

**White Paper**

in advance of

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## Introduction

Climate change driven by global warming is here. Simple in its broadest outlines but highly complex in its local and regional manifestations, climate change will bring extraordinary challenges to humankind, and to nature, as the 21<sup>st</sup> century unfolds.

For conservationists – those of us who plan for the protection, restoration, and management of our natural heritage – there's little question that climate change will be one of the major challenges that we'll face in the coming decades. Global warming is already changing our landscapes and experts predict that its effects on flora, fauna, and sea level will accelerate.

Climate change is significantly altering virtually every aspect of the natural world and its phenomena:

- In the 20<sup>th</sup> century, average global temperatures increased by .74°C (1.3°F) and projections for the 21<sup>st</sup> century are dramatic. The “best estimates” suggest a minimum global temperature increase of 1.8°C (3.2°F) by 2100, more than double the increase of the last century. The high end of the “best estimates” range predicts an increase of 4°C (7.2°F) over that period.
- Precipitation patterns have changed. In eastern North America, rainfall has increased, while Mediterranean regions and western North America are dryer.
- Extreme weather events are more frequent. The increase in heavy precipitation events is consistent with the general increase in temperatures and the commensurate increase in atmospheric water vapor content. Droughts have become more intense.
- Ice and snow cover is disappearing. Glacial retreat is evident in many global regions. This trend is most pronounced at the poles.
- The oceans are experiencing significant changes. Sea levels are rising, primarily due to water expansion, which accompanies warming. Ocean salinity and acidity are changing. Ocean temperatures, despite their massive volume, increased .9°F in the last century.

For land managers entrusted with preserving biodiversity, such a temperature rise will present an enormous challenge. Assuming the low end of the best estimates (an increase in global temperatures of 1.5°C to 2.5°C), 20 to 30 percent of plant and animal species will be in danger of extinction. And while we all hope for an effective policy response that will curtail climate change emissions, as James Hansen, NASA's senior climate scientist, has observed, “Even if we decide now... to slow down as fast as is practical, there's still going to be enough emissions to take us to the warmest level that the planet has seen in a million years.”

This paper is intended to provide a quick-to-read briefing on some of the key issues and concerns land managers will face in dealing with climate change's impact on public lands. It is organized as follows:

**Part 1** looks at "The Challenge: A Shifting Landscape for Land Managers & Policymakers," which examines the difficulty of restoration planning when coming decades may bring significant fluctuations in habitats and their ability to support their native species.

**Part 2, "New Frameworks: Is the Past a Useful Guide to the Future?"** asks if the information land managers have depended on in the past will serve them as well in years to come.

**Part 3, "Policy Issues: Aiming at a Moving Target,"** considers the wide range of current policies that may need reconsideration if public lands agencies are to begin a process of adaptation to climate change.

**Part 4, "Beyond Interagency Efforts: What Multi-sector Cooperation Looks Like,"** underscores the importance of cooperative efforts in dealing with climate change impacts and provides several success stories about multi-sector cooperation.

**Part 5, "Hope & Fear: The Need for Powerful Messages,"** highlights the necessity of providing the public with hopeful stories that will sustain the conservation movement, and establishing ongoing communications efforts to help the public understand the need for long-term planning.

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Kevin Sweeney, the author of this white paper, is a consultant with significant experience in climate change issues, public lands policy, and corporate strategy. He coordinated the National Security and Climate Change Project, working with eleven retired admirals and generals on a ground-breaking report outlining the security implications of climate change. He was special assistant to Interior Secretary Bruce Babbitt, director of environmental strategies for the outdoor company Patagonia, and is currently a lecturer at U.C. Berkeley's Haas School of Business.

This paper is being issued in conjunction with a November 15 symposium on climate change and public lands. It is intended to help establish a common understanding of some of the adaptation challenges facing public land managers and those who acquire lands for conservation purposes. A follow-up paper will be issued after the November 15 workshop.

The views expressed in this white paper are the author's, and do not necessarily reflect the views of the symposium's sponsors.

## 1. The Challenge: A Shifting Landscape for Land Managers & Policymakers

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### Interview Excerpts

*How do we shift from protecting the place to protecting biology? Is that possible, given how people think of the Park Service? Are we thinking of the parks as having amorphous boundaries?*

*If conditions at Joshua Tree no longer favor the Joshua trees, where do the trees go? And a more pressing question: How do they get there?*

*We might focus our attention on biodiversity, but the biggest impacts, the ones that will really get the public's attention, are those on the Southern California beaches. If we start losing beaches at a rapid rate, people will know it. It will affect the regional lifestyle in very important ways, and it will affect the region's sense of itself.*

*\*Excerpts shown here, and elsewhere in this report, are selected from interviews with two dozen public land managers, policy makers, scientists and others. Those interviews were conducted in anticipation of the November 15 workshop.*

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**P**ublic land managers historically have been asked to manage with goals that include the following:

- Acquiring and protecting existing conditions so they are favorable to a specific species, groups of species or natural processes.
- Preventing or limiting the invasion of exotic species, and eradicating or maintaining control of those that have invaded.
- Restoring conditions to those that existed prior to a specific event, such as Euro-American settlement.

Climate change brings significant challenges to each of those goals, and leads to difficult questions for land managers and policy makers.

- If a particular habitat is moving northward or upward in a significant way, why expend resources trying to retain conditions in their current state?
- With changes in surface water flows and groundwater availability clearly on the horizon, when is it appropriate for land managers to reconsider current assumptions about the viability of certain communities of flora and fauna?
- How will ecological restoration and management objectives need to shift as the manifestations of climate change become clearer? The classic ecologist's question (What time is this place?) will have new resonance and complexity.

This is not to suggest that restoration is no longer a viable goal. Restoring populations and ecosystems to better health can in turn make these species and systems better able to adapt or migrate in response to climate shifts. It can buy critical time while adaptation studies are developed. And it can build public interest in the value of biodiversity and full systems.

Consider as well the substantial projected impacts on California's water supply as overall precipitation declines, more of it occurs as rainfall and less as snowfall, and river and stream flows generally decrease (and increase in temperature.) As the hydrological context or foundation for our ecosystems shift, how do conservation managers respond?

For adaptation strategies, some generalizations may broadly apply, but even these should be considered with care. Many mountain species are expected to move up in elevation as temperatures climb. This may not always be so, however, as some species may move to lower elevation to find cooler canyon air. Many species may move north as temperature ranges shift. This, too, may not always be the case. And, fundamentally, species that comprise discrete ecosystems are likely to adapt to shifting climate-related factors in non-parallel ways, eventually scrambling familiar ecosystems.

Two examples can help illustrate the challenges facing the state's land managers. One involves the Valley oak; the other involves salt marshes.

**Example: The Valley Oak**

The iconic Valley oak occurs throughout the Central Valley and elsewhere in the state's lower elevations. This massive tree, the largest of all oaks in North America, can grow to be centuries old and more than 100 feet tall. Valley oaks are currently experiencing significant stress. More than 90 percent of the state's native Valley oak terrain is now under urban or agricultural use.

Climate change adds an additional stress. Current projections suggest that the viable range for Valley oaks may migrate northward by a significant distance over the next 50 years. (The Valley oak takes roughly 50 years to produce viable acorns to naturally sustain a healthy grove.) Land managers face a difficult challenge. If existing groves at the southern end of the species' current range can be restored after fires or other damaging events, would it be worth the expense? If healthy groves at the southern end of the current range become available to purchase as a conservation reserve, would it be a wise purchase if the grove will be unable to sustain itself in coming decades?

The more generalized question this raises is: Should land managers devote money and other resources to support restoration projects for species that climate change is virtually certain to expel in just several decades, or are such energies better focused on other projects?

**Example: Salt Marshes**

Similar questions can be asked in connection to a much larger, and much more expensive, restoration project that has gained a great deal of visibility.

In the last century, the San Francisco Bay lost 85 to 90 percent of its marshlands, resulting in massive damage to fisheries, wildlife, and water quality, and compromising natural flood management. The trend toward degradation started when commercial salt operations began in the Bay in 1854.

Now, the South and North Bay are the locations for major salt marsh restoration projects. By any standard, these are ambitious efforts that hold the potential for positive impacts on the quality of life in the area for plants, animals, and humans. In both locations, tens of thousands of acres used for industrial salt production are expected to be restored to their natural conditions.

A 2004 article in "Bay Nature" magazine said, "When the project is completed – which may take decades and cost millions – it is likely the Bay will more closely resemble its original state than it

has at any time in the past century. Thousands of acres of new tidal marsh will grace the shoreline, nurturing juvenile fish and shellfish, filtering pollutants from creeks and urban runoff, and sheltering endangered birds and mammals."

The ironic, and challenging, clause in that statement is that it "may take decades." With the very real prospect of sea level rise, one can ask if it is possible or feasible to restore these places to their natural condition – when the natural conditions that created them may no longer exist at that particular location in a few decades. Even assuming the more conservative estimate for sea level rise of one meter this century, the salt marshes ringing the Bay will be markedly transformed; they will likely no longer be marshes at all.

Will the decades of work and millions of dollars be well-spent if a rising sea level means that the marshland being restored will be either completely submerged under sea water or little more than tidal mudflats by mid-century, perhaps sooner? The question is not meant to be loaded or leading, because the answers are not obvious. It is posed merely to highlight the challenges facing land managers in the future.

**Key Questions:**

1. What are the best ways to catalog these potential changes and challenges?
2. How far can land acquiring and land managing agencies go in decisions based on the uncertainty of long-range projections, risk management, and accepting failure?
3. To what extent should the conversation about potential impacts be broadened at the outset to include those outside of the environmental and conservation communities?
4. Should these discussions be framed in a context that not only focuses attention on adaptation needs, but that also serves as a reminder of important mitigation steps?

## 2. New Frameworks: Is the Past a Useful Guide to the Future?

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### Interview Excerpts

*Some of the basic principles of conservation biology will be key. We want large reserves that are connected. We want diversity protected. Beyond that, maybe we don't want to get stuck in the detail.*

*Conservation biologists and natural resource managers – we've often looked at the world as a static thing. We've always known that things move around and change over time, but it hasn't been such a big part of our thinking. What climate change does is push us to think more about dynamics. Because we don't know what our static picture will look like in 50 years, we should definitely not preclude options.*

*With models, you sometimes have land managers who think they know what the future is and they manage to it. But they forget that models are best used not for forecasting, but for understanding the systems. And the models are not about small landscapes. Getting your arms around something like the Sierra Nevada is about as close as you can get.*

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Since the beginning of human civilization, nearly all planning efforts have assumed relatively stable climate conditions. This is true for all sectors, including the management of public lands. It may be particularly true for those who acquire lands to be held by, or managed by, government agencies. The permanence of these transactions has assumed a long-term ecological value. Parklands are acquired with the intent of preserving them in perpetuity. Rangelands and forests are held in public trust because the species and activities those lands support are considered valuable to the community. When the climate is no longer stable, but is instead dynamic, the frameworks for acquiring and managing public lands may also need to be dynamic.

And we are indeed entering a period of climate dynamism. Current models can give us some sense of what lies ahead on a global and regional level, but we don't know how these changes may unfold on a local level. We also do not have a fine understanding of nonlinear change processes. We do know, however, that we are entering a climate regime never before experienced by humans, and a period of great environmental change. And that notion will lead some to ask: If the climate regime will be unlike anything humanity has seen before, should we reconsider our understanding of how we manage the public lands, and to what purpose?

Nearly all of the interviewees consulted in the preparation of this paper mentioned the notion of adaptive management. In its broadest definition, this is a management approach that accepts uncertainty as a given, though it works to understand and reduce those uncertainties over time. It involves continuous monitoring and, in many cases, a rapid and fluid sharing of information among managing partners, and more than anything, it involves the notion of "learning by doing."

Many scientists have stressed the need for redundancies. The best ways to hedge one's bets, they suggest, is to try a wide range of strategies while continuing to hold on to whatever reserves are possible. This may pose a significant challenge to those acquiring lands for conservation purposes: Funding for redundancies may be a hard sell to the public.

Nearly all of the interviewees indicated that no single solution will fit all cases, and that the work will likely require a large and diverse toolbox.

Forest Service biologist Connie Millar has described a range of adaptation options, which may be useful for those needing to adapt management or acquisition strategies:

- Increase resistance to climate change. This involves working to stop the effects of climate change. It could be analogous to building larger and taller dikes to stop a rising tide. It is not sustainable in the long-term, but may be important in the short-term for a variety of reasons. Some classic examples here may be the reintroduction of salmon into streams that are warming, or removing pine trees from invading a mountain meadow.
- Promote resilience to climate change. This involves minimizing stresses on an ecosystem in order to help it return to prior conditions after a disturbance of some kind. Thinning a stand of trees or using prescribed burns are examples of resilience efforts.
- Enabling Ecosystem Responses to Climate Change. This pulls us into a new management paradigm, and asks us to consider the ways in which ecosystems may change, or may need to change, if we're to retain biodiversity. This can involve such active steps as assisted species migration. Because of the uncertainties involved, it may require redundant approaches.

Noticeably absent from the above list is the restoration of ecosystems. While this has been a celebrated approach in recent decades, it is likely it will be viewed with greater skepticism. It purports to restore a system to its exact state prior to some event. Given that the climate regime will be substantially different, one can question how an exact restoration will be possible or sustainable.

In "Buying Time: A User's Manual for Building Resistance and Resilience to Climate Change in Natural Systems," World Wildlife Fund researchers offered a similar list of adaptation steps. "Increasing the resilience of a natural system is a standard goal of conservation; intact ecosystems have more resources for withstanding stresses. Natural systems are already affected by an array of stresses, from fragmentation to pollution to invasive species. Climate change will add another layer of stress to this complex matrix of interactions. Increasing ecosystem resilience to climate change will require even greater vigilance and longer term planning." While the manual offers detailed guidelines for the management of various types of ecosystems, its recommendations fall into three broad categories:

- Protect adequate and appropriate space
- Limit all non-climate stresses. Such stresses almost universally become more severe in combination with climate change
- Use active adaptive management and strategy testing

Key elements of conservation biology may be essential to any strategy. These would include:

- Large landscapes managed strictly for natural resource values.
- Neighboring landscapes managed for different purposes, but with their natural resource values preserved.
- Connectivity maintained between protected natural areas and landscapes.

A period of climate dynamism and massive environmental change may force land managers to ask if the past is no longer a useful reference for future conditions. They may need to ask questions that challenge current assumptions or intentions.

Land managers may need to become more familiar with the practice of triage. According to Millar, a key aspect of triage is to recognize the gravest case – the urgent victim that is untreatable with the available resources. Those are cases in which the rescuers, or the land managers, must pass by to focus on situations that are treatable.

One example of reconsidering current assumptions is the discussion surrounding assisted migration, which may become a viable management option as a means of preventing extinctions caused by climate change. With this approach, land managers may predict that favorable conditions (such as average temperatures and rainfall) for a particular species may migrate faster than the species can migrate; to compensate, they would move samples of flora or fauna to a new location, to help the species achieve viability in a new location.) This approach is highly controversial. Some will point to the clear extinction threats associated with inaction. Others will point to the unintended consequences that may be associated with introducing exotic species into different landscape.

Another example of reconsideration is the focus on *evolutionary hot spots*. Biodiversity is limited by two processes – introduction and extinction. With this notion in mind, one might suggest public lands agencies could spend more resources identifying and protecting those landscapes with a greater propensity to support the evolution (or introduction) of new species or specie modifications that increase their resiliency.

Many public lands agencies manage two kinds of resources: historical and natural. They work aggressively to preserve conditions at historical sites. And they work to allow natural forces to reign in their other sites. There may come a time, relatively soon, when these missions could mix. At what point do land managers consider some of their natural jewels to be historical, or vestigial, treasures? If key species of flora and fauna begin migrating out of a park's boundaries, will park staff be expected to resist that move and retain populations within the park? How much intervention is justified?

The approach to reserve design may necessarily change with a new climate regime. Land managers may need to extend their focus to include future niches or to accommodate inevitable changes in a particular landscape.

#### Key Questions:

1. Does the state have sufficiently large, sustainable reserves in each of the ten ecological regions in California?
2. Can we ensure that we have large, sustainable reserves that include examples of all vegetation that currently occur in California?
3. Do we have a definition for "large reserves" in California?

### 3. Policy Issues: Aiming at a Moving Target

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#### Interview Excerpts

*This work may really be about preserving and protecting biology, not preserving and protecting place. That would require a lot of people to think differently about what we do and how we do it.*

*Sea level rise would hit us in a number of ways. It affects resources we've been asked to protect – both historical and biological. This could mean difficult challenges and choices. It will also take a toll on some of our infrastructure, requiring relocation in some cases. That's very costly.*

*I hope we don't get into analysis paralysis. We don't want to put ourselves in a position where we can't act because we disagree on the data.*

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**A** wide range of current policies may need reconsideration if public lands agencies are to begin a process of adaptation to climate change. Any changes that result may need to be implemented under very difficult financial circumstances: Climate change effects are likely to have a significant impact on national economies and agency budgets.

What follows is a list of potential policy dilemmas.

#### **Acquisition Strategies**

Land acquisition strategies must be adapted to climate change conditions. Many adaptation frameworks and strategies stress increased need for preserving large landscapes and for retaining or developing connectivity among reserves or undeveloped landscapes. This could lead to calls for greater coordination of land purchases, by agencies and nongovernmental organizations. It could lead to potential tension over funding, with some groups supporting protection for lands that are less rich in biodiversity but that have other important values, including open space and barriers against suburban development.

The notion of forward-looking acquisitions may gain importance. In coastal protected areas, the National Parks Conservation Association suggests that managers should work to acquire lands inshore from existing parks. This could potentially allow park ecosystems, such as critical sea turtle nesting beaches, to migrate landward as sea level rises. Similarly, a larger network of marine protected areas could provide corridors of healthy systems to allow marine species to slowly move to cooler water.

#### **Easements**

Given the scale and scope of potential changes, it may be unlikely for the government to acquire and manage the lands required to assemble large reserves. Agencies may need to consider more active use of easements, with new management practices being brought to lands that remain in private hands.

#### **Mitigation**

Some have suggested that our understanding of mitigation banking should be reconsidered. It may be necessary or useful to change existing mechanisms so that mitigation can be done on a

larger scale. Current mitigation planning is linked to a specific location and a specific species. There may be broader ways to approach this as a means of developing adaptation strategies on a larger scale. If 20-30 percent of species may go extinct by 2100, mitigation directed at establishing large landscape reserves may provide most reliable insurance against extinction. California's Natural Community Conservation Program has broadened the use of mitigation efforts, but even more flexible regimes may be necessary.

### **Multi-species Efforts**

The politics of species' protection will likely grow more complex and intense. On the one hand, attempts to use the federal Endangered Species Act, for example, to force action against climate-related threats may spark a backlash increasing the pressure to eliminate or curtail federal protections. On the other hand, climate challenges may lead to a broader recognition of the limitations of single-species approaches, and perhaps to consensus on a broader and more integrated approach. Some may see an emerging competition between funding large scale landscape protection and what may be perceived as "rear guard" actions to protect individual species. Here again, we may move into public discussions of ecological triage. Are there steps or principles to be developed that can set constructive parameters for these kinds of discussions?

### **Sequestration**

Carbon sequestration strategies using forests and other ecosystem types will be in development over the next decade, spurred in part by opportunities to connect to a global carbon-trading market. Land management agencies may be in a position to help direct these efforts toward multiple objectives. Some lands are more valuable for their capacity to support biodiversity – in addition to their capacity to store carbon.

### **Land Management beyond Biodiversity**

These discussions should always acknowledge that the public lands serve many different needs and values. Early emphasis for adaptation is focusing necessarily on biodiversity values, but other values are important as well.

Open space near urban centers can offer comfort and rejuvenation for those living in crowded cities. If a range of economic and cultural stresses follows the ecological stresses associated with climate change, open space in and near urban centers may play an important calming role. When communicating with the public, it may be important to ensure that these values are acknowledged.

Small parks in large cities can serve to reduce ground temperatures substantially. Plants collect and retain water more efficiently than skyscrapers and parking lots; when water vapor evaporates from leaves on plants and trees, it cools off the air nearby.

River flows have obvious biological impacts. They also have cultural impacts. The capacity of California rivers to sustain boating and fishing habits may be reduced with reduced flows.

### **Structural Issues in Government**

There are many examples of government structural issues that interfere with cooperation among various agencies. Under a static climate regime, these barriers may have had value. Under a dynamic climate, and in a period when flora and fauna are expected to migrate in significant ways, they may represent a great hindrance to productive activities.

This goes well beyond the "silo" problem that is often assumed to be the cause of poor cooperation among public lands agencies. Congressionally mandated boundaries affect the areas

of influence in the National Park Service, Forest Service, and Fish & Wildlife Service. These restrictions have prevented land managers in one agency from purchasing lands that would facilitate direct linkages with lands operated by another agency – a necessary step in building the kinds of large reserves that could enhance resilience.

Even within single agencies, structural impediments may add to costs or reduce overall effectiveness. The state conservancies may need much greater flexibility to meet adaptation challenges. For example, an increased use of easements could reduce their financial load while still supporting biodiversity goals across large landscapes.

### **Issues Related To Science**

Virtually all of the interviewees described a need for additional research on the effects of climate change and possible adaptation strategies. They described a need for user-friendly tools that can begin to help land managers at all levels begin to plan with some sense of a new climate context.

There is confusion about the extent to which global data and models can be downscaled for local use. And there is some concern about information overload.

Agency officials agreed on the need to accommodate the needs of scientists in order to develop management practices that are applicable in the near future. This is an essential point: The pace of innovation must be hastened. Agency staff must be open-minded about the need to reconcile various protocols and requirements. Scientists must be open-minded about the need for practical and user-friendly mechanisms.

### **On the Horizon:**

What follows is a small sample of the many interesting initiatives that may be helpful to land managers interested in planning for climate change adaptation.

- The California Council on Science and Technology will begin producing an annual review of climate science advances. Their reports will assess the quality of recent reports, note any significant changes in our understanding of the issues, and will highlight California-specific applications. It will offer a distillation to make the application of these documents and concepts easier for policy makers and land managers.
- The Western Mountain Initiative is a collaboration of scientists whose research focuses on understanding and predicting responses of western mountain ecosystems to climatic variability and change. Within this initiative is a separate Sierra Nevada project. The initiative projects how climate changes will affect vegetation, hydrologic processes and disturbances (such as fire). It also is considering possible management responses.
- The California Climate Change Center is producing, on a biennial basis, a series of publications called “California Climate Scenarios.” These will likely be helpful as the process of downscaling global models is improved over time. They may also play a public communications role, in much the same way that the IPCC reports have. The next version is due out late in 2008.
- The Resources Legacy Fund has launched a Strategic Bond Implementation Project to help ensure that public funds are spent in ways that allow for the whole to be greater than the sum of its parts, within an overall frame of climate change. This is a privately funded effort, and may affect, or be affected by, an agency’s capacity to leverage its funding.

Key Questions:

1. What would be reasonable goals for conservation in California as it relates to climate change?
2. Will the state play a role in developing offset markets? Will the offsets match biodiversity and other needs?
3. What is the process for cataloguing the changes – both projected and observed?

#### 4. Beyond Interagency Efforts: What Multi-sector Cooperation Looks Like

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##### Interview Excerpts

*The water agencies can be good partners in this. They really need a granular level of information. They need to understand potential changes in weather patterns, and how any changes in land management practices might shift as a result of those changes in weather.*

*We need to accommodate the science. We need to open up the public lands for research so we can understand what is going on. The BLM, Forest Service and Park Service all have different requirements. We have different approaches and different levels of appreciation for the work. We need to be more seamless in our approach to getting people out for research and monitoring*

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**I**nteragency cooperation for adaptation to climate change may be more challenging than past cooperative efforts. A key reason is the moving target: We may be entering an era when conditions are unlike any the earth has seen in more than a million years. An area with a dynamic climate may require dynamic management processes. With this in mind, land managers may not want to assume that an obvious path for successful cooperation already exists.

Jennifer Penny, Director of Research for the Toronto-based Clean Air Partnership, stresses the value of a commitment to stakeholder engagement, and says this is much broader than interagency cooperation: It should involve many societal sectors. She extracted lessons from a number of adaptation efforts currently underway:

- Structured processes, with broad participation and regular communications mechanisms, have a much better chance of success.
- Mid-level staff members at the participating institutions are often key to sustaining efforts over the long term.
- Those processes that focus heavily on technical modeling often reduce engagement. Those that strive to keep things simple and interesting for a wide range of participants have much better prospects for success.
- Researcher-led processes often end when the funding stops.

Laura Whitely Binder of the University of Washington draws lessons from the Kings County adaptation planning efforts. Among the key steps she suggests are:

- Basic climate science information for the region should be collected, reviewed and organized for multiple uses by people of varying skill levels.
- Organizations should build internal and external support for preparedness. Consistent communication is essential to these efforts, and should include informal gatherings, such as brown bag lunches.
- When preparedness plans are developed and implemented, prioritization is key.
- There must be a commitment to measure and update. Adaptation is a continuous process that must evolve.

Whitely Binder also identifies guiding principles for planning:

- Increase public awareness of climate change and projected impacts.
- Develop and maintain technical capacity to prepare for climate change impacts.
- “Mainstream” information about climate change vulnerabilities, risks, and preparedness into planning, policy and investment decisions.
- Increase the adaptive capacity of built, natural, and human systems in a given community.
- Strengthen community partnerships that reduce vulnerability and risk. Impacts don’t stop at the boundaries.

While there are examples of public lands agencies currently cooperating on data collection and analysis related to climate change adaptation needs, the cooperative efforts have generally not yet shifted into action planning. Below are three examples of cooperative efforts, two of which are based in urban areas and one of which is not specifically climate related. They are presented here to show potential frameworks for collaborative adaptation efforts.

**Example of Cooperation: London**

London will face a number of challenges with climate change. Thames River flooding is a growing concern. By century’s end, the Thames Barrier, built to guard London against tidal surge floods, may have to be used as often as 200 times a year. Extreme heat events are more likely, even in England. Approximately 600 people died in London from the August 2003 heat wave, offering a painful portrait of what could happen more often. (More than 2000 individuals died in the event across England and Wales.)

The London Climate Change Partnership, a consortium of 30 stakeholder organizations formed in 2001 and coordinated by the Mayor of London, is proactively examining the city’s vulnerabilities and best options for adaptation strategies. With a heavy emphasis on interagency and multi-sector cooperation, it involves representatives from science, government, transport, finance, residential and commercial development, health, and communications. It continues to make a special effort to interest a wide array of stakeholders – and keep them interested. It maintains a dedicated, crisply informative Web site, and has a respected, senior business leader as its chairman.

The Partnership’s goals include:

- Embedding adaptation in London policy documents.
- Raising awareness of climate risks and opportunities across all sectors.
- Commissioning research and developing adaptation guidance.
- Bringing adaptation principles to new and existing buildings.

The Partnership has held more than 100 workshops with relevant city departments and agencies, covering climate science, likely impacts, options, and strategies. It participates actively in the city’s comprehensive planning efforts.

The Clean Air Partnership’s Jennifer Penney cites the importance of the organization’s committed executive champions, effective stakeholder communications and engagement policies, and the collaboration of a strong community of researchers. The effort appears to be on a path to success because adaptation strategies are increasingly noted in the region’s overarching policies, and broad-scale adaptation plans have been developed.

**Example of Cooperation: King County, Washington**

In 2005, Washington's King County hosted a conference on climate change issues, titled "The Future Ain't What it Used to Be," (a Yogi Berra quote). The County presented an "initial road map for local governments with information, analysis, and ideas to anticipate, mitigate, and adapt to changes in agriculture, coastal areas, fish and shellfish, flooding, storm water and wastewater, forestry, hydropower and water supply."

The conference led directly to a new book, "Preparing for Climate Change: A Guidebook for Local, Regional and State Government," which does exactly what its title promises: It guides, in exacting, step-by-step detail. The writers focused on processes, not any specific sector, and sought to reach a national audience.

"Preparing for Climate Change" charts the course King County is taking; at the same time, it provides a detail-rich resource to any group engaged in the new work of adaptation. The book stresses the pragmatic. It is "designed to facilitate planning for climate impacts by specifying practical steps and strategies that can be used to build community resilience into the future." The publication news release states, "These steps include creating a climate change preparedness team; identifying community vulnerabilities to climate change; and identifying, selecting, and implementing adaptation options."

The book includes chapters on scoping climate change impacts, building and maintaining support for climate change preparedness, creating the preparedness team, conducting vulnerability and risk assessments, developing the preparedness plan, implementing it and assessing the plan's progress.

**Example of Cooperation: Preserving Wild California**

One recent example may offer insights into cooperative ventures. Preserving Wild California is a privately funded effort focusing on protecting wilderness and wild lands throughout the state. The nomenclature is important: By using an expansive definition, Preserving Wild California doesn't overlook lands that don't fit the traditional requirements for statutory designation as wilderness – but which can nonetheless provide important habitat for species in need.

The project advisors developed a clear list of priority landscapes to ensure that the program stays focused on key areas. This has helped the project avoid making purchases that may represent a good price in the short-term, but are not fully aligned with the overall goals.

Because the top priority was given to biodiversity values and inholdings, this strategic focus holds attention on connector landscapes – which may not look as beautiful but which may in fact make the biggest contribution to biodiversity. Without this kind of focus, attention and donor support might shift to pockets of land that fit a more conventional definition or image of pristine wilderness – but don't contribute a great deal to biodiversity needs.

This kind of process may be particularly important if donor support for wilderness begins to dwindle. It could provide a mechanism to help ensure that the most important landscapes from a biological standpoint – not just the most beautiful ones – are supported by the movement.

**Key Questions:**

1. To what extent are the land management agencies fully committed to cooperation on climate change adaptation planning? How would we know if this commitment was real?

2. Who are the right participants for a cooperative process for adaptation planning? Who are the right leaders?
3. With funding available now for land purchases, what kinds of cooperative steps should we take in the very near future to ensure that we make the best investments possible?
4. What kinds of nontraditional stakeholders could add significant value to these discussions? What business leaders could play a leadership role?

## 5. Hope & Fear: The Need for Powerful Messages

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### Interview Excerpts

*What may be needed is a compelling, romantic, interesting story line for species adaptation and migration. We may need something to replace the compelling story of restoration.*

*We need to start focusing public attention on the long-term costs of business-as-usual versus the short-term costs of adaptation. That seems like a better way to frame these discussions.*

*We need to prepare for those events – the drought, the flood, the windstorm – that can help awaken communities to the local consequences of what now only looks like a global issue.*

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**T**he conservation community has long built public support for its efforts with powerful and hopeful images of wilderness. Wallace Stegner wrote that wilderness was important for its own sake – that the *idea* of wilderness was central to the American character. Many have talked about a spiritual side of wilderness – of the need to protect God’s creation. Photographic images have helped tell a powerful story of beauty. Looking ahead to adaptation strategies, the prime targets for acquisition may not be the beautiful lands that match a common definition of wilderness. Rather, they may instead be such imperfect places as matrix lands or rangelands that serve as connecting corridors.

In recent decades, many Americans have been inspired by restoration projects. The Yellowstone wolf reintroduction was dramatic and galvanized public opinion in support of ecosystem protections. The salt pond restoration in the San Francisco Bay will likely serve as a sign of hope for many visitors. As the notion of restoration changes, and as the understanding that pre-industrial conditions may not be a realistic goal in many cases, replacement efforts are likely to be lacking in obvious drama.

What, then, are the compelling stories that drive public support for adaptive efforts? What are the beautiful and hopeful stories that will sustain the conservation movement?

There is a flip side to these stories as well. As climate change affects more charismatic species, public concern can rise quickly in a short period of time. (This has clearly been the case in the last 18 months with the polar bear. Stories about polar bears in peril have had a real impact on public opinion.) When these stories appear, and when public concern is heightened, public land managers, or those acquiring lands for conservation purposes, may be able to put this energy to constructive use. The prospects for doing so, however, will be greater with advance planning.

In addition to these hopeful stories, there may be a need for an ongoing communications effort to help the public understand the need for advance planning. Some of this work may involve a form of staging, when various public agencies prepare for calamitous events that may help the public see the need for long-term planning. As major floods hit, and once public safety concerns have been addressed, will the relevant agencies be poised to ensure that media coverage shows that these events are expected to be more likely with climate change?

Ongoing efforts can focus on terms such as “100 year flood,” so that each time they appear in print or on the airwaves, agency staff can make it clear that the term is now a misnomer.

The city of Vancouver expended a great deal of effort to help the community understand that the major flood of 2006, which ravaged the city, was a climate change event, in that it offered a glimpse at the kind of event that will be more likely under climate change.

**Key Questions:**

1. Should we start planning now for a communications strategy to help with adaptation planning?
2. Who should participate in planning a communications strategy? Who should lead it?
3. Should we prepare, in advance, for how we might talk about storms, floods and other events as being connected to climate change?