "preventing disasters" becomes "promoting safety and well-being" etc.). Dodging a bad situation is never as powerful as standing tall in a good one. Help people focus on what they want, not what they expect.
- *Openness to outcome* – Participants must feel absolutely unconstrained in their visioning, and the group must feel it has permission to create whatever vision of their community that they want. Visioning is not the place to place constraints on the future. At a later stage, dialogue can be encouraged and facilitated to bring climate change and other stresses into the picture.

The participants in the exercise may be invited to find a creative way to visualize their shared vision – maybe in drawings or some kind of artwork that can be exhibited for all to see and remember. [textbox of an example, if available?] If there were separate groups doing the visioning exercise, a powerful dialogue can be initiated when they are brought together to share their visions. As visions often generate hope and positive energy, it is important to allow participants to dwell in this joyful, positive place – when anchored well, it is a powerful place to return to over time when challenging situations discourage people to stay engaged.

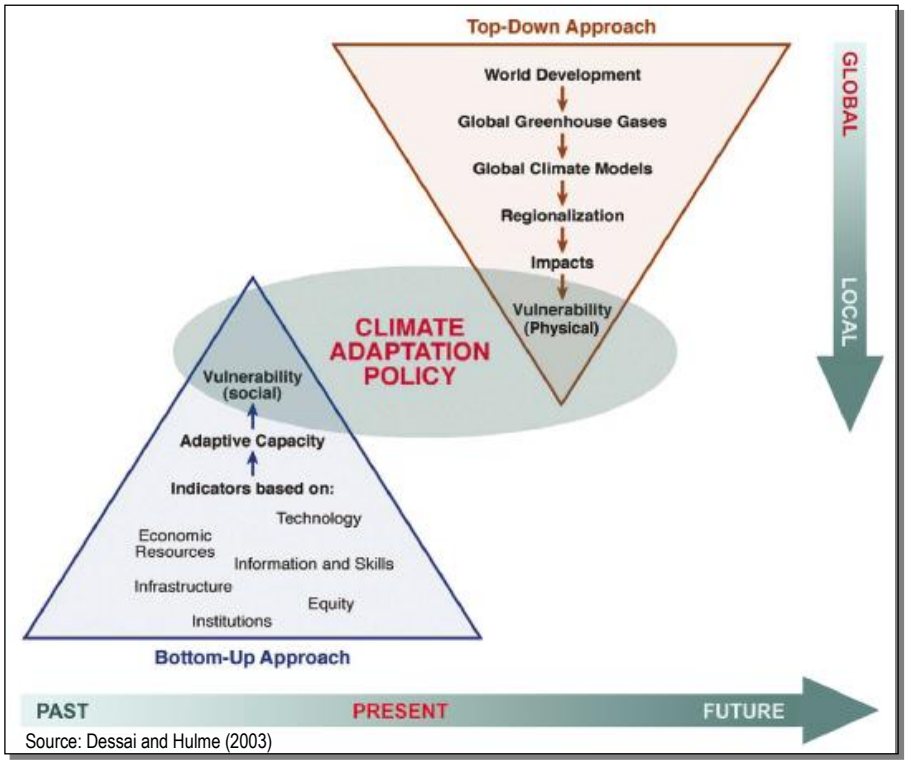
Developing the Knowledge Basis for Adaptation Planning

Adaptation planning should be guided by the power of a positive vision for the future and be informed by the best available knowledge. As argued above, the best available knowledge in many cases is a mix of scientific information and locally-held and indigenous knowledge. Sometimes scientific information about the environment or socio-economic circumstances and climate projections is scarce or outdated or all-together missing. In other instances such information may be available only at a regional scale, lacking local specificity. In these instances, any available information, or whatever scientific knowledge will be generated in the course of the adaptation planning process, must be integrated with local and indigenous knowledge. What knowledge is generated should be informed by the concerns and needs identified together with community members.

Generally, the process of generating necessary knowledge will be iterative, becoming more specific over time. Thus, it is important to set up an expectation (and process of follow-through) for ongoing and meaningful participatory engagement in shaping the research agenda, maybe even participating in knowledge generation, and regularly being updated and informed of new insights.

This section describes the different knowledge components that should inform the adaptation planning process. In several cases, concrete examples are given of how conservation practitioners have addressed different knowledge needs. [this would be a good place for a textbox of regional information sources; I am not very familiar with these, but maybe you have this relatively readily at hand?]

We begin below with the three critical elements that are required for adequate adaptation planning: (1) assessing climate change risks, (2) assessing vulnerabilities to these identified climate change risks, and (3) identifying and assessing adaptation options and barriers. The first two of these are sometimes described as the "top-down" and "bottom-up" components of a comprehensive risk assessment, with the third linking the two (see Figure).



Importantly, in each of these analyses, there will be significant uncertainties – some related to the availability and quality of data, some to ways in which certain aspects and processes can be represented in models, others related to the fundamental level of understanding of an issue or the relationships between different aspects of the environment and society, and finally some irreducible uncertainties related to the inherent characteristics of a system – chaotic processes in the climate system, unpredictable interactions or evolutionary changes in biotic systems, self-reflexivity in human systems, and so on.

While some uncertainties can be reduced with additional data collection and research, others will persist and must be communicated and explained to those who must weigh the risks and choose among various adaptation options. The very fact that these uncertainties exist, and that they are possibly larger than those influencing decisions in the past when climate was more stationary, calls on decision-makers to retain as much flexibility as possible in their choices and to avoid foreclosing future adjustments in their adaptation strategies and actions.

Persistent uncertainties call on decision-makers to retain as much flexibility as possible in their choices and to avoid foreclosing future adjustments in their adaptation strategies and actions.

Assessing Climate-related Risks

Historical Climate Records

In many regions, there is extensive experience with climate-related risks, such as seasonal patterns of monsoon rains and related floods, winter storms, periodic droughts (e.g., during El Niño years), extreme heat or cold, and so on. Many of these patterns, and especially notable events, have been recorded systematically by weather stations, tide gauges, regional climate research centers, or university-based researchers. In these instances, there is a good foundation of historical climate information, which can help to discern whether there already has been a detectable trend in particular climatic variables (e.g., temperature, precipitation patterns, sea level, the length of the seasons (determined by the dates of the first and last frost or first and last rains), changes in snow and ice, and so on. In other instances there may only be spotty information, unreliable records, or orally transmitted stories of historical events or changes in seasonal patterns. People who spend much time in the environment and closely observe nature may have valuable information. Because humans always have perceptual filters, however, such observations can be valuable, but should be carefully assessed and compared with additional information sources, whenever possible, to "triangulate" their accuracy.

Observed historical patterns and any changes therein are an important starting point for assessing climate-related risks that certain regions, communities, or ecosystems face. They reveal the types of risks that can be expected and provide concrete illustration for what extreme events look like (geographic extent, areas particularly exposed, duration and frequency, intensity, warning signs, etc.). They also illustrate socio-economic and environmental vulnerabilities – a topic we return to below.

Climate Change Projections

In addition to historic records, observations, and emerging trends, what may be expected in the future is equally important to assess the climate-related risks. For some regions of the world, fairly good climate change projections exist at this time – at least good enough to give a rough indication of what may occur. Such projections are not quantifiable forecasts of what *will* happen in the future, but rather plausible scenarios of what *may* happen under certain assumptions about how global emissions of greenhouse gases may change over the coming decades. These assumptions are typically based on scenarios developed by the IPCC, which integrate global and large-scale regional patterns of economic development, technological changes, population growth, and different degrees of regional and global cooperation.

In recent decades, the climate science community has made significant progress in modeling global climate change (Solomon et al. 2007). Models are improving in their abilities to replicate historical climate patterns and events; they also are improving in their spatial and temporal resolutions. Growing computational power has allowed researchers to produce "downscaled" climate change projections for different regions of the world. In many instances, however, the available climate projections will be coarse-scaled and should be considered an initial guide. One element of the ongoing adaptation planning will be to improve the existing knowledge base, possibly with the help of external experts, and to periodically revisit the question of improved climate change projections. The appendix provides a variety of global and regional research centers that provide climate change projections.

Additional resources may be available at regional or a country's premier research universities. [great place for a textbox or 2 describing different ways how people obtained needed (or best available) climate information]

Qualitative Scenario Exploration

In some instances, climate change projections for the region of interest have not yet been produced or can simply not be found. This limitation should be remedied as soon as possible as one of the first steps in the ongoing adaptation planning process. In the meantime, the community could already engage in a valuable exercise: qualitative scenario exploration. In this exercise, community members could explore what potential changes in climate would be particularly challenging or require adaptations in the community. Participants should consider both gradual and modest changes as well as more abrupt and extreme changes. For example, there may already be experience with droughts, and how to buffer against and cope with the occasional dry period. A more severe, longer, or more frequent occurrence of drought, however, may cause severe disruption. What type and degree of change would be problematic? Similarly, sea level may already be rising, causing erosion and the occasional coastal flooding event. How much more could the sea level rise before it would cause unacceptable levels or frequencies of flooding, land loss, wetland inundation, changes in soil and water salinity, and so on?

Qualitative scenario exploration like this can alert communities to emerging threats and help identify situations or thresholds that require an adaptive response. It can also help a community see how far or close they are to a particular threshold, thus alerting them to the need for a timely plan and response.

Climate Change Impact Assessments

Top-down, model driven climate projections can be used to derive qualitative or – ideally – quantitative impacts assessments for specific locally-important systems water availability, agriculture, human health, ecosystems, sea-level rise and so on. Such impact assessments identify the potential physical risks a region or community may face. This is an important input into a comprehensive assessment of a region or community's vulnerability. The Appendix lists a large number of tools available as well as published literature. Many of the research centers listed in the Appendix provide case examples online. [link to ELAN as appropriate]

The Ecosystems and Livelihoods Adaptation Network [ELAN]

The *Ecosystems and Livelihood Adaptation Network (ELAN)* is a new effort initiated by IUCN and WWF-US, intended as a network of conservation and development organizations. ELAN aims to address the growing and pressing need for adaptation planning that links conservation and livelihood concern. It recognizes that adaptation has to be extensive, and it must be implemented quickly. A wider variety of more effective adaptation options are needed and their applications need to be scaled-up across the globe. There is a particular need for a more networked and shared approach to developing, adopting and implementing ecosystem-based climate change adaptation strategies across the world, and to more widely developing and applying knowledge and techniques for ecosystem-based adaptation. Given the climate-ecosystems-people nexus it is more essential than ever that climate adaptation plans take into account human livelihoods and their dependencies on ecosystems.

ELAN consists of a central secretariat "hub" and thematic and regional nodes as "spokes." ELAN serves as a platform for diffusing information generated around the globe. It encourages exchange, analyses, and syntheses within and across regions. Its efforts focus on building capacity; accelerating application of existing knowledge; creating additional adaptation options and resources; and informing national, regional, and international bodies to ensure that policies established in response to climate change provide a supportive framework for action on ecosystem-based adaptation strategies. The adaptation network is research-driven, action-oriented, and committed to delivering innovative and practical solutions to adaptation and risk reduction based on the latest information and the diffusion of knowledge among adaptation practitioners and policy-makers.

(Adapted from IUCN and WWF (2008); for more information see: [is there a url ye?]

Climate change impacts will not occur in isolation from each other. The science of this "ecology", i.e., of integrated cross-sector impacts assessments is very limited still at this time, and the models that do exist are often not available at or developed for the local level. There is a significant need to identify – even in principle – what the cross-sector interactions may be

and how they can be assessed systematically. The same is true for impacts assessments that link impacts in one location or region with those experienced in another region (for one example see (Adger, Eakin and Winkels 2008).

Despite the limited availability of scientific tools and models, cross-sector interactions should not be ignored. A simple qualitative way to begin exploring what the possible linkages may be is to use a simple matrix approach to facilitate a systematic examination of interactions. While these interactions may not be quantifiable at this time, they may identify critical thresholds or possibilities for "domino effects" that may otherwise be overlooked.

Assessing Socioeconomic and Ecological Vulnerabilities

Many adaptation planning efforts are built on climate change projection-driven impacts assessments alone. This can only be considered a first step, however, in understanding where and what type or level of adaptation may be required. Impacts assessments are assessments of the potential (physical) risks. Independent of the physical climate, however, ecosystems and communities differ in their vulnerability to whatever climate change may unfold. Imagine, for example, a projection of a 2-degree warming of the sea surface temperature. How severe the ultimate impacts are on the local coral reefs, however, depends not just on the absolute amount of warming, but also on the condition of the reefs in question: are they already under significant stress from overuse, pollution, or sedimentation, or are they still quite pristine? Are the corals near their thermal tolerance limit or several degrees from it? These contextual and confounding factors will make all the difference whether the corals will bleach and/or will be able to adapt or recover after a particularly warm sea water episode.

The same is true for impacts on people: Communities already experiencing extreme poverty and hunger, for example, will be much more severely impacted by the experience of more frequent extreme events (such as extended droughts impacting their ability to grow the food they need) than a richer community with diverse livelihood systems. People in generally good health and decent health care facilities will be better able to cope with new and emerging health threats than those already disadvantaged and far from health care facilities.

A strong focus on assessing place-based vulnerabilities and designing strategies to ameliorate them will be a no-regrets strategy even in the absence of sufficient climate change information.

These local conditions "on the ground" are fundamentally important to assess in order to properly assess the seriousness of potential climate change risks, to identify appropriate adaptation options, recognize barriers, and prioritize interventions in order to reduce the vulnerabilities adequately.. A strong focus on place-based vulnerabilities and designing strategies to ameliorate them will be a no-regrets strategy even in the absence of sufficient climate change information.

Much like with the assessment of climate-related risks, the bottom-up vulnerability assessment in a region or community should make use of both historical information and be forward-looking. There is a rich literature on vulnerability assessments (see Appendix for tools and examples; see also the cases described in Patt et al. 2009 and Schipper and Burton 2009), but many share certain steps in common (e.g., Eakin and Luers 2006; Füssel 2007; Moench et al. 2008; Polsky, Neff and Yarnal 2007; Schröter, Polsky and Patt 2005). Below a stepwise vulnerability assessment is described that integrates much of this literature to illustrate the underlying principles and information needs. Where adequate scientific information and tools are available, such vulnerability assessments can be conducted in a quantified and spatially explicit manner (e.g., using GIS). In the absence of such a solid knowledge base, even a qualitative vulnerability assessment can be revealing. As with the climate risk information, any lack in knowledge should be remedied as soon as possible and inform the ongoing, iterative adaptation planning process. Key concepts relevant to a vulnerability assessment are defined in the textbox. Note, any part of the analysis described below can be conducted by experts or in collaboration with community members – and in many instances a collaborative, participatory approach is preferable as community members are likely to hold important information of their situation.

A Stepwise Vulnerability Assessment

1. *Bounding the System*. It is critical to begin a vulnerability analysis by clearly bounding the system of concern. For example, if vulnerability in the water sector is to be explored, is the focus on a region or a community's water system, or the household supplies and consumption, or maybe on coastal groundwater resources likely to experience saltwater intrusion by sea-level rise? Does the analysis involve only the water supplies or also include the infrastructure that connects sources, storage, users, and treatment of fresh water? Which users are included, which not? Are the institutions that govern water use, any laws, regulations or customary rights part of the analysis or not?

2. *Gathering Essential Baseline Information*. The next step involves an honest assessment of the current condition of the system of concern. If a visioning exercise was conducted, this step may include an assessment of the ways in which the system is consistent with or deviates from the desired, envisioned condition. Both, the minimally necessary and the optimal conditions could be considered and compared to the actual current condition. For example, how much habitat is absolutely necessary to protect certain species or to retain certain ecosystem goods and services? How much would be optimal, above and beyond what is absolutely essential? How does the need or desired optimum compare to what is currently protected?

   Key Definitions

   ADAPTATION – Efforts to modify the *impacts* of climate change, i.e., any adjustments in natural or human systems in response to actual or expected climate changes or their effects in order to minimize harm or take advantage of beneficial opportunities.

   RISK – The likelihood (probability) of a certain hazardous event or negative impact occurring.

   VULNERABILITY – The susceptibility of a system to experiencing harm, determined by its exposure and sensitivity to the risk and by its ability to respond and adapt.

   RESILIENCE – The ability of a system to absorb some amount of change, including shocks from extreme events, bounce back, recover, and, if necessary, transform itself so as to continue to function and provide essential goods and services.

   (Sources: Parry et al. 2007; Moser 2008)

   This step in the analysis should identify the aspects of a system that are of particular concern? For example, in assessing a community's vulnerability to additional health stresses from climate change, it is important to understand people's current state of health (including such issues as malnutrition, other serious prevalent diseases such as HIV, malaria, and dengue fever etc.). Some individuals or groups may be in a particularly challenging situation already, and these individuals should be identified. Here, the point is to identify concurrent stresses that may affect people's exposure, sensitivity, or adaptive (or response) capacity. Such stresses may include the current state of air and water quality, the number of people living in areas exposed to flooding, the lack of regular health care, poverty, or gender- and age-related differences in access to food or clean water, or differential risks of accidents.

3. *Core Analysis*. The next step constitutes the heart of the vulnerability analysis, and it has four parts.
   Part 1: Define different subcomponents of the system (for example, subregions, subpopulations, or different components of an affected sector). [photo or map of an area that shows an example]

   Part 2: Identify sector-specific criteria have to be identified for each of these subcomponents in order to characterize the three components of vulnerability: the level of exposure to a given climate hazard, the degree of sensitivity to the projected change or stress, and the response capacity, reflecting both the ability to cope with extremes and adapt to change. [illustration of any aspect here by photo(s) with caption]

   Exposure: The geographic or functional exposure describes a system's location vis-à-vis a specified climate hazard. It may also describe one's dependence on a particular resource. Exposure can be expressed, for example, as projected temperature extremes, the amount of sea-level rise, or a reduction in water supply

for a community; or it may be expressed in the number of people or species at risk of experiencing a particular climate change or impact.
Sensitivity: The sensitivity of a system is the degree to which it reacts to a specified climate risk. For example, older people are more sensitive than younger people to extreme heat; coastal communities with healthy mangroves or coral reefs will be less sensitive to the onslaught of a coastal storm than those without. Ecosystems already negatively affected by pollution tend to be more severely impacted by additional stresses such as temperature extremes than healthy ones.
Ability to respond: The ability to respond is the capacity of a system to cope with impacts as they occur and the ability to adapt to ongoing change (note, the coping and adaptive capacity that together make up the ability to respond may well differ within and between groups or systems). For example, the availability of insurance, tight social networks, a strong emergency response capacity, flexible institutions, diverse economic resources or the availability and accessibility of alternative locations to which species could migrate as temperatures or sea levels increase all would make for greater adaptive or response capacity.

Part 3: Assess for each subcomponent the degree of exposure, sensitivity and response capacity (for simplicity's sake, this can be done in a qualitative way, e.g., low, medium, or high). Take, for example, a coastal region, for which a vulnerability assessment is being conducted. The identified subcomponents may include near-coastal cliffs and bluffs, coastal floodplains, beaches potentially suffering erosion and sand loss, and wetlands. For each of these subcomponents, one can identify criteria for exposure, sensitivity, and response capacity that may vary from low, medium, to high. For example, coastal erosion may vary along the local coastline from zero to several feet a year. Depending on the local situation, classes of severity could be identified to indicate low, medium, to high exposure.

Part 4: The last part in the core vulnerability analysis is to combine the ratings for exposure, sensitivity, and response capacity. This can be done is simple and in more sophisticated ways, and the general rule here is to not try to be more sophisticated than the underlying data allow. A simple approach may be to translate the low/medium/high ratings into numerical (e.g., 1/2/3, respectively, and to add up the numbers for each of the three components). Consequently, (sub)systems, particular geographic locations, or groups of people in a community may turn out to be more or less vulnerable. More sophisticated methods may attempt to weigh the different components differentially, but this should only be done if there is a well established rationale for why, for example, sensitivity is more important than exposure or response capacity. The research literature offers some examples of using different statistical methods, but these should only be relevant if reliable scientific data is available to measure each component.

Whatever method is chosen, it is important to realize that these three components can combine in various ways to make a system more or less vulnerable. For example, an larger community may have several neighborhoods where a large number of elderly residents live. All are exposed to the same degree of extreme heat, and may even be similarly sensitive, but the people in one neighborhood live in newer, better insulated homes (the richest may even have air conditioning), which modifies their exposure and they may have better access to a communal cool space or they may be connected to people who come and check on them to ensure their well-being. The people in another neighborhood live in older buildings and have no place to go to cool off. The latter population of elderly community members is clearly more vulnerable to heat than the former.

In another case, exposure, sensitivity and the ability to respond will combine differently: a farmer may be exposed to changes in climate and grow rather heat- or drought-sensitive crops, but because of his access to irrigation channels, his ability to adapt is quite high, so this farmer is not very vulnerable over all. [textboxes, textboxes, textboxes would be great anywhere here]

4. *Identifying Leverage Points by Examining Causes*. In the next step of the vulnerability analysis, the task is to identify proximate and deeper causes (drivers) of vulnerability in order to find the leverage points for adaptation (see also Meadows 1999). The most immediate or direct causes will differ by sector and location, but may include such things as lack of access to health care, lack of binding laws or clear customary rules, lack

of enforcement of those laws or rules, lack of information, lack of education, lack of access to markets, lack of transportation, and so on. In addition to important things lacking, there may also be important drivers, such as market prices, civil unrest, power imbalances, or deeply held values that can contribute to vulnerability. Beneath those lie the deeper drivers, typically related to larger trends in the population, economy, technology, culture, and the environment that may be difficult to affect by a single community, industry, or even the nation. Examples may include things like poverty, development pressures, population growth and related changes in the demographic composition of a community's or the nation's population, weaknesses in institutions or governance (planning, compliance, corruption, etc.), or large-scale trends such as economic globalization. To the extent available knowledge allows, describing the state of knowledge, including relevant historical changes leading to the present time, deepens the understanding of the system's vulnerability and opens up opportunity for intervention. Where knowledge and data are not available, important future research needs should be identified. [photo to illustrate any aspect here]

5. *Identifying Increasing Stresses*. In the final step, those conducting the vulnerability assessment try to assess what is known or expected in terms of future changes in the underlying causes of vulnerability. Again, scientific knowledge may be limited, but for some sectors and issues, projections may be available (~20-30 years). If no scientific information is available, it may still be possible to identify those societal and environmental changes that *would* be particularly worrisome, or to assume recent historical trends will continue at least for a few years. Independent of any additional stresses from climate change, may these concurrent social, cultural, economic, demographic or technological trends aggravate or ameliorate the region's, community's or environment's vulnerability? [textbox opportunity]

   The rationale for projecting the causes of vulnerability forward is the same as for making climate change projections: What challenges lie ahead? Not concerning oneself with the question how vulnerabilities may change independently of climate change is to run the risk of being insufficiently prepared as both climate risks and concurrent stresses change. For example, agricultural adaptation options must be determined considering the changing climate trends and risks as well as any changes in agricultural markets, fuel and fertilizer prices, the impact of mitigation policies (for example, related to biofuels) on crop prices, as well as developments in irrigation technology, genetic engineering, and agricultural policy at the national and even international levels.

   Also similar to the assessment of climate-related risks, it would be wise to consider scenarios of gradual and more extreme changes, as well as the coincidence of multiple stressors. It is important to keep in mind that the vulnerability assessment of one sector or ecosystem or community is a manageable first step. In reality, however, the impacts that affect one system may interact with those experienced in another. Ecosystem changes will ultimately impact (and maybe compound) local communities; changes in water supplies will affect agriculture, ecosystems, and human health; impacts on a neighboring region will affect the local situation. These interactions are more systematically assessed below.

Identifying Adaptation Options and Barriers

In light of existing and changing climate-related risks and the vulnerabilities (and their causes) identified in the stepwise analysis above, the question now arises: what actions can be taken to ameliorate the situation? The careful examination of differential vulnerability, and of its underlying causes and trends, has revealed needs and leverage points, and thus is critical for identifying the most appropriate adaptation strategies. It also helps prioritize (or modify the priorities based on the climate risk assessment for) adaptive interventions. A sole reliance on an assessment of climate-related risks might give rather different answers, underscoring once more why both top-down and bottom-up approaches are needed.

Identifying Options

Identifying appropriate and feasible adaptation options should be informed by the existing adaptive capacity as well as by potential barriers to realizing that capacity "on the ground." The factors that determine adaptive

capacity include: the availability of economic resources, the existence and access to relevant technologies, the availability of relevant information and skills, an in-tact, operative infrastructure, the availability and access to stable, functional institutions (including organizations, governments, rules, laws, rights – such as land tenure or water rights – and responsibilities), healthy, resilient ecosystems and a rich natural resource base, and equity in distribution and access to the above. Typically, these characteristics or dimensions are interrelated and often co-vary. For example, limited economic resources affect the access to technology and functional; access to institutions, education, training, and information is often skewed along lines of existing social divisions, wealth distribution, and inequities. A degraded environment may severely limit the productivity of economic activity and maybe reinforce social inequities (see textbox on Community Wealth above) [a textbox on land tenure issues?]

The factors affecting a community or sector's adaptive capacity begin to suggest that adaptive responses can be rather diverse in nature: removing market barriers or economic constraints may make a community generally less vulnerable and more resilient; addressing institutional shortcomings (e.g., establishing rules, improving compliance, changing land tenure, shifting rights and responsibilities) can reduce the vulnerabilities of the poorest, most marginalized members of society; repairing decrepit infrastructure or restoring ecosystems or agricultural land may improve the productivity, food security or safety of a community, and so on.

Generally, adaptation options may fall into one or several basic categories:

- *PREVENTION:* attempt to prevent certain impacts from materializing (e.g., retreating from an eroding shoreline prevents loss of homes and infrastructure, reduce non-climatic stresses to increase ecological resilience),
- *PREPARATION*: help systems and people prepare for expected changes (e.g., establish better warning systems, improve health care, build migration corridors for species),
- *RESPONSE*: enable them to better respond to extremes or impacts when they occur (e.g., improving emergency response through preparedness and training),
- *RECOVERY*: assist them to recover more quickly after the extreme event is over (establish insurance schemes for poor people, establish burden-sharing mechanisms, provide technical assistance after a disaster; accelerate reforestation after wildfire), or
- *TRANSFORMATION*: help them change and transform more fundamentally (e.g., shift from one type of agricultural production to another, retrain people, or relocate communities).

Analysts in collaboration with community members and community leaders may be able to identify a wide range of actions that could reduce vulnerability to climate change impacts and other non-climatic stressors. Some strategies may particularly focus on decreasing exposure, others on reducing sensitivity, and yet others on increasing the community's response capacity. Often, any set of strategies may address two or all of these vulnerability components. The initial list of potential adaptation strategies may be long and wishful.

Identifying Barriers

To practically realize any one of the options, the question must be asked, what may stand in the way of implementing it? In many instances, the identified options make perfect sense, and analysts and community members may wonder why – if they are so obviously helpful – why have they not already been implemented? In other cases, where entirely new options have been identified, the question of constraints should be asked just as well to ensure they are practically feasible. [textbox on barriers could be great]

Barriers (and sometimes absolute limits) may come in a variety of forms, including:

- ecological limits (e.g., the speed with which a species can adapt or migrate)
- negative environmental consequences (e.g., use of pesticides to deal with increased insect pests produces unacceptable impacts on water quality)
- technological feasibility (e.g., even if bulkheads and seawalls are available in principle, they cannot be built along particularly high-energy coasts)
- economic costs (e.g., pervasive poverty may limit what adaptation option a community can afford)

- institutional barriers (e.g., lack of cooperation between governance entities within and across different scales that need to coordinate their respective adaptation actions)
- laws, regulations and customary rules (e.g., land tenure may need to be redistributed to reduce the vulnerability of landless community members)
- procedures (e.g., long-standing cultural practices may prevent full inclusivity of all community members in making adaptation decisions)
- lack of technical knowledge (e.g., scientific uncertainty due to lack of data and models is perceived as too large to decide between several adaptation options)
- political calculus (e.g., political leaders may weigh the political risk in taking or foregoing certain adaptation actions)
- social acceptability (e.g., shifts in conservation philosophy, targets, or approaches may be unacceptable to some, producing conflicts and stalemate)
- entrenched habits, entitlements (e.g., living along a beautiful, but eroding shoreline and refusing to retreat; giving up water rights; reducing fishing quotas to protect stocks)
- deeply held cultural values (e.g., protection of a sacred site along an eroding shoreline may become prohibitively expensive)
- social justice (e.g., the unequally shared cost burden of certain adaptation options, or the exclusion of certain populations from access to a common good as a result of adaption)
- interpersonal relationships (e.g., potentially useful, even life-saving information is not accepted or used due to distrust of the information source)

(Adapted from Moser 2009; see also Adger et al. 2009)

These barriers – even if they do not constitute absolute limits – can constrain, delay, and possibly render less effective the options ultimately chosen to prepare for and minimize the impacts of climate change. To the extent adaptation options are identified in a participatory manner with members of the community, the potential options should be thoroughly vetted against the real-world experience of communities dealing with risks and stresses today. Sometimes governments (at the local and at higher levels) are particularly important in ensuring that these barriers are minimized or overcome, but governments themselves can be the source of the barriers. Clearly identifying the impediments and what would help minimize, remove, or circumvent and overcome them is a critical task and a creative challenge in identifying appropriate adaptation strategies.

Barriers can constrain, delay, and possibly render less effective the options ultimately chosen to prepare for and minimize the impacts of climate change.

Identifying Resources and Mechanisms to Realize Adaptation Options

If the initial brainstorm of adaptation options produced a long list of potential actions, the careful consideration of barriers may have reduced that list to a more realistic one. In the next step of determining adaptation strategies, it is equally important to evaluate what plans, processes, laws, rules and assets are already available and in place that can be drawn upon to realize the identified adaptation strategies. This step helps to identify efficiencies, opportunities, synergies, win-win strategies, pools of resources and expertise, and the creative human resources that that are readily available and can be used or redirected toward the communal goals and priorities identified (e.g., in the visioning exercise, or more narrowly focused in the assessment of vulnerabilities and adaptation options). For example, there may already be a fairly good network of conservation areas, with all attendant staff, technical capacity, and scientific knowledge. These existing areas may become regional climate adaptation research hubs that can help build the knowledge base not just for conservation but also broader adaptation concerns. Through land swaps or purchases, the network of conservation land may be even better linked to create greater landscape connectivity. Traditional resource management practices – almost forgotten in the course of modernization – may be revitalized to enhance resilience. [great place for an example in a textbox]

To the extent adaptation strategies cannot be realized with existing resources and institutions, additional resources, programs, processes, policies, or changes in rules and practices must be identified. What are the resource and knowledge needs, institutional or organizational improvements, legal changes, staffing and training needs to fully realize critical adaptation strategies? What cultural or social practices need to be changed and how can that be accomplished? If more fundamental changes are needed (e.g., relocation to higher ground), what external support may be available and who can help obtain it?

Assessing Cross-Sector and Cross-Scale Linkages

Similar to the assessment of cross-sector impacts – however qualitative at this time – it is important here again to consider interactions between adaptation options. Every effort should be made to avoid taking any adaptation actions in one sector that would undermine the options or effectiveness of adaptation strategies in another. Similarly, adaptation actions in expectation of one type of impact should be avoided if it increases the vulnerability to another.

The possibilities of interaction here are diverse and should be carefully considered. These interactions may occur because of connections through infrastructure (energy, information, transportation) and through the movement of energy, materials, or people. Carefully checking for cross-sector interactions is basically a practice of due diligence and best practice – to try to assess, as best as is possible, the potential for unintended consequences and surprise interactions. Relevant forms of cross-sector interconnection may include, but not be limited to, the following:

- the spread ("spilling") of impacts, especially during extreme events;
- the mutual magnification of impacts, due to interaction;
- competing needs for, and changing flows of, resources, capacities, goods, and services (affecting coping and adaptive capacity in one or both sectors);
- responses increase existing vulnerabilities or create new ones (exposure, sensitivity, response capacity);
- responses in one sector limit the "action space" for adaptation in the other; but also
- responses create positive synergies where two or more adaptation goals can be met with one action.

Similar interactions should not only be assessed between different adaptation actions, but also between mitigation and adaptation. For example, actions that may be taken locally to mitigate climate change (e.g., reforestation) may also serve adaptation needs (e.g., establishing more habitat for species) (see also Section 2). Actions to manage climate risks through either mitigation or adaptation will almost certainly also interact with non-climate-related policies and activities. Emphasizing this here again (even though any of these constraints may already have come up in the careful assessment of barriers and constraints) simply aims at underlying that responses to climate change must not undermine other development, risk reduction or sustainability goals. Sometimes this may involve difficult tradeoffs and choices, but these can only be adequately assessed and mitigated, if they are well understood and carefully debated with those most directly affected.[2] [textbox/photo w/ example would be great]

In addition to cross-sector interactions, there are also cross-scale interactions that are critically important. In many instances, for example, adaptation needs at the local level cannot be met with the resources and leverage available at that level. Communities may require financial or technical assistance from, and institutional changes at, higher levels of decision-making. These cross-scale linkages and needs should also be identified in order to develop specific strategies and actions that can address them. For example, to improve landscape connectivity of ecosystems, higher-order coordination and planning may be needed. To decrease dependence on national or global markets, several communities may decide to come together to form regional exchange networks. To improve public health, medical research and health care provision may need to be supported by extra-local means. [again, a textbox with photo may be great to illustrate where changes at higher level were needed, and how that was accomplished]

[2] Future generations and nature do not have the same opportunities as those present and able to speak. Thus, their interests must be (and often are) represented by specific interest groups, but are most easily overlooked.

5. Implementing Adaptation Strategies and Plans

Thinking ahead and planning accordingly (rather than just fulfilling current needs and wants) is uncommon and challenging in most modern human societies. Systemic, multi-generational thinking may be a way of thinking that remains alive only in the most isolated, traditional and/or native communities largely isolated from the globalizing economic and cultural trends, structures, and way of thinking characteristic of the 21st century. And yet, many regions may not be accustomed or equipped to use modern means to inform their planning and decision-making (e.g., scientific projections). Yet the need for planning ahead in light of global environmental changes requires changes in awareness, understandings, beliefs, decisions, and practices.

This tension between familiar ways of doing things and the need for change because of rapidly changing environmental conditions will affect all adaptation planning. Even the most interesting, exciting, and challenging planning process, will encounter inertia, resistance, waning interest, or simply the all-too-human desire to "keep things the way they are." And planning must be followed by action to turn ideas into reality. In this section we highlight some of the challenges and tasks relevant to implementing the initial set of adaptation actions, and how to keep the process going over time. Because adaptation planning is ongoing rather than a one-time effort, this ongoing process needs to remain flexible and adaptive to new circumstances, new science, and insights gained from early actions; it will therefore require ongoing monitoring, review, and adjustment.

Motivations and Barriers

The processes of visioning, participatory engagement, and comprehensive risk, vulnerability, and adaptation options assessment may be more than many communities have done before. If skills and capacities were relatively low at the outset, and had to be built over time, there may be a natural need for a pause. It will be critically important, however, to maintain momentum and not let too much time lapse between the planning and the implementation. Too large a gap may send a message to the community that the effort was not sincere; hopes may be disappointed; motivation may subside, especially as other pressing concerns of daily life regain precedence.

People will need to see practical results – personal benefits and communal changes in their daily lives that demonstrate that the adaptation planning process was worth it and made a difference.

Importantly, the process requires patience, careful guidance, encouragement, and continuous attention to the needs of participants. One of the critical ongoing needs is to build trust and confidence and to maintain it. People will not only want to be engaged in empowering visioning, and interesting, community-building assessments of risks, vulnerabilities and response options. People will need to see practical results – personal benefits and communal changes in their daily lives that demonstrate that the investment in this adaptation planning process was worth it and made a difference. Those guiding or facilitating the process, thus, should keep a close eye on practical "deliverables." Positive results are gratifying, provide positive feedback, and build confidence; moreover, follow-through on promises builds trust and sustains engagement.

It is a critical task of the initiators, facilitators and leaders of the adaptation effort to help people keep an appropriately wide and long-term perspective. Helping people remember the shared vision, the strategy chosen together to move from the current situation to that desired future, helping them be aware of potential set-backs along the way, and reassuring them of ways to address them and learn from them will all be part of the ongoing communication task. Updating people regularly on progress and asking for feedback is another way of keeping them engaged.

Leaders must also pay particular attention to the barriers (some identified, others maybe overlooked before) that may prevent proper implementation of the adaptation strategies ultimately selected. Some of these may involve people's ways of thinking, emotional responses, or habitual behaviors and roles; others may relate to time (or

timing), money, technical assistance needs, or social and cultural sources of support. Yet in other instances additional changes in rules, the economic incentive structure, enforcement mechanisms, or in the sense of empowerment are needed. It is important for leaders to remain vigilant and help address the barriers directly, finding creative ways to overcome them, or else adaptation planning may fail to result in realization on the ground. This practical realization, however, is maybe one of the most important ways not just to reduce vulnerabilities and manage the emerging climate risks, but to keep the community engaged in an ongoing process of moving closer and closer to the desired vision.

Coordination Across Relevant Divisions and Levels of Governance

As described above, impacts and responses do not necessarily fall neatly into institutional divisions and remain contained at a particular scale. Moreover, many adaptation strategies require coordination across levels of governance and among department or agencies. In this way, climate change impacts and adaptation responses are in no way different than other activities: the governance of economic activities, provision of social services, and management of natural resources typically involve multiple levels of governments, including, sometimes, transborder coordination. [photo of a transborder situation with brief story]

The adaptation strategies identified at and for the local level to meet local community needs will thus most likely need to involve institutions elsewhere or require resources that go beyond local means. Sometimes, higher-level policy changes are needed to create the enabling conditions that will give local communities the means, flexibility, and freedom to implement a chosen adaptation option. Sometimes, higher-level policy changes are needed to remove a particular set of barriers. Unless policy-makers at those levels hear what changes and resources are needed, they will not see the necessity or feel the push to make them happen. [could use a practical example]

Local leaders thus have the additional task to coordinate with others in similar situations, form coalitions where useful, and communicate their needs to actors at other levels of government, in different sectors, and across a larger region to enable effective local implementation of adaptation strategies. The vulnerability and adaptation options assessment will have provided useful information to inform this coordination and advocacy task. The exercise may also have revealed a need to expand the range of stakeholders that ought to be brought into the adaptation planning process. At a future iteration, then, it would be important to invite these additional actors.

Milestones Toward Reaching Adaptation Goals

One important way in which communities can keep the momentum going is to jointly identify milestones that indicate movement in the direction of the shared vision through a variety of measures of success. Knowing what to look for is important psychologically, as well as socially and scientifically. Precisely for these reasons, setting manageable goals is already common practice in many conservation and development projects (see the Figure on p.x (16 currently)).

The importance of measurable indicators of progress notwithstanding, it is important to keep in mind that climate change is progressing at an accelerating pace, producing significant uncertainties and unpredictable circumstances. Thus, at the same time that milestones should be identified, participants in the process should be made aware of the irreducible uncertainties. Even with the best intention, best effort, and due diligence, a milestone may not be reached because conditions changed in unforeseen or even unforeseeable ways.

It is also important to keep in mind that it is actually difficult to identify when an adaptation was “successful.” If a species is protected for another few decades but lost in 2050, was the adaptation effort successful or not? If a conservation effort aims (and maybe succeeds) to keep an ecosystem intact in its current composition, and thereby creates a “museum habitat” that can no longer survive on its own but requires perpetual human intervention, was the adaptation strategy successful or not? If a community succeeds in sustaining a particular type of economic activity or its location but loses important ecosystem goods and services in the defense of the

human use, was the adaptation successful or not? These question are difficult to answer from a scientific standpoint, and debatable on economic, ecological, social and ethical grounds. Thus, the question of goals and milestones actually requires careful consideration and engaged community discussion.

It is clear, however, from these caveats, that leaders of the adaptation process should initiate a discussion of goals and milestones, convey the irreducible uncertainties, update the community frequently, and ask for input on course adjustments. [could have a textbox of a case where design standards, goals were set, some reached, others not and how that was handled]

Learning Orientation

The above discussion of goals and milestones, just like the entire adaptation planning process, requires a "learning orientation." Establishing attitudes of openness, flexibility, eagerness to learn, and a willingness to change is a long-term prospect rather than an immediately obtainable result. Its growth over time can be fostered through education, building of social capital and involvement especially of younger people in future-oriented thinking and management. It can also be supported through an agreed-upon regular cycle of reviewing progress toward goals, identifying shortfalls or problems (and the respective causes), addressing them through research and/or changes in behavior, practices, and resource management. Starting small, illustrating success, positive feedback and reinforcement can all help establishing a learning orientation. Building the local capacity to research and critically examine ecological, social, and climatic conditions will also help foster a culture of learning. Given the novelty of doing risk and vulnerability assessments and being involved in innovative adaptation planning, people will need encouragement to take a positive attitude and actively set out to learn through developing and testing hypotheses, being engaged in monitoring changes in their environment, and actively participate in the communal effort.

Climate change places us all into novel situations, and much valuable time could be lost, critical opportunities could be missed, if everyone had to "reinvent the wheel." We must share what we're learning.

Part of the learning culture that needs to be engendered in communities is an attitude of freely sharing what is being learned. Even falling short of established goals will be important to share. Climate change places us all into novel situations, and much valuable time could be lost, critical opportunities could be missed, if everyone had to "reinvent the wheel" and learn every lesson by themselves. Thus it is critically important to document what is being attempted, how it was done, what the experiences with it were, and then to share with others the lessons learned, as well as accessing the lessons learned by others. Networks such as ELAN (see above) and others listed in the Appendix will be extremely useful for this purpose. [photo of people sitting together sharing experiences]

Monitoring and Observation

Learning how to envision a desirable future, how to engage community members, how to do assessments, and how to identify adaptation options must be supported by learning about the changes in the environment. Communities must establish networks and capacities for ongoing monitoring of climate variables, observation of changes in the natural environment, and in the human systems being impacted by these changes as well as by the adaptive responses. Such observations will not only begin to fill the persistent information gaps; they are at the heart of "adaptive assessment and management" – a flexible, learning-oriented, scientifically informed approach to adjusting management over time as circumstances require.

Importantly, adaptive adjustments are not just made in response to changing climatic or environmental conditions. They can also take account of changes in the socioeconomic context, community needs and interests, changing values, changing scientific understanding, and changing policy environments. The importance of collecting information about changing conditions cannot be overstated. It is the only systematic way to improve the

knowledge base about the local situation and to enable a better informed decision-making process. That said, monitoring has always suffered from the challenges of maintaining observational networks: cost, staff time requirements, the need for persistence, patience, diligence, and commitment. Adaptation planning leaders should not underestimate the resources needed to maintain adequate monitoring networks, and would be well advised to establish them together with relevant experts. [textbox of an example?]

Commitment and Accountability

The very nature of adaptation is change. A changing environment requires changing interaction with that environment. Thus, inevitably, implementation of adaptation options requires someone to have to change. As individuals or groups of stakeholders are asked to take certain actions or are required to change their practices or give up something, it is important to obtain their public commitment to doing so, and identify ways not only to support them but to hold them accountable. A variety (and ideally a mix) of social, legal, financial accountability mechanisms may all be useful, but the choice of appropriate measures is culturally sensitive and requires local knowledge. Mechanisms of accountability ideally are also mutually agreed upon. Having such commitments and accountability in place increases the chance that adaptation strategies are actually implemented and that people see progress in the direction they desire and agreed to. Sometimes it may be easier to start with smaller commitments and then move to bigger ones, but this may not always be feasible. Big steps, big commitments can also be more motivational. The action steps taken must be commensurate with the challenge to be believable. When commitments have been carried out, it can be enormously powerful to then publicly recognize the individual or group of people for their efforts. Again, accountability and acknowledgment are culturally specific and forms and opportunities should be carefully selected in any given context.

To the extent governments or organizations have to follow through on a promise or commitment, accountability may be more challenging. Good governance can be challenging in many places. Here, culture, history and politics interact to create different degrees of institutional responsiveness, democratic accountability, and effectiveness. In fact, it may be one of the most challenging, yet also one of the most important and ultimately most rewarding aspects of the entire adaptation effort to improve governance locally and beyond.

It may be one of the most challenging, yet also one of the most important and ultimately most rewarding aspects of the entire adaptation effort to improve governance, locally and beyond.

The Way Forward

[I ran out of steam here, and want to invite you to add some thoughts, spin, encouragement… to give this the right tone]

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