



forest

WISDOM

newsletter of the forest guild / number three / december 2005



Mike Dombeck is professor and System Fellow of Global Conservation at the University of Wisconsin, Steven's Point . He formerly served as the Chief of the Forest Service and Acting Director of the Bureau of Land Management.

Water: The Forgotten Forest Product

My daughter, Mary, was a Peace Corps volunteer in a village in Mali. Each day she got a small amount of drinking water, which she had to purify, plus two buckets of water for bathing. We are far more fortunate here in the United States, a relatively water-rich nation. Yet even here, water restrictions have become the norm in some parts of the country — in the East, where supplies once seemed inexhaustible, and in the arid West, where a number of states, along with Mexico, routinely fight over the trickle from what is now the parched Colorado River.

Given such realities, I am puzzled that water rarely enters the debate as the Bush administration and interest groups argue about roadless areas, logging and forest fire management. For water is perhaps the most important forest product. Forests generate most of the water in the country, providing two-thirds of all the precipitation runoff — the water that comes from the sky — in the 48 contiguous states. Some 14 percent of all runoff comes from the roughly 192 million acres of our national forests, which take up only 8 percent of the land. According to the Environmental Protection Agency, more than 60 million people in 3,400 communities in 33 states rely on national forests for their drinking water. Millions more depend on state and private forests to facilitate the refilling of aquifers from which they draw their water.

Water and the National Forests

The National Forest System, because of topography, location, vegetation, and geology, has more influence on national water supplies, particularly in the West, than any other single entity. This makes National Forest lands the nation's largest and most important water provider.

Water and the National Forests, continued on page 2

in this issue:

Editor's Note:
Water Matters

3

Tribal Thinking:
Forestry and the New
Millennium of Water

5

Forestry in the New
York City Watershed

6

Are BMPs
Effective in Protecting
Water Quality?

10



forest WISDOM

forest guild / december 2005
newsletter number three

forest GUILD

P.O. Box 519
Santa Fe, NM 87504
505-983-8992
505-986-0798 F

Staff

Henry Carey

Executive Director

Fred Clark

Membership Coordinator

Rob Dryden

Accountant

Barbara Hoehne

Assistant to the Director

Eric Holst

Pacific Region Director

Eytan Krasilovsky

Community Forestry

Melinda Marrs

Graphic Designer

Robert Perschel

Northeast Region Representative

Orlando Romero

Community Forestry

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 the 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.

Water and the National Forests, continued from page 1

A century ago, President Theodore Roosevelt recognized the vital connection between forests and water. When Roosevelt and Gifford Pinchot, the first United States Forest Service Chief, set up the national forest system, they talked about managing for the greatest good for the greatest number — for the long run. This was in response to the cut-and-run era of timber harvests that left the United States with 80 million acres of denuded forests, mostly in the East and upper Midwest.



Pinchot believed that we ought to value forests for their “effect on the climate and floods, rainfall and runoff, springs and erosion.” The first Committee of Scientists, the National Forest Commission of 1897, recommended the establishment of 13 forest reserves for timber, water supply, and flood prevention. Watershed management is the oldest and highest calling of the Forest Service and a critical part of the Organic Act of 1897, which stated the purpose of federal forest reserves:

*To improve and protect the forest within the boundaries, or for the purpose of securing favorable conditions of **water flows**, and to furnish a continuous supply of timber.*

Yet in modern times, this connection has been lost. When I was Forest Service Chief in the Clinton administration, I participated in more than 100 Congressional and public hearings and fielded thousands of questions about forest policy. Then, as now, water rarely surfaced as a forest management issue. Yet water from our national forests has an economic value of

more than \$3.7 billion a year, according to a Forest Service report issued in 2000.

Over the past 50 years, the watershed purpose of the Forest Service has not been a co-equal partner with providing other resource uses such as timber production. In fact, watershed purposes were sometimes viewed as a “constraint” to timber management.

Relatively few of the national forests thoroughly address their original watershed purposes through forest plans. Water was typically considered in the context of stream corridor management, fish habitat, and to some degree water quality. This despite the fact that in addition to fishing and water-based recreation, over 3,400 communities rely on national forest lands in 33 states for their drinking water, serving over 60 million people. Assessment of the watershed conditions needed to maintain the ecological function of forests, provide drinking water for downstream communities, and enhance and sustain public forest values will be of paramount importance as we revise over 60% of our forest plans in the next few years.

The \$3.7 billion value mentioned above does not include the value of maintaining fish species, many other recreation values, nor the savings to municipalities who have reduced filtration costs because water from national forests is so clean. Nor does it account for the millions of visitor days where people are fulfilled by the simple act of walking beside a cool clear stream, river, or lake. Healthy watersheds that produce high quality water also provide for a long-term sustained yield of other goods, values, and services. Given the fundamental importance of water to all life on this planet it is arguable that the value of water is “priceless.” Who would have thought that today we would be paying more for this bottle of water than the cost of gasoline?

It comes as no surprise that the Bush administration has instituted new forest-management policies. New administrations always bring new policies. What's unfortunate, however, is that some of these policies effectively abandon Theodore Roosevelt's long-term goals.

Water and our National Forests, continued on page 4



EDITORS NOTE:
Water Matters

By Eric Holst

the forestry profession has an image problem. The root cause is related both to behavior and to deeply held perceptions that have built up among the interested public over decades. A restoration of confidence will derive from a combination of improved practices across the landscape and from a dedicated effort to show the public that foresters are managing forests in ways that benefit their values.

A precondition to this restoration process is an acknowledgment on the part of the forestry profession that forests – including privately-owned forests – are a public trust resource. To be specific, foresters can no longer provide lip service to their contributions to the public trust. We must explicitly acknowledge our responsibility to provide benefits both to landowners and to public at-large.

What benefits does the public expect? I recently conducted a review of public opinion research related to forests and natural resources on behalf of the Guild to get a better sense of what the public expects of forests and of foresters. My conclusion can be summarized very simply: “it’s the water, stupid.” Poll after poll, research

study after research study all reach the same conclusion. Americans value clean water above all other natural resources. Opinion research reveals also that the public understands the connections between water quality and forests and that they believe their values are threatened by forest conversion and poor forest management.

Clearly, further research is necessary to confirm and expand these conclusions. And clearly the public values other forest values including wood products, recreation, open space, etc. Nevertheless, this synthesis suggests that in order for the forestry profession to regain public confidence, we need to do a better job of addressing the public’s overwhelming concern with water quality. Many would argue that we are already doing a good job. After all, BMPs are in place in every state, compliance rates are generally strong and improving, and BMPs appear to be effective. But the response of the forestry community to water has generally been defensive and compliance-oriented; foresters have been too heavily focused on minimizing negative impacts and, to a large extent, have only grudgingly acceded to the Clean Water Act and other efforts to minimize and mitigate water quality problems.

The imperative for foresters at present is to go beyond complaining to demonstrate how excellent forestry can not only minimize impacts but also improve water quality in our rivers, streams, and municipal water supplies. But this imperative flies in the face of the following economic reality: with very few exceptions, water has no market value for forestland owners and therefore they lack any incentive to go beyond compliance.

With this issue of Forest Wisdom, the Guild seeks to fuel a dialogue within the profession and among members about how to “do better by the water.” This dialogue is beginning to gain volume, thanks in large part to former Chief of the US Forest Service, Mike Dombeck, who for the last several years has been reminding the forestry profession and policy makers of the central importance of the “forgotten forest product.” His message is being echoed more and more frequently, most recently by two

“Poll after poll show that Americans value clean water above all other natural resources.”



Eric Holst

is Director of the Pacific Coast office of the Forest Guild.

Water Matters, continued on page 4

National forest planning regulations should specify that the remaining old-growth public forests should not be harvested, since these wild lands provide the cleanest water in the country. Rather than wasting energy on the rancorous, tired debates about road building into remote wild places and old-growth forest management, the focus should be on how to let our forests do their job of producing high-quality water. Given our water supply problems, this should be the highest priority of forest management.

Getting Back to Basics

How will the decisions we make on the land today influence what we are remembered for one hundred years from now? That should be the question that guides every decision we make. What made Pinchot's young Forest

Service unique was a set of conservation values that were not always popular but were made in the long-term interest of land health. Jay Cravens, a Forest Service retiree, once offered me some advice on stewardship. He said, "Mike, just take care of soil and water and everything else will be OK." That sage counsel should guide our approach to watershed management.

In nature, there is a direct connection between the forest and the faucet. Our challenge is to build human understanding into that connection. Forests are vital to this country's water supply. Water is perhaps the most undervalued and underappreciated forest product. Watershed health and restoration should be the overriding priority for forest management. We can leave no greater gift to our children than to leave the watersheds entrusted to our care healthier, more diverse, and more productive. ■

prominent western forestry professors, Jerry Franklin and Norm Johnson, who declared in a recent publication that "the maintenance of a well-regulated high-quality water supply will be the most important function of forests in the 21st century."

If this is true, what are the implications for foresters? Should on-the-ground forestry practice change to respond to the public's demand for cool, clean water from forested watersheds?

What practices should be more prominent? Which should be discouraged? Can we create markets to help create incentives to drive this change? These are the questions that we are asking but certainly not answering through this issue of Forest Wisdom. ■

Footnotes:

1. See www.uwsp.edu/cnr/GEM/dombek.htm for several examples of Dombek's writings and speeches.
2. Franklin, Jerry and K. Norman Johnson. 2004. Forests Face New Threat: Global Market Changes. *Issues in Science and Technology*. Summer 2004 (www.issues.org/issues/20.4/franklin.html)

John Mount, Forester, Southern California Edison Forest Type: Westside Sierra Mixed Conifer

The 20,000 acres of forest land that I manage were entirely harvested prior to modern forest practices. All of the roads were located before 1950 using standards that would be unacceptable today. While this does create some problems, we use all the current guidelines of erosion control structures and have been very successful in maintaining our lands and preventing soil movement into our streams and lake. Uneven aged management, rolling dips, waterbars, outsloping of seasonal roads, and locked gates during winter months are just some of the preventative measures taken by Edison Forestry to prevent soil movement and enhance water quality.

Paul Carlson, Executive Director – The Land Trust for the Little Tennessee, Franklin, NC

Forest Type: Southern Appalachian hardwoods

In the moisture-rich southern Blue Ridge Mountains residential development surrounding headwater streams and in riparian zones is the principal threat to water quality. While the State of North Carolina is demonstrating extraordinary vision by investing tens of millions of dollars annually to purchase land and conservation easements to protect waterways and watershed areas, current policy is that "benign neglect" will be the only acceptable management approach in these protected areas, even in the face of unknown future forest health issues. A key conservation challenge is how to promote forestry as the "highest and best use" of these areas.

“Water from our national forests has an economic value of more than \$3.7 billion a year.”

In this issue we introduce:

Wisdom from the Field

a series of brief notes from practicing foresters describing their management approach to protecting water resources.



TRIBAL THINKING:

Forestry and the New Millennium of Water

By Bill Wilkinson

Jared Diamond, in his recent book *Collapse*, identifies deforestation as one discrete factor that has contributed to the failure of civilizations over the centuries. He observes that most people involved in deforestation seemed to be aware that what they were doing was in some way harmful, if only for the loss of wood as their primary building material. But in each of these societies, a more harmful consequence of deforestation was the degradation of the water supply. A society becomes poorer when it loses wood for building materials, firewood for cooking and heating, and suffers depletion of its water supply. Add a few more negative factors, such as the inability of outside populations to aid struggling ones or over-investment in military ventures, and a society eventually collapses. Interestingly, concomitant with the onset of their collapse, all the societies Diamond describes had reached their zenith in terms of population, societal complexity, power, and wealth.

Diamond also describes several cultures that recognized their potentially fatal stressors and adapted their cultures so as to alleviate the problems, and therefore survived. Japan, for instance, was able to institute a policy of wide-

spread forest protection in the 1500s, making it today the most forested of the industrialized countries. In spite of wood imports from countries where deforestation is rampant, the Japanese have maintained a forested landscape for five hundred years that holds the soil in place and is a font of pure mountain water.

Timber Culture, River Culture: A Clash of World Views

Working from 1986 to 2000 as a forester on the Hoopa Valley Reservation, I had a front row seat for the collision of two cultures. For the first three of those years, I worked as Assistant Silviculturist for the Bureau of Indian Affairs. I arrived during an era in which the BIA was aggressively applying intensive, “scientific” forestry to the productive forest landbase. Reacting to an earlier era of “chopper’s choice” highgrade logging, the BIA Forestry Department at the time was ubiquitously clearcutting, windrowing, burning, and planting. The BIA had also been spraying herbicides, in direct opposition to the will of the Tribal Council, which ultimately banned the practice. Stream buffers were basically non-existent, and

“Working as a forester on the Hoopa Valley Reservation, I had a front row seat for the collision of two cultures.”



Bill Wilkinson

is a founding member and associate with BBW Associates, a forestry consulting firm, in Arcata California. He previously served as Timber Management Officer with the Hoopa Valley Indian Reservation.



Kevin Brazill

is the Forestry Program Manager for the Watershed Agricultural Council in Walton New York.

THE FORGOTTEN FOREST PRODUCT

*Forestry in the New York City Watershed;
Private Lands, Public Benefit*

By Kevin Brazill

across New York's Catskill Mountains and lower Hudson Valley, hardwood forests spread for hundreds of miles on each side of the Hudson River. The woods – owned mostly by private landowners – fuel the local wood-based economy, provide sanctuary to homeowners and wildlife, and supply over 10 million New York City metropolitan residents with clean, unfiltered water. Roughly 1.3 billion gallons of water pours into the city everyday – 90% of it coming from deep reservoirs in the vast Catskill/Delaware watershed, west of the Hudson.

In the early 1990s, the US Environmental Protection Agency mandated that New York and other large American cities filter their water or implement watershed protection measures to ensure a safe drinking water supply. Rather than pouring billions of dollars into building and maintaining a series of filtration plants, the New York City government proposed regulating upstate dairy farms and forestry operations to prevent non-point source pollution – in the forms of cow manure and skidder-drag – from fouling upstate streams.

Those rumors of regulation fueled an already deep resentment among upstate New Yorkers toward the city's government. After all, many upstate towns were displaced – graves exhumed, homes moved, farms eliminated – when reservoirs were built from the latter 1800s through the 1960s. With the prospect of losing their rural lifestyle and economic livelihood fast becoming a reality, farmers and community members came together to fight the city.

After years of conflict, a resolution was reached and in 1993, the not-for-profit Watershed Agricultural Council (WAC) incorporated and began using city dollars to develop whole farm plans on regional dairy operations. Since then, the Council has added a conservation easement program and a forestry program to continue implementing voluntary incentives to keep working farms and forests productive and clean.

The WAC Forestry Program

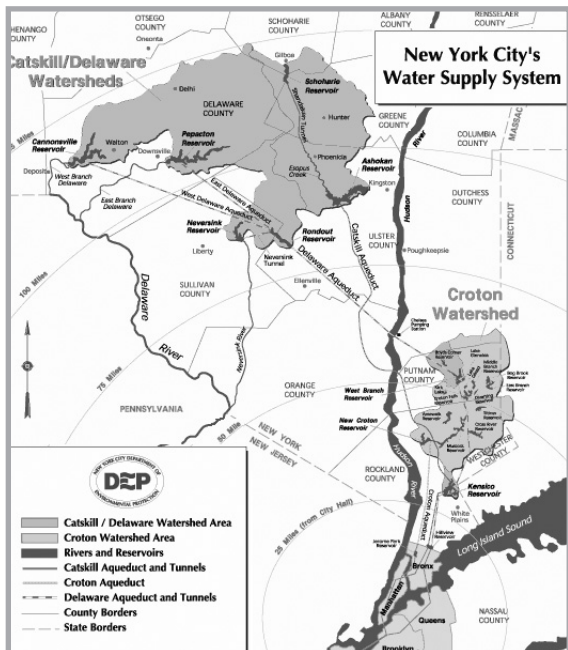
What began in 1997 as a two-person operation charged with helping landowners plan their forests' future has grown into a program that employs six foresters and natural resources professionals. Overseeing the operation is a diverse committee vested in the future of New York forestry. Today, the WAC Forestry Program is a multi-million dollar land planning, forestry education, and economic development initiative that serves as an international model for public-private partnerships.

The WAC Forestry Program receives nearly equal amounts of funding from the New York City Department of Environmental Protection and the USDA Forest Service with priceless technical expertise from both agencies and the New York State Department of Environmental Conservation. The Forestry Program trains foresters in riparian management and sediment control and then adds them to a select list of "Watershed Qualified Foresters." This elite group can receive funding to write forest management plans for private woodland owners in the New York City watershed. Management

“*Rather than pouring billions of dollars into building and maintaining a series of filtration plants, New York City proposed regulating upstate dairy farms and forestry operations to prevent non-point source pollution.*”

plans include a host of features to help the landowner become a better steward. Always voluntary, these plans serve as the springboard for landowner and forester involvement in the WAC Forestry Program.

To date, nearly 500 plans have been written by Qualified Foresters covering over 90,000 acres. Once a landowner has an approved plan, funding opportunities to improve forest roads, install timber harvest roads, and implement plan prescriptions are available. The program encourages sustainable timber harvesting for



New York City draws its drinking water, among the cleanest in the nation, from two upstate forested regions: the Catskills and the Croton watersheds.

the following reasons: 1) regular harvests ensure a constant wood supply for the local economy, 2) growing trees absorb nutrients more quickly than decaying trees, thereby reducing nutrient loads in water flowing through forests, 3) many timber harvesting techniques improve wildlife and tree species diversity, and 4) revenue gleaned from timber harvests can help lower property taxes, thereby reducing parcelization and fragmentation of forests.

To bolster the planning and implementation initiatives on private woodlands, the WAC Program also has a strong economic development component that grants dollars to local

wood-based businesses. Since 2000, more than 75 companies have received over \$2 million to retool, hire apprentices, market, expand, and improve safety. These dollars – provided by the USDA Forest Service – help to ensure that markets exist for the wood harvested from watershed woodlands.

Finally, much of the WAC Forestry Program's mission revolves around educating people – landowners, loggers, foresters, students, and government decision-makers – about the benefits of sound forestry and its relationship to clean water. Without landowner buy-in, student bus tours to the reservoirs, and the WAC's three Model Forests the Forestry Program would not be able to meet its goals.

Successes and Challenges

Throughout its first eight years of operation, the WAC Forestry Program has experienced its share of successes and challenges. Success lies primarily with its partner and contracting agencies and Watershed Qualified Foresters who help sell the program to its target audiences. From small not-for-profit groups like the Catskill Forest Association to large universities like the SUNY College of Environmental Science and Forestry in Syracuse, NY, reaching landowners, educating loggers, and bringing all the disparate groups together at Model Forest sites has made a difference in changing attitudes toward forestry.

Most of WAC's forestry challenges have come at the urban-rural interface, in the Croton Watershed east of the Hudson River. There, WAC foresters have had to work harder with its partnering agencies to convince people about the value of actively managing timberlands. In October 2003, a proposed Model Forest in Putnam County was fiercely opposed by a small group of local individuals. Since that time, WAC foresters and their partners have worked hard to tailor the project to fit community needs while maintaining the integrity of the Model Forest established to educate and provide space for diverse ecological research. ■



Much of the WAC Forestry Program's mission revolves around educating people about the benefits of sound forestry and its relationship to clean water.

To learn more about the Watershed Agricultural Council and its many land conservation and economic development programs, visit the website: www.nycwatershed.org. There, visitors can take a virtual tour of the Frost Valley Model Forest, read about the skills of various Watershed Qualified Foresters, find a primary and secondary wood products directory for the region, and learn more about urban kids touring the forests that filter their water.



Guild member Linwood Gill testing depth to armor layer in Flynn Creek, CA.

the goal appeared to be to turn every available acre into a tree farm. Although these practices didn't match my more conservative viewpoint, all the folks I worked with in BIA Forestry were highly motivated professionals, and I learned a great deal from their friendship and tutelage.

It wasn't long, however, before I realized that the Tribe itself was suspicious of BIA practices and motives. Before I arrived, conflicts over herbicide use had heightened tensions to the point that the Tribe established its own "shadow" forestry department to monitor BIA activities, and, where possible, directly conduct operations such as geological reconnaissance and fisheries assessments, as a contractor to the BIA. The entry of Tribal Forestry folks into the process of forest management and planning was wrenching for many BIA managers because they were forced to consider issues from other perspectives.

But an even larger change was in the works. In 1989, a long-overdue act of Congress gave the Hupa Tribe (Hoopa is the place, Hupa the people) control of their own reservation for the first time since its establishment. The tribe soon assumed management of their forest resources. The "shadow" forestry department had become the official forestry department and I was lucky to be offered a job as a tribal employee, working in the same capacity as before.

The head of Tribal Forestry, Gary Risling, took over the position of Forest Manager. Gary was an energetic, college-educated tribal member dedicated to putting a tribal stamp on reservation forest practices. Under Gary's direction, the tribal forestry department, including fellow Guild members Greg Blomstrom and Mark Lancaster, began to develop a new forest management plan. During the next couple of years, the tribe developed a linear program and conducted extensive stakeholder consultations with the tribal elders' Cultural Committee. With the collaboration of many departments and individuals, the new plan began to take shape. As the prescription silviculturist, I began to implement the silvicultural elements of the plan even before it was approved, expanding the "Res" silvicultural horizons beyond the clearcutting paradigm.

One thing became apparent early in the planning process: a much stronger emphasis would

be placed on water – particularly the protection of watercourses and management of fisheries. The Hupa like most Indians of Northwestern California belong to a riverine culture. In addition to acorns, their aboriginal staple is anadromous fish, particularly salmon. By the late 1970s the fisheries resource had declined so drastically it seemed on the verge of disappearing.

Tribal Forestry calculated that the allowable cut of 14 MMBF/year would have to decline to around 10 MMBF, if buffers for streams and landslides, as well as cultural areas (which had been heavily damaged under the BIA) were set aside or only lightly managed. Although the Tribe is largely dependent on timber income, tribal members, with few exceptions, accepted this significant loss of production.

Before European contact, the local Indian tribes had evidently solved their environmental problems. There appear to have been no major obstacles on the horizon to them continuing to live for several thousand more years in cultural patterns that would only slowly evolve. One might characterize the pre-contact way of life as operating in a circular fashion: religion was part and parcel of daily life, every activity was guided by ritual, and the social calendar was arranged according to the round of dances that maintained the belief system of world-renewal. Likely, most tribal members expected the world to keep turning as it always had, with little sense of progress, or even time, as Westerners perceive it.

The mindset of the BIA was just the opposite. Its goal was to help acculturate Indians into a Western point of view and get them moving into the future. The BIA foresters with whom I worked felt they could see the future, and were confident that their practices would, in the end, give the Indians what they really needed: a sustained income that could help them achieve economic security in the money economy.

As a Western thinker, the idea of progress is inherent in the way I perceive the world. At the same time, as a practicing forester in a natural forest management environment, I regularly consider what might happen decades and centuries ahead. Land managers are inherently

“The mindset that allows for deforestation and encourages illegal logging for short-term economic gain is, to me, the farthest thing from conservative.”

conservative. And, though I'd likely be considered moderate politically, I'd like to see some *genuine conservative* thinking applied to forestry. The mindset that allows for deforestation and encourages illegal logging for short-term economic gain is, to me, the farthest thing from conservative.



Toward Water Catchment Forestry

At Hoopa, we started with a narrow but energetic western mindset determined to wring maximum economic return from a landbase. That mindset was strongly modified by points of view coming from an ancient, stable, indigenous culture. Water, in the end, was more important to the Tribe than production of timber. Maintaining good-quality water and managing for fish was felt by tribal members to be interlinked with their survival as a culture.

Since forests are vital in maintaining a healthy hydrologic cycle and water is our most valuable commodity, one would think that clean and clear water might, as at Hoopa, be considered the highest and best end product of forest management everywhere. But maximizing timber production still tops most foresters' priority lists. The Guild, however, has required its members to think about these things. The First Duty Principle forces us to think about the forest before the timber. What if, as a thought, we tried to see the world like the Hupa tribal elders? What if we thought of our practice of forestry as primarily aimed at developing and maintaining healthy forested water catchments across the landscape? This might be a perspective more attuned to a new and challenging millennium in which water will be critical for

the maintenance of society as we know it, and far more important than timber. If the owners of the forests we manage directed us to manage for water first, timber second or third, could we adapt, or, like the BIA foresters at Hoopa, would we continue to operate through "informed denial?"

The Land -- and Water -- Ethic

Is a forester who manages primarily for maximum sustained production of clean water still a forester? I would argue yes, since, in my mind, a forester is not just a timber manager, but also the caretaker of all aspects of a forest. All foresters are a wee bit hydrologist, a wee bit wildlife biologist, geologist, engineer. But we're the *only* profession that's charged with nurturing the forest: manipulating — or choosing not to manipulate the forest in order to meet societal goals. Our profession is unique in that it requires scientific knowledge to be combined with experience, and that synthesis to be physically applied across the landscape.

I wonder whether the forestry profession might have a better shot at selling its services to the public if foresters articulated their primary goal as protection of water catchments and production of maximum, clean water, with timber management being an essential but secondary element of that management. We might even be perceived as one of the more critical professions needed to stave off the impending collapse of our Westernized global culture. The Shoguns of Japan demanded forest protection and management, thereby avoiding the impending collapse of their society. Can our global population support such an effort now, especially since it's clearly in everyone's best interest?

To help articulate a vision, we forest stewards might proclaim the New Millennium as "The Millennium of Water." Given the necessities of the upcoming and more crowded generations, wouldn't that be a worthy goal, and one in which foresters, most naturally, could lead the way? ■

Darcie Mahoney -
Consulting Forester, Elk, CA
Forest Type: Coastal Redwood/
Doug Fir

To me, watercourse protection is very simple: keep shade on the water and within the riparian area, and keep dirt out of the creek. However you can accomplish that should adequately protect water quality. My usual prescription for water quality protection includes (in addition to the California Forest Practice Rules): leave at least 75% of the conifers and 75% of the other trees within the watercourse protection zone (the zone is slope-driven and may exceed that of the Forest Practice Rules). No trees are to be felled across the channel unless ok'd by the forester. No trees are cut immediately adjacent the stream (unless ok'd by the forester for cable operations—we use cable roads that are generally no more than 6' – 10' wide); and if ground cover is removed during felling and yarding of trees from anywhere within the watercourse protection zone, it is replaced with slash or straw. I try to prevent equipment operations within the zone, but if it is not feasible, all exposed soil needs to be covered. In addition, I practice selection management outside of the zone which provides further watercourse protection by simply minimizing overall ground and canopy disturbance.

“While BMPs are often implemented at a high rate, some are concerned about their effectiveness.”



Poor forest management can result in siltation of reservoirs and river systems.

THE FORGOTTEN FOREST PRODUCT

Are BMPs Effective in Protecting Water Quality?

By George Ice

George Ice

is a forest hydrologist and Principal Scientist with the National Council on Air and Stream Improvement.

best Management Practices (BMPs) are designed to reduce water quality impacts from management activities. Two familiar BMPs for forestry are water bars on skid trails and streamside management zones around streams. Water bars can divert water off the disturbed skid trail surface to a location where it can infiltrate and sediment can settle before it is delivered to a channel. Streamside management zones provide many water quality functions. They provide shade, are a source for large wood recruitment, protect the channel from disturbance, and can minimize delivery of sediment and nutrients to streams. For states with Forest Practices Acts, such as California, Idaho, Oregon, and Washington, the forest practice rules and implementation procedures are the BMPs for forestry. States have found that there are high compliance levels with forest practice rules. For example, Oregon found an overall 96% compliance rate with the forest practice rules (Ice et al. 2004). Yet, while BMPs are often implemented at a high rate, some are concerned about their effectiveness. In this article we will address the question: are BMPs effective?

Approaches to answer the question have evolved over time. Early assessments of BMPs

were performed by interdisciplinary teams who looked for visual evidence of whether BMPs protected water quality. For instance, in Washington Sachet et al. (1980) visited 102 randomly selected forestry operations. They concluded that “water quality was well protected when forest operations were conducted in compliance with the regulations.” They also reported that when operations did not use the forest practice rules “water quality impacts were frequent.” Similar assessments were conducted in many states, including Oregon (Brown 1978) and California (CSWRCB 1987). These interdisciplinary team assessments are still used effectively today to monitor the implementation and effectiveness of state BMPs (e.g., Idaho, Montana, and Florida).

However, interdisciplinary team assessments have some limitations. These assessments rely on visual information at the time of the field visit. Teams cannot provide conclusive proof of performance for water quality problems that do not leave visual signs (e.g., dissolved oxygen and nutrient concentrations) or that occur at critical periods that may not overlap the field visit (e.g., temperature). As a result, process-based research and monitoring and watershed studies are needed.

A good example of a process-based monitoring effort is the Riparian Function and Stream Temperature Study (RipStream) in Oregon (See http://egov.oregon.gov/ODF/PRIVATE_FORESTS/docs/fp/RipStreamProposal.pdf). Its purpose is to evaluate the effectiveness of the Oregon forest practice rules in protecting stream temperature and maintaining riparian forest stands that can provide large wood to streams and wildlife habitat. This involves a basic study design (replicated at multiple sites) that measures shade, overstory and understory vegetation, down wood before and after harvesting, and stream temperatures before and after harvesting and upstream and downstream of management units.

Projects like the RipStream study provide detailed information about a specific BMP, but it is often also important to assess the overall performance of a package of BMPs. BMPs are often designed to complement each other. One approach to assessing the effectiveness of the BMP package has been to use watershed studies that compare water quality impacts from logger's-choice or unrestricted forest management with water quality from a watershed where BMPs were applied.

One example of a watershed study of BMPs is a comparison of the results from studies in the Piedmont region of the South before BMPs were being routinely implemented (Hewlett 1979) and a later watershed study where BMPs were used (Williams et al. 2000). Hewlett concluded and Williams et al. confirmed that with better streamside management zones and roads, and without soil disturbance from machine planting, sediment losses would have been reduced by 90%. In fact, by looking at various water quality parameters from sediment to dissolved oxygen to silvicultural chemicals we find that BMPs are routinely 80 to 99% effective in reducing water quality impacts compared to unrestricted practices (Ice 2004).

Even process-based BMP effectiveness research and watershed-scale studies of water quality response may not be sufficient. Ultimately we need to know if not only water quality but also aquatic organisms are being protected. Watershed studies such as the Hinkle Creek Study in Oregon are looking at amphibian, macroinvertebrate, and fish response to forest

management where the Oregon forest practice rules are applied (See <http://wrc.cascadeweb-dev.com/HinkleCreek/HinkleCreek.html>). An influential study in Florida monitored benthic macroinvertebrate response to forest harvesting. No significant differences were found for reference and impact reaches attributable to the silvicultural operations when BMPs were used (Vowell and Frydenborg 2004).

The importance of this final step cannot be over emphasized. We sometimes come to incorrect assumptions about what is "best" for aquatic systems. The Alsea Watershed Study showed that lack of streamside management zones around streams and lack of control about felling direction could result in excessive slash in streams (Moring and Lantz 1975). In some cases this can result in severely depressed dissolved oxygen levels. This finding and assumptions about fish passage needs led to excessive cleanout of wood from streams. But wood was found to benefit fish habitat. Today we manage riparian areas so that wood can be delivered to adjacent streams. We routinely assume that more shade around a stream makes for better fish habitat, but Wilzbach et al. (2005) found that thinning near the stream to increase light resulted in an increase in resident salmonid productivity (probably due to increased primary production and resulting increases in macroinvertebrates that serve as food for fish). A balance may be needed to maintain and enhance fish productivity in streams so that stream are not excessively warmed by removal of shade but neither are they choked of in-stream productivity due to impenetrable canopies.

There will always be some skepticism about the effectiveness of BMPs. BMPs can dramatically reduce impacts but are usually not 100% effective. The performance standards used to assess BMP effectiveness may not be physically achievable. Every year we expect greater levels of protection from management activities. BMPs will continue to need to be tested to determine their effectiveness in reducing management impacts and meeting environmental objectives. Simultaneously, BMPs need to be economically and institutionally sustainable or it is likely that management will change to a land-use other than forestry. ■

REFERENCES

- Brown, G.W. 1978. Oregon's Forest Practices Act: An early appraisal. *Journal of Forestry* 76(12):782.
- California State Water Resource Control Board (CSWRCB). 1987. Final report of the forest practice rules assessment team to the State Water Resource Control Board. Sacramento, CA: California State Water Resource Control Board.
- Hewlett, J.D. 1979. Forest water quality: An experiment in harvesting and regenerating Piedmont forests. Athens, GA: University of Georgia School of Forestry Press.
- Ice, G., Dent, L., Robben, J., Cafferata, P., Light, J., Sugden, B., and Cundy, T. 2004. Programs assessing implementation and effectiveness of state forest practice rules and BMPs in the West. *Water, Air & Soil Pollution: Focus* 4(1):143-169.
- Ice, G. 2004. History of innovative Best Management Practice development and its role in addressing water quality limited waterbodies. *Journal of Environmental Engineering* 130(6):684-689.
- Moring, J.R. and Lantz, R.L. 1975. The Alsea Watershed Study, Parts I-III. Fisheries Research Report 9, Oregon Department of Fish and Wildlife, Corvallis, OR.
- Sachet, J., Keller, S., McCoy, A., Orr, T., and Wolff, N. 1980. An assessment of the adequacy of Washington's forest practice regulations in protecting water quality. Forest DOE 90-7A, Washington Department of Ecology, Olympia, WA.
- Swift, L.W. 1986. Filter strip widths for forest roads in the southern Appalachians. *Southern Journal of Applied Forestry* 10(1):27-34.
- Vowell, J.L., and Frydenborg, R.B. 2004. A biological assessment of Best Management Practice effectiveness during intensive silvicultural and forest chemical application. *Water, Air & Soil Pollution: Focus* 4(1):297-307.
- Williams, T.M., Hook, D.D., Lipscomb, D.J., Zeng, X., and Albiston, J.W. 2000. Effectiveness of Best Management Practices to protect water quality in the South Carolina Piedmont. In Tenth Biennial Southern Silvicultural Research Conference Proceedings, General Technical Report SRS-30, USDA Forest Service, Southern Research Station, Asheville, NC.
- Wilzbach, M.A., Harvey, B.C., White, J.L., and Nakamoto, R.J. 2005. Effects of riparian canopy opening and salmon carcass addition on the abundance and growth of resident salmonids. *Canadian Journal of Fisheries and Aquatic Sciences* 62: 58-67.

forest GUILD

P.O. Box 519
Santa Fe, NM
87504



forest

WISDOM

**Guild
Regional
Coordinators:**

Northeast

Andy Shultz

63 Quimby St.
Augusta, ME 04330
Home/Office
207-623-3194
cell: 207-242-8845
a.Forestry@prexar.com

Southeast

Jerry Gaertner

North State Forestry
5420 Knightdale-Eagle Rock Rd.
Knightdale, NC 27545
919-266-7718
919-266-7095 (Home)
northstate1@juno.com

Jessica Wilson

197 8th Street
Monteagle, TN 37356
931-924-4539
jessandnatew@yahoo.com

Northwest

Jean Shaffer

Forestland Management
8400 Rocky Lane SE
Olympia, WA 98513
360-459-0946
jeanforest@cco.net



WATER

“Should on-the-ground forestry practice change to respond to the public’s demand for cool, clean water from forested watersheds? What practices should be more prominent? Which should be discouraged? Can we create markets to help create incentives to drive this change? These are the questions that we are asking but certainly not answering through this issue of Forest Wisdom.” - Eric Holst, Editor of Issue Three