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forest

WISDOM

forest guild national publication / summer 2010

in this issue:

Sustainability: A Foundation of Forest Ecosystem Services

Functioning ecosystems sustain human communities. The air we breathe and the water we drink are products of natural processes on which we all rely. The combined benefits people obtain from the natural world can be covered under the rubric of "ecosystem services." These vital services include supporting functions such as nutrient cycling or soil formation; products such as fresh water and fuel; regulating services such as flood or climate regulation; and cultural resources such as recreational, educational, or aesthetic opportunities.

Some ecosystems services have long been recognized and fit easily into existing economic paradigms. For example, timber is the property of the landowner, and its value is established by the market. However, many ecosystem services have not been considered private property. Often these non-market services have fallen under the category of public good in which everyone benefits but no one owns. Unfortunately, there are many examples of public goods that have been laid to waste in the proverbial "tragedy of the commons," when over use or exploitation leads to the destruction of the resource.

Governmental regulation is one solution to protect ecosystems and the services they provide. For example, the federal Clean Water Act was enacted to protect fresh water from pollution. Another approach to protecting ecosystems and the services they provide is to develop markets so that they can be valued in economic terms. New markets for carbon are a charismatic example of how a market can be developed for a public good. Ecosystem services markets are designed to compensate landowners for some of the public goods their lands produce and thereby encourage landowners to protect or enhance those services.

On March 19, Agriculture Secretary Tom Vilsack announced new details about the functions and objectives of USDA's Office of Environmental Markets (OEM) formerly the Office of Ecosystem Services and Markets. Headed by Sally Collins, OEM will work

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Making Good Forestry Pay

Dear Forest Guild members and friends,

It isn't news to anyone reading this that the recent economic downturn and declining forestry-related markets have had a negative economic impact on the forestry sector. If the current conditions persist and historic markets don't rebound, how do you make good forestry pay?

In New Mexico, where the traditional forest products industry left decades ago, the focus has been on building a forest restoration-based economy that is scaled to utilize small, low-value wood from forest restoration activities. This change to a restoration-based forestry economy holds promise but is slow to meet the ecological and economic goals of landowners and forest-based communities.

For some, forest biomass is seen as a way to offset land management costs and meet renewable energy goals. While biomass removal and utilization holds tremendous promise, caution should be used to ensure that biomass development is done sustainably. The Forest Guild has worked to increase attention being paid to the impact of biomass harvesting on forest health, water, and wildlife and has just released a set of sustainability guidelines to inform biomass harvesting for Northeastern forest types.

Markets for ecosystem services and benefits, including clean water, air, wildlife, and carbon, are also being looked to as a way to make good forestry pay. These developing markets matter to forestry professionals because they are a means of capturing the value of well-managed forests. And I would argue that Guild forestry is the best way to ensure that systems that provide ecosystem services and benefits are managed sustainably in a healthy condition.

This edition of *Forest Wisdom* explores the subject of ecosystem services through articles that address a wide range of small- to large-scale, potential and current paradigms. As new markets emerge, many questions remain about how services and benefits will be valued and what impacts these markets will have on the land. As we begin to develop answers to these questions, the Guild will remain engaged to ensure that the role of responsible forest stewardship is maintained.

Sincerely,

Michael DeBonis, Executive Director

Otter Brook Farm, Peterborough, NH
Photo by Charlie Koch

Ecosystem Services: Where's the Money?

by Charlie Koch

Late last fall and early winter, I was working for a husband and wife who were planning to place a conservation easement on their land to protect the land from future development. Their only payback would be for the donation on their federal income taxes. My job was to count the trees and come up with a timber liquidation value. The land appraiser was going to estimate how many house lots the property could be divided into if it were to be developed. I might be over simplifying, but it seemed that ecosystem values weren't going to be incorporated into the appraisal. Bare land value plus timber value plus development value equals full market value, right?

Prior to getting started with my cruise, the landowner gave me a natural resource inventory that had been compiled by an ecologist (one of the most comprehensive non-governmental documents I have seen). Most of the ecosystem values that we commonly talk about were included in the inventory: wildlife, wetlands, soil, aquifer recharge, natural communities, etc. Nary was a dollar sign seen throughout the entire document.

As I was cruising through a spruce swamp on the property that had no timber value (couldn't be logged) and no development value (couldn't be built on), my questions were and still are: what kind of values do we have here, and is there any way to attach a dollar value to them? The spruce swamp had tremendous wildlife habitat and wetland value, but I wasn't sure if what I considered a value had a dollar value. I kept coming back to these questions: Why shouldn't it? How come we couldn't attach a monetary value to those things that were addressed in the natural resource inventory? Are they something that we just talk about and manage for because we feel they are very important (one reason for being a Forest Guild member)? Are there specific and easy ways of attaching dollar values to them? My feeling is there isn't, or I wouldn't be writing about it. Hopefully, I just don't have the tools or knowledge yet.

When I asked the land appraiser how she identified and valued ecosystem services, she replied, "it's not an easy thing to do, given the variations in easement language, in markets, the newness of all of this, etc." She did offer her opinion that values for ecosystem services are currently not easily defined unless they are specific to a buyer/seller relationship, with the buyer being the wildcard. Her appraisal of this particular land hasn't been completed yet, but my feeling is that the landowner's donation value is going to be miniscule, making their

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Charlie Koch

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Family woodland owners own 55 percent of forests in the northern U.S.

Recognizing the Value of Forested Watersheds

by Todd Gartner and Margaret Munford, American Forest Foundation

Todd Gartner

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Margaret Munford

As conservation program coordinator for the American Forest Foundation, Margaret works on place-based conservation projects, strategic outreach, and public policy for family woodlands. mmumford@forestfoundation.org.

Forested watersheds provide two-thirds of drinking water in the United States as well as recreational opportunities, carbon sequestration benefits, and wildlife habitat. With increasing uncertainty in a changing climate, foresters and woodland owners will likely be required to manage for the adaptation and resilience of forests' natural benefits, also known as "ecosystem services." Loss of forests to development, such as suburban and exurban sprawl, also threatens perhaps the most important ecosystem service: clean water. Because many municipal water supplies originate in nearby watersheds, forests near metropolitan areas are often the most critically threatened. In the Northeast, family woodland owners own more than half of the forested land, making them key players in any conservation strategy that protects the water supply and other forest ecosystem services.

To address this emerging issue in private forest management, the American Forest Foundation (AFF), along with key partners, is developing and implementing a Northern Forest Watershed project that will financially recognize the value of forested watersheds to municipal and other downstream users. The goal for the Northern Forest Watershed project is to establish a new framework that will "broker" the sale of ecosystem services by private landowners to buyers such as municipalities, government agencies, land trusts, nonprofit organizations, and corporations. For example, conserving the water filtration functions of a healthy forest may prove cheaper than constructing a new water filtration plant.

The project will provide economic incentives and technical assistance for family woodland owners to restore, enhance, and protect aquatic resources in two critical watersheds in the Northern Forest region—the Crooked River in Maine and the upper Connecticut River in New Hampshire and Vermont. Each area is within a discrete forested watershed with significant family woodland ownership. The Crooked River watershed feeds

Sebago Lake, which in turn provides the primary water supply to the city of Portland, Maine. The upper Connecticut River watershed spans from the Canadian border to the town of White River Junction, Vermont. While both pilot sites have significant family woodland ownership, each has distinct qualities that illustrate a variety of common issues for connecting watershed users to family woodland owners.

Crooked River Watershed

In addition to recreational opportunities and providing habitat for the indigenous land-locked salmon, the Crooked River watershed directly affects the drinking water of Sebago Lake, which is the primary water source for Portland Water District, and delivers 25 million gallons of water to nearly 200,000 people daily. The city of Portland currently holds a filtration waiver from the Environmental Protection Agency, having demonstrated that the water meets federal requirements without filtration. If exurban development continues unabated, the city may lose the waiver, mandating an increased investment in a filtration facility. A proactive investment in forests now will help Portland keep its waiver and avoid far more substantial filtration and treatment costs. Because of the direct linkage between the Crooked River watershed and downstream users in Portland, the project will explore connecting the municipal utility as the buyer and family woodland owners as the seller of watershed credits.

Upper Connecticut River Watershed

The upper Connecticut River watershed differs from the Crooked River watershed example primarily because there is no single municipality recipient of the watershed services, and the watershed is mostly ground water (rather than surface water). The mainly rural population includes several small townships and a significant agricultural community. The users of watershed services provided in the upper Connecticut are more reliant on water for recreational use than for drinking water. The recreational opportunities in the upper Connecticut attract significant boating and fishing enthusiasts. These distinctions from the Crooked River will provide an opportunity to examine and determine the variety of possible avenues for watershed user engagement.

Project Implementation and Success

Technical advisory teams for each pilot site will develop the framework for actual transactions. For maximum participation and conservation benefit, we will explore a variety of different incentives for transaction, including direct payments (one-time, annual), cost share assistance, tax incentives, market access preference, and technical assistance to the woodland owners. Understanding the political, economic, social, and ecological context of each separate watershed will help advisory teams determine which incentives will work best.

Trading criteria are not yet defined, but will include an acreage minimum and a management plan approved by project partners. Family woodland owners will need to demonstrate long-term management actions that actively protect and enhance water quality and quantity, air quality, and sustainable land use. These management actions can include, but are not limited to: riparian buffer management, invasive species control, and adoption of forest road best management practices. Woodland owners will work closely with their foresters to implement the management plan and monitor management activities.

The permanent protection of watersheds also plays a critical role. Therefore, properties under conservation easement will be assigned a higher value as long as their owners implement appropriate riparian buffer and forest management activities. Currently, only 4.7 percent of the Crooked River watershed and 23 percent of the Connecticut River watershed are permanently protected under conservation easement. The project will include both the purchase and donation of easements.

By serving as a replicable model for other forested watersheds, we believe AFF's project will help ensure long-term protection and enhancement of forests and the multitude of services they provide. ■

Todd, right, speaks with a woodland owner about watershed management.

> "Conserving the water filtration functions of a healthy forest may prove cheaper than constructing a new water filtration plant."

Placing a Value on New Mexico's Forest Ecosystem Services

by Zach Grant and Dr. Zander Evans

*"Most films do use the landscape, the forest, the rangelands —and **yes,** without those — we would not get those films."*

Lisa Strout, Director
New Mexico Film Office

New Mexico's forests provide a wide range of benefits, from timber to wildlife habitat to clean water to carbon storage to beautiful vistas that draw visitors from around the world. This wide range of benefits can be summed up in the phrase "ecosystem services." Defining and valuing ecosystem services is difficult. However, establishing values for forests' ecosystem services, particularly non-market services, can help ensure they are protected. Moreover, the cost of converting forestlands to other uses is more obvious when a dollar value of all the services that forests provide can be compared to the value generated by potential land conversion.

We surveyed ecosystem services, both market and non-market, to bring attention to the many benefits of New Mexico's forests and provide a foundation for future work to more precisely define their value.

Timber

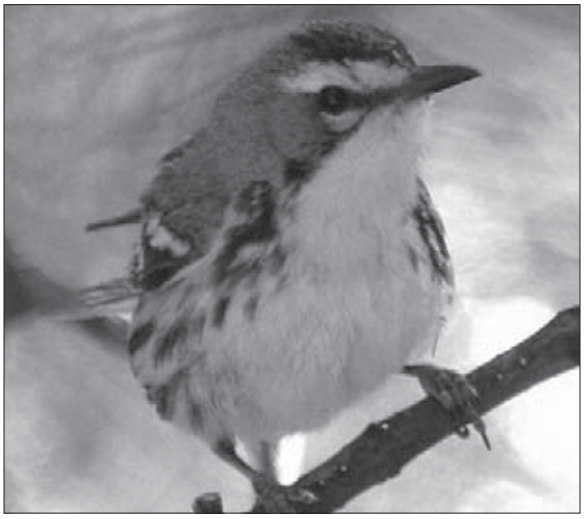
Timber is one of the most obvious products of New Mexico's forested ecosystems and has clearly defined market value. Although New Mexico's timber economy has declined steadily over the past two decades, as of 2002, it still provided economic value: $48 million in sales of both finished wood products and mill residues. Timber products and sales included lumber, mine timbers, and other sawn products ($34 million, 72 percent), vigas and latillas ($4.4 million, 9 percent); and mill residues and other products ($8.9 million, 19 percent).

Woody Biomass

Woody biomass from forests (low-quality wood that has not had a traditional market beyond firewood) has the potential to be a viable emerging market in the years ahead, due to increased concern about the cost of energy, carbon emissions, and wildfires. However, in New Mexico as well as many other areas, this potential is hampered by difficulty in setting up wood-to-energy facilities, inconsistent supply, and harvesting and transportation costs. Where markets are available, woody biomass can generate about $13 per ton, but often removal costs are anywhere from $37 to $2,500 higher than revenue from biomass. The wide range of costs is due to the broad spectrum of project conditions including distance of the site to the road, processing plant, or market, and the state of the local markets themselves. Biomass removal is often more economical as a by-product of sawtimber harvests. In areas like New Mexico that do not have existing biomass markets, the economic value of biomass will remain low until markets develop. However, low-value wood from forests has provided an ecosystem service for local firewood for centuries, and new markets may expand opportunities to use this material.

Tourism and Recreation

There were nearly 25 million tourists in New Mexico in 2005. Millions of these tourists were recreational visitors who came to New Mexico to: hike or bike (2 percent), hunt or fish (1 percent), ski and snowboard (1 percent), camp (2 percent), or participate in other adventure sports (2 percent). Overall, tourists spent about $5 billion dollars in 2005 and generated about 57,000 jobs. In 2003, 1.2 million people who came specifically to participate in outdoor recreation spent $160 million dollars and generated $288 million dollars in indirect spending. Many more visitors came to New Mexico



From top to bottom -
Ski Santa Fe, near Santa Fe, NM . Photo by Zander Evans.
Kayaking at Heron Lake, NM. Photo by Sara Bergthold.
Grace's Warbler seen in NM. Photo by Mark L. Watson.

for other reasons and enjoyed forests through activities such as rural sightseeing.

It is hard to disentangle the how much tourism (and how much of tourism's economic impact) is directly related to forests, but it is clearly a large value. A 2006 estimate of New Mexico's inventoried roadless areas amounted to $25 million dollars annually. This estimate pertains to just 9 percent of New Mexico forested area, so presumably the total recreational value of forests is much higher. State-wide, hiking and biking generated about $80 million dollars in 2005 while skiing and snowboarding produced about $480 million dollars during the 2007 – 2008 winter. A full accounting of recreation value would include all the leisure activities forest provide such as camping, rock climbing, river rafting, horse-back riding, wildlife viewing, and hunting.

Wildlife Viewing and Hunting

Wildlife viewing and hunting provides one way of assessing the economic importance of wildlife habitat as an ecosystem service. Nationally in 2006, about 71 million people spent about $46 billion dollars watching wildlife. In New Mexico, 787,000 people spent about $297 million dollars watching wildlife during 2006. The total economic impact of people who enjoy watching wildlife is as much as twice that value. Moreover, according to some scientific studies, even the existence of rare and endanger animals provides value in New Mexico and there is an intrinsic value in wildlife genetic and species diversity.

Nationally, hunters spent as much as $23 billion, and anglers spent $42 billion, though the total economic impact could be more than twice that value. In 2006, hunters spent about $164 million while anglers spent over $300 million in New Mexico. In New Mexico, in fiscal year 2006-07, more than 97,000 people bought big game licenses, 246,000 bought fishing licenses, and the Habitat Stamp Program collected nearly $850,000. The total economic impact of hunting in New Mexico in 2001 was estimated at about $342 million.

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Zach Grant

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A copy of the complete article including citations is available at the Guild website: www.forestguild.org/publications/research/2010/NM_ecosystem_services.pdf

Payments for Forest Carbon: an Emerging Ecosystem Services Market

by Rebecca Brooke

> "Developing a forest offset project requires targeted forest management along with the measuring and monitoring of carbon assets, data management, accounting, market analysis, and deal brokerage."

Editor's note:
This article has been excerpted with permission from Payment for Forest Carbon: Opportunities & Challenges for Small Forest Owners, written by Rebecca Brooke on behalf of The Northern Forest Center, Coastal Enterprises, Inc., and Manomet Center for Conservation Sciences 2009. This project is part of a five-year Northeast Forest Investment Zone (NFIZ) Project funded by the U.S. Endowment for Forestry and Communities. The Forest Guild is a NFIZ project partner.

Payments for carbon sequestration present an opportunity for small forest owners to gain a new revenue stream from their forests while reducing the impacts of climate change. Such payments also provide additional benefits: landowners gain a supplemental income that could help to make working forests profitable, preventing the need to sell or develop land; sustainable forest management is encouraged; and the public gains the many services that healthy forestlands provide, such as clean water, wildlife habitat, and open space. There is the potential for the entire Northern Forest region to benefit.

At the same time, small forest owners must be aware of the challenges that accompany forest carbon projects. Offset development can be complex and expensive. Given the high level of uncertainty regarding carbon regulation and fluctuating carbon prices, landowners should consider not only the potential return but also the financial risk associated with forest carbon projects. While government programs may be simpler to access and provide a more reliable return, these programs are just beginning to be discussed.

Looking ahead, there is both opportunity and uncertainty in the development of payments for forest carbon sequestration. Bringing a forest offset project to market involves multiple steps and a variety of skills. Developing a forest offset project requires targeted forest management along with the measuring and monitoring of carbon assets, data management, accounting, market analysis, and deal brokerage. The exact process varies depending on the specific project and offset standard, but a general outline of the steps and participants involved is included below.

Project Initiation

Small forest offset projects are generally initiated by a sub-aggregator or aggregator who market their

carbon aggregation programs through landowner meetings and workshops, websites, or direct mailings. If a landowner is interested in participating in a project, they submit an application with basic information about the forest and proof of ownership. Accepted applicants are offered a contract to complete the carbon offset project. This contract requires forest owners to follow the aggregator's specific program terms and the rules of the standard that will be applied to the project. Contract lengths vary from 15 years to 100 years depending on the standard.

Project Design Document

Project development requires the help of a professional forester and involves documentation of forest carbon characteristics and forest management in a Project Design Document (PDD). The exact requirements of project development vary widely by standard. The PDD includes information from:

1. A carbon inventory that measures the amount of carbon presently sequestered in different parts of the forest. This acts as a baseline against which future carbon sequestration is measured.
2. A forest management plan that provides guidelines for current and future forest management.
3. A sustainable forest certification that is normally obtained from the ATFS, FSC, or SFI. A project developer initiates landowner interest via workshops, mailings, etc.
4. Growth and yield modeling, which helps to determine the total carbon value of the land.

Carbon Pooling

Once the PDD is complete, the sub-aggregator or aggregator uses a data management system to organize multiple small offset projects into a larger carbon pool. In this context, a carbon pool refers to an electronic combination of the carbon sequestration potential from multiple small projects. Carbon pools are created in order to generate offsets that are large enough for market transactions. A forest carbon pool typically includes the carbon sequestration generated by at least 10,000 acres of forestland. Pooled projects typically share common characteristics such as geographic proximity.

Verification and Registration

An independent third-party verifier confirms the information in the PDD to ensure compliance with carbon accounting standards. The carbon pool is then registered, either through the marketplace where it will be sold or in the case of over the counter (OTC) sales, on a carbon registry that tracks the ownership of the carbon pool through all market interactions. Offsets increasingly pass through multiple owners (due to market speculation) before they are used to offset emissions and thus retired. Registries help to prevent fraud by making sure that an offset is only retired once.

Marketing and Sales

Marketing and transaction decisions are handled by the carbon aggregator or a broker on behalf of the entire carbon pool. Landowners are paid when a sale is made and after all fees and loans have been deducted from the gross revenue. Because forest offset projects sequester new carbon each year, carbon sales for a single project may take place as frequently as every year for the duration of the contract. Thus, a forest offset can provide an annual revenue stream for small forest owners. However, if carbon prices are low, an aggregator can also choose to wait to sell that year's carbon.

Monitoring and Auditing

After the sale of the offset, the forest owner must continue to monitor that forestland and ensure that carbon remains sequestered for the duration of the contract. Monitoring reports are required on an annual or semi-annual basis depending on the standard. Occasional carbon audits by a third-party double check these reports.

Costs and Risks

Developing a forest carbon offset can be expensive. Landowners are often, though not always, expected to pay for the up-front expenses in the project development phase including the carbon inventory, management plan, and sustainable forest certification.

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"Project development requires the help of a professional forester and involves documentation of forest carbon characteristics and forest management in a Project Design Document ."

At right - Close-up of a shitake mushroom. At far right - Freshly harvested mushrooms.

Cella Langer

Forest Guild members Cella Langer, above, and Laurel Thwinger, below, are both students at Warren Wilson College who have worked on the shitake mushroom project. Laurel is seen holding freshly picked shitake mushrooms.

Laurel Thwinger

Cultivating Shitake Mushrooms at Warren Wilson Forest

by Cella Langer and Laurel Thwinger

Founded in 1894, Warren Wilson College lies just outside of Asheville, North Carolina in the Blue Ridge Mountains. The school is home to 950 full-time, undergraduate students who all participate in a unique, triad-style education that includes academics, work, and service. Each student is required to complete 15 hours a week on a designated work crew. Started in 1979, our forestry crew's shiitake mushroom (*Lentinula edodes*) operation was one of the first outside of Japan to commercially harvest this valuable non-timber forest product. By using the by-products of hardwood thinnings produced elsewhere on campus, the crew started producing mushrooms in an old-growth stand. Since then, the operation has tripled in size. The current three-quarters-of-an-acre plot plays host to just over 1,500 inoculated logs.

The forestry crew inoculates the logs with several mushroom species such as shiitakes, oysters (*Pleurotus sp.*), reshi (*Ganoderma lucidum*), and lion's mane (*Hericium Erinaceus*), on any useable hardwood by-products. A major function of the operation is to transform otherwise wasted resources into a valuable educational experience and an economically viable forest product. Logs ranging from three to eight inches in diameter are cut into four-foot lengths. Oak *(Quercus sp.)* is the preferred growing medium for the shiitakes, while tulip poplar (*Liriodendron tulipifera*) is ideal for oysters. However, oak and poplar are not always readily available as by-products, in which case any available hardwood is used, including sourwood (*Oxydendrum arboreum*), cherry (*Prunus serotina*), and others. Logs are cultivated by placing "plugs" of mycelium-inoculated dowels into holes drilled into suitable logs.

Prior to 2007, the mushroom harvests were dependent on rainfall and moisture. A crew of two to four students visited the site daily between the spring and fall months to harvest any mushrooms. The harvests were irregular, and the quality of the product mediocre. When the operation was increased in size in 2007, 'forced fruiting' methods were implemented that entailed soaking colonized logs in livestock troughs filled with water provided from an on-site well. Upon removal, the logs would be pounded against large rocks and returned to their ricks for four to six weeks at which point the process is repeated. The intention of forced fruiting is to control and regulate harvests. By following a sequence of soaking and pounding, the colonizing mycelium is 'shocked', thereby producing the mushroom. A dependable harvest can be expected three to four days following this process.

Not only has the site transitioned from rainfall-dependant harvests to forced fruiting, but the actual arrangement of the logs has also been changed. The original layout of the site grouped the logs in a log cabin formation. The resulting microclimate allowed for more retained moisture, but the finished product was often damaged by pests and of a lower quality. Because the logs no longer rely on these microclimates, they rest on ricks in space-efficient, long rows.

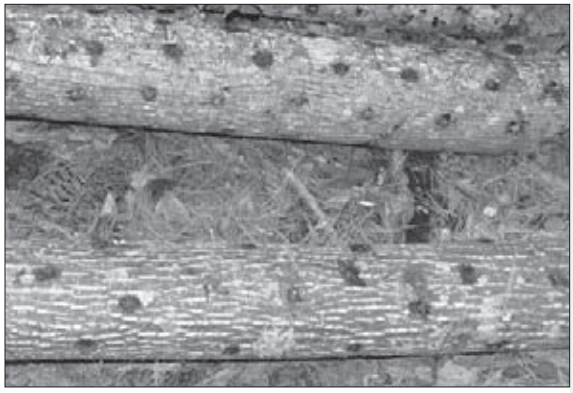
Since 2007, the actual volume of mushrooms harvested has increased significantly. In addition, the product is consistently cleaner and more aesthetically pleasing. The majority of the mushrooms are marketed directly to the Warren Wilson community, campus cafeterias, and local restaurants. Without the forced fruiting process, establishing a permanent relationship with many of our restaurant customers would not have been possible. Ongoing management of these sales also provides the students with an educational marketing experience.

While not directly applicable, the student work program may present a unique context for assessing economic viability and applicability for larger operations. At Warren Wilson, the crew is granted a budget in which fixed costs of the operation, such as mushroom spawn, are included, and labor is paid by the institution at a rate near minimum wage. If the crew accounted for labor and was not provided a budget, the current operation would not be economically viable. However, the production operates on an economy of scale. The crew intends to increase the number of logs by 50 percent in 2010, while yearly labor will remain at relatively the same. Fixed costs of spawn and inoculating labor are expected to increase by only 10 percent over five years, a 50 percent increase in profitability is predicted.

In all, the mushroom production and marketing operation at Warren Wilson College has demonstrated one potentially viable ecosystem service solution for woodland owners. ■

Warren Wilson College Forest.

Innoculated logs are placed on ricks for easy access for harvesting.



Logs are cultivated by placing "plugs" of mycelium-inoculated dowels into holes drilled into suitable logs.

Close-up of shitake mushrooms.

Valuing NM Ecosystem Services, from page 7

Photo above by Mark L. Watson

Water Quality

In the high deserts of New Mexico, water is particularly valuable because of its scarcity. In 2006, the Rio Grande Basin (the largest river system in the state) received 29 percent of its water from national forestlands. An estimated 0.33 acre-feet per year of surface-water flow originated from each acre of national forestlands in New Mexico. Expanding that estimate by the 16.7 million acres of New Mexico forested land in 2000 (including USFS, private/Indian Trust, Bureau of Land Management (BLM), state), as much as 5.5 million acre-feet of water flows from New Mexico's forests each year. At $17 per acre-foot, the value of water calculated in 2000 just for in stream flow, New Mexico's forests provide at least $93.7 million dollars in clean water. The curernt value may be significantly more.

Non-timber forest products & services

New Mexico's forests provide numerous other services for which prices could be developed and some that are probably impossible to quantify. For example, piñon nut harvesting is important both culturally and economically in the Southwest. While the BLM charges only $.25/lb for piñon gathering, the nuts sell for nearly 100 times that in the retail market.

Pollinators

New Mexico recently passed a bill recognizing the importance of pollinators, some of which make their homes in forests. Nationally, bees pollinate $15 billion worth of crops, and other insects provide up to $57 billion in ecosystem services through dung burial, pest control, and wildlife nutrition.

Carbon

New markets are also being developed for ecosystem services like carbon. It should be possible to estimate a monetary value to the 148 million tons of carbon stored in trees in New Mexico's forests, especially if new climate change legislation escalates the price of carbon. The nuts and bolts of valuing forest carbon is explored in more depth in the article on carbon forest offsets on page 8 in this issue.

Education

As outdoor learning laboratories, New Mexico's forests provide a valuable educational service for numerous children through in-school and extracurricular programs. For example, 860,000 boy scouts and others have visited the Philmont Scout Ranch in Cimarron, New Mexico. Outdoor, interactive education can increase student test scores, reduce discipline problems, increase teacher job satisfaction, and build resource stewardship.

Scenic vistas

New Mexico's forests provide a backdrop for its burgeoning film industry. "Most films do use the landscape, the forest, the rangelands – and yes, without those – we would not get those films." (Lisa Strout, Director of the New Mexico Film Office, 2009) So some portion of the $253 million spent by the film industry in New Mexico is due to the spectacular vistas and beautiful settings provided by forests.

Spirituality

Perhaps the most difficult ecosystem service to put a monetary value on is the spiritual or religious values that forests provide. As John Muir said "Everybody needs beauty as well as bread, places to play in and pray in, where nature may heal and cheer and give strength to the body and soul alike," (*The Yosemite* p. 256). New Mexico's mountains are sacred to many of the Pueblos and Native American tribes of the region. For example, Mount Taylor in west-central New Mexico was designated a Traditional Cultural Property in 2009.

Conclusion

Though it is difficult to establish the exact value of the ecosystems services New Mexico's forests supply, this review of the existing data demonstrates their importance. Clmate change and forest fragmentation will likely only increase the value of services such as water and carbon storage. Emphasis on renewable energy may increase the value of woody biomass from forest while the colony collapse disorder has raised awareness about the importance of pollinators. Hopefully, research will provide better estimates of these services' economic worth so that the full value of New Mexico's forests is acknowledged. ■

Where's the Money, from page 3

return on investment an altruistic rather than a financial gain. If that happens, I guess I shouldn't be outraged when a woodlot is carved clean of its trees, topsoil stripped, sand and gravel excavated, and houses built – the money is so easy to follow! What started out as my "rant" has turned into a "cry for help!" I don't claim to know much about any of this. I just counted the trees, but wouldn't it be easier to persuade people to care about marshlands, swamps, wetlands, water quality, the existence of a host of plant and animal species, and the beauty of the landscape if we could attach a dollar value to them? ■

Sustainability, from page 1

to carry out USDA's climate and rural revitalization goals by supporting the development of emerging markets for carbon, water quality, wetlands, and biodiversity.

"Environmental markets leverage private investments that result in cleaner air, improved water quality, restored wetlands, and enhanced wildlife habitat," said Vilsack. "These markets have the potential to become a new economic driver for rural America, exactly what we need to support a bold, creative future for America's farmers, ranchers and rural communities."

OEM will work across government and in consultation with experts and stakeholders to build a market-based system for quantifying, registering, and verifying environmental benefits produced by land management activities.

The Forest Guild's principles encourage the protection that ecosystem services aspire to provide by placing the highest priority on the maintenance and enhancement of the entire forest ecosystem. Management that maintains the health of the entire ecosystem, ensures that forests continue to provide a full range of services whether they are recognized by the market or not. ■

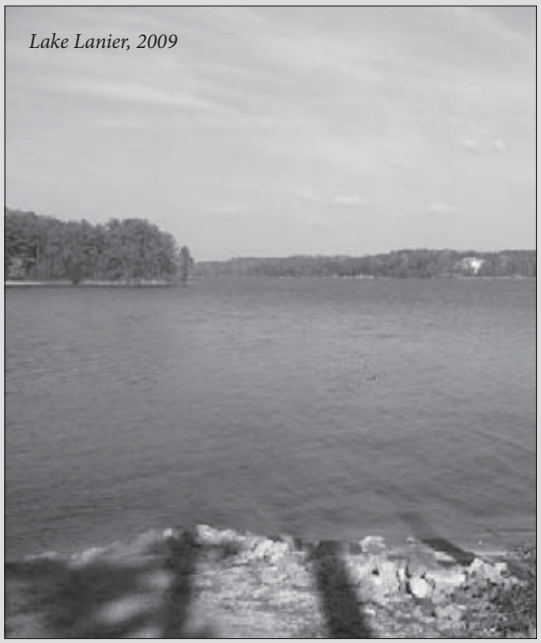
MISSION

The Forest Guild promotes ecologically, economically, and socially responsible forestry as a means of sustaining the integrity of forest ecosystems and the welfare of human communities dependent upon them. The Guild provides training, policy analysis, and research to foster excellence in stewardship, to support practicing foresters and allied professionals, and to engage a broader community in the challenges of forest conservation and management.

Above - Arcata Community Forest, Arcata, CA. Photo by Michael McDowell

Forest Stewardship and Water Quality

The Forest Guild is the recipient of a recent grant to identify and assess how sustainable forest management and conservation of forestlands in the Upper Chattahoochee and Upper Etowah watersheds can be an effective part of a long-term solution to water quantity and quality issues facing the city of Atlanta and North Georgia.



Lake Lanier, 2009

The connection between forests and water use is not always tension-free. In fact, in many areas across the U.S., water-related tensions are growing. Historically, Americans have paid little or nothing for municipally-supplied water from forested headwaters. Administrative costs for storing, purifying, and delivering water are calculated, but no value or cost structure has generally been associated with maintaining the watershed landscape itself. Generally, forestland owners have assumed the cost of clean, abundant water.

As water demand per acre of forest in the U.S. has increased by twentyfold in the past 100 years, water demand in Georgia has similarly increased. Municipal water consumption in Georgia is 528 million gallons per day. The Atlanta metropolitan area and North Georgia face a long-term water crisis in light of the recent drought combined with the July 17, 2009 ruling by Federal District Judge Paul Magnuson that Lake Lanier's water supply, a primary municipal water source, was not an originally authorized purpose of Lake Lanier, but rather was intended to be an incidental benefit of water released for the primary purpose of hydroelectric power. Judge Magnus's conclusion was that the current water supply levels exceeded the US Army Corps of Engineers' authority, and thus congressional approval would be needed for the Corps to allow Lake Lanier to continue to be used to meet current water supply levels for Atlanta. Although the judge's decision does not go into effect for three years, it is clear that long-term solutions to ensure a stable water supply to the Atlanta metropolitan area and throughout Georgia are required.

The Georgia Forestry Commission's July, 2008 report "Sustainable Forest Management in Georgia" declared, "With two out of every three falling raindrops in Georgia landing on forestlands, the sustainable management of Georgia forests is the most cost-effective measure in protecting area water resources for public consumption." In 2009, the Georgia Environmental Protection Division reported a decline in the extent of streamside forests across much of the state between 1974 and 2005 with the greatest losses in the Upper Chattahoochee (16 percent). Additionally, the Georgia Water Coalition Partners 2008 Water Report stated that safeguarding the headwaters of Georgia's river basins is vital to the protection of water quality, water quantity, and watershed health. ■

"Extensive fragmentation and degradation of forests, rivers, and other ecosystems have led to loss of biodiversity and ecosystem services... Worldwide, in terms of land-use change, it's estimated that the annual financial loss of services ecosystems provide such as water, storing carbon, and soil stabiliation is $64 billion a year."

United Nations
Global Diversity Outlook-3
May 2010

Forest Carbon Offsets, from page 9

In addition, the sub-aggregator, aggregator, and broker each are paid a commission from the gross revenue of the sale. Total project costs vary widely based on the size of the project, whether the forest owner has previously completed a forest management plan and sustainable forest certification, and the requirements of the project's offset standard.

Table 1 contains a list of expenses typically associated with a forest offset project. Some sub-aggregators and aggregators offer financial assistance to small landowners to cover up-front project development expenses. This is either in the form of a low-interest loan that is repaid through the revenue from carbon sales, or outright subsidization of expenses, usually funded through a philanthropic grant. It is also possible, though difficult, to find external investors in forest offset projects. Alternatively, buyers looking for specific project attributes (i.e. location, co-benefits such as conservation of wildlife habitat) may pre-finance a project. In general, larger projects tend to cost less on a per-acre basis because some costs are fixed. This means that larger projects are able to break even at lower carbon prices and thus carry less financial risk for the landowner. At $1.50 per ton (the CCX price in June 2009) most carbon aggregators estimated that at least 200 acres per landowner would be necessary for a forest offset project to be profitable. Clearly a solid financial analysis should be conducted before a landowner signs a contract and the project is begun.

Table 1

Cost Description	
Opportunity Costs	Foregone profits from harvests (through higher retention, longer rotations, etc.) or development.
Forest Carbon	Characterizes carbon forest pools, measures key carbon inventory fluxes, collects related data necessary to drive growth and yield models.
Forest Management Plan	Describes objectives and prescribed management actions for forest area, including a plan to measure and monitor carbon with quality.
Growth & Yield Modeling	Helps to value the carbon in the project through the manipulation of inventory data and the forest management plan.
Sustainable Forest Certification	Third-party certification that the forest is being sustainably managed. Most commonly obtained from the ATFS, FSC, or SFI.
Verification Fee	Third-party verification of information contained in the PDD is required.
Registration Fee	Most carbon offset standards have registries, which track the carbon pool through various transactions (re-sale of carbon offset projects is increasingly common) until it is retired, helping to prevent fraud.
Sales Fee	The CCX trading platform charges $0.20 cents per ton trading fee on all transactions. Carbon brokers also charge varying sales fees.
Sub-aggregator Fee	The sub-aggregator fee covers expenses such as education & outreach, application review, data management in the aggregation process, and general project oversight.
Aggregator Fee	The aggregator fee covers expenses associated with project development as well as market knowledge and deal brokering actions.
Monitoring & Auditing	After the initial establishment of a carbon project, the landowner must keep their aggregator updated on changes in forest carbon stocks. Auditing is undertaken to ensure that the landowner is fulfilling their contract and that carbon is being sequestered at the estsimated rate. ■

"Larger projects are able to break even at lower carbon prices and thus carry less financial risk for the landowner."

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Panoramic view of Lake Tahoe Photo by A. Romosan

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