Pah-to (Mt. Adams) – Yakama. Photo by Mark Rasmussen.

Indian Peoples' Visions

Achievement of the dynamic future that tribes desire for their forests is the most compelling criterion for the adequacy of forest management. Thus, a tribal vision for the way their forests should look and be in the future is a critical component of effective management planning and implementation. Ideally, this vision is reflected in a written document that can be referenced or incorporated into a forest management or natural resources management plan. But it is more important that tribal forest futures are discussed in earnest by tribal members and leadership, and that the discussion is listened to carefully by foresters and other resource managers. This communication is particularly important given the fact, often previously observed, that tribal people tend to live intimately with the consequences of management decisions. Often their forest is neither remote nor conceptual but rather their everyday environment and a constant source of both material and spiritual sustenance.

In an effort to understand tribal citizens and resource professional's views of Indian forests and forestry, IFMAT I conducted surveys and focus group discussions during site visits to Category I and II timber tribes. Results revealed that tribal members and resource professionals had differing perceptions of what tribal members valued the most. Tribal members on the whole favored "protection" of the forest resource, whereas resource professionals thought that tribal members favored economic return. Through further interpretation of survey results and focus groups held at most reservations visited, it emerged that tribal members defined protection as the sustainable provision of all benefits derived from the forest, including, but not limited to, harvesting and revenue generating activity, and beginning with the assurance that forests are kept as forest land in perpetuity.

IFMAT II and III adopted similar survey and focus group techniques in order to evaluate if 1) the overall vision first articulated in IFMAT I has changed, and 2) if progress has been made in transforming forest management to better reflect that vision.

Methods

To assure that each time period was truly comparable, the same survey instrument was used as in the other assessments. As before, the survey was given to focus group members and made available to the tribes for dissemination. The only difference from previous IFMATs was that the survey was made available in an online format as well as through paper copies. Survey documents used by IFMAT can be found in Appendix VI.

We collected a total of 218 surveys, and conducted focus group discussions during 12 of the site visits (Table V.I). Each focus group included 5-15 individuals invited to attend by the tribal forester. We asked the same questions as in previous IFMATs: 1) "What do you most value/want from your forest and why?" 2) "What do you think about current management practices on your tribal forest?" and 3) "Have you seen changes in management since the last IFMAT, and if so, what has changed?" Focus groups were held at the Coquille, Nez Perce, Menominee, Quinault, Flathead, Colville, Eastern Band of Cherokee, Tule River, Fond du Lac, Yakama, Mescalero Apache and Fort Apache Reservations.

Table. V.1 2012 survey respondents

Demographic	Number of Respondents
Tribal Public	127
Tribal Natural Resources	28
Tribal Forestry	31
Non-tribal Forestry Staff	32
Total	**218**

Findings

V1. Tribal vision themes remain consistent over the last 20 years. The diversity of Indian tribes, values, and forests make generalization difficult. However, for the most part, tribal members tend to express a holistic view of the forest, seeing it as more than an aggregate of resources. Tribes have consistently articulated the primary importance of caring for the forest and managing it in an integrated fashion.

Another central element of the tribal vision is the importance of self-determination and self-governance. With recent trends toward greater management by tribes, these values have been at the heart of many changes to tribal forestry operations and have led to increased tribal member satisfaction in the quality of forest management. As part of this vision of self-determination, the role of youth education and effective communication with the tribal

public in forest and natural resource management again arises as a central part of the tribal vision that was expressed repeatedly in focus groups, surveys and discussions with tribal forestry and natural resource staff.

V2. Convergence of goals and values continues. The first IFMAT report revealed a significant divergence between tribal public values and the perception among BIA personnel of those values. Tribal members articulated a clear desire to place protection of forest resources foremost, with strong concern also for cultural uses and aesthetics. BIA personnel, especially non-tribal foresters, placed greater emphasis on income generation as a primary management value. Tribal natural resource staff also rated protection less highly than did the tribal public.

IFMAT II reported a convergence of views and values between the tribal public and resource managers. A majority of survey respondents, including both tribal members and forestry professionals, agreed that forest protection should be the management priority. This shift in perception was especially evident among non-tribal BIA foresters, who placed markedly less emphasis on income generation compared to IFMAT I. IFMAT II explained this trend toward greater convergence as 1) the beginning of a shift toward greater tribal self-governance, 2) an increase in the number of forest managers who are Native American, and 3) greater presence and influence of tribal natural resources departments.

IFMAT III found that the trend toward greater agreement on management priorities continues. All groups valued protection as the most important objective, with cultural and scenic values remaining fairly consistent. Income production remains the only category showing inconsistency between the groups, but the gap is narrowing. Although 31 percent of tribal natural resource employees rated income as important, none of this respondent group felt income to be the most important value, whereas more than 20 percent of non-Native tribal employees cited income as the paramount benefit. That difference, however, is minor compared to IFMAT I. IFMAT III finds agreement among respondents that protection of forests should be the management priority.

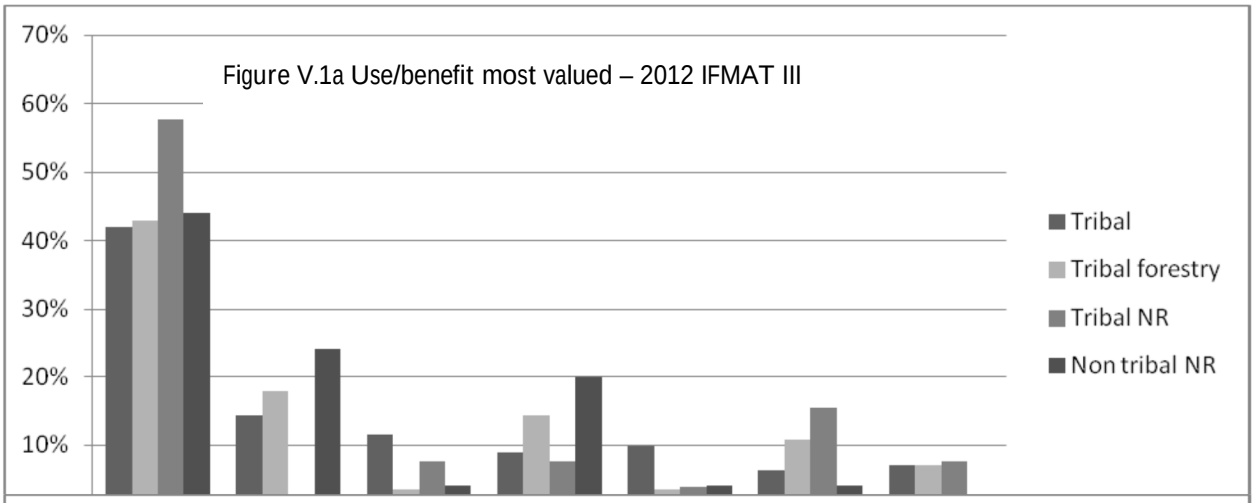

Figure V.1a Use/benefit most valued – 2012 IFMAT III

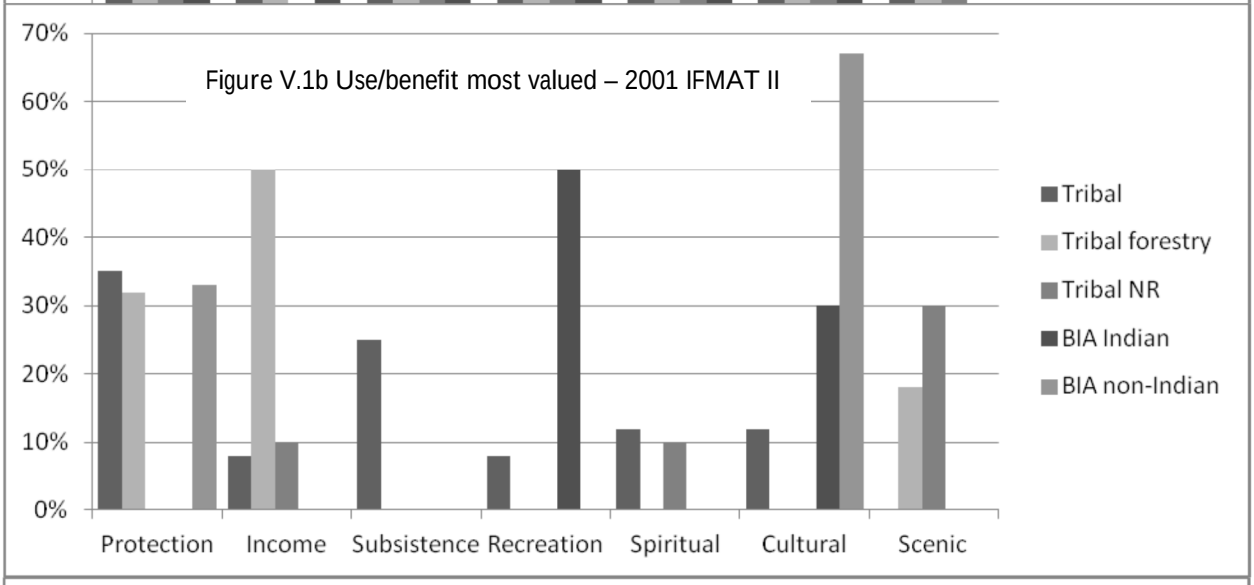

Figure V.1b Use/benefit most valued – 2001 IFMAT II

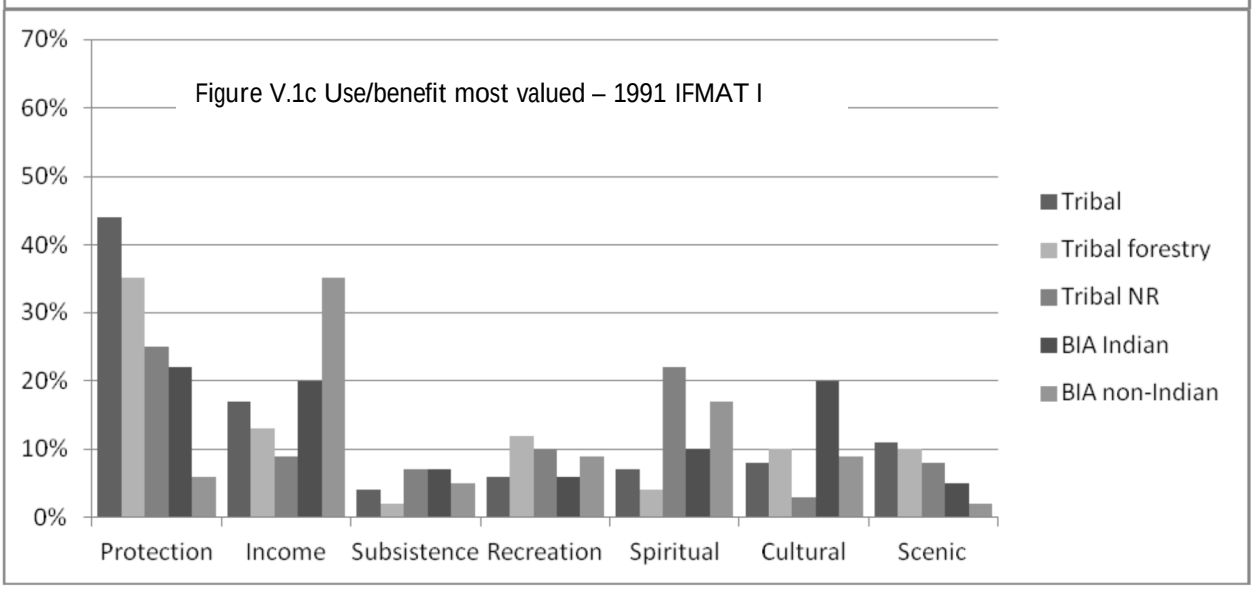

Figure V.1c Use/benefit most valued – 1991 IFMAT I

When IFMAT III survey participants were asked *"What do you want from your forest?"* the convergence of views between tribal members and non-Indian forestry professionals is striking as can be clearly seen in Figure V.2. In most cases tribal and non-tribal responses were within a few percentage points of one another. Income, while acknowledged by half of the respondents as an important forest value, is subordinated by cultural and environmental priorities.

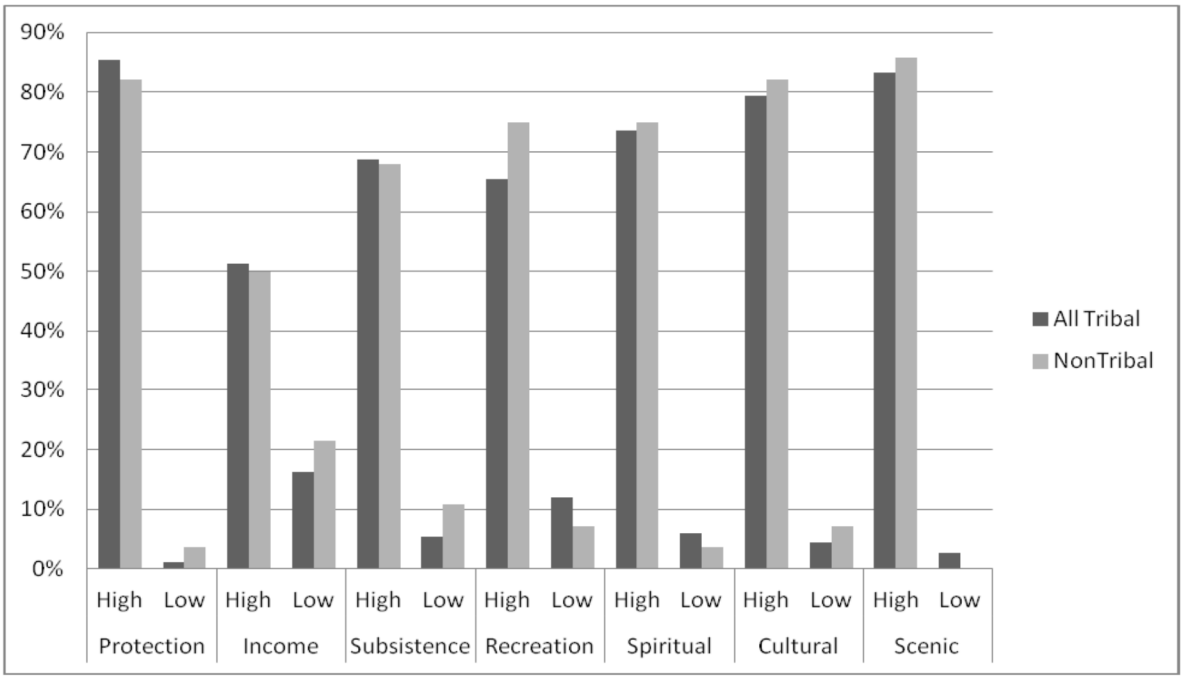

Figure V.2 What do you want from your forest?

V3. Perception of the quality of management over time has noticeably improved. In the last two decades, there has been a marked move toward self-determination and self-governance, with most tribes visited during IFMAT III contracting or compacting the management of their forests. This has led to greater tribal input in management direction and vision with a corresponding increase in positive perception of the quality of management by tribal members.

IFMAT I found that overall, the tribal pubic was not satisfied with the quality of management being performed on tribal lands. Specifically, less than 25 percent of survey respondents gave a "good" or "excellent" rating to the following activities: grazing, recreation, water quality and quantity, non-timber forest products, employment of tribal members, creation of new enterprise, food gathering, spiritual values, visual quality, protection from pollution and waste, poaching, trespass, and overall management.

IFMAT II found some improvement in overall perception of the quality of management, but still less than 25 percent of survey respondents gave a "good" or "excellent" rating to the

following activities: grazing, recreation, non-timber forest products, employment of tribal members, creation of new enterprise, spiritual values, visual quality, poaching and trespass. Categories that showed improvement included water quality and quantity, food gathering, protection from pollution and waste, and overall management.

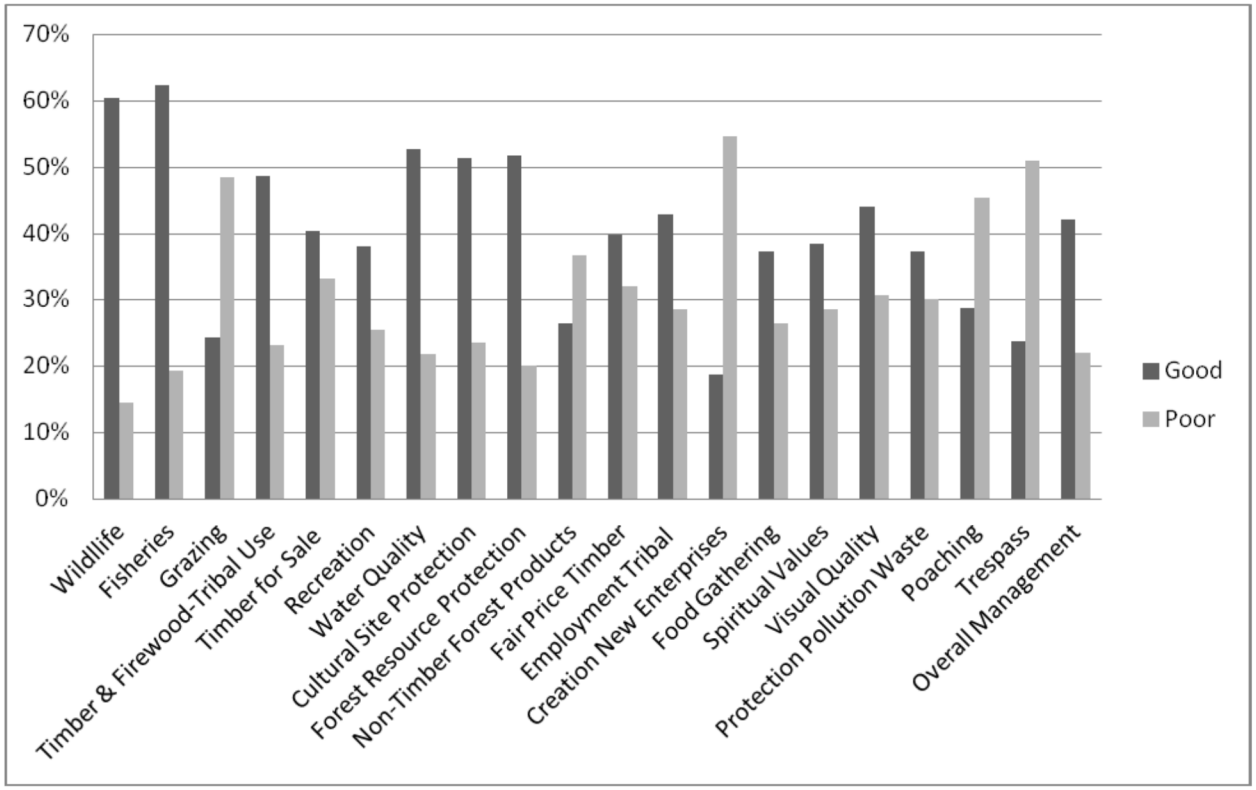

Figure V.3 How well do you think your forests are being managed?

In the last 10 years, tribal member satisfaction with aspects of management has improved, with only three activities now receiving less than 25 percent "good" or "excellent" ratings: grazing, creation of new enterprise, and trespass. Although approval is by no means universal, the general trend is positive, and five programs received greater than a 50 percent "good" or "excellent" rating: wildlife management, fisheries management, water quality, cultural site protection, and forest resource protection. Five activities, however, received a higher proportion of negative ratings than positive. These were grazing, creation of new enterprises, trespass, management for non-timber forest products and poaching. Overall management received 42 percent positive ratings, compared to only 22 percent of tribal members surveyed that ranked it as poor.

Recommendation

V1. Innovative and continued efforts need to be made to foster, strengthen and continue communication between the tribal membership, tribal forestry, other natural resource programs and tribal leadership. We find that a tribal vision of their future forest's appearance, productivity and dynamics is the foundation of management planning. An integrated vision of the suite of components, values and products a tribe wishes to pursue will require effective information and education provision by resource managers, and vigorous involvement and discussion by leaders and members. Without this vision process, we feel that integrated management planning will produce modest and sometimes harmful results. As an acknowledged element of state-of-the-art forestry, BIA should work to assure that adequate resources are made available to conduct meaningful outreach to tribal members through scoping and visioning sessions as well as field tours such that tribal visions are well-understood and can be incorporated into forest planning. Outreach should include young people (K-12 students) as well as tribal elders, leaders, and general membership.

Comments from tribal members shared during focus group discussions

Natural, beautiful places for traditional uses

- "We have an awesome forest land, we need forest management to maintain and protect our lands and forest."
- "Our cultural value is directly a part of Mother Earth, not separate in any way, spiritually connected".
- "The forest is our world, both spiritual and cultural."
- "The forest is us. The forest is the most important part of our future. We are planning to be here forever."
- "The value of a forest is our life. The forests and the people have been here together for thousands of years."
- "If we are not maintaining our forests, then that is a reflection of how we are living our lives."
- "More people are using the woods now, visiting for ceremonial and spiritual purposes."

Integrated management

- "The forest needs to be managed for multi-use. The BIA Forestry has only allowable cut and income in their eyes. It's a part of their performance evaluations. Don't harvest if timber prices are too low. Cutting timber to create jobs is detrimental to the forest. The timber will always be there for another time. Manage for species manipulation, spacing, insect, disease, fire, and subsistence."
- "Very disappointed in 10-year management plan. Seems to be just another document no one pays attention to. I have never seen an evaluation of what worked in the

previous plan and a critical evaluation of what needs improvement. Our huckleberry fields are less than desirable. Too many wild horses in forested area pushing out the deer and elk."

- "Is there a way (for the BIA) to measure success that doesn't punish tribes for non-timber forest management?"
- "As an Elder once said 'Fish grow on trees. Everything is part of a circle."
- "We have been here for eons. We have been sustained and have sustained. Everything is important. We must guard against missing links and pieces."
- "We must strive for economic sustainability in the whole community (tribal and non-tribal). The tribe has to be a leader in how things are managed. The tribe won't be successful without a successful larger community."

Self-governance and trust responsibility

- We could avoid future litigation about the land such as the one that is happening right now if the government kept their word and the natives buy their ancestral land and start respecting themselves."
- "Training and educating. Then we don't need BIA! We don't anyway (they encumber our efforts!)"
- "Our foresters are working on their days off in order to get things done- they should get paid better for what they do."
- "They (BIA) have a trust responsibility. The only thing missing is the trust."
- "Things are getting better but they are getting more complicated all the time."

Communication, tribal public involvement, education

- "I would suggest they make more effort to keep the tribal members informed on who runs forestry, what they are managing and for what reasons. I would like to know more about our Forestry program."
- "It seems like there are a lot of trees being hauled off. It would be nice to know where these trees are being taken, or what authorization was given. I am sure it is posted somewhere, but I do not feel I am informed, nor do I feel I know where to look."
- "Keep the Community educated and updated on all activities."
- "Teach our young people in schools to be aware of our beautiful land, to preserve it!"
- "Forestry could always do a better job of educating the community and explaining the reasons behind forest practices, but it takes time and staff to do this. It is hard for them to do this without resources or time."
- "Unfortunately, the natives are not teaching their future leaders (the children) about the importance of sustaining the land that we once used to respect."

Tribal youth – Mescalero Apache. Photo by Vincent Corrao.

The Indian Forest Resource and the Benefits It Provides

In order to gain greater understanding of the multi-dimensional benefits that Indian forests provide, the ITC requested that IFMAT III quantify economic, social, and ecological benefits provided by Indian forests to tribal and regional societies. This section addresses ITC question 2: Quantification of economic, social, and ecological benefits provided by Indian forests to tribal and regional communities.

"Our Land is What Makes Us Who We Are[12]*"*

Not counting Alaska, Indian lands once covering 2.4 billion acres are now reduced to 57 million acres, mostly in the West. A very small fraction of lands in Indian Country are in fee ownership (in which the owner holds title to and control of the property), but the vast majority are held in trust for tribes and individual Indians by the federal government. The Secretary of the Interior as the primary designated federal trustee of Indian Country, thus oversees the largest land trust in the world.

[12] Focus group comment from IFMAT I

There are 12 BIA Regional Offices that, for comparability to prior IFMAT reports, we have grouped into 5 reporting regions as follows:

Northwest – Northwest (Portland), Rocky Mountain (Billings), Pacific (Sacramento)

Southwest – Southwest (Albuquerque), West (Phoenix), Navajo (Gallup)

Lake States – Midwest (Minneapolis), Great Plains (Aberdeen), South Plains (Anadarko), East Oklahoma (Muskogee)

East – Eastern (Nashville)

Alaska – Alaska (Juneau)

On a total of 334 Indian reservations in 36 states, there are 18.6 million acres of Indian forests and woodlands. Of the total number of reservations, 305 have trust status and 29 are in fee ownership. Excluding Alaska, we find 18 million acres on 294 Indian reservations located within the contiguous United States and held in trust by the federal government. It is these lands and the forestry programs charged with their care to which IFMAT's inquiry directs its primary attention. Complicating Indian forestry further, however, are the thousands of fragmented, fractionated, and forested allotted lands that are owned by individual Indian families and are held in trust by the federal government, most often within reservation boundaries, and managed in conjunction with tribal forest trust lands.

Coastal conifer forest – Makah. Photo by Mark Rasmussen.

Diverse forest types: diverse benefits

Forest land and the resources it provides are very important to tribal people. Since the first IFMAT report in 1991, through dedicated programs of reacquisition, tribes have been able to gradually increase their cumulative forest holdings by more than 2.8 million acres. Tribal forests cover about one-third of all Indian trust lands and serve as the economic and cultural backbone for many Indian reservations. There is perhaps no other single natural resource as varied or as

important to tribal governments and their members. Forests store and filter the water and purify the air. They sustain habitats for the fish and wildlife that provide sustenance for the people. They produce foods, medicines, fuel, and materials for shelter, transportation, and artistic expression. Forests provide revenues for many tribal governments, sometimes the principal source of revenue, and sorely-needed employment for Indian people and rural communities. Forests provide a sense of place that sustains tribal lifeways, cultures, religions, and spiritual practices. These "ecosystem services" are perhaps nowhere more closely linked to community and cultural vitality than in Indian Country.

Tribal forests and woodlands are ecologically and geographically diverse, hosting representative samples of most of the tree species and forest ecosystems found in North America. They include, for example, Douglas-fir, western red cedar, and hemlock in the moist Northwest; giant sequoias and redwoods in California; ponderosa pine, lodgepole and larch in the Inland West; pine, pinyon, and juniper in the dry woodlands of the Southwest; aspen, maple, oak and white pine in the Lake States; eastern red spruce in the Smokey Mountains; and northern hardwoods and mixed conifers in the Northeast.

Of the 18 million forested acres on Indian reservations, six million acres are considered commercial timberlands, nearly four million acres are commercial woodlands, and more than eight million acres are a mixture of non-commercial forests and woodlands. More than one million acres of these forests have been set aside from harvest by tribal governments as cultural and ecosystem reserves.

Young hardwood forest – Eastern Band of Cherokee. Photo by Vincent Corrao

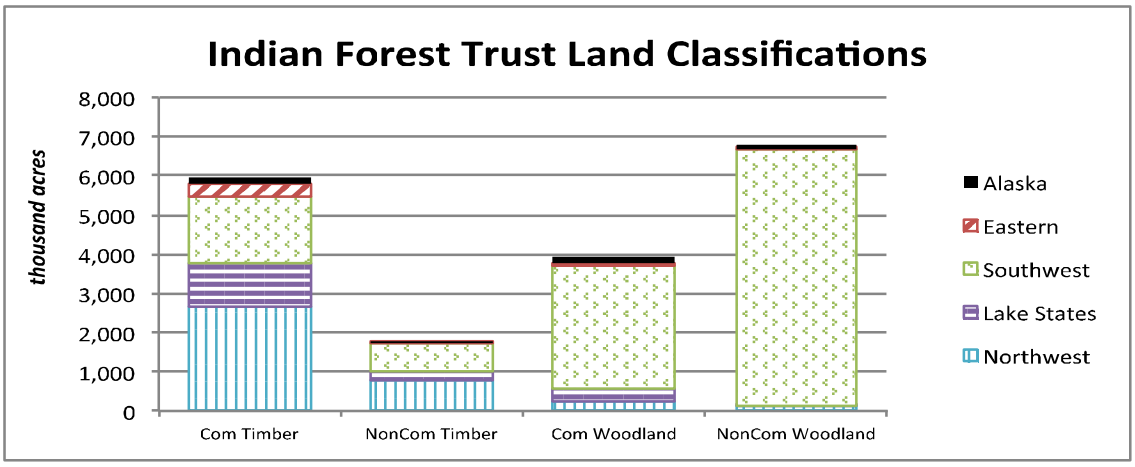

Figure IF.1. Forest classifications by region.

Table IF.1. Forest Classifications by acreage and region.

Indian Forest Trust Land Classifications by Region - *thousand acres*					
	Com Timber	**NonCom Timber**	**Com Woodland**	**NonCom Woodland**	**Total Acres**
Northwest	2,667	796	235	122	3,820
Lake States	1,091	193	359	5	1,649
Southwest	1,718	725	3,133	6,567	12,143
Eastern	311	30	11	12	364
Alaska	175	51	174	61	461
Total Trust Lands	5,963	1,795	3,912	6,766	18,437
Total Trust & Fee Lands	6,051	1,812	3,912	6,803	18,593

Table IF.2. Forest Classifications of trust and fee lands.

Indian Forest Land Classifications – *reservations trust and fee*			
Component	**Trust & Fee**	**Trust Only**	**Trust w/o AK**
Forested Reservations	334	305	294
Timber Only	124	99	97
Woodland Only	121	109	109
With Woodland	210	202	193
Indian Forest Lands – *thousand acres*	18,593	18,437	17,975

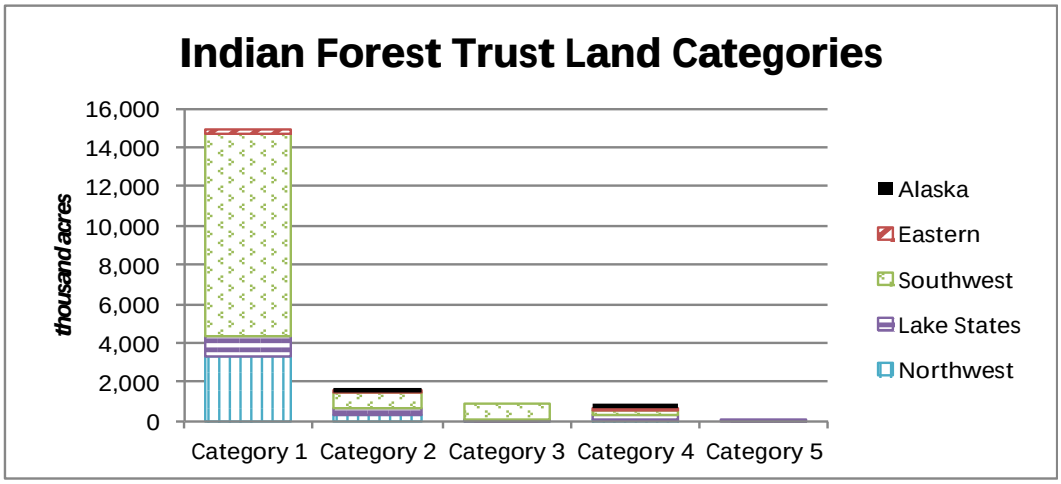

Figure IF.2. Indian forest categories and acres by region.

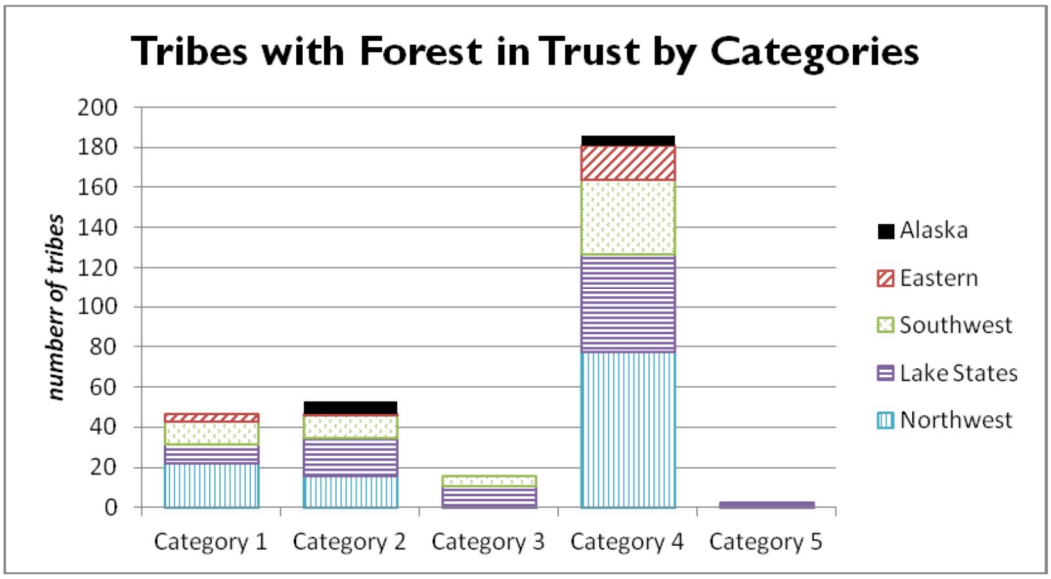

Figure IF.3. Indian forest categories and number of tribes by region.

The Number of Indian Forest Reservations in Trust by Category

Table IF.3. Reservations in trust by number and category.

	Category 1	2	3	4	5	Total
Northwest	22	16	1	78	1	118
Lake States	10	19	10	49	2	90
Southwest	11	11	5	37	0	64
Eastern	4	1	0	17	0	22
Alaska	0	6	0	5	0	11
Total	47	53	16	186	3	305

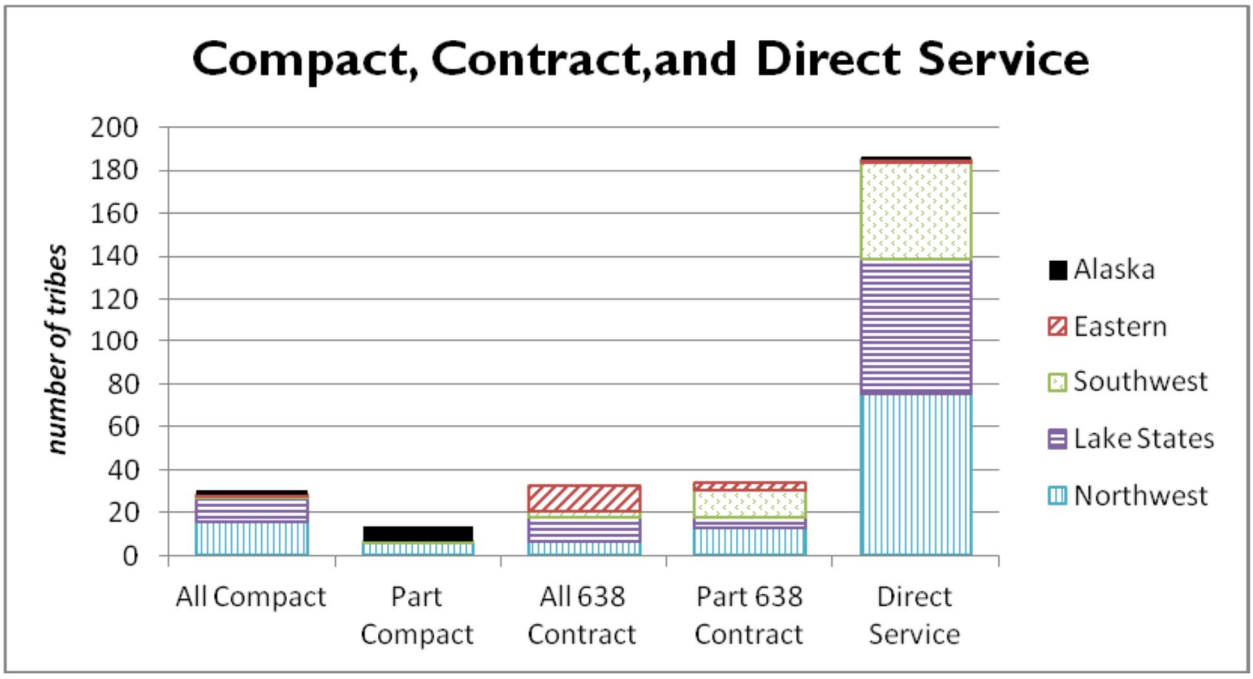

Figure IF. 4. The number of compact, contract, and direct service Indian tribes.

Table IF. 4. The number of compact, contract, and direct service Indian forestry programs.

The Number of Indian Forest Reservations in Trust Compact, Contract, Direct Service							
	All Compact	Part Compact	All 638 Contract	Part 638 Contract	Direct Service	Other	Total
Northwest	16	6	7	13	76	0	118
Lake States	11	0	11	5	63	0	90
Southwest	1	1	3	13	45	1	64
Eastern	1	0	12	3	1	5	22
Alaska	2	7			2		11
Total	31	14	33	34	187	6	305

Table IF.5. Changes in Indian forest lands from 1991 to 2011 by region and forest type.

1991 Region Acres	Commercial Timberland	Noncommercial Timberland	Commercial Woodland	Noncommercial Woodland	Total Acres
Alaska	259,417	2,917	305,189	106,805	674,328
Northwest	2,307,373	993,514	236,962	84,678	3,622,527
Lake States	1,019,116	277,514	274,455	0	1,571,085
Southwest	1,794,789	391,183	3,544,645	3,904,439	9,635,056
Eastern	300,027	25,233	20,000	0	345,260
Total w AK	**5,680,722**	**1,690,361**	**4,381,251**	**4,095,922**	**15,848,256**
Total w/o AK	**5,421,305**	**1,687,444**	**4,076,062**	**3,989,117**	**15,173,928**

2001 Region Acres	Commercial Timberland	Noncommercial Timberland	Commercial Woodland	Noncommercial Woodland	Total Acres
Alaska	181,566	52,602	191,035	89,477	514,680
Northwest	2,265,891	1,116,330	195,660	144,518	3,722,399
Lake States	1,045,152	233,751	214,658	4,092	1,497,653
Southwest	1,838,440	568,884	2,895,615	6,389,447	11,692,386
Eastern	248,196	59,069	22,228	6,400	335,893
Total w AK	**5,579,245**	**2,030,636**	**3,519,196**	**6,633,934**	**17,763,011**
Total w/o AK	**5,397,679**	**1,978,034**	**3,328,161**	**6,544,457**	**17,248,331**

2011 Region Acres	Commercial Timberland	Noncommercial Timberland	Commercial Woodland	Noncommercial Woodland	Total Acres
Alaska	175,329	51,169	173,992	60,860	461,350
Northwest	2,667,277	795,529	234,664	122,323	3,819,793
Lake States	1,091,373	193,197	359,089	4,882	1,648,541
Southwest	1,717,951	725,198	3,133,034	6,566,654	12,142,837
Eastern	311,039	30,258	11,033	11,654	363,984
Total w AK	**5,962,969**	**1,795,351**	**3,911,812**	**6,766,373**	**18,436,506**
Total w/o AK	**5,787,640**	**1,744,182**	**3,737,820**	**6,705,513**	**17,975,156**

Change 1991-2001	Commercial Timberland	Noncommercial Timberland	Commercial Woodland	Noncommercial Woodland	Total Change
Alaska	-84,088	48,252	-131,197	-45,945	-212,978
Northwest	359,904	-197,985	-2,298	37,645	197,266
Lake States	72,257	-84,317	84,634	4,882	77,456
Southwest	-76,838	334,015	-411,611	2,662,215	2,507,781
Eastern	11,012	5,025	-8,967	11,654	18,724
Total w AK	**282,247**	**104,990**	**-469,439**	**2,670,451**	**2,588,250**
Total w/o AK	**366,335**	**56,738**	**-338,242**	**2,716,396**	**2,801,228**

Timberlands

The estimated total standing inventory of commercial timber in Indian Country is 43 billion board feet (BBF). It is from the commercial timberlands that most of the income from harvest of forest products is generated. The Northwest has a scant 20 percent of all Indian forestlands but more than half of the forest inventory is located there. In 2011, two-thirds of total Indian harvested timber volume and 80 percent of the stumpage value came from harvest activities in Northwest forests. Although the Southwest has nearly 30 percent of Indian timberland and 80 percent of the commercial woodland, in 2011, harvest volumes were only two percent of the total Indian timber harvest and less than one percent of the stumpage value. The Lake States region, with 20 percent of the commercial timberland, produces most of the hardwood harvest: 25 percent of the total timber volume, and 18 percent of the stumpage revenue. Eastern forests contribute seven percent of the timber volume and three percent of revenue (BIA 2012a). While timber harvests occur in Alaska, primarily on fee lands owned by Native corporations, analysis of Native forestlands in Alaska is beyond the scope of this report.

A struggling world economy and consequent fall in log and lumber prices have had a significant impact on Indian forest programs and harvests. During the 1990s, harvest volumes averaged 800 million board feet (MMBF)/year. By 2001, harvest had dropped to 600 MMBF/year, due to the federal shift in funding from forestry to fire management as much as market changes. However, by 2011, Indian timber harvest fell to 360 MMBF/year, the lowest volume of timber harvested from Indian forests since the great depression (BIA 2012a, Newell et al. 1986). Stumpage returns in 2001 equaled $87 million but in 2011 dropped by more than half to $43 million. All Indian forest communities have suffered as timber has lost value, but the Southwest has been particularly hard hit with revenues from timber sales dropping to less than three percent of 2001 levels (BIA 2012a).

Double cut band saws - San Carlos Apache. Photo by Mark Rasmussen.

Losses in infrastructure

In connection to the decline in timber harvests, mill closures and job losses have swept through the forest industry and across the nation. FIA statistics show that since 2005, 1,009 sawmills, 15 pulp mills, and 148 other mills closed: together, 19 percent of all mills in the United States forest sector. U.S. lumber production has dropped b40 percent (Smith and Guldin 2012). For tribes that sell logs to scarce

and distant markets such loss of customers can be devastating. For tribes that operate milling facilities it can be just as bad (Morishima et al. 2011). Since 2001, ten Indian sawmills have closed, leaving just four that struggle to remain operating.

As timber revenues drop, economic consequences ripple throughout reservation economies. For instance, forest management deductions (FMDs) are assessed as a percentage deduction from gross timber sales revenue. Since these monies are used for stewardship activities such as tree planting, falling timber prices limit tribal abilities to practice forestry. When FMD shortfalls are made up from other tribal funds, programs such as student scholarships may suffer. When federal funding for tribes declines as well, cycles of reservation poverty and forest health decline are perpetuated.

Winter pulpwood harvest – White Earth. Photo by Larry Mason.

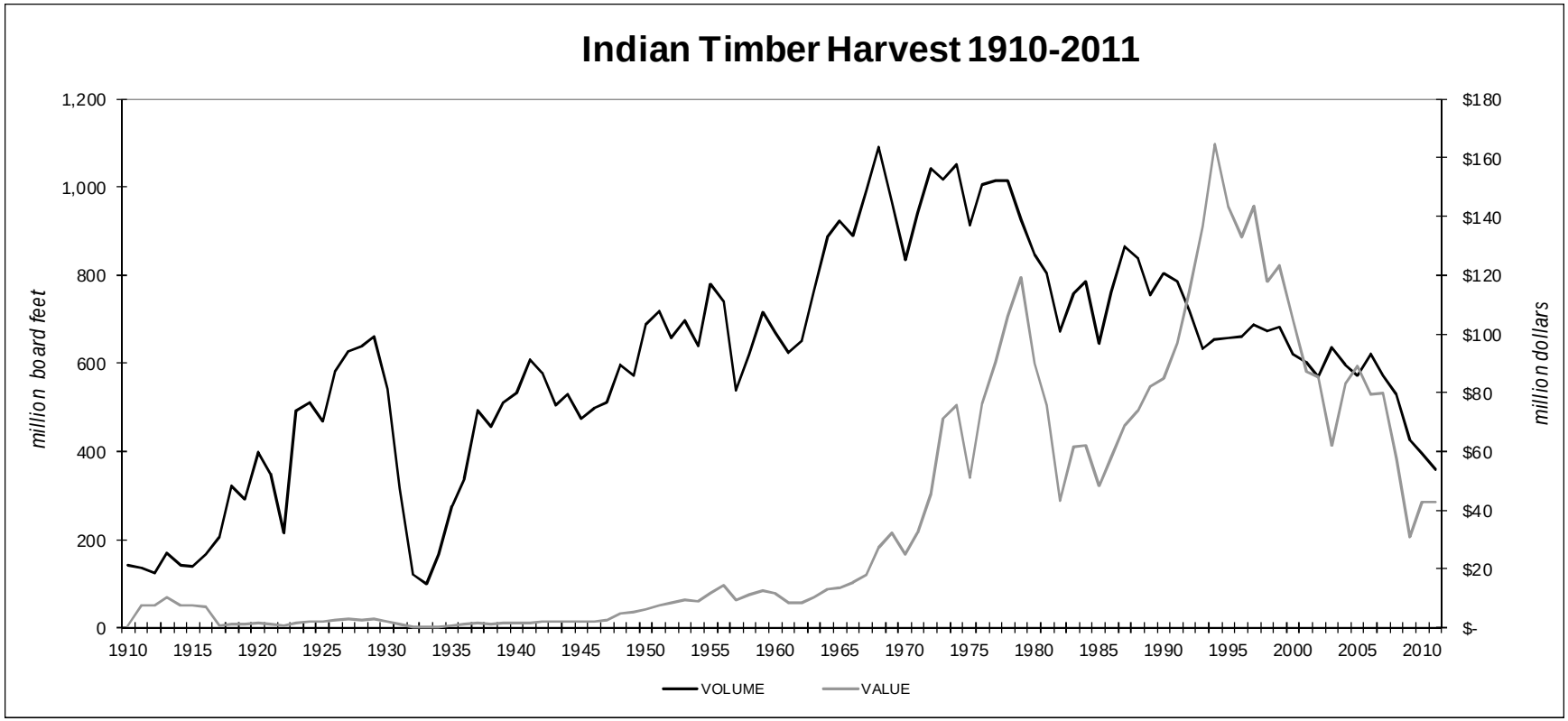

Figure IF.5. Indian timber harvest: volume in million board feet and value in million dollars of the day from 1910-2011.

The green chain - Mescalero Apache. Photo by Larry Mason.

Jobs

However, although tribal timber activities have slowed considerably, Indian forests remain a source of significant employment. Timber harvests extend high job and revenue leverage in part because of the labor-intensive nature of some Indian forestry practices, such as uneven-aged management and extended rotations. The BIA reported that jobs resulting from timber harvest in 1991 and 2001 were equivalent to 53 full- and part-time jobs for every MMBF of timber harvested (IFMAT 2003, 1993). These economic multipliers indicate that for 2011, Indian timber harvests generated 19,000 full- and part-time jobs suggesting a loss of more than 10,000 jobs in the last decade representing a reduction in community benefits of 38 percent from 2001 levels.

However, updated assessments of the regional impacts of Indian forestry, once provided by the BIA, have not been available for twenty years. Updated assessments of regional impacts would provide important information for evaluating investments in Indian Country.

In addition to forestry programs, the BIA Branch of Wildland Fire Management (BOWFM) oversees more than 60 percent of the DOI casual firefighter workforce, approximately 7,000 employees, many of whom are Native Americans, that are on call as needed for deployment to interagency wildland fire emergencies (BIA 2012b). The BIA and tribes jointly manage response resources including helicopters, air tankers, engines, and bulldozers. In aggregate, BIA received more than $160 million for wildland fire management in 2011 (BIA 2012c), which included fire preparedness, hazardous fuels reductions, suppression, and burned area emergency response (BAER) funds.

These BIA funds serve to protect people, wildlife, property, and forest ecosystems by providing resources for fire management programs, reducing the risk of fires, and protecting resources once fires start. On average, BIA obligates around $75 million per year for fire suppression alone. Because the incidence, magnitude, and duration of fires cannot be foreseen, however, suppression funds vary widely from year to year. For example, BIA use of fire suppression funds ranged from $52 to $89 million over FY 2007 through FY 2009 (OIG 2009).

Navajo fire crews. Photo by Dale Gilmore

Investments in thinning and hazardous fuels reductions keep forests healthy and resilient, helping to avoid stand-replacing crown fires with accompanying environmental and economic consequences, including pollution to the atmosphere. In 2011, Indian tribes and the BIA performed fuel hazard reduction treatments on 232,368 acres throughout the nation at a total cost of $40.3 million, an average of about $174 per acre (BIA 2012c). Hjerpe and Kim (2008) conducted analysis of the economic impacts of 2005 National Forest fuels reduction programs in the Southwest. Their results, which are consistent with studies from Oregon (Nielsen-Pincus and Moseley 2010), indicate that 16.7 jobs plus $705,000 in economic activity were generated from $1 million allocated to fuels reduction treatments. These numbers suggest that 2011 BIA

hazard reduction treatments resulted in close to 700 reservation jobs and $28.4 million in economic outputs.

Work projects that create employment for seasonal labor are welcome in jobs-starved reservation communities. For example, tree plantations on 15,600 acres of reservation lands in 2011 established new forests and generated around 10,000 person-days of employment (BIA 2012a, Larson 2006). However, there is much more to be done. The Indian Forestry Status Report (BIA 2012d), submitted annually to Congress as required by NIFRMA, indicates a backlog on Indian reservations of more than 750,000 acres in need of planting, thinning, or other stand improvement.

Tribal forestry programs are also seeing a need for their services on neighboring federal forests. Upwards of 80 million acres of overstocked forests are in need of treatment on national forest lands (Wilent 2012). Indian tribes and the USFS share nearly 3,000 miles of contiguous borders and sixty tribes have treaty rights that extend onto federal forests where culturally important resources need protection. The agency and tribes are more than just neighbors; they are partners with common goals for social, cultural, ecological, and economic sustainability (Forest Service 2012).

Wildfire

Federal forests at risk from uncharacteristically severe wildfires can pose significant hazards to tribal communities. For example, wildland fires that started on private and federal lands in Southern California in 2003 devastated several Indian reservations (NYT 2003), as did 2008 fires originating on federal lands in the ponderosa pine forests of the Inland West (NWCN 2008), and in the Southwest, where fires burned centuries-old cliff dwellings and destroyed about 6,000 acres and 63 homes on the Santa Clara Pueblo (Indian Country Today 2011). Because losses from wildland fire can threaten social and economic stability, tribes are seeking a more proactive role in partnership with federal neighbors to confront declines in forest health and reduce hazardous fuel loads under the authority provided by the TFPA. (U.S. Congress 2004).

Effects of fire on cultural resources - Coconino National Forest, Arizona from Kelly and McCarthy (2012).

A dramatic example of the effectiveness of Indian forest thinning occurred in 2011. On May 29, the Wallow Fire started on the Apache-Sitgreaves National Forest in central eastern Arizona. By June 6, it had burned 240,000 acres. Indian hotshot and hand crews began burnout operations along 45 miles of reservation roads and previously treated prescribed fire units on the White Mountain and San Carlos Apache Indian Reservations. When the fire hit the Indian fire line and thousands of acres that been previously treated to reduce fuel loads, it dropped to the ground (Jackson et al. 2011). By the time the Wallow Fire had reached its final size on July 8, it had burned 835 square miles in Arizona and 23 square miles in western New Mexico. Wallow was the largest wildland fire in Arizona history, but would have been bigger without Apache thinning and burning (Quester 2011). As importantly, a disproportionate number of acres outside of the reservation burned at unusually high severity for those forest types.

Heroes of such fire fights across the nation's public and private landscapes are the Indian fire fighters under the authority of the BOWFM. Since 1948, with the formation of the Mescalero "Red Hats" and the Southwest Indian Fire Fighters, thousands of American Indians have distinguished themselves as "fire warriors." Approximately one out of five forest and wildland firefighters today is an American Indian or Alaska Native. Firefighting remains a much-needed source of income for reservation families. Firefighting wages represent approximately one-third of the income Indian firefighters earn each year (DeJong 2004).

Red Hat firefighters on the lines in California, 1951. Photo by Oscar Shields; US National Archive (DeJong 2004).

High-severity crown fires cause significant environmental damage to forests, wildlife, and water quality. They also release large pulses of greenhouse gases, such as carbon dioxide (CO_2), into the atmosphere. Wiedinmeyer and Neff (2007) found that U.S. wildfires release volumes of

CO_2 equivalent to four to six percent of total annual U.S. emissions. On the other hand, healthy forests that are managed to avoid severe fires play an important role in global carbon cycling by absorbing carbon dioxide during photosynthesis, storing carbon above and below ground, and producing oxygen as a by-product of photosynthesis. In the presence of increased greenhouse gases in the atmosphere, healthy forests help to mitigate the effects of climate change by removing CO_2 from the atmosphere. Indian forests currently sequester approximately 400 million metric tons of CO_2 equivalent. Indian forest lands that are successfully managed to restore historic fire regimes avoid the high mortality and CO_2 releases associated with pathogens, insects, wildfires, and decay. If nascent markets for carbon offsets and other "ecosystem services" mature, the environmental contributions of Indian forests could become financial opportunities for tribes.

Woodlands

Little commercial timber harvesting occurs on the woodlands and non-commercial forests that account for two-thirds of all Indian forested areas. Eighty percent of these lands are found in the Southwest region. In total, 202 tribes have woodlands. For 109 of these tribes, woodlands are their only forests, but they are being neglected. The last report on the state of Indian woodlands was published in 1988, before concerns about climate change took on a sense of urgency (BIA 1988). Woodlands are semiarid ecotones at the margin between forests and rangelands; responses of vegetation to variations in climate changes are expected to be most rapid and extreme at these types of boundaries between ecosystems (Allen and Breshears 1998). Grazing practices (including the effects of feral horses) are having a negative impact on many Indian woodlands, juniper encroachment is altering surface water availability in some areas, and tribal elders are attributing changes in woodland vegetation and wildlife abundance to climate change.

Woodland landscape – Colville. Photo by Serra Hoagland.

The economic implications of woodland utilization, albeit generally overlooked, can be significant. Analysis of BIA free-use permits indicates that tribal members gathered 78,000 cords of firewood in 2011 (BIA 2012e). Tribal use of firewood instead of heating oil to warm their homes avoided a cumulative cost burden of more than $30 million (EIA 2012, Reeb 2009). Had they used heating oil, more than two and a half times the green gas emissions would have been released during combustion (Reeb 2009, Houck et al. 1998).

Non-timber forest products

A recent study, commissioned by the ITC, reported on opportunities to increase value returns and employment from Indian forests. The study team found that sensitive harvest of non-timber forest products (NTFP) had promise and aligned well with sustainable forestry (Morishima et al. 2011). For thousands of years, Native Americans have actively used many of the species that we now call NTFPs. Moerman (1998) reported that Indians used more than 4,000 species to create over 40,000 medicines, foods, shelter materials, baskets, and other subsistence and trade items. Contemporary recognition of the value of indigenous approaches to health and wellness has led to incorporation of many traditional plants and herbs into medicines. High regard for Native remedies helps create opportunities for Indian peoples to develop markets for health, herbal, and cosmetic products. Traditional tribal stewardship represents the earliest form of organic and sustainable management of forest ecosystems, adding further NTFP opportunity to take advantage of high-value "buy local" programs, organic food marketing, and direct-to-consumer "green" sales programs. Harvest, preparation, and sale of NTFPs provide low-cost entry to potentially rewarding business opportunities. BIA reporting, although dated, suggests that collection, use, and sale of basketry materials, range forage, berries, floral greens, and a host of other NTFPs generate tribal benefits equivalent to $8-10 million annually. Marketing both traditional and new forest products can provide individuals and businesses based in Indian Country with sustainable incomes from the forest, which could be critical during the cyclical fluctuations of timber markets. In addition, marketing of NTFPs could fit well with other tribal enterprises such as gaming and ecotourism (Morishima et al. 2011).

The list of NFTPs is extensive, including medicinals, forest botanicals, fresh floral, preserved floral, charcoal, aromatics, nuts, berries, roots, flowers, decorative woods, cones, seeds, Christmas greenery, chips, shavings, excelsior, sawdust, bark mulch, pine straw, firewood, syrups, wild game meats, honey, craft materials, mushrooms, native landscape plants, music woods, cultural and spiritual products, and more. Progress, however, has been constrained by limited access to start-up capital and a lack of available expertise in products marketing (Morishima et al. 2011).

Floral greens, big game, mushrooms, and biomass are but a few of the NTFPs available from Indian forests (Morishima et al. 2011). Images from the public domain.

Finding

Nearly two thousand individuals, Indian and non-Indian, some of who are directly employed by tribes and others that work for the BIA, earn a living keeping Indian forests healthy and productive. Thousands more find related income as contractors, workers, fire fighters, and service providers. Sale of reservation timber helps to support tribal governments and communities. The contributions to cultural identity, employment, and revenues, as well as subsistence and informal economies that are provided by forests, are uniquely important to Indian families as compared to the more transient and opportunity-rich broader society. Because of these ties, threats to forests, such as changes associated with climate change, are expected to be more severe for American Indians. In other words, although American Indians have contributed relatively little to the causes of climate change, they face disproportionate risks (Lynn et al. 2011). Traditional practices such as the gathering of traditional foods, medicines, and firewood, as well as grazing, hunting, and fishing that have been practiced for millennia are jeopardized. Economic ventures are also threatened, as well as future growth.

Recommendation

IF1. Establish a regular BIA state-of-the-resource report including assessments of marketing, economics, woodlands, and climate change that would incorporate a protocol for continuing data acquisition (with specific reference to NIFRMA questions). Existing federal agency examples of such assessments include the FIA, the Resource Planning Act (RPA) assessment, and the National Climate Center assessment.