

Climate Change Issue Paper: Climate Change, Rural Communities and Landscapes

There is a strong scientific consensus that climate change is occurring and will significantly impact natural resources, economies, and communities around the world.¹ Forests and other natural landscapes provide critical value to ecosystem function, sustainability and climate change mitigation. The restoration and maintenance of public and private lands will achieve environmental and economic benefits, while helping to put in place climate change adaptation and mitigation strategies. Climate change may significantly impact rural communities. Yet, rural communities and landscapes can provide solutions to reduce and sequester greenhouse gas emissions.

The Rural Voices for Conservation Coalition (RVCC) is particularly concerned with how climate change will impact rural communities in the Western U.S. and the forests, watersheds and rangelands that dominate this landscape. Rural communities are often the front line stewards of forest, range and watershed resources, and play a critical role in helping to restore ecosystem and watershed functions of natural landscapes, patterns and processes that increase the ability of forests to sequester and store carbon.² Although there has been significant research and policy discussion nationally regarding the impacts of climate change on terrestrial ecosystems, the amount of research and reflection related to rural communities has been limited. This paper; 1) presents information on the potential impacts of climate change on rural communities in the U.S., 2) discusses the need for rural communities to engage in early adaptation measures, 3) identifies opportunities for rural communities to develop and implement mitigation measures related to the restoration and stewardship of surrounding natural landscapes, and 4) suggests that the utilization of the by-products of restoration for value-added products and renewable energy production legitimately achieves economic development and contributes to carbon sequestration.

RVCC FRAMEWORK FOR CLIMATE CHANGE POLICY

National policy addressing climate change, currently being developed in Congress will have dramatic effects on rural communities and landscapes. Specific components of national climate change policy, such as how resources are prioritized, credit allocation or distribution, offset eligibility, or the opportunity to participate in emerging markets will affect rural communities and landscapes. Therefore, rural communities should have a role in the collaborative development of national climate change policies. RVCC believes several key principles for rural communities and landscapes should guide how climate change policies are developed and adopted in the U. S.

¹ Intergovernmental Panel on Climate Change, *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the IPCC.* (Cambridge, UK: Cambridge University Press, 2007).

² The Oregon Forest Resources Institute, *Forests, Carbon and Climate Change: A Synthesis of Science Findings.* (Corvallis, OR: Oregon Forest Resources Institute, 2006), 3-20.

KEY RECOMMENDATIONS

1. Develop and fund opportunities for climate change research, education and monitoring.
2. Create federal climate policies that protect the most vulnerable populations, as well as climate-sensitive public goods.
3. Integrate climate change mitigation within forest restoration efforts.
4. Foster mitigation through forest carbon-offset markets and ecosystem services.
5. Promote green jobs.

RVCC PRINCIPLES FOR U.S. CLIMATE CHANGE POLICIES

1. Federal and state governments should foster the development and dissemination of reliable climate change information and tools to help build public understanding of climate change issues. Governments should assist rural communities in developing climate change assessments, strategies, and plans, and monitoring strategies to enhance collaborative learning and adaptive management.
2. Federal and state climate change policies must include strategies to ensure that low-income and other vulnerable populations receive assistance with climate change impacts. The needs of these populations in rural areas may be significantly different than those of urban low-income and vulnerable populations.
3. Federal and state strategies for public and private forest land management should integrate climate change considerations within collaborative, landscape-scale forest restoration efforts.
4. Markets for forest carbon-offsets and ecosystem services should encourage broad and diverse participation, provide access and opportunity for rural communities, and clearly address issues related to project scale, sustainability, and benefits to local communities.
5. Federal and state climate change policies should provide technical and financial assistance to rural communities for capacity building and workforce training to implement both adaptation and mitigation strategies.

WHO WE ARE

The Rural Voices for Conservation Coalition is comprised of western rural and local, regional, and national organizations that have joined together to promote balanced conservation-based approaches to the ecological and economic problems facing the West. We are committed to finding and promoting solutions through collaborative, place-based work that recognizes the inextricable link between the long-term health of the land and well being of rural communities. We come from California, Oregon, Washington, Idaho, New Mexico, Montana, Arizona and Colorado.

CLIMATE CHANGE IMPACTS

Ecological Impacts on Forests and Terrestrial Ecosystems

Forest ecosystems are dynamic systems always adjusting to outside influences and internal processes. Climate change is introducing a period of 1) accelerated change resulting in uncertain alterations of ecological processes to which some species will be unable or will have difficulty adapting to an abrupt change, and 2) significantly altered natural processes and conditions, including temperature, rain patterns, disturbance regimes, species composition, and wildlife habitat. Fragmentation of natural areas and other land-use changes magnify the negative impacts of climate change and the potential spread of invasive species.³

Rising temperatures will encourage some species to shift their range northward and to higher elevations. Plant growth may actually increase in some areas due to longer growing seasons and increased CO₂ concentrations, while decreasing in others due to reduced precipitation. Climate change is predicted to alter disturbance regimes such as increasing the intensity and frequency of storms, fires, the spread of noxious weeds, and insect outbreaks.⁴ Change in forested ecosystems is not inherently negative. However, the rapid rate and uncertainty surrounding climate change over the next century will be difficult for plants, animals, forested landscapes and the human communities that depend on them for the many ecosystem services they provide.

These are just some of the ecological impacts on forests and terrestrial ecosystems that the scientific community anticipates. Rural communities must be seen as a critical part of our nation's strategies to adapt to and mitigate these impacts at appropriate scales across public and private lands.

Social and Economic Impacts on Rural Communities

Although there has been significant research and policy discussion nationally regarding the impacts of climate change on terrestrial ecosystems, the amount of research related to rural communities is limited. Many rural, low-income, resource-based communities lack the social, financial, or political capacity to engage in climate adaptation or mitigation measures. Although some international programs highlight the effects of climate change on developing countries and the poor, there is little research or targeted government programs in the U. S. addressing climate change impacts among the most vulnerable populations.

Public policies must recognize the disparity of climate change impacts to some segments of society. ***Low-income and underserved rural communities may be disproportionately affected by climate change.*** The disparity is due to a number of factors including, but not limited to: geographic isolation and location, culture and livelihoods that are closely tied to natural resources and natural-resource economies, and high poverty rates. Considering social vulnerability is important because populations such as the poor, elderly, disabled, or underserved

³ See RVCC Private Lands Paper for a full discussion of the impacts of land conversion on ecosystems and rural economies. <http://www.sustainablenorthwest.org/quick-links/resources/rvcc-issue-papers>

⁴ The Rocky Mountain Climate Organization and the Natural Resources Defense Council, Hotter and Drier: The West's Changed Climate. (New York, NY: Natural Resources Defense Council, Publications Department, 2008), <http://www.nrdc.org/globalWarming/west/west.pdf> (accessed May 20, 2008).

POTENTIAL CLIMATE CHANGE IMPACTS

(Excerpt from the Stern Report on the Economics of Climate Change)

On current trends, average global temperatures will rise 2–3° Celsius within the next 50 years or so. This warming will have severe impacts on a global scale, often related to water:

- Melting glaciers initially increasing flood risks and then strongly reducing water supplies, affecting one-sixth of the world's population.
- Rising sea levels resulting in tens to hundreds of millions more people flooded each year with warming of 3 or 4 degrees Celsius.
- Ecosystems are becoming particularly vulnerable with 15–40% of species potentially facing extinction after a warming of only 2° C.
- Forest fires, insect and disease problems, droughts, heat waves, flooding and storms rising in intensity and frequency.

may have less capacity to prepare for, respond to, and recover from climate-related hazards and effects.⁵

Rural, resource-based communities are vulnerable to changes in markets, forest health, ecosystem services, and other climate-related factors that affect their livelihoods, cultures, and identities. For example, if global warming increases the occurrence of large fires (as it is currently predicted to do), rural communities in close proximity to these fires will suffer the highest losses.

Furthermore, the impacts of climate-related hazards on natural landscapes and ecosystems may impact local and regional economies based on food production, forest management, and/or recreation. Decreases in winter snow pack will have significant impacts on water supply in many rural communities, as well as on fisheries resources affecting coastal and riverine communities and economies. Job losses and other adverse effects on local businesses will have significant and disproportionate indirect effects in rural communities.

ADAPTATION AND MITIGATION STRATEGIES FOR NATURAL ECOSYSTEMS AND RURAL COMMUNITIES

Adaptation and mitigation strategies provide opportunities for rural communities to prepare for the impacts of climate change and to reduce the rate of climate change. Adaptation and mitigation measures are often confused and need to be understood as clearly distinct strategies requiring significant federal and state investment and guidance to be successfully implemented and adopted.

Adaptation strategies focus on helping natural and human systems adjust, or change, to accommodate altered conditions due to climate changes. Adaptation measures aim to reduce the adverse impacts on plant and animal species, functioning ecological systems and their environmental services, and social and economic systems.

⁵ Williamson, T.B., D.T. Price, J.L. Beverly, P.M. Bothwell, J.R. Parkins, M.N. Patriquin, C.V. Pearce, R.C. Stedman and W.J.A. Volney, A framework for assessing vulnerability of forest-based communities to climate change (Edmonton, Alberta: Natural Resources Canada, Northern Forestry Centre, Information Report NOR-X-414, 2007), http://nofc.cfs.nrcan.gc.ca/bookstore_pdfs/27507.pdf (accessed May 23, 2008).

ECOSYSTEM SERVICES are commonly defined as benefits people obtain from ecosystems. The Millennium Ecosystem Assessment – a four-year United Nations assessment of the condition and trends of the world’s ecosystems - categorizes ecosystem services as:

- Provisioning Services or the provision of food, fresh water, fuel, fiber, and other goods;
- Regulating Services such as climate, water, and disease regulation as well as pollination;
- Supporting Services such as soil formation and nutrient cycling; and
- Cultural Services such as educational, aesthetic, and cultural heritage values and recreation and tourism.

Ecosystem Services Resources

Ecosystem Services Council: <http://www.ecosystemservicescouncil.org/>

United Nations Millennium Ecosystem Assessment: <http://www.millenniumassessment.org/en/Reports.aspx>

Regardless of efforts to reduce greenhouse gas emissions, climate change will have significant impacts on natural ecosystems and rural communities in the U. S. over the next several decades. It is critical that climate change policies provide technical and financial resources to help natural ecosystems and rural communities, and federal and state land management agencies, adapt to climate change, particularly to safeguard the ecosystem services provided by these rural landscapes.

Adaptation is the only response available for the impacts that will occur over the next several decades before mitigation can have any measurable effect. Adaptation has the opportunity in most cases to provide local benefits that may be realized in the near future. Some adaptation will occur without policy action, as individuals or businesses see and respond to market opportunities brought on by environmental changes such as planting crops or trees expected to have greater resilience to anticipated climate changes. Other aspects of adaptation such as decisions to build new infrastructure will require greater foresight and planning and need to be stimulated and enhanced through policy incentives and guidance. In addition, there are some aspects of adaptation that involve public goods and global benefits, including improved information about the climate system, climate-resilient crops, management strategies for maintaining healthy natural ecosystems, and renewable or low-carbon energy technologies.

Mitigation measures focus on decreasing future climate change threats by reducing atmospheric concentrations of carbon dioxide (CO₂) and other greenhouse gases (GHGs).

Mitigation policies and actions generally aim to 1) reduce greenhouse gas or carbon emissions (e.g., energy conservation, wildfire reduction, energy efficient technologies) or 2) create “sinks” for sequestering and storing carbon (e.g., forests, other terrestrial ecosystems, oceans). Policymakers are developing policy frameworks that set goals for reducing greenhouse gas emissions over time, allocating carbon allowances to various industry sectors and business entities, and establishing protocol for measuring, reporting, and trading carbon credits and other vital ecosystem services that are critical for mitigation and the resilience of human and biological communities. Frameworks such as cap-and-trade approaches determine the structures, processes, and priorities for allocating public resources through carbon allowances and for stimulating the establishment and functioning of carbon markets.

Mitigation through Restoration and Stewardship of Natural Ecosystems

Natural ecosystems and forests can be managed in ways that will increase their capacity to sequester and store carbon, and reduce their carbon emissions from natural disturbances and management practices. In addition, carbon emissions can be reduced through careful utilization of woody biomass for long-term wood products or for energy purposes. Federal land management agencies need to develop and implement climate change mitigation strategies addressing issues and opportunities on public and private forests, rural and urban forests. These mitigation strategies should take an integrated approach to forest restoration and stewardship in order to be cost-effective and to carefully address the array of ecosystem services.

Mitigation through Forest Carbon-Offset Markets and Ecosystem Services

Federal policy frameworks (e.g., cap-and-trade) that promote the establishment and trading of carbon credits through markets can help support rural communities. Such frameworks can stimulate entrepreneurial activity and encourage investment in forest-sector projects that provide credible and verifiable carbon benefits, while also enhancing ecosystem services and providing economic development opportunities for rural communities. It is critical, however, for these policy frameworks to:

1. encourage broad and diverse participation in forest-sector offset projects,
2. ensure that project scale enhances environmental and community economic gains,
3. maintain the sustainability of natural resources for future generations, and
4. benefit local communities.

Frameworks can include outreach and technical assistance initiatives to reach forest landowners and diverse participants in rural communities, including: state and local officials, leaders from small business, nonprofit groups, forest workers, tribes, and low-income and other under-served groups.

Green Collar Jobs: Community Capacity Building and Economic Diversification in Climate Change Mitigation

Nationally, leaders in the climate change movement have recognized the potential economic contributions from climate change mitigation activities. Green Job promotion is becoming commonplace in national policy discussions. However, current dialog about Green Jobs, which focuses to a large extent on energy efficiency and clean energy in large cities, risks capturing only part of the economic initiatives possible through the “greening of our national economy”. Indeed, the limited discussions of Green Jobs in rural communities have thus far centered on agriculture as it relates to biofuels and, more abstractly, as a source of wind power. Although these are important ways that rural communities can contribute to our green economy, the dialog ignores the broader significance of rural landscapes.

FOREST PROJECT TYPES

Within the emerging carbon markets that do include forestry, there are five forest project types that have been characterized as common:

- **Afforestation.** Planting trees on land that has been in a nonforest land use for a number of years.
- **Reforestation.** Planting trees on land that was forested but has lost forest cover and is not recovering naturally. Severely burned western forests may qualify under this definition if they show no recovery after a period of time.
- **Forest management.** Managing a forest to protect and/or enhance carbon stocks, such as encouraging a longer-term management regime/cycle for carbon storage.
- **Forest conservation or protection.** Preventing a land-use change that would destroy or degrade an existing forest, such as conversion to agricultural or development uses.
- **Forest products.** Providing credit for harvested wood that would go into long-term wood products or into bioenergy, if it can be shown that such practices result in net carbon storage.

Sampson, Neil, Steve Ruddell and Matt Smith, *Managed Forests in Climate Change Policy: Program Design Elements*. ([Bethesda, MD]: Society of American Foresters, 2007), http://www.safnet.org/managedforests_final_12-14-07.pdf

RECOMMENDATIONS

1. Develop and Fund Opportunities for Climate Change Research, Education, and Monitoring.

1.a. Climate change research should be prioritized and address ecological, social, and economic considerations for rural communities and landscapes; and publicly developed information and tools must be disseminated effectively and to those most in need.

- Federal, state, and private sector (including philanthropic) funding for climate change research should include contributions from social science that investigate ecological, economic, and social systems in relation to climate change vulnerability, adaptation, and mitigation.
- Federal policies and programs should support knowledge transfer/science delivery of research that results in tools and resources that assist rural communities in assessing the potential impacts of climate change and developing adaptation strategies and plans. These resources and tools may include information on how to assess climate risk and GIS mapping systems that may help rural communities understand climate change impacts.
- The federal government should play a critical role in fostering and engaging in collaborative processes and developing information and enabling conditions for landscape-level or cross-ownership management planning and projects.

1.b. Ensure that federal land management agencies develop and share information to advance understanding of forest sector mitigation measures, including:

- Establishing methods for estimating baseline carbon data in plants, soils, and products for existing forests and rangelands;
- Identifying strategies and actions to increase carbon sequestration and storage, reduce greenhouse emissions from forest ecosystems, and utilize woody biomass for long-term products and energy; and
- Conducting demonstration projects on various mitigation measures.

1.c. Provide rural communities with financial and technical assistance to assess the potential impacts of climate change and develop adaptation strategies and plans, with a particular focus on the impacts to and needs of low-income and underserved groups.

1.d. Prioritize resources and funding for monitoring of environmental, social, and economic outcomes of mitigation (and adaptation) strategies to ensure adaptive management and rapid response to unanticipated changes and negative impacts.

2. Create Federal Climate Policies that Protect the Most Vulnerable Populations, as well as Climate-Sensitive Public Goods.

2.a. Create a financial safety net to protect the poorest in society, who are the most vulnerable to the ecological and economic impacts of climate change and least able to afford protection (including insurance).

- Federal climate change policy must include strategies to ensure that low-income and other vulnerable populations in rural areas receive the assistance and support they need to adapt and participate in climate change mitigation strategies.

2.b. Federal and state governments must develop long-term policies to protect climate-sensitive public goods.

- This includes policies related to natural resource protection, coastal protection, and emergency preparedness. These policies would also lead to financial assistance for severe local and regional impacts related to climate change such as major storm, drought, or wildfire damage and address issues related to supplies of water resources for rural communities, agricultural users, and downstream municipal and energy users.

3. Integrate Climate Change Mitigation Within Forest Restoration Efforts.

3.a. Develop climate change policies that recognize and support landscape-scale forest restoration projects and approaches that integrate climate change considerations such as:

- Forest, watershed, and habitat restoration activities that enhance carbon sequestration and storage.
- Hazardous fuels reduction activities that reduce fire risks to communities, reduce potential carbon emissions, and restore healthier forest conditions and functions.
- Utilization of woody biomass removed through hazardous fuels reduction and forest restoration treatments for long-lasting, value-added wood products and for community-

scale energy production. The removal and utilization of these woody by-products reduces direct carbon emissions if these materials were to burn in a wildfire. The production of bioenergy from these by-products might provide further benefits for reducing carbon emissions, if they substitute for fossil fuel energy.

- A proactive approach to wildfire that recognizes the need for long-term restoration and community planning to reduce wildfire risk is included in climate change strategies. Although dedicated support for emergency wildfire suppression will continue to be essential, suppression should be part of a comprehensive strategy to create landscapes that are more resilient to fire and less likely to have uncharacteristically large carbon emissions.

3.b. Create land management planning and performance standards and direct funding so that federal agencies (BLM and USFS) are encouraging private and public investment in increasing the resilience of communities, ecosystems, infrastructure, and economies to climate change.

- An equitable allocation to USDA Forest Service and Department of Interior of federal adaptation funds can help address adaptation issues on national forests and public lands.
- Technical and financial assistance made available to private forest landowners and communities can result in strategic plans and action to adapt to climate change.
- Restoration and rehabilitation programs that protect and repair natural processes and restore connectivity in terrestrial and aquatic ecosystems.
- Incentives and rewards for sustainable land management practices and energy efficiency.

3.c. Private Lands: Create federal programs that prioritize outreach, financial, and technical assistance to private landowners to adopt forest mitigation measures, including protection of forestlands.

- In addition to forest management strategies and actions, federal policies are needed to provide incentives to private forest landowners and communities for protecting existing forests, or “keeping forests as forests,” in order to reduce forest conversion and fragmentation, which are responsible for large amounts of carbon emissions.

3.d. Urban Areas: Develop and fund outreach and assistance programs to encourage tree-planting and maintenance in cities and towns.

- In addition to sequestering and storing carbon, urban trees and forests can provide significant energy conservation benefits through direct shading of homes and buildings and reducing the urban “heat island” effect by shading roads, buildings, and hard infrastructure.

4. Foster Mitigation through Forest Carbon-Offset Markets and Ecosystem Services.

4.a. Establish markets for forest carbon-offsets and ecosystem services that encourage broad and diverse participation, provide access and opportunity for rural communities, and clearly address issues related to project scale, sustainability, and benefits to local communities.

- Encourage voluntary systems and eventually move into regulated systems.

4.b. Examine the federal role in forest carbon offset markets and ecosystem services. Federal land management agencies should engage in the development of forest carbon offset markets. Federal lands should be included, and, in some instances take the lead in advancing carbon offset markets through research and applied demonstration projects. As credible carbon values, measurement protocol, and trading practices are developed, land management agencies should be participants so that questions and issues about the federal role and effects of federal participation are addressed. Carbon credits and trading should increase potential investment in ecosystem services and land management activities. It is appropriate for federal land management agencies to participate, and, in fact, to facilitate the advancement of these markets through information development, dissemination, and demonstration.

- Rural producers must travel great distances to engage markets and perform many routine livelihood duties; therefore, their carbon footprint per capita may be proportionately larger than urban dwellers in the same income class. This condition makes it even more important to consider carbon offsets in and by rural communities and landscapes.

5. Promote Green Collar Jobs. Greening our national economy should include the stimulation of rural jobs that support the health and function of our nation’s forests, grasslands and watersheds. Rural communities may have existing business infrastructure and a knowledgeable workforce to engage in this work or build capacity in these areas. Federal climate change policies should assist rural communities develop and implement adaptation and mitigation measures as described below.

5.a. Develop federal climate policies that include rural-focused Green Job initiatives to support business development, workforce training, and community capacity building to give rural communities access to and fair opportunity in the emerging industries aimed at developing renewable energy technologies, ecosystem restoration and stewardship, and other related sectors. Key issues will include appropriate scale, long-term sustainability, retention of benefits in rural communities, and technical and financial assistance for businesses, worker training and transition assistance for displaced workers.

5.b. Include opportunities for rural communities and workers in the Climate Change Worker Training Program (or similar future policy proposals).⁶ Climate change policy and legislation should authorize and provide funding for a worker training program for the purposes of establishing a skilled workforce capable of implementing adaptation and mitigation activities and creating opportunities for businesses and displaced workers. In addition to training workers for new energy-related technologies, the program should include training for sustainable natural resource management at an appropriate scale and wood processing activities in rural landscapes, such as:

- Restoring or enhancing the capacity of forests to adapt to climate change.
- Restoring or enhancing the capacity of forests to sequester or store CO₂, including training to help rural communities participate in emerging markets, covering topics such as protocol, project planning, and methods for measuring, monitoring, and verifying climate change mitigation projects.

⁶ Lieberman Warner Climate Security Act (S. 2191): <http://lieberman.senate.gov/documents/detailedaca.pdf>. (Accessed June 1, 2008).

- Reducing CO² emissions from forests and natural ecosystems, through activities such as hazardous fuels reduction.
- Utilizing woody biomass from forest restoration and fuels reduction activities for renewable energy purposes.

U.S. ENGAGEMENT IN INTERNATIONAL ACTIVITIES

As a global economic leader and with high per capita energy and resource consumption, the U.S. is responsible for a large share of global greenhouse gas emissions. We must recognize this responsibility and demonstrate leadership by engaging with the rest of the world on climate change negotiations, strategies, and commitments. Because tropical deforestation is such a significant global issue, the U.S. should recognize and be supportive of related policies. Finally, because we have important scientific information and management expertise regarding forests, the U.S. can provide assistance to other countries with less capacity to engage in climate change policy and action. RVCC supports the U.S. government engagement in international discussions on a post-Kyoto agreement to address climate change, recognizing our roles and responsibilities as a global economic leader to provide direction on this over-arching global issue. Specific roles for the U.S. could include:

- Establishing a leadership role in discussions on forests, sharing information and gathering comment from non-governmental entities.
- Developing strategies to help address tropical deforestation issues.
- Assisting developing countries to prepare forest-sector climate change action plans.

FOR MORE INFORMATION

Resource Innovations

Kathy Lynn
541-346-0687
kathy@uoregon.edu

American Forests

Gerry Gray
Tel: 202-737-1944 ext. 217
ggray@amfor.org

Learn more about RVCC: 503-221-6911
issue@sustainablenorthwest.org
www.sustainablenorthwest.org/rvcc

COALITION PARTNERS

Arizona

Forest Energy Corporation

California

Alliance of Forest Workers and Harvesters
Mid Klamath Watershed Council
Sierra Business Council
Student Conservation Association
Trinity County Board of Supervisors-District 3
Watershed Research and Training Center

Colorado

Forest Energy Colorado

Idaho

Framing Our Community
Lemhi County Economic Development Association
Salmon Valley Stewardship

Maryland

Communities Committee

Montana

Flathead Economic Policy Center
Game Creek Forest Restoration, LLC
Northwest Connections
Swan Ecosystem Center
Vander Meer's Wildland Conservation Services
Watershed Consulting, LLC

New Mexico

Forest Guild
Gila WoodNet
Restoration Technologies, LLC
Santa Clara Woodworks
SBS Wood Shavings

Oregon

Applegate Partnership & Applegate River Watershed Council
Audubon's Ten Mile Creek Sanctuary
Bear Mountain Forest Products
Central Oregon Intergovernmental Council
Ecosystem Workforce Program
Grant County Court
Hells Canyon Preservation Council
Institute for Culture and Ecology
Lake County Resources Initiative
Lomakatsi Restoration Project
Oregon Department of Forestry
Oregon Paleo Lands Institute
Resource Innovations
The Siuslaw Institute, Inc.
Sustainable Northwest
Wallowa County Board of Commissioners
Wallowa Resources

Vermont

Biomass Energy Resource Center

Washington

Mt. Adams Resource Stewards
Northwest Natural Resource Group
Pinchot Partners

Washington, D.C.

American Forests

APPENDIX I:

RESOURCES

General Climate Change Resources

Intergovernmental Panel on Climate Change. Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. Geneva, Switzerland: IPCC, 2008. <http://www.ipcc.ch/ipccreports/ar4-syr.htm>

Pew Center on Global Climate Change. "Global Warming Basics." Pew Center <http://www.pewclimate.org/global-warming-basics>

Stern, Nicholas. "Stern Review Report on the Economics of Climate Change." Cabinet Office – HM Treasury. http://www.hm-treasury.gov.uk/Independent_Reviews/stern_review_economics_climate_change/sternreview_index.cfm

Climate Change, Forests, and Mitigation

Perschel, Robert T., Alexander M. Evans and Marcia J. Summers. Climate Change, Carbon, and the Forests of the Northeast. Santa Fe, NM: Forest Guild, 2007. http://www.forestguild.org/publications/2007/ForestGuild_climate_carbon_forests.pdf

Oregon Forest Resources Institute. "Forests, Carbon and Climate Change." Conference Resources and Presentations. <http://www.oregon-forests.org/conferences/carbon>

Western Forestry Leadership Coalition. "Climate Change and Western Forests." Policy Statement. http://www.wflcenter.org/news_pdf/275_pdf.pdf

Ingerson, Ann. "U.S. Forest Carbon and Climate Change: Controversies and Win-Win Policy Approaches." Washington, D.C.: The Wilderness Society, 2007. <http://www.wilderness.org/Library/Documents/upload/ForestCarbon-ClimateChange.pdf>

Forest Guild. "Forest Wisdom: Climate Change and Forests." Newsletter Number Eight of the Forest Guild / December 2007. <http://www.forestguild.org/publications/Wisdom8.pdf>

Redefining Progress. "Climate Change in California: Health, Economic and Equity Impacts." Redefining Progress, 2006. www.rprogress.org/publications/2006/CARB_Full_0306.pdf

Frumhoff, P.C., J.J. McCarthy, J.M. Melillo, S.C. Moser, and D.J. Wuebbles. Confronting Climate Change in the U.S. Northeast: Science, Impacts, and Solutions. Synthesis report of the Northeast Climate Impacts Assessment (NECIA). Cambridge, MA: Union of Concerned Scientists (UCS), 2007. http://www.climatechoices.org/ne/resources_nereport.html

Climate Change Adaptation Resources

Convention on Biological Diversity. "Adaptation Planning." Climate Change Adaptation Database. <http://adaptation.cbd.int/>

Federation of British Columbia Naturalists. "Community Planning Tools and Approaches for Protecting Freshwater Shorelines in the Thompson–Nicola–Shuswap Region of the BC Interior in Response to Climate Change." http://adaptation.nrcan.gc.ca/projdb/pdf/179b_e.pdf

Intergovernmental Panel on Climate Change, Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the IPCC. Cambridge, UK: Cambridge University Press, 2007. <http://www.ipcc.ch/ipccreports/ar4-wg2.htm>

Armitage, D. 2005. Adaptive Capacity and Community-Based Natural Resource Management. *Environmental Management*. 35, no. 6 (2005): 703-715

Berkes, F. and Jolly, D. 2001. Adapting to Climate Change: Social-Ecological Resilience in a Canadian Western Arctic Community. *Ecology and Society* 5, no. 2 (2001): 18. <http://www.consecol.org/vol5/iss2/art18>

Parkins, J. R. and MacKendrick, N.A. 2007. Assessing Community Vulnerability: A study of the mountain pine beetle outbreak in British Columbia, Canada. *Global Environmental Change* 17, no. 3-4 (August-October 2007): 460-471.

Tompkins, E.L. and Adger, W.N. 2004. Does Adaptive Management of Natural Resources Enhance Resilience to Climate Change? *Ecology and Society* 9, no. 2 (2004): 10. <http://www.ecologyandsociety.org/vol19/iss2/art10>

Social Vulnerability

Lynn, K., and W. Gerlitz. Mapping the Relationship Between Wildfire and Poverty. Resource Innovations, University of Oregon and National Network of Forest Practitioners, 2005. <http://ri.uoregon.edu/programs/CCE/poverty.html>

McCarthy, J.J., O.F. Canziani, N.A. Leary, D.J. Dokken and K.S. White, eds. Climate Change 2001: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, UK: Cambridge University Press, 2007.

Williamson, T.B., D.T. Price, J.L. Beverly, P.M. Bothwell, J.R. Parkins, M.N. Patriquin, C.V. Pearce, R.C. Stedman and W.J.A. Volney, A framework for assessing vulnerability of forest-based communities to climate change (Edmonton, Alberta: Natural Resources Canada, Northern Forestry Centre, Information Report NOR-X-414, 2007), http://nofc.cfs.nrcan.gc.ca/bookstore_pdfs/27507.pdf