Ecological basis for community participation in land and resource conservation

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The Ecological Basis for Community Participation in Land and Resource Conservation

by

Melanie A. Judge

A Professional Paper

presented in partial fulfillment of the requirements for the degree of

Master of Science: Environmental Studies

University of Montana

1999

Approved By:

[Signatures]

Committee Chairperson

Dean, Graduate School

4-30-99 Date
This paper is dedicated to my partner and husband,
Thomas W. Parker:
a student of life and a lover of nature.

I would also like to thank Richard A. Cooley
for many talks . . .
beneath the old ginkgo tree,

And my mother
for showing me that it could be done.
Abstract

What is the ecological basis for involving local communities in land and resource conservation efforts? Some environmentalists worry that the current interest in community collaboration on controversial environmental issues is undermining the need to answer to an ecological bottom line (McCloskey, 1996; Coggins, 1998). These critics fear that community based conservation efforts constitute a political position of compromise and only serve as a feel good option for individuals and groups not willing to take a strong environmental stand (Blumberg and Knuffke, 1998).

This paper seeks to elucidate some of the specific ways in which participatory methods can make the job of conservation not only more socially palatable, but more ecologically sound. The benefits to conservation of local knowledge are explored, as are some of the obstacles to utilizing this knowledge. The ecological benefit of diversifying the constituency for environmental causes to include rural residents is also explored.

Some of the ideas developed within these pages are currently being set into motion by an organization the author helped to found. The name of the organization is Northwest Connections, and the work it and others in the Swan Valley of Montana are doing serve to illustrate key points within the paper. One of these points addresses the potential for rural residents to become contributors to conservation by becoming involved in the long term ecological monitoring of the ecosystem in which they live.

This professional paper is directed toward environmentalists that may be concerned about the current interest in community based collaboratives; it intends to communicate how rural residents, in particular, can become allies in the conservation process. It also has relevance for other local communities interested in developing ways for their citizens to become more actively involved in conservation.
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I. The Context:

Place

The Swan Valley is a forested mountain valley approximately 60 miles long and 15 miles wide situated between two wilderness areas: the Bob Marshall Wilderness and the Mission Mountains Wilderness. According to the U.S. Forest Service's Interior Columbia Basin Report, the Swan Valley supports a higher level of biodiversity than both of these two wildernesses and scores highest, along with Glacier National Park 75 miles to the north, in biodiversity for the state of Montana (USDA, 1996). Many species of national concern including lynx, cougar, wolverine, fisher, grizzly bear, bull trout, west slope cutthroat trout, elk, pine marten, goshawk and bald eagle make the Swan Valley their home (USDA, 1994).

The Swan Valley is managed for multiple uses by the Forest Service, Plum Creek Timber Company, and the Montana Department of State Lands, as well as a small number of private land owners in a checkerboard pattern of ownership (Figure A). The history of settlement in the Swan Valley is recent with the first wave of homesteading occurring in the 1910's (McKay 1994). Before this time, the valley was used by the Salish and Kootenai Indians as transitional hunting grounds, and for fishing and the gathering of roots and berries (People's Center, pers. comm 1999). The valley was routinely disturbed by natural and human caused fires before settlement (Barrett 1980, 1997). Since settlement, a small rural community, rarely exceeding 500 full time residents, has chosen this harsh wintering environment as its home. Residents have managed to make a living as Forest Service seasonals, working at local
Figure A: Map showing ownerships in the Swan Valley
saw mills, fur trapping, guiding hunters, farming milk and beef cows, growing gardens and finding food and shelter from the resources at hand (McKay, 1994).

The biggest economic boom to hit the Swan Valley was in the 1980's, as timber harvest on corporate lands accelerated in the deregulated fiscal environment of the Reagan years and then subsided as the best and biggest timber became more scarce. This boom and bust created tremendous conflict between residents of the Swan. Timber jobs were at first abundant and then gone. Environmental groups succeeded in closing public lands in the valley to timber harvest in order to mitigate for the rapid changes that had taken place on corporate lands. It became easy for environmentalists to look around at the fresh roads and clearcuts and blame loggers and just as easy for loggers to look at the prospect of no work and closed roads on public lands and blame environmentalists.

Like other places suffering from the timber wars in the West, people on both sides of this argument made efforts in the early 1990's to begin trying to resolve the stalemate in public lands management by initiating dialogue, learning from one another, overcoming prejudices and working together on land management projects. The Swan Valley Citizens' Ad hoc Committee began in 1990 and is still ongoing (Cestero, 1997). The Ad hoc committee aims to "assist the community in resolving collaboratively, the conflicts affecting the Swan Valley" (Cestero, 1997). One of its brainchilds, The Swan Ecosystem Center (SEC), helps to pull Forest Service and citizen energy together in planning land management projects and ecosystem learning activities. Currently, SEC is involving citizens in a multi-stakeholder effort to develop a landscape analysis on the condition of the Upper Swan Valley ecosystem in
order to identify land management priorities for the future.

Person

I am a newcomer on this landscape. A native of Arizona, I studied Environmental Studies at the University of California, where my focus was international sustainable development. While in college I studied the Sarvodaya Movement in Sri Lanka, community based wildlife conservation in Tanzania, and had the opportunity to travel to Colombia to study La Compaña Verde, a nation wide social movement for citizen based conservation. It was while in South America that I realized I was misplaced in a distant land and that I should return home to address the cultural roots of environmental problems in my home country, the United States.

One critical shortcoming of the American approach to conservation, I decided, was the distance in an industrialized culture between the daily reality of most citizens and the ecological processes which sustain them. And, my thinking went, this distance drives a lot of harmful overconsumption in this country, which in turn drives over extraction world wide. I assigned myself the role of educator (as much learner as teacher) and worked for five years as a public high school teacher. My main focus was involving teenagers in hands-on projects to address local and global natural resource issues, while educating them about their own place in the resource conversion process.

My perspective on the environmental movement has been to view it as a social movement, an attempt to shift human values akin to the struggle for social equality in this country. I have never personally been drawn to the work of the big national environmental organizations because I felt that they were missing the critical ability to empower and mobilize people at the grassroots. Back in school I had been exposed to the work of the Highlander Folk School in
Tennessee, a place where social movements in the US have been addressed from the ground up.

Highlander has worked with rural adult populations in Appalachia and throughout the southern United States, bringing them together to share their concerns and to figure out how, as ordinary citizens, they could reach across their differences and make constructive change (Highlander, 1992). Highlander worked with labor in the 1930's, civil rights community organizers in the 1950's and 60's, rural residents standing up to environmental degradation in Appalachia in the 1970's and 1980's. I knew that someday I would find a way to transition myself into the kind of work that Highlander engendered: work that cut to the core of participatory democracy and put ordinary people, as well as distant representative and interest groups, to work for themselves and their environment.

I moved to Montana and then to the Swan Valley in the early 1990's and everyday that I am here I recall the words of Dick Nelson in The Island Within (1994) when he said that he had come to a place in his life where he would rather climb one mountain a thousand times, than to climb a thousand mountains. I live now in a place in which I plan to live for the rest of my life. Though I had imagined it would take much longer, I have discovered a niche for myself in the world of community based conservation.

I currently work full time for Northwest Connections (NwC). NwC is a non profit business founded by my husband Tom Parker and me in 1996 (Appendix A). The purpose of the organization is “to integrate local knowledge and science in efforts to conserve habitats and habitat linkages in the Northwestern part of Montana (Northwest).” Northwest Connections, inspired in part by Highlander, works to involve local community members in
participatory ecological research and action projects. These projects have helped inform my thinking on collaborative conservation efforts.

Throughout this paper, the work of Northwest Connections is described in order to illustrate key points about the perils and promises of community based conservation. These references are not evaluative and should not be read as such. I shall leave the evaluation of Northwest Connections to some other observer. The work of NwC had to be included, however, because I have arrived at many of my ideas about rural communities and conservation inductively, drawing general ideas from particular experiences. I didn’t really know what I thought about community based conservation until I was neck deep in doing it.

Literature

From my perspective, living and working in the Swan Valley in 1999, I am alarmed when I read the current literature on community based conservation. One concern I have is that the current dialogue suffers from the Western\(^1\) mind’s faulty habit of thinking in an either/or framework (Govinda, 1988). As citizens we are asked to choose between national environmental groups upholding the ‘rule of law’ (Coggins, 1998) on the one hand, or local consensus groups who are finding creative solutions to grid locked resource conflicts on the other hand (Blum, 1998). Both options, when taken in isolation, exhibit significant shortcomings.

In the first scenario, by supporting the mandate and strategy of national environmental groups, society maintains the ability to legally enforce environmental regulations, but degrades the social will of rural people to abide by such laws. Social conflict increases between the educated wealthy urban class and the working rural class in this country. In the second scenario, where

\(^1\) "Western" with a capital ‘w’ is used to mean Occidental or European-influenced.
local consensus is sought, society secures the support of a diversity of people for environmental solutions and maintains the peace, but lacking the legal teeth to enforce these solutions, loses ground in the face of malice or ignorance.

The first choice shows an insulting distrust of human nature while the second choice shows a naive trust in human nature. “Which is correct, the one or the other?” The Western mind struggles to perceive. But the answer is not one or the other, but both and neither. Neither status quo environmental advocacy nor citizen collaboratives will deliver us unto an ecological future. But both can be employed to help us along the way. “The emergence of partnerships, if properly understood, can strengthen the environmental movement instead of dividing it (Brick, 1998).

In order to understand the role of citizen collaboratives in the environmental movement it is instructive to look at the civil rights movement. Here the work that Highlander did in the 1950’s is analogous to the work of community collaboratives now. By hosting conversations among blacks and whites in which they addressed the problems in their communities, Highlander built tolerance and understanding within individuals which translated into social capital in communities and that social capital allowed local people to tolerate civil rights legislation (Horton, 1990). As this country witnessed in Arkansas in 1961, without this social capital, the ‘rule of law’ meets its ultimate enemy -- organized and armed local resistance. The minds of people must be changed before the laws demand them to do so. Alone, neither community organizing nor legislative reform would have succeeded in changing the social and cultural norms of the nation, but together they were triumphant.

Another concern I have with the current debate on community conservation is the tendency to discuss local and national spheres of influence
while ignoring global forces. The real consolidation of power in regard to natural resources is in the hands of multi-national corporations and the global growth-at-all costs economy that they serve. National environmental groups are fearful that a handful of local people are stealing away their power base. "This redistribution of power is designed to disempower our constituency, which is heavily urban" (McCloskey, 1996). But far more powerful interests pose a significant threat to our nation's future. Metanational corporations are exacting enormous profits from the globalization of the economy. They have been able to convince the Clinton administration as well as the American people that tariffs and regulations on American imports and exports are not necessary and that agreements such as NAFTA are good for workers and the environment, when nothing could be further from the truth.

During the 1980's in the Swan Valley, the number one cause of destabilization in the ecosystem and in the social fabric of the community was the excesses brought on by the rapid liquidation of 'assets' (otherwise known as forests) belonging to one corporation. Putting the blame on the Forest Service, the contract logger, the environmental groups or the local employees of that corporation is perhaps easy because they are more tangible and visible targets. But the underlying forces driving this liquidation include such non-tangibles as increasing world population, higher levels of consumption in wealthier countries, and greed for massive accumulations of wealth among a few corporate power brokers. Though these forces are beyond the scope of this paper, they are worth mentioning in order to put all of our discussions in a global context.

My third concern with the current debate leads directly into the point of departure for this paper. I am concerned that when local people are referenced,
they are almost always considered as people with self interest, people with distinct views on the issue, but almost never as people with *knowledge*. Knowledge of our ecosystems is almost always understood to be in the hands of scientists, professional land managers, environmentalists and legal experts. Residents of rural communities, however, have considerable experience with and knowledge of their environment. This knowledge needs to have a higher level of recognition among those discussing the relative merits of collaboration and it should be better integrated into the practice of collaborative land and resource management.
II. Local Knowledge

Collaborative approaches to natural resource problems have the potential to be more ecologically sound because they involve people who have a working understanding of the landscape in question. When collaborative efforts truly engage local knowledge they depart from conventional scientific expert-driven processes and set a new conservation paradigm into motion.

The flow of information characteristic of the land management meetings I have attended, even those dedicated to the new concept of ecosystem management, has almost always been from the agencies and experts to the people. Indeed, much of the literature on ecosystem management still treats residents of a place as empty vessels into which knowledge about the environment is poured (Salwasser, 1991). Local people are acknowledged to have important opinions and interests. Rarely, however, do we read or hear of citizens as a source of knowledge.

Local knowledge is considered to be 'anecdotal' at best and misguided 'folk' knowledge at worst. Environmentalists, land management agencies, universities and even private land owners are consumed by the need to have scientifically credible knowledge. Science, they believe, will pave the way to ecological sustainability (Wilkinson, 1998). Many now believe that science is the only way to transcend the battling values of special interest groups (Manning, 1998).

When applied to ecology, however, science has its limitations. Science
excels at describing organisms and even simple processes in isolation. It succeeds best when it can control variables and reduce the level of complexity. But ecology, if it is nothing else, is the study of complex interrelationships. Conventional scientific approaches are found lacking when faced with this challenge. “The more complex the system or problem being studied, the less certain the hypotheses, models, and theories used to describe and explain it.” says Tyler Miller (1995) in a section titled ‘Limitations and Misuse of Science’ in his Environmental Science text book.

David Tillman, a renown plant communities ecologist, conducted a survey of the work of ecologists as a whole and found the alarming fact that 70% of all field studies lasted only one to two seasons. Tillman wonders if scientific researchers were “getting a biased view of how nature works” based on the tendency to look at systems over a short time frame (Baskin, 1996). Similarly, Peter Kareiva of the University of Washington surveyed the literature and found that half of the field experiments in population dynamics were done on plots a meter or less in diameter (Baskin 1996). Both of these scientists have questioned whether they and other scientists might be missing something.

That something is the ecology of a place. What scientific process, in its inherently reductionist approach, can not well appreciate are the multiple patterns of life as they constantly adapt to specific site conditions. Ecosystems are complex and dynamic.

Uncertainty arises from an incomplete understanding of how ecological systems work and from insufficient information. However, even if these sources of uncertainty could be removed through more research and better theory, ecological systems are inherently variable (Committee of Scientists, 1998).

There is a rift between the kind of information that scientists can produce and the information that land managers need. Scientists can well describe the
needs of individual species. Land managers need to understand those species in the context of the specific conditions of a specific landscape at a specific time. That gap can be closed with the help of rural people who live in a place over time. Local knowledge, far from being irrelevant, could be considered a center point of ecological conservation and restoration work. This is something that community based practitioners are coming to realize. “They (rural people) want their local science knowledge included with that of outside experts” (Gray and Kuzel, 1998).

A different kind of knowing

People who live in one place over time have knowledge. What is the nature of this kind of knowledge and how does it compare to the kind of knowledge that conventional scientific experts have?

Many experts bring their knowledge intermittently to the task of managing lands in Montana’s Swan Valley. There are experts on bears, bull trout and migratory song birds. There are experts in habitat typing, fire ecology and forestry. There are experts on community economic development, rural sociology and timber dependent communities. We are addressed by experts continually.

The world needs experts. Someone who has studied pine marten in every reach of their range and understands the ins and outs of pine marten biology, physiology and population dynamics has important information to contribute to the task of managing the Swan Valley which is home to pine marten, among other things. This kind of knowing is what I call horizontal knowledge and is only part of what any one place needs to understand its ecosystem.
Conventional wisdom is that if you take several layers of this kind of knowledge and lay them one atop the other, you will begin to discover some understanding of the ecosystem as a whole.

**HORIZONTAL KNOWLEDGE**

<table>
<thead>
<tr>
<th>Layer 1</th>
<th>pine marten</th>
</tr>
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<tbody>
<tr>
<td>Layer 2</td>
<td>soils</td>
</tr>
<tr>
<td>Layer 3</td>
<td>bear</td>
</tr>
<tr>
<td>Layer 4</td>
<td>roads</td>
</tr>
<tr>
<td>Layer 5</td>
<td>streams</td>
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<tr>
<td>Layer 6</td>
<td>human activity</td>
</tr>
<tr>
<td>Layer 7</td>
<td>lynx</td>
</tr>
<tr>
<td>Layer 8</td>
<td>woodpecker</td>
</tr>
<tr>
<td>Layer x</td>
<td>timber harvest</td>
</tr>
</tbody>
</table>

Because the task of understanding ecosystems involves so many complexities, land managers delegate it to computers and call it computer modeling. But horizontal knowing alone, no matter how many layers you contribute, can not tell the whole story of an ecosystem. What residents of a place, particularly those who are working on and with the land, can provide is **vertical knowledge**.

Vertical knowledge comes from observing and reflecting on a specific place over time. This kind of knowing cuts across not 5 or 10 but hundreds, perhaps thousands, of different ‘fields’ of horizontal knowledge. Vertical knowledge is local knowledge. Conventionally we dismiss this kind of knowing for many reasons. It is limited in its geographical scope and so it is “too small a sample size” to be able to make generalizations. Secondly, it has rarely been quantified in any consistent manner. And thirdly, it is ‘subjective’ in that it comes not from someone trained in objective scientific method.

All of these concerns have some merit, depending on what the goal is. If
the goal is to discover the nesting habits of pygmy nuthatches across their range, the information an informal local observer can provide is important, but marginal. If, however, you want to live in and steward a specific place for all of time, vertical knowing can not be discarded.

<table>
<thead>
<tr>
<th>VERTICAL KNOWLEDGE</th>
<th>Swan Valley</th>
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</thead>
<tbody>
<tr>
<td>Layer 1  pine marten</td>
<td></td>
</tr>
<tr>
<td>Layer 2  soils</td>
<td></td>
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<tr>
<td>Layer 3  bear</td>
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<td>Layer 4  roads</td>
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<td>Layer 5  streams</td>
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<td>Layer 6  human activity</td>
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<td>Layer 7  lynx</td>
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<td>Layer 8  woodpecker</td>
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<tr>
<td>Layer 9  timber harvest</td>
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<tr>
<td>Layer x  aquatic plants</td>
<td></td>
</tr>
</tbody>
</table>

Vertical knowing provides unique insights into the processes, cycles and dynamics of a specific ecosystem. The human brain is far more sophisticated than a computer (though for some reason most people are convinced otherwise) and one human brain exposed to hundreds of thousands of observations in a specific place begins to “model” ideas for how the ecosystem functions. One person watching the climate cycles over 30 years and the deer populations and migrations, and mink and highways and bears and environmental laws and floods and beargrass and fungi ad infinitum begins to develop an intuitive sense of the patterns and dynamics occurring in that place. This is what we sometimes term “local knowledge.”

Computer modeling is an attempt to develop in machines the capacity for this kind of intuitive knowledge. Intuition, in this sense, is a direct understanding based not on a linear accumulation of facts but on a dynamic and complex sorting of life experience.
Vertical knowledge is interdisciplinary knowledge by definition. Interdisciplinary knowledge is well suited to solving ecological problems because of its ability to address the relationships between aspects of the ecosystem, not just characteristics of an individual species or resource. If interdisciplinary knowledge is the natural product of living an observant and engaged life in a specific community, it stands to reason that "experts" in this sort of vertical knowing should be involved in any program that seeks to be interdisciplinary, holistic, and ecological.

Not only does local knowledge tend to avoid the constraints of academic disciplines, it also can provide an understanding of the natural range of variability as it relates to cycles and dynamics in the ecosystem. Two field seasons in the Swan Valley looking at snowshoe hare populations, for instance, are inconclusive because it is difficult to ascertain whether the study occurred during the high, medium or low part of the natural population cycle. Many local trappers, however, can chart hare populations to the month over decades. By incorporating local knowledge into conventional research efforts, that research could be significantly strengthened. "Scientists have realized that they have been ignoring the knowledge of the local folks to the detriment of scientific knowledge" (Edwards, 1998).

Consulting local knowledge is not a new idea. In other countries, conservationists have long celebrated the place-based knowledge of aboriginal peoples (Western, 1994). Within this country, we have tended to celebrate, the knowledge of Native American peoples. Barry Lopez in Of Wolves and Men observes that the Inuit hunter understands the wolf in a way that the contemporary wildlife biologist can not.

The thoroughness of the Nunamiut's observation is the result of the keen
attention given to small details, and, as is the case with all oral cultures, the
constant exercise of a rich memory. On a riverbank, for example, faced with a few
wolf tracks headed in a certain direction, perhaps a scent mark, the Nunamiut will
call on his own knowledge of this area, as well as his knowledge of wolves, what
time of year it is and so on, and on things he has heard from others and make an
educated guess as what this particular cluster of clues might mean—which wolves
these might have been, where they were headed, why, how long ago, and so on.
His guess will be largely correct (Lopez, 1978).

It should be reiterated that much of the power of this kind of local
knowledge comes from observing not only the wolf, in this case, but in
observing the relationship of the wolf to countless variables in a specific place
over time: weather cycles, ungulate populations, plant communities, wind
direction, pack structure, topography, human activity, to name only a very few.
Vertical knowledge has the potential for developing the depth (in contrast to
breadth) of our ecological understanding.

We have learned to see the sacred bond and deep knowledge of the
hunting and gathering of others, but perhaps we have overlooked the valuable
contributions that our own rural dwellers may make. I have learned first hand
since living in the Swan Valley that individuals who have hunted, trapped,
fished, logged and settled this forested landscape have learned many of its
ecological secrets. Many also have in their oral histories some of the
experiences of the Salish people who used this place as a hunting ground and
travel way. This reservoir of knowledge and experience is currently sitting
untapped.

The Keystone Center National Policy Dialogue on Ecosystem
Management (1996) includes a section in its report on the value of local
knowledge:

When groups collaborate to work on ecosystem issues, “experts” are often drawn
into the process as participants or as advisors to share information and knowledge
they have about the ecosystem. Expertise comes in at least two forms. one kind
of expertise comes with education, training, experience, or research. . . . The
other kind of expert is the local citizen with experience and knowledge based on an intimate familiarity with local conditions. This type of expert might have knowledge, experience, or memory that is not accessible to normal scientific inquiry. This kind of "traditional" or "anecdotal" knowledge should be heard and valued (Keystone, 1996).

To my knowledge, this is the only policy paper that gives local communities any significant credit for having a detailed understanding of their environment.

Local knowledge and conservation

Local knowledge is no substitute for science, but it may be the vital link between science and the wise use of resources that we expect science to inform and guide. Local knowledge can function in tandem with conventional scientific approaches in several ways. One way we have seen local knowledge function in the Swan Valley has been as a starting point for scientific inquiry.

A local resident observes the landscape over a protracted time period and tends to develop a feel for what constitutes the 'norm.' When a species or community or the entire ecosystem acts in a way that seems out of the norm to the local observer, questions arise. The questions that are held in the minds of local residents are shaped by the current and site specific conditions of the land and so provide a compelling source of research questions for conservation purposes.

In the Swan Valley, efforts to inventory and begin the restoration of the whitebark pine ecosystems were initiated by one local community member who, having noticed a rapid decline in the health of these forests while guiding hunters in the mountains, pushed the question to the forefront. Other questions have not yet attracted the attention of the academic and government institutions, but they should. How come there is so much algae downstream of Lindbergh
Lake these days? Why has the Swan River dropped and become more scoured? Whatever happened to all of the whitefish that used to run in the winter? Why are some timber harvest units regenerating while others are not? Are there really more ravens than ever, or does it just seem like it? Why don’t we have the cold winters we used to?

Researchers, including graduate students, often develop research questions in response to the current literature in their field or in response to their own curiosities. Sometimes it is very difficult for students, in particular, to generate topics at all. At the same time, most local residents do not have the time or money to thoroughly investigate the questions that need answered in their communities. By bridging these two worlds, the academic and the rural, research projects could be developed that better address actual conservation needs.

It may also be possible to avoid redundancies in research and optimize limited dollars by incorporating the existing knowledge of local rural citizens in research projects.

It is one of the oddities of our age that much of what Eskimos know about wolves—and speak about clearly in English, in twentieth century terms—wildlife biologists are still intent on discovering. . . (Lopez, 1978)

Graduate students and professional researchers are not currently trained to value and consult with bodies of local knowledge. In fact, the class barriers between these two groups of people are usually formidable. It is unlikely that rural citizens with a high school education or less will approach the scientific community with their ecological questions due to the social stigma associated with lacking university credentials. It is, therefore, important that researchers begin to include an inventory of community concerns when looking at a particular landscape or ecosystem.
Local residents can also become collaborators in scientific research. In a case study concerning the management of sea urchin harvest on the Caribbean island of St. Lucia, harvesters collaborated in the assessment of sea urchin ecology and contributed greatly to resource managers' understanding of this animal. It became evident, that because of their many years of dependence upon this animal, the harvesters themselves understood things that the scientific community could not, at least not within a time frame that was practical for the conservation of the species. In the case of the urchin, a participatory research project was set up to employ several of the traditional harvesters in the monitoring of the urchin. By including the harvesters, managers of the fishery codified the local knowledge and put it on equal footing with all other scientifically derived knowledge (Warner, 1997).

In the Swan Valley, Northwest Connections utilizes local fur trappers to monitor rare forest carnivores. The NwC field team uses their collective personal history on the land as a baseline of understanding on preferred habitats, seasonal movements, home range size, reproductive rate and thresholds for disturbance of lynx, fisher, marten and wolverine. The team also has a high level of skill in the field: identifying tracks, route finding and mapping. Most academic researchers and land management professionals would be reluctant to include persons who have harvested an animal in its recovery, but NwC is finding that fur trappers understand the resiliencies and vulnerabilities of these species and so have much to offer the conservation of these animals.

We have been asked about our concern that local trappers will exploit the information they gather to further harm the species in question. We have found that, particularly those local trappers who have a strong tie to this specific
place, already know where these species exist and were already concerned about their survival. One trapper in the valley was imploring the Montana Trapper's Association to commission a study on lynx twenty years ago. Local care is perhaps as unrecognized and untapped as local knowledge. Collaboration in the monitoring of the ecosystem gives local people an opportunity to express and further develop their connection to the land.

Local knowledge, because of its site specific nature, is uniquely poised to inform on-the-ground management. Going back to the urchin project, harvesters knew exactly where and when the urchins were most vulnerable and so were uniquely able to recommend timed closures on the harvest season and geographical boundaries on the harvest area.

In the Swan Valley, road closures have been implemented to protect grizzly bears. The only scientific evidence being used to provide the rationale for the number and location of closures comes from extrapolations of grizzly bear studies in other ecosystems and how those bears related to roads. One of our projects is to supplement scientific predictions about our bear needs with the site specific local knowledge of the people who live with the bears.

In addition to being site specific, local knowledge often covers several decades at a minimum. This historical information adds a dimension of time to traditional scientific research which is more often than not compressed in to a much shorter time frame. Conservation projects require a baseline understanding of where the ecosystem has been in order to evaluate where it should be heading, how its processes may have been altered by human manipulation, and what can be done to restore it. Local knowledge is often discarded as a source of baseline information because of its informality and inconsistencies, but science itself has its inconsistencies. When surveying the
existing research on any topic, a reviewer must search for the 'emerging consensus' among scientists. This, too could be applied to surveys of local knowledge.

Without the baseline information offered by local observers, many conservation projects would be misdirected. Take the current concern for lynx in our area. The Swan Valley has experienced tremendous habitat conversion due to timber harvest, road construction, fire suppression and, to a lesser degree, development. To begin an assessment of lynx in our ecosystem would be meaningless without some historical perspective on what was here before much of this human disturbance.

As part of our work at Northwest Connections, we decided to codify the baseline of local knowledge that exists on lynx and interview trappers in the area to find out what they knew. Many would argue that a simple review of the trapping records would give you the number and location of animals trapped in the ecosystem. But what we found in our interviews were accounts of animals that were caught and set free, animals that were tracked and observed, and a sense of the ecology of the animal that individuals had that does not come through in simple statistics. All of the persons interviewed knew of whole drainages that used to consistently house animals that are now absent of any sign. Two different persons had observed lynx behaving in ways that the current literature insists they do not. One observed male cats traveling with the family group and another observed lynx living in freshly burned areas without any old growth denning habitat, making their dens in thickets of brush (Thompson, 1998).

What we have found through our work at Northwest Connections is that local knowledge can be systematized, it can be mapped and it can be as
substantive in its contribution to conservation as any formal scientific process.

The literature on local knowledge in conservation is full of examples of similar work in other countries, work which illustrates all four of the benefits of local knowledge to conservation. In Zimbabwe, rural farmers and ranchers have been involved for over twenty years in efforts to monitor the elephants there. Success in this venture compared with the abject failure in the conservation of the rhino in that same country has lead some observers to conclude that involvement of the local land users is the critical factor in success or failure of conservation programs as a whole (Hill, 1991).

In Mexico, scientists had long ignored the knowledge held by local women regarding various types of indigenous crops.

Mexico has the highest diversity in maize and the women are responsible for the identification and selection of maize varieties. The ability to select is based on experiences with indigenous agroecosystems that sustain human life and the germplasm (Bain, 1993).

They now realize their baseline of information resides in the oral histories of these women. Researchers are turning to these women as the basis of a genetic conservation program. In the land of the Inuit, researchers are currently combining traditional knowledge and modern science in a caribou study that builds local people into all aspects of the work.

In far northern Canada, researchers included an ‘advisory group’ of Nunavut elders in their study of the caribou migration (Taylor 1998). This advisory group provided a historical baseline of information by interviewing residents about migration and mapping the historical knowledge. The group also selected local people to be trained as researchers and cooperate in the study by managing such things as the GIS system. The elders also offered feedback on the ethical aspects of the study.

When scientists wanted to set up a radio telemetry project to track the
movement of the caribou, the elders initially were against such an effort. They were concerned that it would be disrespectful to the animal and that the rest of the herd would shun the collared cows. Faced with rapid change across the north, the elders accepted the tracking project but were then offered to participate in the process of collaring the animals. They were quite helpful in identifying the lead cow of each band of caribou, something that would not be immediately obvious to the scientist. The involvement of local Inuit people is enhancing caribou conservation.

Obstacles to Local Knowledge -- External

Local Knowledge enhances the scientific process by generating research questions, providing baseline information as well as a site specific understanding of the ecology of place. Local people can utilize their knowledge in collaborative efforts to identify and protect the resources upon which they depend. Participatory efforts that access local knowledge can produce ecologically sound results that conserve and restore species, habitats and ecosystems before it is too late.

There are, however, a number of obstacles to the inclusion of local knowledge in conservation efforts that bear mentioning at this point. The one that NwC most often encounters is the "it won't stand up in court" argument. Because environmental issues have become so litigious in the past two decades, biologists and land managers have to think like lawyers. They can only admit evidence that will stand up to legal challenges and so are reticent to accept information that is not statistically derived.

When my partner Tom Parker first proposed the idea of involving himself and other local people in collecting ecological data in the Swan Valley he
received no response to his proposal from the Forest Service and this response from Plum Creek Timber Company:

From our experience, all data that we use for management decisions is held to the highest possible standard by other conservation organizations, agencies and the public. Therefore, we are very sensitive about how, and by whom, data is collected. Because of this high standard, and our own interest in credible science we use only fully trained staff biologists and foresters to collect and collate data that will have management implications (Seigars, 1995).

The environmental movement has helped to create this atmosphere. It has become so focused on change by way of law suits and legislation that is has become procedural rather than substantive (Brick, 1998). In the above letter from Plum Creek the writer is not concerned with whether or not the proposed activity will help provide a more ecological outcome on the land. He is concerned with whether the information will be challenged in court. His concern is not about what the information says, but about how it was collected.

This current emphasis on scientifically credible data is a trap that environmentalists have set and in which they now find their own tail. Environmentalists have allowed the burden of proof to be placed on them to demonstrate why some resource must be saved, rather than placing the burden of proof on the extractor showing why and how that resource must be taken. Some environmental groups take great pride in being ‘defenders of mother earth’, but it should concern us that we are constantly on the defense and that the language and argument in this defense is restricted to procedural arguments. “The environmental movement is well equipped to lobby and litigate at the national level, winning a few small battles and forcing gridlock where it can’t win. But the environmental movement is also mired in its own Vietnam -- winning many inconclusive battles but losing the war” (Brick, 1998).

The legal context in which so many of our environmental battles are now
being fought also has the unintended result of taking the spiritual foundation out of environmentalism. What local knowledge can offer, in its own anecdotal way, is the message of moral imperative.

In considering the conservation of grizzly bears in the Swan Valley, NWCC has listed and shared with agencies the observations that one resident has made over twenty years that demonstrate the importance of Beaver Creek as an early spring feeding and rearing habitat for sow and cub bears (Parker, 1997). The information is compelling not so much for its statistical basis but for the sense that comes through that regardless of the population targets for recovery or the statutes governing endangered species protection or the letter of the Swan Valley Grizzly Bear Conservation Agreement, this place is special to bears and it should be restored and protected if for no other reason because it is the 'right' thing to do. The fact that this resident says, "In all my time in these mountains I have never seen a place so deeply lived in by grizzlies" (Allen, 1998) is deemed unimportant because it will not stand up in court.

The second external obstacle to local knowledge has to do with academic prejudice. In our society knowledge is something you gain at school and so it stands to reason that the more school you have attended, the more knowledge you must surely have. Many local residents have an elementary or high school education and so are not considered to understand much about ecology.

But if we are to believe some of the greatest educational thinkers of the past few hundred years -- Rousseau, Dewey, Pearl -- we would realize that experience is the greatest academic institution of all. It stands to reason that the quality of a person's experience with the environment should indicate the credentials warranted. Ironically, academics often have very little experience in
land and resource issues.

"Most environmentalists reflexively feel that logging on the national forests is a bad thing, but this view is seldom based on any first hand knowledge, and rarely based on any experience with logging or wood products other than as an end user" (Snow, 1998).

Whereas academics may have a better understanding of overarching concepts and larger scale political and economic contexts, local people may actually have a better understanding of the land and resources in question.

Among local citizens it is important to distinguish between the resident who has not so much as left her T.V. in her 40 years of living, and the resident who is extracting a living every day from the earth. Contrary to what most environmentalists would think, the local people who are engaged in the extraction of resources on a daily basis -- ranching, hunting, logging, trapping, fishing -- have some of the most important contributions to make to the conservation of the ecosystem. They are outdoors watching the changes that they and others are exacting on the earth and studying the response not as an intellectual exercise, but as a matter of survival. "It's not just people with Ph.D.s that can supply critical knowledge for national forest management. There is tremendous value and insight contained in indigenous and local knowledge" (Wondolleck, 1998).

The third obstacle to the integration of local knowledge and conservation has to do with the decentralized nature of local knowledge. Unlike academic knowledge emanating from a handful of experts and published in well known journals, local knowledge is dispersed across the landscape. In our own case the Forest Service district with main authority over the Swan Valley already has a great deal of interest and trust in local knowledge. They have overcome the first two obstacles, in fact Northwest Connections' information has been cited in
legal documents (USDA, 1998), and local knowledge is being integrated into a Landscape Analysis that will be the basis of the next Forest Plan revision. But the third obstacle is still difficult for this agency to address.

In attempting to reorganize itself in ways that include the contributions of the local community, the Forest Service has had to reverse current institutional trends. First, the trend in government downsizing has encouraged the Forest Service to locate agency staff farther and farther from the rural areas. In our own situation, rather than having the ranger station at Condon, central to the Upper Swan Valley Ecosystem, it is now located in Big Fork at the periphery of the ecosystem. Currently, resource staff and the ranger himself travel long distances in order to attend meetings, field trips and events designed to involve the community in land management decisions. This access to local knowledge is costly and often competes with other imminent concerns.

Also the Forest Service can not easily access quality sources of local knowledge because of another institutional barrier. Few Forest Service staff come from the local community. Historically, many local residents were employed with the agency: cruising timber, staffing lookouts, fighting fires, managing recreation (Shaw, 1967). Hiring preferences have shifted towards individuals with academic backgrounds now and the location of the district office has encouraged new staff members (often found in national searches) to locate in the Big Fork-Kalispell area.

When the Forest Service included more rural community members within its own ranks it was able to utilize informal social ties to access important local knowledge. Such a community based employee would know which of his/her neighbors might remember the fire history of a site, or have information on where the bull trout once spawned, or know currently where there are pockets
of blown down timber to salvage without cutting green trees. We are fortunate in our district to have a number of resource professionals who go out of their way to discover this kind of local knowledge, but it is not easy for them due to their distance from the community and their lack of personal relationships with community members.

It has been pointed out that the Forest Service lacks 'institutional memory' (Cestero, 1997). This is most commonly attributed to the high turnover rate in Forest Service positions. I have noticed in the Swan Valley, however, that there is quite a strong memory of Forest Service activity among rural residents. Because of the fact that so many were employed by the agency in previous decades and also because of the interdependence of the community and public lands, the people often know the agency's history better than the agency itself. Residents remember where and why timber was harvested because they were there. Many current agency staff have recently moved to the Swan from different regions and/or different states and so, by definition, have no memory of the history of activity on that ranger district.

In order to access decentralized place-based knowledge, the agencies have to accept the credibility of this knowledge and they have to 'reinhabit the landscape'. This may occur by putting their professionals in the rural community and by hiring rural residents as resource professionals. Simply valuing local knowledge implies wholesale changes in our land management agencies.

Putting current resource professionals on the ground and in the community requires overcoming two other obstacles. The first is our growing social bias towards technology as the answer to our environmental ills. The second is the current social environmental standoff between the Forest Service
and environmentalists.

It was not long ago when the job of a silvaculturist, a wildlife biologist, or a hydrologist for the Forest Service included an enormous amount of field work. With the current switch to GIS level information and the computer modeling rage, these individuals are now perched in front of computers rather than walking the woods. This has widened the gap between local knowledge and land management decisions because of the very language of discourse. Local people do not speak “pixels” and many resource professionals do not speak “witness trees” (Nixon, 1972). The daily experiences of these two groups of people are becoming so different that even when they want to speak to one another, the translation comes slowly.

In order to address numerous legal appeals against any planned management actions, the Forest Service is tied up in the office producing written documentation and defenses for itself. The breakdown in trust between this agency and environmentalists, due to abuses of the public involvement process by both sides, has reinforced the trend to keep resource professionals in the office and away from the land and rural communities. Orville Daniels, a retired Forest Service supervisor, speaks of the current demands on Forest Service personnel:

As we became more technically oriented for our work to be legally defensible, we began to put our energy into how to do NEPA, fight appeals, handle administrative legal processes, etc. That’s become a large part of the Forest Service’s work today at the ranger district level. That has sucked all the energy out of those people (Daniels, 1998).

Though we all benefit from many of the battles that have been won by environmental law and appeal, it is also the case that we all suffer the consequences. One of the consequences is felt by community based groups
who have a difficult time getting their agency professionals in the community and on the ground because of the reasons just mentioned. Much has been said about the grievances that environmental advocacy groups have towards community based collaborative conservation. Traditional environmental advocacy, is indirectly, also an obstacle to community based conservation. By keeping land management professionals tied up in the endless preparation of legal documentation it prevents them from putting people and dollars into the field and addressing these problems first hand.

Obstacles to Local Knowledge -- Internal

Within communities there are also factors which make local knowledge difficult to utilize for conservation purposes. The first has to do with a common pluralistic ethos in rural America which discourages neighbors from telling each other how to live. The firm belief in private property rights is only one aspect of this rural mindset. The other is a healthy respect and tolerance for philosophical differences among community members. Where local knowledge is to be used for conservation purposes, many individuals are reluctant to contribute their insights for fear that their information might be used to curtail the activities of other community members.

Rural residents also experience the corollary to academic prejudice. Believing the cultural assumption that schooling equals smarts, they lack the confidence to contribute their knowledge. Many times resource professionals and academic observers mistake silence on the part of rural residents for complacency. I have talked to a number of Swan Valley residents, however, that choose not to participate in land and resource management discussions out of humility, not complacency. This was the case even when they had very
There is one additional obstacle which surfaces when trying to encourage local people to contribute their knowledge to conservation efforts. There is a strong stigma in rural communities around being an 'environmentalist.' Environmentalists are viewed as extremists who take a no-compromise approach to preserving the earth in a static state and give no regard to the lives of the people who live in these environments. Again, association with an environmental effort connotes to many rural residents an interest in controlling the destiny of friends, family and neighbors. Because this connotation is undesirable, participation in conservation efforts is kept to minimum.

Addressing the internal and external obstacles to the inclusion of local knowledge in conservation requires addressing a number of deep seated social and cultural issues. Concerns about individual freedoms, social inequality and the locus of social control are embedded in many aspects of ecological issues. The long term conservation of land and natural resources depends upon unraveling the cultural knot that keeps local people from more freely participating. Without local knowledge the ecological potential of any given conservation project is diminished.

The ecological benefits of local knowledge

With a majority of environmental issues around the planet right now conservationists are up against the time clock. Rapidly increasing habitat fragmentation is extinguishing species at an alarming rate, in some cases before we knew they existed (Quammen 1996). Many issues need to be
rapidly assessed in order to develop sound restoration policies as quickly as possible. By surveying and documenting the ecological knowledge of local people such assessments can save time, money and resources. This kind of involvement of local people accelerates the learning process and enables conservationists to restore and protect ecosystems sooner and with a higher level of confidence.

A second ecological benefit is also time related. Local people can be involved in long term ecosystem monitoring projects which may identify catastrophic change before it is too late. Such monitoring projects are not designed to quantify incremental changes precisely, but they will detect dramatic changes early (Kendall, 1994). If conservationists depend only upon periodic research projects it may be two decades before the conditions of any given ecological community or population are remeasured. But, by enlisting local people as vigilant watchers of their ecosystem, changes from year to year are likely to be noticed and acted upon.

The third and more long term benefit of involving local knowledge is that a broader element of the human community becomes active caretakers of the earth. The possibility exists that the environmental movement, by embracing participatory methods, may be able to extend itself. Rather than functioning as a small subset of the population fighting to force the rest of society to become more environmental, the movement may be able to involve enough other people that environmental awareness becomes mainstream.

Conservation International, a Washington D.C. based conservation group, has recently developed a ‘rapid assessment’ program in response to the growing need to assess conservation priorities without investing heavily in academic studies. The model is heavily reliant on scientific experts, but they do train local people to monitor ecosystems once those lands have been assessed by the visiting team.
If a majority of Americans believed in the goals of conservation and habitat restoration, the chances of achieving such goals would be much higher. Environmentalists should be concerned about building and diversifying their constituency. Unfortunately, many environmental organizations have fought good legal battles and reported dutifully to their members, but have done little to weave their values and ideas into the fabric of the nation, in particular into the cloth from which rural America is spun.

Like many social movements of the past, the environmental movement has strong leadership in academic circles among the educated and the privileged. But unlike the abolitionists, the suffragists, or the unionists, they have not yet succeeded in holding hands with the working class, finding the common rallying points that help to build a true majority for the cause.

National environmentalists would also do well to remember that their approach is not without strategic weaknesses. National environmental groups have large but relatively uncommitted memberships, relying on “checkbook activism” of predominately white, urban, upper middle class voting blocs. This invites a host of problems, not the least of which is the bitter and well organized resistance of working men and women in rural communities. (Brick, 1998)

Here in the Northern Rockies, I have heard rural people who do not hold classic environmental values spoken of as if they were the enemy and my work referred to as akin to treason. “How could anyone be a serious environmentalist and feel that backcountry horsemen, snowmobiles, loggers and trappers were
people who should be respected, listened to and included in conservation?'

Conversely, many working class people consider environmentalists the enemy. Indeed, many of the successes of the environmental movement in this region have come at the expense, mainly, of working people. I think there are two central questions that stem from this scenario. 1) How do we make advances in conservation and restoration that do not unduly punish working rural people and 2) How do we encourage all people including rural working folks, to do what we all must do and sacrifice some personal gain for the good of the whole?

One important thing we can do to avoid unduly punishing working people is to stop grinding the economy of land and resource extraction to a halt, and begin developing a working person's economy around the restoration and conservation of land that includes careful sustainable extractive activities. So far, conservation jobs have gone almost exclusively to the educated and the elite, but for both social and ecological gain, we need more of those jobs on the ground. I'll explore this more in the next chapter. Meanwhile, we should use strategies such as the Defenders of Wildlife program to reimburse ranchers for predation losses wolves and grizzly bears to mitigate for the impacts that conservation policies have on people working in conventional extraction industries (Defenders, 1999).

At the recent Interagency Grizzly Bear Committee (IGBC) meeting in Missoula, a rancher from the Rocky Mountain Front, an area inhabited by recovering grizzly bears, made this comment, "The conservation of endangered species is something that benefits the whole nation; I think it should be recognized, though, that the cost of doing so falls disproportionately on the rural land owner" (IGBC, 1999). Dusty Crary has put his ranch in a conservation
easement, has moved his calving operation up out of the riparian area where
grizzlies feed, has invested in electric fences across his ranch to prevent
livestock depredations and has restricted the freedom of his family to move
across the ranch in order to minimize human-bear conflicts. He has reduced his
economic gain for the sake of the grizzly bear and a whole host of other natural
features on his land. And, I think, he puts up a challenge that needs met.

What has the average person given up in order to save the grizzly bear?
Have those persons who are arguing for zero cut on national forests sworn off
the use of wood products? The persons who are pushing for road closures,
have they given up driving along forest roads to access remote trailheads?
Have backcountry skiers considered avoiding mountain slopes in order to
protect wolverine denning habitat? It seems that if we environmentalists are to
preach selfless action, we should be prepared to practice it. If we want people
to come on board, we have to somehow show that we’re already on the boat.

Mr. Crary asked for two things at the meeting. The first was recognition of
the fact that endangered species recovery exacted a more direct cost on him
and his family than on most other Americans. His second request was that
someone, anyone, responsible for grizzly bear recovery, come to his place,
meet him in person over coffee and discuss the issue first hand. Mr. Crary
implied that he would have more acceptance for the process of grizzly bear
recovery if he were to have more direct communications with land and resource
managers. Dusty Crary’s collaboration in bear management means the
difference between life and death for a number of grizzlies on the Rocky
Mountain Front. If we care about these individual bears and what they
contribute to the survival of the species, we’ll listen to Crary and work to be
inclusive of local land based workers.
I'm referencing Mr. Crary's comments because my perception is that his views are representative of many rural residents. In response to my second question of how to nudge all citizens towards a more selfless worldview, I think his example demonstrates that many people, despite how they are sometimes characterized, are already transcending their narrow self interests and acting on behalf of the environment. Environmentalists, ironically, often put rural land owners on the defense, forcing a retreat to the language of self interest.

Many times environmentalists take a demanding tone. Though it may seem forceful, demanding attitudes are usually more cathartic than effective. The will of rural people to give a bit for the sake of the environment has been stifled by an indignation at having their livelihoods and life's pleasures taken without consultation, without a voice. "It is no wonder that opinion polls in rural areas show a steady support for environmental concerns, but increasing contempt for "environmentalists" (Brick, 1998).

Here in the Swan I have noticed that this resentment toward environmentalists overshadows many people's concern for the environment. Though a person may be quite troubled by the status of wolverine, what you hear publicly is their defense of their rights to snowmobile on public land. Though many local loggers are privately concerned about fish and wildlife species, they speak in defense of logging because it is their way of life.

"Community conservation is an important tool to temper some of those voices, which often acquire their zeal because the environmental movement has no mechanism where local residents can simultaneously express anxiety about their livelihoods as well as their concern for the local environment" (Brick).

This dynamic has in turn served to convince environmentalists that rural people have a narrow self interested view of the world (Coggins, 1998).
At the heart of most environmental crises is a tendency towards narrow self interest and a failure to provide for the welfare of 'the environment', which is perceived by most people as outside of their narrow view. The antidote is to find ways to make people care about that which exists outside their narrowly defined self interests. Either this constitutes enlarging their self interest with claims such as "we all need the environment in order to live and prosper" or encouraging the wholesale transcendence of self interest as a motivating principal of action.

It is a sign of just how defeated environmentalists feel that most of us are not engaged in addressing this problem of self interest at all. Litigation based environmentalism is driven by a belief that people will never care and so we need mechanisms of coercion to force them to act as if they cared. But historically, coercion is at best a short term solution. Persuasion is a much more powerful tool because in order to persuade someone, you must encourage them to believe in a different course of action (Pearl, 1972). Begrudging compliance, though it may look the same on the surface, does not produce the same long term, self sustaining transformation that does willful stewardship.

Expanded self interest can progress to an interest in things larger than self. Tocqueville, in his ruminations on American democracy, thought that a vision of the public good founded in enlightened self interest was "the best suited of all philosophical theories to the wants of men in our time."

Participation, says Robert Bellah, becomes a "habit of the heart" and takes on its own momentum and take on its own life. Citizens "experience little conflict
between their self-interest and the community's public interest precisely because a long term involvement in the community has led them to define their very identity in terms of it (Bellah, 1985)."

Environmentalism in the rural west has done exactly the opposite. Rural people, many of whom already had a strong commitment to place, have not been involved in conservation in a way that enlarged their commitment to the health of that place. By making loggers, ranchers and miners out to be the enemy of environmental causes, environmentalists have created more distance between people's rural identity and the condition of the land. The response to environmentalists attacks on rural livelihoods has been to cling even more fiercely to those livelihoods as the source of identity.

This hardening of personal identity has proved to be the foundation for anti-environmental campaigns in Western Montana. The rhetoric of wise use groups including "they're taking our village" finds support in rural communities as people find environmental groups increasingly successful in denying timber sales, mining permits, motorized recreation and in closing roads, limiting hunting and fishing opportunity and extinguishing grazing leases.

Inclusive approaches to conservation lessen the level of alienation and resentment in rural communities, feeding the collective social will to give to something outside oneself. Not only can this translate into support for large scale actions like an environmental initiative, it results in small actions in the daily lives of individuals that, taken as a whole, are a mighty force for the environment. Inclusiveness can create the tolerance in one individual for a bear passing through her/his yard or a beaver in her/his stream or a road closure on her/his favorite sunset viewing road.

Environmentalists may want to heed Lao Tzu (Wilhelm, 1985) who made
the observation that aggression begets aggression. The conventional approach to conservation through coercive litigation has in some cases increased the direct damage wrought by local people on the land. Unfortunately, this is a self fulfilling prophecy: the more you mistrust people, the less trustworthy they become. Participatory conservation efforts are attempting to reverse this trend and broaden the constituency of conservation to these rural communities by creating opportunities for involvement. Involvement encourages the notion that we are taking care of our land rather than they are saving the land from us.

In a recent radio interview, Mary O'Brien, an environmental activist, spoke of her friend who had logged for 25 years in the coastal forests of Oregon. She relayed that when he came to the inner realization that it was time to confront his role in the over extraction of this resource, he said to her, “I can’t join a regular environmental organization; that’s not my culture (O’Brien, 1999)”

It struck me in listening to this that his experience defines a distinct need in our society right now. We need conservation organizations that bridge the working class to the professional class, the rural outdoorsmen and women to the urban recreationist, the small town resource producers to the big town resource consumers.

At Northwest Connections (NwC) we are attempting to include local people in the conservation of the Swan Valley ecosystem. Participation comes in many forms. We have articulated three levels of participation thus far: regular employment with NwC, periodic volunteerism in NwC projects, and informal reporting of ecological information to NwC. In the Swan we have roughly 500 full time residents. In 1998, we employed four persons, we involved about 25 in volunteer efforts and over 75 offered information to us.
This constitutes only 1%, 5% and 15% of the population respectively, but the effects are much larger than these numbers would relate.

Each person that we involve lives within his/her own sphere of influence. The employment of one hunting guide, one logger, one educator and one builder reaches beyond these persons into a hundred conversations with other hunters, loggers, educators and builders in the valley. At lunch time, in the store, around the dinner table, the language of participation grows.

**Hire locally**

NwC recruits local residents who have demonstrated a keen interest in the natural environment to work as lead members of a field team. These ‘field naturalists’ work together and with our scientific and technical advisors to design and implement long term ecological monitoring efforts. Currently these efforts include: forest carnivore monitoring; grizzly bear linkage zone monitoring; whitebark pine inventory and road monitoring. The information produced is mapped on GIS maps and provided to the Forest Service, the U.S. Fish and Wildlife Service and Montana Fish Wildlife and Parks for use in managing the land and resources in the Swan Valley (Appendix B).

Our three field team leaders -- Tiger Hulett, Mike Stevenson and Tom Parker -- bring their collective understanding of this specific ecosystem to everything they do. They also reach out into their families, friends and the community in order to inform their work. Tiger consults with his father who, like himself, is a logger and remembers working much of the ground we now monitor. Mike consults with his neighbor Bud Moore who, like himself, was actively trapping many of the species we now track. And Tom, an outfitter by trade, questions many of the homestead era residents about changes they’ve seen on the landscape.
This ability to tap years of individual experience, as well as the collective experience of the entire community, makes our work efficient. Our field team knows the topography so they rarely waste time getting lost (something most field biologists do at the start of any project), they have insights into the behavior of wildlife and so minimize disturbance to animals, can anticipate the weather by recognizing well known patterns and require no training on the identification of local flora, fauna or their sign. By knowing something about the ecological patterns of this specific place, our field teams can put limited dollars to work in the areas that most need them.

The hiring of these local residents offers them legitimate inclusion in the process of conservation. The monitoring they do contributes directly to the management of this ecosystem. Moreover, through the community connections mentioned above, the hiring of three or four local residents actually involves the inclusion of large segments of the community. They become a legitimized conduit for local knowledge. Barry tells Tony to tell Tiger that the big bear that was in Bertha Creek three years ago is back again this year. As that knowledge is shared, a small amount of tension in the community is relieved from too many years of being shut out of the system.

**Volunteer Opportunities**

To further widen community involvement in our monitoring projects, we enlist volunteers from the community to document any wildlife or resource condition observation they might make in the course of their regular outdoor activities. This core of volunteers include snowmobiles, cross country skiers, hikers, bird watchers and Sunday drivers. Some simply live in extraordinary places and keep a keen eye out the window. In order to become a NwC volunteer, we require folks to take our Animal Track and Sign workshop or have
equivalent life experience. We want people to participate, but we also want accurate information.

For residents who are not employed with NwC and who do not regularly volunteer, we have a reporting line. Many of the chance observations that residents make are unknown to land managers because of the strong distrust that so many residents have for government agencies. We advertise regularly in the local paper for residents to report their wildlife and natural resource observations to us. Some have been quite important.

One man called when he noticed the creek near his house running chocolate brown in late summer. We went up to investigate and found a large scale natural land failure up stream of an important bull trout fishery. Another woman reported seeing a fisher, an indicator species that is quite rare in our valley. We were able to go out into the field and document the specifics of this animal's location and behavior. Another report came from a resident who was afraid that the authorities would hassle the grizzly bear that had damaged some equipment on his place. We were able to come out and document the track of this bear, information that later helped us persuade FWP not to destroy that bear.

Historical interviews

NwC believes that our elders in the Swan Valley are important and untapped resources. Particularly now, in a time of rapid habitat change, we are finding that historical interviews are able to put our current observations in context.

In the early 1980's C. Garland did an interesting project in the lower Swan Valley. She interviewed long time residents about bear sightings and recorded and mapped these occurrences. This information is some of the only
data we have which establishes and characterizes the historic use of this valley by bears. Having just found out about Garland's work, we would like to extend her project to the upper Swan.

NwC already conducts interviews with long time residents and maps the resulting information about the presence, distribution and behavior of a number of species here. We began with lynx because of their impending status as a federally threatened species. By interviewing the men who trapped from the 1930's to the 1980's we are piecing together the history of this species in our valley. In comparison to our current monitoring efforts, we have already identified historically occupied habitats that are currently unoccupied. The abundance of bobcat in these habitats further leads us to our current working theory that cumulative effects including climate warming, precommercial forest thinning, trapping, roading, and winter recreation may have driven these lynx out of these habitats, at least until one or more of these conditions changes.

Participation in land management planning

Northwest Connections does not provide arguments like the theory outlined above to land managers (though sometimes our opinions are sought out). We see our role as providing consistent site specific information to land managers so that their analysis and the resulting actions are more ecologically sound. The Swan Citizens' Ad Hoc has had some success at involving locals in management planning and implementation. Northwest Connections does interface with quite a number of local residents who do not participate in the Ad Hoc. We hope that one direct effect of NwC's work will be to increase participation in local efforts at collaborative land management by providing avenues for involvement that are less formal and less public than Ad Hoc
meetings. Field based program such as ours allow local people to operate in a familiar and comfortable environment. In such an atmosphere, they may gain a higher level of confidence in their own knowledge and slowly become more interested in participating in other types of land management decision making processes.

**Involvement in training workshops**

NwC hosts periodic workshops and cross-learning sessions in order to bring professional and local knowledge together. Last summer we held a set of workshops on whitebark pine ecology. We invited whitebark pine experts and foresters to gather with NwC staff and interested volunteers. Our visiting presenters gave us information about the decline of whitebark pine across the Northwest, and our local residents shared their observations of specific stands here in the Swan and western Bob Marshall. We spent two days in the field learning common forms of stand assessment and learning field identification of various wildlife signs and pathologies from one another.

Currently we are organizing a two day workshop on lynx. We've invited a number of the region's lynx biologists as well as agency wildlife managers to share with our field team and interested members of the community what is known about this species across its range. In return, our team will share what we are finding in this specific piece of lynx habitat. We'll present our historical information, anecdotal reports and results of our snow track surveys. Our goal is the exchange of information to better all lynx management and the development of trust and respect between scientists and community members. This trust may one day parlay into improved cooperation in the conservation of other species.
The ecological benefits of inclusion

By diversifying the constituency of conservation, resistance to and even direct sabotage of conservation policies that are instituted at the state and national level can be reduced. "National environmental regulations can compel change, but these will be shallow and short-lived without a corresponding development of local social and political capital" (Brick). Rural people can be the most effective adversaries of the environmental movement by virtue of their direct connection to many of the nation's most critical wild lands. They can also be the most effective collaborators with environmentalists if they are consulted, involved, and if their immediate survival is not directly and vehemently threatened.
IV. The New Economy

Community based conservation can be the modest beginnings of an economic transformation with far reaching implications. By providing opportunities for local people to engage in economic activity that is oriented towards ecological restoration, these kinds of conservation efforts offer “ways to recycle lost livelihoods into the jobs of the future” (Hawken, 1993). Spencer Beebee and a group called Ecotrust have articulated this process as follows, “If the demand for high-quality forest products, organic food, fish, wild areas, clean air and unpolluted water is increasing while supply is decreasing, then it is possible to capitalize on the supply-demand gap, create wealth, and improve the quality of life by restoring natural ecological processes” (Little, 1996). Community conservation processes may begin to fill some of these ‘market niches.’

In his book, The Economic Pursuit of Quality, Tom Power (1988) outlines his criteria for a healthy and ecologically sustainable economy. At the local level, he says, it must have “the availability of useful and satisfying work for existing residents.” NwC is attempting to make a small dent in economics as usual in the Swan Valley by employing Swan Valley residents as guides, course leaders and field researchers. Our goal is to tap an unrecognized source of human capital and create an alternative or supplementary source of employment to individuals who are currently scrambling to make ends meet in traditional extractive industries.
What makes the kind of work we offer "satisfying" to many local people is the fact that it is outdoor work. Individuals who make their living logging, trapping, hunting and ranching tend to do so in large part because they desire an outside lifestyle. This is where a lot of job retraining programs fail; loggers don't want to trade their saw in for a computer, or anything at all related to a desk and an office. Ecological monitoring puts people outside doing exactly the kinds of things they already live here to do.

The work we offer is also skilled work. People who have learned woodsmanship skills, who have refined them almost to an art, do not feel good about themselves if they have to shrink back to unskilled labor. Ecological monitoring draws on skills that local people know they have and some they don't realize they have. It also encourages individuals to increase their skills and knowledge related to natural history.

In addition to being satisfying, this kind of field work is perceived as "useful" to the individuals who currently work for NwC because it is helping to solve the problems that they know that the recent economy of extraction has helped to create. Our monitoring projects are being designed in coordination with Plum Creek, the Forest Service and U.S. Fish and Wildlife Service to provide current and site specific information on important indicators of forest and habitat health. To the degree this information is utilized to help avoid the serious collapse of ecosystem functions, we are helping to sustain rural traditions that parents wish to pass on to their kids -- fishing, hunting, logging.

According to Power (1988), a local economy also needs to contribute to community stability. One of the greatest concerns of Swan Valley residents is the prospect of reduced opportunities for work for themselves and, in particular, their children in the years to come. This lack of opportunity is seen as a major
source of instability. Lynn Jungwirth of Hayfork, California tells the Swan Valley’s story too, “The seniors, especially boys, looked at their futures and saw nothing: no work in the woods or at the mill, no retail jobs, no hope. The livelihoods of these children of logging families had been lost in the national political deadlock” (Little, 1998).

Young people will be more likely to stay in the Swan if opportunities to work out in the woods still exist. “A sustainable economy provides jobs in local communities, not just for new comers, but for the people that are already living there” (Power, 1988). The jobs NwC provides to the community will most likely remain minimal, but we will help to stir the entrepreneurial imagination of other local residents in ‘retooling’ themselves for a restoration based economy.

By observing our activity, other local people may engage in entrepreneurial efforts that could produce goods and services for rapidly downsizing government agencies. We can imagine businesses that specialize in such things as riparian restoration, road reclamation, stewardship logging, or campground maintenance. These are all activities that require skill with light and heavy machinery and which benefit when the people on the ground have a first hand knowledge of the area. It is quite foreseeable that the very same individuals who were hired to build a road may be hired to restore it.

By validating local knowledge, NwC may stimulate young people’s interest in apprenticing in that knowledge. We would like to see local knowledge of the environment be a celebrated and financially rewarded asset. One of the follies of environmental education in small rural schools like that in the Swan is that the knowledge developed does not stay in the community unless there are jobs to attract and hold young people. Where incentives exist to actually use ecological knowledge, that knowledge will more directly
translate into benefits for the land. Like the indigenous people who are losing their language, rural communities are losing the language of earth knowing. Retaining and rewarding this knowledge can contribute to the continuity of the community. "While certain industrial skills will become less valuable, biological knowledge and understanding will soar in demand because it will provide the means to integrate human needs with the carrying capacity of natural systems" (Hawken, 1993).

Another way in which NwC can contribute to community stability would be in having positive impacts on Plum Creek and Forest Service activities here. Awareness of and participation in the valley's environmental and social issues by community members, may discourage both industry and government from high-impact short-run timber management practices. A commitment to a long term moderate presence of these entities in the valley could contribute greatly to the ability of the community to sustain itself. We want our community to live off the interest of the natural capital here, not off depletion of the capital account itself. The Swan is rich in natural resources, and yet it could be bankrupt in no time if we are not judicious in our decisions.

Currently, the people that enjoy the most economic stability in the Swan Valley are those that receive some sort of transfer payments (retirement, investment dividends, trust funds), and are in essence living entirely off wealth generated somewhere else. Though such an economy may have the superficial appearance of being a 'clean' economy, tracing the source of the money almost always leads to a highly consumptive activity elsewhere on the planet. We would rather see stability come at the hands of responsible and innovative local activity.

Money is not the only kind of security that rural people need. Residents
in the Swan Valley need things like firewood directly from the forest and need neighborly help thawing their pipes in a deep winter freeze. Community based conservation keeps people talking despite their differences and maintains this social security system. It is also much less likely than distantly directed conservation efforts to sever local access to subsistence resources. In order to survive the inevitable change (Hawken, 1993) away from an economy based upon the rapid export of resources, local communities will require this kind of social capital.

Obstacles

Our experiment with hiring local people to do ecological monitoring is not without its distinct challenges. The first challenge is that the majority of local people in the Swan Valley of working age are not as skilled as their parents were in the outdoors. The traditional skill that early settlers used to make a living on the land are being lost quickly. There are only a handful of people that we could identify who have a reliable grasp of animal track and sign. Once we identified those persons and approached them with the idea of working for Connections, they were willing. But soon thereafter we met with a second obstacle. Though these individuals desire more of the kind of work that we offer, we were not able to compete with the hourly rate that they could make in more consumptive jobs. For those with families to support this has presented a difficult situation. If you can make $25/hour logging, guiding hunters or building trophy homes, how can you justify making $10/hour monitoring the condition of the ecosystem.

Some NwC employees have tried to complete all of their work during their weekends, but that competed with family time. The way we seem to be
able to compete is by providing stability and benefits. We are currently fundraising so that we will be able to provide full time year-round salaried positions. When compared with contract work that is subject to the vagaries of the market, our lower overall wage is more competitive.

Another obstacle to hiring local people is the social stigma associated with any kind of economic activity that does not seem to produce an obvious product. "Real work", the thinking goes, results in the material things that we adorn our lives with. Related to this problem is the perception, among our board members and employees even, that grants and donations are not an acceptable source of funding. Though NwC is a non profit organization, local community members consistently encourage us to develop business like income from courses and contracts. In the long run, this will lead us to a more healthy organization, but these social pressures to provide real work gained from real income, were difficult at the start.

For all the obstacles, community based conservation efforts that seek to create jobs in conservation offer more promise than peril.

Separating humans from their traditional habitat is not the solution. The better answer is to build the capacity of local communities to steward their natural capital. Recognizing that the goal of communities - long term economic prosperity - is inextricably bound to the goal of environmental organizations - the conservation and restoration of ecosystems - shifts the paradigm into a more constructive mode, wherein the forces of economic development and conservation are no longer enemies, but allies. (Ecotrust statement as reported by Little, 1996)

If we succeed in preserving rural lifestyles while transitioning the paradigm within which rural activities occur, community based conservation efforts will set the stage for a new and more ecological society.
V. Citizen Based Ecosystem Monitoring

Northwest Connections has an interest in 1) applying local knowledge to conservation, 2) broadening the base of support for conservation and 3) developing new economic opportunities for rural people in conservation. It is in this spirit that we have initiated our community based ecosystem monitoring program. Ecosystem monitoring projects offer local community members a good avenue for participation in land and resource conservation and are a necessary and missing part of ecosystem management occurring in the Swan Valley.

Ecosystem management requires planning, implementation and monitoring (Interagency, 1995). The controversy currently raging over local community collaborative groups often centers on the locus of control for public lands management. The question of how much control local people should have in decisions which affect national public lands is often posed in the literature debating collaboratives (Blumberg and Knuffke, 1998).

This question, however, assumes that the focus of ecosystem management is in the planning stages of any land management project. “In my experience, it all comes down to the implementation phase. National policies and guidelines are debated and decided at the national level. What local people want to do is participate in deciding how that national policy should be developed and implemented in their communities” (Mitsos, 1998). While there are compelling reasons why local people should be involved in planning
processes, there are even better arguments for why and how local citizens should be engaged in the implementation and monitoring of ecosystem management. In particular, monitoring seems to be a void in the current practice of ecosystem management that local community members may be able to fill.

Planning quite often gets the largest share of government funding, implementation gets what’s left over and monitoring usually receives nothing. "Monitoring is one of the great unfunded mandates" (Kusel and Gray, 1998). I attribute the underfunding of monitoring to a common habit of the Western mind. It is not just an accidental oversight, it is the manifestation of a whole worldview. Westerners put tremendous emphasis on innovating, creating, originating. We enjoy incredible freedoms to implement new ideas, even if we sometimes forget to consider carefully how such ideas may effect others. In contrast, Eastern cultures have based their actions on past experience, providing time for reflection on what can be learned from past action (Govinda, 1988). Both cultures progress, each with its attendant strengths and weaknesses.

Ecology, because it is complex and dynamic, is teaching land managers to become more reflective in their approach to land management. It is now well recognized that ecosystems are not mechanistic and they do not respond in rigidly predictable ways to certain stimuli. Planning used to take up a lion’s share of project budgets because investment in predictive models was high as the result of our linear style of progress. But most land managers now admit that it will never be possible to fully predict all of the compound and random variables in the ecosystem.

By utilizing reflective practices such as monitoring, managers can learn how their actions, in specific places at specific times, affect the ecosystem. “This
process of linking management with monitoring ... is termed *adaptive management* (Noss, 1994). Ecosystem management, if it is to truly be ecologically driven, requires adequate monitoring of the ecosystem. The diagrams being drawn these days in the journals of adaptive management depict spiral processes of planning, implementation, monitoring and evaluation that informs a slightly different kind of plan next time (Noss, 1994).

**Types of Monitoring**

The term monitoring appears in the literature of ecosystem management in many different contexts and breaks down into two general categories. The first kind of monitoring measures the response of the land to specific human actions and generally is implemented to see if that action met its intended goals or not. This kind of monitoring requires setting criteria for success and measuring outcomes against these criteria. I call this *project* monitoring.

The second kind of monitoring has a more diffuse focus and is not intended, necessarily, to determine the success or failure of individual management actions. This kind of monitoring describes a landscape, identifies indicators for ecosystem health and function, and keeps track of these indicators over a long period of time in order to detect dramatic changes. I call this *ecosystem monitoring*.

Here in the Swan Valley, citizens participated in a collaborative effort to plan, implement, and monitor a ponderosa pine restoration demonstration site. One of the assumptions of the project was that removing understory trees would save mature pines from catastrophic fire, promote their regeneration and restore the natural grass and shrub understory. This habitat change was, in turn, expected to provide more functional habitat for old growth ponderosa pine
dependent species of birds and mammals. Monitoring of the project includes before, during and after vegetation plots, bird count points, and track transects. Project monitoring, like that of the ponderosa pine project, helps to assess the effectiveness of that project and it gives diverse parties the opportunity to build trust. “Monitoring offers everyone involved to ensure that their concerns are met.” (Kusel and Gray, 1998).

Project monitoring seems to get into trouble where it becomes too tied to the predictive planning mind set. We expect change and so we monitor in order to measure if that change was what we expected or not. If the changes were as expected, we are apt to term the project a success. If not, we are apt to claim it a failure. But ecosystems will always respond in some mixture of expected and unexpected ways. Already with the Ponderosa Pine project we have seen the Forest Service and some environmental groups square off, the former pointing to results that were expected and claiming success, the latter pointing to those which were not and doubting success. Project monitoring is useful and will become more so as we learn to ask ‘what have we learned,’ rather than ‘were we successful?’

Ecosystem monitoring has no predictions. Ecosystem monitoring is designed to put people on the land, watching it in systematic ways in order to recognize patterns, breaks from those patterns, and in order to learn what it is that nature can tell us. NwC’s goal is to watch the ecosystem and let it inform us and alert and direct our attention. As Bud Moore, a native Montanan trapper and professional forest manager, is fond of saying, “let the land tell you what it needs.”

As land managers transition from focusing at the scale of forest stand management to the scale of ecosystem management they will need to move
beyond project monitoring and involve information derived from ecosystem monitoring. “Periodic monitoring is a fundamental part of ecosystem management” (Samson and Knopf, 1992). Reed Noss has delineated four categories of monitoring. The first three are aspects of project monitoring: implementation monitoring, effectiveness monitoring, and validation monitoring. Put simply these types of monitoring answer the questions about a management action: ‘did it happen’, ‘did it work’ and ‘was it the right approach’ respectively. Noss calls the fourth kind of monitoring baseline monitoring. His baseline monitoring correlates closely to what I’m calling ecosystem monitoring. We do, however, differ on one substantial point. Noss says that baseline monitoring is “directed at some element or process that is not expected to change.” We differ in that NwC expects change. Nature cycles, it experiences stochastic events, it is constantly adapting to changing circumstances. Detecting change does not necessarily indicate that we have a problem. Detecting change that is outside the natural range of variability does indicate a problem. One of the largest challenges to our efforts at ecosystem monitoring will be addressing the question of what exactly constitutes the normal range of variability for various species and processes.

Noss is strong on the need for baseline monitoring projects to have an overarching goal, “Without a goal, baseline monitoring would qualify as the mindless data gathering so often criticized” (1994). The overarching goal of NwC’s monitoring program is to maintain ecological integrity and habitat connectivity in human inhabited forest lands (see Appendix A). Because we feel that habitat fragmentation is the greatest threat to the long term health of the ecosystem, connectivity is our unifying theme. Some of our monitoring projects are designed to monitor the known causes of habitat fragmentation and others
monitor the probable effects.

In the first category, we have initiated projects that monitor the condition and use of roads and trails in the Swan Valley. This year we will be expanding to projects on the Lolo National Forest. These monitoring efforts provide information to the Forest Service which assists them with evaluating which roads are the highest priority for obliteration, which are in the highest need of noxious weed control, and which may be best suited for flexible road closure management allowing local people seasonal access for firewood gathering, huckleberry gathering etc.

On the Swan Front trails leading into the Bob Marshall Wilderness, we monitoring human use, wildlife use and trail conditions in order to assist with assessing the effects of these trails on water quality, wildlife movement and human activity. These two projects are examples of projects which monitor the known causes of habitat fragmentation.

One effect of habitat fragmentation is the loss of populations or subpopulations of plant and animal species (Quammen, 1996). In order to conserve the integrity and connectivity of habitats, we have designed projects which seek “to detect significant changes in the abundance, distribution or health of endangered, threatened or vulnerable species before it is too late to reverse the trend” (Noss, 1994). Distribution information is particularly helpful in the process of mapping, assessing and restoring micro habitat linkages. These are the ribbons of habitat that occur on the scale of 1-4 square miles that make larger linkages such as that between the Mission Mountains and Bob Marshall Wilderness function.

In keeping with Noss's process for setting up monitoring programs we have set about to choose meaningful indicator species, inventory the existing
We leave the last of Noss's steps analyze data and adjust management to the land managers: the Forest Service, the Swan Ecosystem Center, Plum Creek Inc, Dept. of State Lands, and small private land owners.

NwC has embarked upon an effort to monitor carnivore presence and distribution in the Swan Valley.

Given that the first signs of environmental stress usually occur at the population level [it is important] to select species which are relatively easy and cost effective to monitor and provide for an early warning to changes in ecosystem processes and composition (Holling, 1992).

Because carnivores are at the top of the food chain, they are often chosen as indicators of the health and function of the processes that sustain the producers and primary consumers on which they depend (Weaver, 1997; Noss, 1996). Though we focus on the rare and vulnerable carnivores -- lynx, fisher, marten and wolverine -- we keep records of all carnivores in our survey area.

In order to inventory existing information on carnivores, as already mentioned in the chapter on the involvement of local people, we are conducting interviews of local people who have trapped, hunted, and lived directly off of the land and natural resources over the past 100 years. The Forest Service, Fish Wildlife and Parks and the Montana Natural Heritage Program already have historical information that comes from trapping records, bounty records, government track surveys, reintroduction data, scientific research projects and reported sightings. What we try to add are the year in and year out observations of these local residents. Our interviews are designed to ascertain not only where and when people observed various carnivores, but if they noticed any patterns in the population trends, if they can identify any of the key habitat linkages, if they made any observations about the habitat preferences of
these creatures, and if they have a sense of the natural range of variability for this species.

Historical information is helping us to understand the thresholds of the ecosystem for change. This is difficult to ascertain in part because the thresholds themselves are changing. What lynx, for instance, could have withstood ten years ago, may not be survivable now. Cumulative effects may have combined to reduce their ability to adapt to new situations. I agree with Noss (1994) that for this reason ecosystem management necessarily implies acting conservatively not assuredly. Our monitoring produces more questions about thresholds than answers, but they are important questions for managers to hold in their minds when they make decisions.

In order to sample carnivore abundance and distribution NwC hires long time community members to conduct snow track surveys during the winter months\(^3\). These surveys are done along established transects of at least five miles in length. Each transect is surveyed three times per winter (Zielinski and Kucera, 1995) during favorable conditions (Giddings, 1995). At the end of each field season, we have all carnivore locations digitized and put on a GIS map in compatible electronic format with the Forest Service. The Forest Service can then overlay our monitoring data on any set of data they wish for analysis and adaptive management. It has already proved useful in the assessment of the impacts of specific projects. It will become more useful for long term planning processes as we begin to accumulate years of data and are able to track trends.

We have not done anything yet to validate our assumption that the abundance and distribution of rare carnivores correlates to habitat connectivity in the Swan Valley. One plan is to interest university graduate students in

\(^3\) Since data is only being collected in the winter, all carnivore data is skewed towards winter distributions and behavior.
designing and implementing validation projects. For now, we assume that
carnivore research around the nation will continue to inform us about the
validity of these assumptions and the land managers will also factor current
research into their decision making processes.

Why not leave it to the agencies?

What are the benefits of a group like Northwest Connections conducting
this monitoring rather than the Forest Service or any other land management
agency? The first benefit is funding related. Our effort is more cost effective.
Our travel to and from survey routes is considerably lower that the state or
federal government. A Forest Service or Montana State biologist has to travel
50-80 miles by car to get to the same places where we may have to travel 1-15
miles. Although we pay a living wage, our payroll is much more modest than
that of a government agency. Government field biologists are required to work
in pairs, whereas our employees quite often work alone.

Because our costs are lower, we stand a higher chance of sustaining our
programs over the long term. Many a government survey effort has begun only
to have state and federal budgets shift, political priorities change, personnel
turnover, and the project scrapped mid stream. A non-profit organization that
operates largely outside of the politically driven system has a higher chance of
avoiding the pitfalls of government funding. And because we are a non profit
organization, we are able to leverage money from private sources. Private
donors and foundations have a growing interest in community based
conservation.

The second benefit of a community entity monitoring the ecosystem is the
quality of the information. "Since participants (in collaboratives) reside in the
areas under consideration, they observe and remember resource conditions and trends that are relevant to management proposals" (Birchfield 1998). And, as I mentioned before, some of the skills required for monitoring, such as reliable track identification, are stronger among rural residents than government biologists.

The third benefit of such monitoring is that it becomes a source of ongoing education for local community members. Conventional management keeps the learning process within the circle of specialists responsible for decisions. Even if the decisions remain largely in the hands of land owners and managers, community based monitoring keeps locals abreast of current trends in the ecosystem. A higher level of awareness translates to more personal reflection on the ramifications of all sorts of individual activities including hanging bird feeders, fencing pastures, riding ORV's, fishing tenuous streams. Community involvement in the production of ecosystem knowledge helps bolster a sense of collective land stewardship.

Probably the most important benefit is that an organization like NwC is monitoring across ownerships. In a landscape carved up into a pattern of checkerboard ownership the issue of habitat connectivity is difficult for any one land owner, assessing their own lands, to address. Though the Forest Service certainly does consider the situation on private lands when planning their management actions, they do not actually survey those private-corporate lands. One recent example serves to illustrate this issue.

The Forest Service biologists have been doing winter range surveys every year to determine the relative abundance of deer and elk. Those surveys are conducted on three kitty corner public lands sections. NwC initiated winter range surveys last year. Our transect cuts a straight line across the heart of the
winter range, alternating through public and corporate sections. Last year was a mild winter and one of the things that we observed was a disproportionate number of deer and elk on corporate lands. This was because these lands had been heavily logged, the snow was shallow and the ungulates were drawn to the feed available in this more open landscape. Conversely, this year we saw a similar amount of deer and elk sign, but noticed a disproportionate number of deer on public lands. This year, the snow was much deeper in the open sections and well crusted over forcing ungulates to spend more time under the canopy of the multistoried forests on Forest Service land.

A survey of Forest Service lands alone would lead an observer to suggest that there was a large increase of deer and elk abundance on the winter range from 1997 to 1998. Our surveys across ownerships indicate a very modest increase between these two years. This example illustrates the fact that ecosystem monitoring, to the degree possible, should be done without regard for human drawn political boundaries or land ownership. Connectivity, in particular, is an issue that requires monitoring across all ownerships.

Though we have initiated monitoring projects that survey multiple ownerships, our information is mostly accessed by the Forest Service. Will Plum Creek Timber Co., the largest owner of mid and low elevation lands in the Swan Valley, consult Northwest Connections findings? Certainly, with the current emphasis on the development of habitat conservation plans, Plum Creek has embraced the concept of adaptive management to protect threatened and endangered species (Hicks, 1997). Currently, the company conducts its own internal assessments with regard to Best Management Practices, the Swan Valley Grizzly Bear Conservation Agreement, and state water quality standards. Habitat Conservation Plans (HCPs) are in the works
for bull trout and lynx and Plum Creek is investing tremendous resources in developing biological inventories on some of their most sensitive lands. The monitoring of HCPs on private land in the Swan Valley is Plum Creek’s responsibility and the corporation will probably not be interested in the information that one small community organization may produce. The Swan Valley Grizzly Bear Conservation Agreement (SVGBCA), however, is not a standard HCP and may present a different opportunity for the role of a community entity such as Northwest Connections. This voluntary agreement includes special guidelines for coordination on timber harvest, road management and administrative use by all of the major land owners in the Swan valley: Forest Service, Montana Department of Natural Resources and Plum Creek Timber Co. (Swan Valley, 1996). The focal point for the agreement is a system of grizzly bear linkage zones developed by the U.S. Fish and Wildlife Service (Figure B). By maintaining higher levels of security inside these linkage zones, the agreement aims to preserve the ability for Mission Mountains bears to access their spring habitats and interact with bears from the Bob Marshall Wilderness Complex. Private citizens have also have written an agreement to improve the management of small private lands in the valley for grizzly bears (Pelletier, 1994).

Northwest Connections, unlike the main parties to the agreement, does not have a vested economic interest to protect nor are we an advocacy based organization with a predetermined idea of whether the SVGBCA is good or bad. The benefit to the SVGBCA of having a local organization like NwC involved in ecosystem monitoring is that it provides the opportunity for something resembling ‘third party monitoring,’ as our monitoring data stands a greater chance of being objective.
Figure B  Grizzly Bear Linkage Zones
Although a committee of stakeholders was convened in 1995 to address the monitoring of the SVGBCA, the only monitoring activities to date have been what Noss would call implementation monitoring. Compliance with road closures, administrative access requirements, and timber harvest guidelines have been documented. But no effort has been made to monitor the effectiveness of the agreement for bears. In light of this, NwC began monitoring grizzly bear presence in the Swan Valley during the spring of 1997.

During the spring both black and grizzly bears require access to and security within low elevation habitats in the Swan Valley. The first green forage becomes available along these low elevation riparian features and in forest openings receiving plenty of sun. Because the valley bottom is heavily roaded and many of these roads are not well vegetated, it makes a perfect opportunity to detect grizzly bear use via tracks in the mud. Bears wishing to access the pothole complexes and river bottom can not avoid crossing a number of roads.

NwC surveyed all roads with decent tracking conditions which are distributed well across the landscape. Our track locations were then mapped on a GIS layer including the grizzly bear linkage zones and core security areas (Appendix B). Without having put any statistical analysis to the issue yet, it seems that bears are indeed utilizing secure areas where roads have been closed. With some collaboration from the parties to the SVGBCA, I think our monitoring work could be expanded into a validation monitoring project that would analyze what bears are telling us about the assumptions that are guiding the agreement and if we need to alter some of the resulting management schemes. This is an opportunity that NwC looks forward to exploring during the spring of 1999.
To summarize, community based ecosystem monitoring may be beneficial in that it is lower in cost and therefore more likely to persist, it is potentially more detailed and more accurate, it keeps the local public educated and aware of changing conditions, and it addressed the ecosystem on its own terms not within the limitations of political boundaries. But community based ecosystem monitoring clearly has its limitations.

The Question of Scale

Noss mentions that monitoring should take place on several scales: genetic, species, community and landscape (1994). While a community group such as ours is well positioned to monitor species issues -- presence, absence, abundance, distribution -- we are not well suited to monitoring things like heterozygosity in the gene pool and the spatial distribution of vegetational communities. The former required genetic sampling and the latter is better achieved through the use of aerial photography and spectral analysis. A community group is well suited to involve itself with the species and population levels of monitoring because they require a tremendous investment in field work. Because all monitoring efforts should be combined for analysis that leads to management plans, we will always seek to be in strong communication with scientists and managers implementing monitoring efforts at more fine and more course scales than we are able to address.

Currently, the Flathead National Forest is interested in developing a Landscape Analysis for the Swan Valley. The Swan Ecosystem Center has worked quite closely with the Forest Service in the planning process and this may be our first good example of how different levels of monitoring, implemented by community groups and a federal agency, can be integrated to
formulate one overall document that is used as the basis of ecosystem management planning. This particular effort would become the basis of the next Forest Plan revision on the Flathead National Forest. At this time, the Swan Ecosystem Center is writing grants to fund community initiated baseline monitoring projects that could assist with assessing forest community types, plant and animal populations and micro habitat linkages. Depending on the work needed, NwC may be qualified to bid on such monitoring projects.

Credibility

How does a community organization like Northwest Connections gain enough credibility to be able to conduct ecological monitoring projects? We decided that the best way to persuade land management professionals and academic specialists that we could actually conduct rigorous monitoring projects was simply to begin doing it. Before NwC had secured funding, before we had any official approval, we went out and started snow tracking forest carnivores on a volunteer basis. The success we had with this preliminary data and some of the observations we documented made it possible for us to then secure private funding. With funding, we were able to improve our methods and expand our coverage. Now we are trying to develop contracts with various land management agencies whereby we will match government funds with private funds and produce information that can be used by the funding agency.

Though our field staff lack formal university credentials, outside observers can see from the detailed measurements and photographs that our field staff are good at identifying mammal tracks. While many Phd wildlife biologists head out into the field unsure of the difference between a squirrel track and a marten track, many outdoors people have a very keen eye for tracks.
Trappers, in particular, have more opportunity than others to validate their tracks because they actually see the animal they are tracking time and time again.

Monitoring does not provide scientific certainly, "It can tell you when you're wrong, but it can't always tell you when you're right" (Kusel and Gray, 1998). The ecosystem is far too complex to reduce it to cause and effect relationships between those components of the ecosystem which humans manage to wrap their brains around. But although there are large numbers of variables that do not fall within the little boxes on our monitoring forms, many are being experienced by our field staff just the same. What monitoring, like any reflective process, can lead to are flashes of insight, or at least educated hunches, an intuitive feel for what is going on with the ecosystem.

Clearly, it is not credible to manage forests, watersheds, fisheries and wildlife populations on one person's intuition. Perhaps the most important thing that can occur though is for large numbers of observers to gather regularly and share their observations and hunches. In this way, we begin to develop something much more credible: collective intuition. Collective intuition is sometimes called 'professional judgment,' but that name implies that only academically trained persons have the ability to have good judgment. Science does not make decisions, people do. And science can give you all sorts of conflicting data and conclusions.

Our highest hope for NwC's monitoring projects is not that they dictate land management policy in the Swan Valley, but that we, as local people, can deepen our awareness of our environment and add our observations, both qualitative and quantitative, to the process of collectively sorting information and that this will result in ever evolving and improving decisions about land management here. Without the Swan Ecosystem Center and the Swan
Citizen's Ad Hoc Committee, our monitoring data would be much less meaningful. But with the opportunity no only to deliver data, but to discuss its implications, our monitoring just may make all the difference to the future of this ecosystem.

An idea takes hold

There are many other forested valleys which may wish to implement similar monitoring efforts. In the upper and lower Clark Fork, in Rock Creek, Lolo Creek, in the North Fork of the Flathead, the Yaak and many other places, rural people could be getting involved in ecosystem monitoring. The model is particularly useful in towns and communities where conservation policies designed to reduce habitat fragmentation or recover threatened and endangered species have encountered local resistance. Programs such as NwC's would not succeed if initiated by parties outside of the local community. Once a small number of individuals within the town became interested, they would need the support of outside parties such as federal and state agencies, the academic community, and regional environmental groups.

Northwest Connections may be able to help the spread of this idea by establishing the credibility of the approach here in the Seeley and Swan Valleys. With an example to which they can point, other localities would be able to progress in securing funding and collaborative relationships with agencies more quickly that did we. In the future, we may also be able to function as an umbrella group for such efforts around the region, lending our name and non-profit status to other communities doing similar work. Most likely, the main way that NwC will help spread the word is simply by talking with small groups at their invitation, sharing our story and helping them to think through what form of
community based ecosystem monitoring would best work in their area.

Different community groups may develop different sources of funding. Because of my own interest in and experience with environmental education, we decided that educational programs could not only service our conservation agenda, but could also provide funding for long term monitoring projects. We used Earthwatch (1999) as the model for our programs, only we decided to tap into university students who are drawn to Montana, rather than putting on a national marketing campaign for 'working vacations.' Another community may be more interested in following our strategy of trying to develop service contracts with federal agencies, or they may decide to depend upon solely grants, or they may become a membership organization, something NwC has not done, and rely on membership drives, donor campaigns and fundraising events. They may also choose to offer fee for service products or programs that are unrelated to education. The options are many and varied for how other communities might be able to build upon the model that we are developing and take it in their own direction.
VI. Measures of Success

If community participation can in fact make land management more ecological, there need to be ways to measure this progress, both quantitatively and qualitatively. Some of the criteria by which Northwest Connections has asked its funders and evaluators to measure the work being done here in the Swan Valley are:

Quantitative measures:

• Decrease in number of threatened and endangered species lost to direct human mortality

• Increase in rate of private and public acres protected as or restored to functional habitat

• Decrease in the rate of habitat fragmentation

• Increased in conservation easements placed on private lands

• Decreased local vandalism of public campgrounds and facilities

• Higher percentage and greater diversity of residents involved in meetings held by the Swan Citizen’s ad hoc committee.

• Fewer appeals of land management decisions by environmental groups

Qualitative measures:

• Higher level of satisfaction among all parties with management decisions

• Increased community pride in the ecological resources of the Upper Swan Valley Ecosystem

• Decreased community resentment of management actions taken to protect ecological integrity

• Interest among other communities in rural areas of the country in similar
• ecological monitoring projects.

• Higher level of mutual understanding between conservationists (including scientists, environmental groups and university students) and community members

In the future, graduate students interested in the ecological basis for community involvement may want to measure and compare data on these or other related criteria as a basis for evaluating our approach. Interviews, such as those conducted by Cestero (1997) may be helpful in gathering data on the qualitative measures of success.

One caveat to the above statement is that the very act of measuring community attitudes can alter those attitudes. When community processes become overtly studied by outside experts, community members may develop some reluctance towards participation. When local residents feel as if they are part of some great academic experiment they begin to lose faith in the authenticity of the process. "People have to believe that you genuinely respect their ideas and that your involvement with them is not just an academic exercise" (Horton, 1990) This not a reason to avoid academic review of community based processes, but a dynamic that should be addressed in any study plan.
VII. Conclusion

Community participation in conservation addresses the ecological bottom line because it does not aim at changing policies, but at changing people. If environmentalism is to rise to the occasion and become a social movement, as I think it should, it needs to find ways to take hold of people’s minds and spirits and turn them towards the goal of living a fulfilling life within the limits of the planet.

We shift people’s most inborn beliefs through educative processes, but what kinds of educative processes? Information campaigns, especially biased information campaigns, have their limitations in movement building.

if people have a position on something and you try to argue them into changing it, you’re going to strengthen that position. If you want to change people’s ideas, you shouldn’t try to convince them intellectually. What you need to do is get them into a situation where they’ll have to act on ideas, not argue about them. (Horton, 1990)

When I was teaching high school, I stumbled upon the fact that all the good information in the world couldn’t give my students a real understanding of ecological processes and their interconnected social and economic issues. I began reworking my curricula to put my students into service-learning projects: picking strawberries with migrant farmers, building erosion control devices with Navajo Indians, marking timber with private foresters, surveying streams with government biologists. Like Myles Horton, “I was working on the idea that you learn what you do, and not what you talk about.” Many of my students, who
were the sons and daughters of farmers, hippies, professors and immigrants, became personally invested in the future of conservation and the ability of humans to make their livings meaningful and to live within the limits of the earth. I learned a larger lesson, that by involving ordinary citizens in conservation processes, the ethos of conservation gains a foothold in peoples spirits and builds exponentially upon itself.

Again, Myles Horton (1990) speaks to this issue: "....one of the best ways of educating people is to give them an experience that embodies what you are trying to teach". By giving rural residents opportunities to participate in conservation processes, community based conservation efforts allow citizens to experience that the careful conservation of our wild lands and natural resources benefits all people, not just the organized special interest groups they are accustomed to reading about. It makes citizens the subject, not the object of conservation. As rural citizens become part of the conservation process, they become part of a broad based environmental movement. I am reminded of Thoreau's quote: "Already you have castles in the sky, now set about to build the foundation"

As an environmentalist in the early 1980's, I was still of the mind that my role in this life would be to fight to save the earth before it was too late. As an educator in the late 1990's I have decided that it is too late. This is not meant to connote cynicism on my part. I simply have the pragmatic view that the inertia of the past 100 years will continue to seriously degrade our environment, in spite of many good efforts to stop this process. The analogy I draw for myself is that of a forest fire. We have simply set up the conditions too well for the catastrophic wildfire of ecological decay not to occur. The belief that we can control or even stop it is overstated. What I, along with many others, can do is
to plant the seeds of a more ecological culture. We can prepare the conditions such that after the fire has run its course, these seeds will take root and successfully pioneer the scarified soils. This world view has made me less alarmist in my approach to environmental problems, putting me in a much more joyful struggle for 'the long haul.'

Community based conservation may not be well situated to address immediate crises. Its processes are too slow and too inclusive to be efficient in acute and emergency situations such as oil spills and rapidly spreading diseases. But for the majority of today's environmental problems which are the results of chronic issues embedded in our cultural attitudes and political policies, community collaboratives can play a critical role. By drawing on local expertise and encouraging local land stewardship, these processes can ensure that the results are not only more ecological, but that they endure well into the next millennium.
Appendix A: Mission, Goals, Programs of Northwest Connections

Mission
Northwest Connections seeks to combine the best of local knowledge with the best of science in projects that help identify, conserve and restore the habitat linkages that keep the Swan Valley and surrounding ecosystems whole and functioning for all species.

Goals
Northwest Connections conducts long term ecological monitoring efforts which:

- provide land managers with site specific information on wildlife, habitats, and habitat linkages
- employ local people
- provide field-based learning opportunities for students and visitors
- promote an ethic of land stewardship and natural resource conservation

Programs
Northwest Connections has two program emphases: conservation and education. The relationship between these two programs is symbiotic. NwC conservation projects provide students and visitors with opportunities to learn by doing. Field-based courses offer participants direct contact with forested landscapes and rural communities so that the concepts of conservation and ecology can be applied to the realities of people and places.

Many NwC educational programs, in turn, provide financial support for NwC conservation efforts. This reduces the vulnerabilities of these conservation projects to the ever changing priorities of private funders and public agencies.

All Northwest Connections programs integrate local rural residents and regional land management agencies. With our assistance, land owners and managers
have current site specific information on how their properties connect to surrounding acreages; community members have functional ways to contribute their knowledge, ideas and energy to the task of ecosystem based management; students have a place to get out into the field and learn about ecology and environmental issues first hand; and a diversity of citizens have the opportunity to explore their own connection to natural processes.

Program 1: Conservation

Conservation efforts that integrate active resource management require current site specific information. In order to facilitate this kind of adaptive management, NwC involves local people in collecting and providing some levels of information on wildlife, habitats and habitat connectivity.

- **Carnivore snow track surveys**
  Carnivores are considered indicators of ecological integrity. Recent research also indicates that carnivores help establish and maintain ecological balance among communities of plants and animals. NwC has established snow track transects throughout the Swan Valley to monitor the presence, distribution and relative abundance of rare carnivores including lynx, fisher, pine marten, wolverine and wolf. We also document the movement and habitat selection of our more common carnivores: coyote, bobcat, weasel, otter, mink and mountain lion.

- **Grizzly bear monitoring**
  The Swan Valley is fortunate to have a cooperative agreement between federal agencies and private timber companies to maintain security and habitat linkages for the grizzly bear. NwC uses track surveys, remote camera sets, and hair snagging for DNA analysis to document the continued use of this ecosystem by the grizzly.

- **High elevation whitebark pine inventory**
  As a keystone species, the whitebark pine tree provides food for bears, squirrels and birds, provides stability on steep mountain slopes and helps regulate the snow melt. These trees are quickly disappearing due to the cumulative effects of white pine blister rust, mountain pine beetle and the lack of fire in the high mountains. NwC is mapping the remaining stands to assist the Forest Service with developing a restoration strategy for this species and the processes which depend upon it.

- **Road and trail monitoring**
  The number one cause of habitat fragmentation is the vast network of human transportation routes. Roads and trails crisscross the countryside and in many cases compromise security for wildlife and ecosystem integrity. NwC, in conjunction with the Forest Service, monitors open and closed roads and trails, addresses erosion problems, weed infestations, and use by both human and animals.
Program 2: Education

• **Winter Field Studies** -- Students from the region’s universities join us at three times per year to assist with our carnivore snow track surveys. Students have a chance to study wildlife ecology, natural history and environmental issues in the field and have the opportunity to sharpen their winter outdoor skills. Students also participate in interviews of the area’s early trappers and outdoors people, learning the history of animal populations and human activities first hand. (2 semester credits, UM)

• **Animal Tracking Workshops** -- On winter weekends, NwC offers a two day introductory tracking workshop. Both days are spent in the field learning how to recognize animals by track, gait pattern, habitat selection and behavior.

• **Bear Ground** -- Participants come in June when the bears are most active in the low elevation habitats of the Swan Valley. They learn to study the activities of bears via track, scat, foraging sign, rub stations and observation. Participants assist with monitoring remote camera sets and they meet with renowned experts on bear biology and wildlife management. (2 semester credits, UM)

• **Alpine Field Studies** -- NwC offers this course for teachers, students and interested citizens. It is a moderately strenuous week spent backpacking in the high alpine environment of the Swan Range and working on NwC’s whitebark pine inventory. This work sets the context for learning about alpine ecology as a whole, including soils, plant identification, wildlife associations, and fire. Three sections of this course are offered during July and August. (2 semester credits, UM)

• **Landscape and Livelihood: Field Semester** -- During the fall, NwC offers a semester long residential field course for undergraduates in a natural resource related major. The course explores the interdependent economic and environmental issues of a number of Western Montana communities. Students live at NwC headquarters in the Swan Valley and study timber, mining, wilderness, ranching and water issues of Northwest Montana. The course gives students the unusual opportunity to live and work in a small rural community. 12 semester credits.

• **Internships** -- NwC interns work on monitoring projects, assist with educational programs, and contribute to the daily upkeep of NwC equipment and facilities. Internships are open to ages 16 and up.

• **Natural History Adventures** -- NwC customizes and leads family groups, business groups and individuals on wildlife watching and natural history adventures. Popular trips include mountain lion ecology, wildflower photography, and animal tracking.
Appendix B: Results of selected NwC monitoring projects

Forest Carnivore Tracks: 1997-98

Forest Carnivore Tracks

▲ fisher
+ lynx
☆ marten
■ wolverine
 سنوات
Snow Transects
Grizzly Bear Presence
Swan Valley, Montana

Bear Tracks and Observations
- 1997
- 1998

Grizzly Observation

Grizzly Track

GBLZ - Roads

Northwest Connections
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