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News From International Programs of the Forest Service *No. 6, January 2007: Ecosystem Services*

Green Alchemy: Can Markets Save Biodiversity?

by Ricardo Bayon

Ricardo Bayon is the managing director of "The Ecosystem Marketplace."

Worldwide, environmental markets are all the rage. The best known international markets are probably in industrial emissions, such as carbon dioxide, worth billions of dollars. But some countries also have markets in wetlands, soil salinity, and even sand.

What is an environmental market? Take wetlands, for example. Under the Clean Water Act of 1972, developers in the United States must offset wetland losses by creating or restoring another wetland with similar watershed functions and values. You can either do this yourself or pay one of a growing number of "wetland mitigation" businesses to do this for you. The wetland mitigation market in the United States is now worth an estimated $1 billion. Although wetland credits must be locally bought and sold, the market is rapidly acquiring various national actors.

However, when it comes to biodiversity, there is no globally or even nationally tradable unit, such as an area of wetland. The destruction of tiger habitat in Siberia, for example, isn't really offset by the creation of lynx habitat in Spain. Biodiversity values tend to be localized.

So the big question is this: Can markets for biodiversity be established?

In the United States, a cap-and-trade model for biodiversity conservation is emerging nationwide; although, the trend is perhaps most visible in California. There, a process sometimes known as conservation banking has evolved. The process mimics the wetland mitigation model, with the mitigation being done for habitat damage. The first conservation bank was for an endangered songbird, the coastal California gnatcatcher, which lives in coastal sage scrub, a habitat much coveted by developers. The story is quite instructive.

In 1993, at about the time that the gnatcatcher was finally added to the California endangered species list, Bank of America foreclosed on a 263-acre (105-ha) property known as the Carlsbad Highlands. Because the property had coastal sage scrub, the bank suddenly found its development options severely limited. Anyone developing the land would have to pay large sums to mitigate damage to gnatcatcher habitat.

At about the same time, the California Department of Transportation had a gnatcatcher problem of its own: It was building a highway on prime gnatcatcher habitat. The two problems turned into a solution: the California Department of Transportation found Bank of America and paid it to mitigate damage from the highway to gnatcatcher habitat. As part of this payment, the agency puchased a conservation easement on 83 acres (33 ha) of the bank's property. In exchange for mitigation credits, that part of the Carlsbad Highlands would never be developed.

Two years later, the Carlsbad Highlands became the State's first government-sanctioned conservation bank. It has since sold all of its mitigation credits (about 180)

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MERLIN TUTTLE, BAT CONSERVATION INTERNATIONAL, INC.

Green markets can conserve species such as this lesser long-nosed bat (Leptonycteris yerbabuenae) but success often depends on nontraditional partnerships.

WHAT'S INSIDE?

ECOSYSTEM SERVICES

Ecosystem Services: Realizing the Full Value of Forests

by Sally Collins

Sally Collins is the Associate Chief of the Forest Service, Washington, DC.

Did you know that landowners around the world are getting paid to grow trees rather than harvest them? To keep lands forested rather than develop them? Everyone benefits: landowners make money, taxpayers save money, and future generations will have the same rich natural heritage we enjoy today.

It's part of a global trend of paying for "ecosystem services"—harnessing market forces to protect natural resources. As resources become scarce, people are realizing that ecosystem functions have value that can be translated into dollars and cents. Emerging markets for clean air and water, productive soils, and biological diversity are tipping the balance towards conservation.

Forests, in particular, provide many ecosystem services: They scrub our air, filter our water, produce our soils, and nurture our biodiversity. By absorbing and storing carbon, forests neutralize the effects of greenhouse gas emissions on global climates.

Unfortunately, traditional markets for forest products fail to capture such nontimber values—and, increasingly, landowners are tempted to convert their forests to nonforest uses. The United States loses almost 3 acres (1.2 ha) of working farms and ranches to development every day; and the world loses about 30 million acres (12 million ha) of tropical forest every year, mostly to farming and ranching.

By leveraging the many values of forest functions through markets, perhaps forest conservation can finally get a leg up on development. Although the trend is in its infancy, people around the world are finding imaginative ways of remunerating landowners for delivering ecosystem services:

- In Mexico, downstream water users are paying upstream forest managers to protect water quality (see the article by Hutch Brown).
- In Italy, heritage tourism is encouraging communities to develop and protect their cultural and natural treasures alike (see the article by Kent Schneider).
- In California, landowners are profiting from protecting shrubland habitat for an endangered songbird (see the article by Ricardo Bayon).
- Across the United States, voluntary markets are helping businesses meet their targets for reducing carbon emissions, perhaps paving the way for a future cap-and-trade system (see the article by Ricardo Bayon and Amanda Hawn).

The U.S. Department of Agriculture (USDA) Forest Service is engaged at all levels in finding ways to reward landowners for delivering ecosystem services. Our International Programs Staff has organized senior leadership seminars to help build our awareness of the global challenges and opportunities associated with ecosystem services.

Some opportunities come from the 191 million acres (77 million ha) of national forests and grasslands. These lands deliver a full array of ecosystem services as public goods, including clean water, biodiversity, wildlife habitat, and opportunities for outdoor recreation. Public lands also help visitors appreciate all the wonderful things they get from forests. The Forest Service is now looking into the possibility of increasing carbon sequestration on national forest land to help offset climate change. In addition, the National Forest System might be used to promote markets for ecosystem services. For example, a partner in Mississippi has planted trees to restore bottomland hardwood forest on newly acquired national forest land in exchange for carbon credits. By managing the land for restoration and carbon sequestration, the Forest Service guarantees the banked value of those credits.

Other opportunities come from partnership programs. Through its State and Private Forestry Staff, the Forest Service works with States to purchase conservation easements from willing forest owners. Based on payments for services, such partnerships keep millions of acres of invaluable resources on private land protected in perpetuity.

But it isn't easy to market ecosystem services. Who wants to pay for something like water that they already get for free? The key is to convince people that such services are at risk: They won't continue for long without investments in the ecosystems that deliver them.

There are also technical questions with no easy answers. How do you place a price tag on a unit of protected water, for example? Who has ownership rights? Who brokers the exchange? Forest Service researchers are actively exploring such questions to help markets for ecosystem services emerge.

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JENNIFER PETERSON, FOREST SERVICE

Will other countries follow Mexico's lead in making forests a central part of the solution?

Paying for Water-Related Services From Forests

by Hutch Brown

Hutch Brown is a policy analyst for the Forest Service, Research and Development, Policy Analysis Staff, Washington, DC.

Imagine waking up one day and finding your local river reduced to a trickle. That's almost what happened in Coatepec, a coastal community in Veracruz, Mexico. In May and June of 1998, it took nearly all the water in the local river to meet the town's needs.

Unusual drought was only partly to blame. In the dry season, most river runoff comes from upland cloudforests that capture moisture from coastal fog. But three decades of uncontrolled deforestation had devastated the forests' fog-capturing capacity, so the river was running dry.

Forested ecosystems supply abundant flows of pure, clean water, a service long taken for granted and delivered for free. Now water supplies from forests are increasingly threatened, and we are seeing a surge of interest worldwide in finding ways to sustain them. Experience in Mexico and elsewhere suggests that market-based solutions can work, with government as the intermediary.

Government has a role to play because riverflows and other freshwater supplies are public goods. Downstream municipalities can draw on taxes or user fees to pay upstream suppliers to sustain sufficient flows of pure, clean water by protecting the ecosystems that deliver them.

To save its river from running dry, the Mexican town of Coatepec came up with a solution. In 2001, it added a surcharge to municipal water bills, collecting enough funds to reward the owners of well-managed upstream forests. The annual payments were designed to discourage forest owners from converting their lands to other uses.

Drawing on the experience of Coatepec and communities in Costa Rica, Ecuador, and elsewhere, the Mexican Government launched an ambitious national plan in 2003 to sustain water-related services from forests nationwide. Mexico's aquifers, streams, and water bodies are national property, and the Government charges for their utilization. Users pay fees to support a program to remunerate forest owners for their water-related ecosystem services.

The program is designed to keep forest owners from converting their lands to agriculture or cattle ranching. It focuses on noncommercial forests in good condition; commercial forest owners can draw on other Federal programs. Highest priority are municipal watersheds threatened by deforestation, particularly forests with a high fog-capturing capacity. In 2004, the program accepted 352 applications, enrolling about 420,000 acres (170,000 ha) nationwide.

The United States has similar opportunities. A classic example comes from New York City, where the problem was not the quantity of water available, but the quality. An epidemic caused by waterborne pathogens, such as the one in 1993 in Milwaukee, WI, could kill hundreds of New Yorkers. In 1989, the U.S. Environmental Protection Agency ordered New York to build a water filtration plant costing $6 to $8 billion.

Instead, New York spent $1.5 billion on protecting its 2,000-square-mile (5,200-km^2) upstate watershed. The city made payments to local governments and landowners in exchange for limiting development and managing forests sustainably in the Catskill Mountains—and saved billions of dollars in the bargain.

These examples illustrate some of the challenges to market-based solutions. The New York case raised the issue of whether landownership gives the right to pollute—or the obligation to protect downstream water supplies. What institutional framework is needed to balance landowner rights against downstream user needs?

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CATHERINE KARR, U.S. DEPARTMENT OF STATE

Severe water scarcity creates conflict in communities and across local and national boundaries.

Several U.S. cities and States are already at the forefront of carbon trading and sequestration—will the rest of the country catch up?

GEORGE M. ARONSON

Voluntary Markets Set the Stage for Carbon Trading in the United States

by Ricardo Bayon and Amanda Hawn

Ricardo Bayon is the managing director and Amanda Hawn is the editor of "The Ecosystem Marketplace."

When it comes to credit trading for ecosystem services, the United States lags behind—or so the conventional wisdom goes. In fact, the first markets for emissions trading emerged in the United States. In the late 1980s, the U.S. Government set caps on sulfur dioxide emissions—a leading cause of acid rain—and let industries trade to meet the caps. Although a cap-and-trade system for carbon emissions—the leading cause of climate change—is still years away in the United States, voluntary markets are already up and running.

Europe now leads the way in regulated carbon markets. The European Union's Emissions Trading Scheme, operational since January 2005, was designed to meet commitments by European governments under the 1997 Kyoto Protocol, an international agreement to reduce carbon emissions worldwide. The Kyoto accord also set up the Clean Development Mechanism allowing companies or industrialized countries to meet their emissions targets through offset projects in the developing world. Together, the European carbon market and the Clean Development Mechanism have traded $10 billion worth of carbon, according to World Bank estimates.

Although not a Kyoto signatory, the United States has had a voluntary carbon market since the early 1990s. Indeed, the world's first carbon offset deal was brokered in 1989, when the U.S. electricity company AES Corporation, for philanthropic and marketing reasons, invested in an agroforestry project in Guatemala. Trees store carbon as they grow, a process known as carbon sequestration; AES reasoned that it could offset the greenhouse gases emitted during electricity production by paying farmers in Guatemala to plant 50 million trees on their land.

Until the European market got underway, the voluntary market in the United States was the only international carbon market. Its breadth and impact are difficult to measure, because deals take place worldwide and nobody really tracks them. In 2005, however, perhaps 10 to 20 million tons of carbon were traded on the voluntary market. It was only a fraction of the volume in Europe, where a single week of trading in April 2006 saw 20 million tons exchanged; but it was still an impressive figure, given the voluntary basis of the trading.

A key player is the Chicago Climate Exchange, whose members trade among themselves to meet voluntary targets. A ton of carbon on the Chicago exchange has traded for anywhere from $1 to $4.50. Although that hardly compares to the more than $30 per ton traded on the European exchange, the Chicago exchange remains a potential precursor for a regulated carbon market in the United States. Reading the writing on the wall, Fortune 500 companies such as DuPont and Ford have joined the

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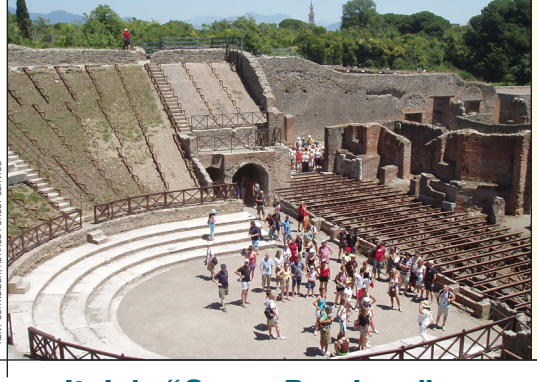
Forest Sevice Research Helps Carbon Trading

To help forestall climate change, Forest Service scientists hope to better understand how much carbon is stored in forests and grasslands and how to build more storage capacity. To that end, researchers are inventorying the amount of carbon sequestered in U.S. forests and quantifying the effects of fire regimes on carbon cycles and forest sequestration. To support viable carbon markets, Forest Service researchers and partners are creating models and tools that landowners can use to estimate current and new carbon sequestered in forest and rangelands.

Part of the solution lies in better utilizing wood products, which continue to store carbon long after a timber harvest. Researchers are looking for ways to extend the storage capacity by improving the utilization, product life, and recycling of wood products. Scientists are also looking for ways to use woody biomass—often the byproduct of fuel reduction and forest health treatments—to offset fossil fuel use and reduce carbon emissions overall.

JOHN MARTIN, CONSERVATION INTERNATIONAL

Improving forest management—such as the current Forest Service work in Liberia—could prove to be valuable later as cap-and-trade systems increase.



KENT SCHNEIDER, RETIRED FOREST SERVICE

Italy is committed to protecting and professionally managing its cultural and natural treasures like Pompeii.

Heritage Tourism: Learning From Italy's "Green Province"

by Kent Schneider

Kent Schneider formerly managed the Heritage Resource Program for the Forest Service, Southern Region, Atlanta, GA, and is now retired.

Picture yourself sifting through a pre-Columbian firepit in Virginia, looking for artifacts. An archeologist comes up with exciting news: A bit of bone you found is from American bison. It's proof positive that bison herds once roamed east of the Appalachians.

What would such an adventure be worth to you? Italians are betting it's a lot. Communities in the Abruzzo, an area with a trove of archeological riches, are banding together to protect their regional heritage while building an infrastructure for "heritage tourists"—people willing to spend time and money exploring the past in places where artifacts are relatively easy to find.

The Abruzzo is a region of forests, mountains, and beaches near Rome. Known as Italy's "Green Province," it has had continuous human habitation since Paleolithic times, yet it still features habitat for many types of wildlife, including wolves and bears. Much of the best habitat is protected in the 150,000-acre (60,000-ha) National Park of Abruzzo.

A magnet for both heritage and recreational tourism, the Abruzzo is pioneering a plan for payments for services: Communities there are drawing tourists willing to pay for the outdoor opportunities they provide. About 30 local communities are helping to create archeological parks and build the needed roads for visitors.

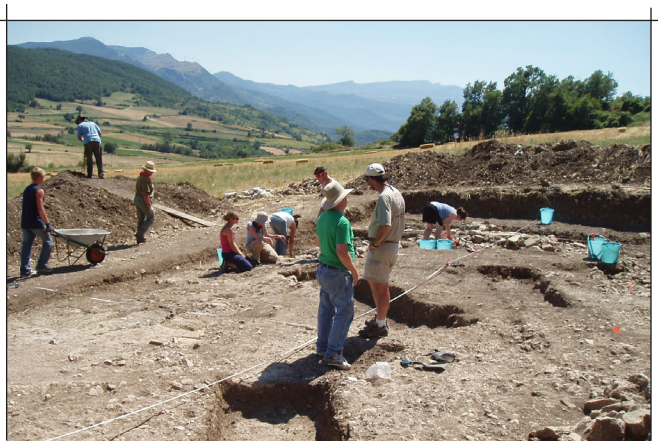
Viewing the entire Abruzzo landscape as an "open-air museum," the Italian Ministry for Cultural Property and Activities is developing educational programs associated with visitor centers, local exhibitions, research centers, and museums in order to promote both cultural and recreational tourism.

The key is to attract more visitors to the Abruzzo. Some join archeological expeditions, such as the Forest Service's Heritage Excursions, spending time in the rural heart of the Abruzzo. In exchange for the opportunity to search for artifacts in beautiful settings, they contribute to community development through their food, lodging, transportation, and other costs.

The work must be carefully done. Like the United States, Italy is committed to protecting and professionally managing its cultural and natural treasures. When it comes to finding artifacts, the trick is to discover where to dig with a minimum of environmental disturbance. In 2001, specialists from the Forest Service and the University of Georgia brought subsurface imaging technology to the Abruzzo. The technology uses ground-penetrating radar to identify areas rich in potential artifacts.

While delivering the new technology, the specialists discovered Italy's community-based heritage tourism program, and the Forest Service saw its potential for parts of the United States with rich natural and cultural resources. In 2003, the Forest Service and the Italian Regional Superintendency for the Abruzzo signed a 3-year agreement to share expertise and technologies in subsurface imaging as well as heritage tourism.

Both sides benefit from the collaboration. The ultimate goal, according to Mike Kaczor, the Heritage Program Leader for the Forest Service, is sustainable, heritage-based local and regional development. "With these agreements," he said, "we can potentially build a long-term relationship with a view towards what works and what doesn't work and that benefits everyone involved."



KENT SCHNEIDER, RETIRED FOREST SERVICE

The Abruzzo in Italy is pioneering a plan for payments for services: Communities there are drawing tourists willing to pay to be part of an archeological dig.




News Bits From Around The World

Forest Service Helps Prepare a Tsunami Warning System

In December 2004, the world was shocked when underwater earthquakes pushed huge waves ashore around the Indian Ocean, killing thousands. The heavy loss of life could have been avoided had a warning system been in place.

With help from around the globe, the United States is implementing the Indian Ocean Tsunami Warning System Program. Funded by the U.S. Agency for International Development, the system will warn coastal communities in Indonesia, Sri Lanka, Thailand, and the Maldives of impending threats from the sea. Due to its extensive experience in emergency response, the Forest Service is helping countries integrate the Incident Command System and emergency preparedness coordination into their disaster response systems.

Forest Service Supports Bat Conservation

More than 1,100 species of bats play a critical role in maintaining the health of forest and other ecosystems worldwide. Yet many bats are increasingly threatened by hunting, habitat loss, and disturbance of roosting sites.

The Forest Service International Programs office has initiated a new partnership with Bat Conservation International to support student scholarships aimed at conserving bats and their habitats around the globe and to help support projects, ranging from Colombia, to Madagascar, to Thailand. Projects are designed to better understand how bats use habitat and how they support seed dispersal and germination as well as rare-plant pollination. Results will help support designation of protected areas.

Forest Service Honors Bird Conservation Achievements

In March 2006, Forest Service Associate Chief Sally Collins presided over an awards ceremony for the agency's Wings Across the Americas program.

To conserve birds across the Americas, the Forest Service has fostered partnerships across borders and boundaries through funding, technical expertise, and a forum for mobilizing citizens, governments, and organizations on behalf of bird conservation. The annual Wings Across the Americas awards ceremony celebrates work to conserve birds and their habitats, recognizing the roles that birds play in ecosystems. The 2006 awards honored outstanding partnership achievements in research and management, habitat conservation, and international cooperation.

Visit these Web sites for more information related to articles in this issue:

Ecosystem Marketplace, Forest Trends—http://www.ecosystemmarketplace.com

Forest Service's Ecosystem Services—http://www.fs.fed.us/ecosystemservices/

Forest Service Northern Global Research Change Forest Program—http://www.fs.fed.us/ne/global/index.html

Chicago Climate Exchange—http://www.chicagoclimatex.com/

Heritage Resource Program—http://www.fs.fed.us/recreation/programs/heritage/

Wings Across the Americas—http://www.fs.fed.us/global/wings

Bat Conservation International—http://www.bci.org

Indian Ocean Tsunami Warning System—http://www.iotws.org/

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Forest loss is a growing problem worldwide, and it won't be stopped by government fiat alone. Yes, we will still need such traditional approaches as zoning or tax incentives; and yes, incentives for sustainable forestry will continue to include income from traditional forest products. But the best way to conserve our privately owned forests for future generations is to recognize that sustainable forestry is worth more than exploiting the land or selling it to developers. Through careful interventions, governments can help landowners realize the full value of their forests by making ecosystem services pay.




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for $10,000 to $15,000 apiece. Today, there are many such gnatcatcher banks in San Diego County, with similar mitigation credits selling for upwards of $25,000 each.

And that's not all. Part of the revenue from the sale of credits by the Carlsbad Highlands Conservation Bank went into a trust fund that can be used—at least in theory—to pay for conservation of the land. In effect, a private landholder has created a private gnatcatcher park funded in perpetuity.

Californians have since created more than 50 conservation banks for a variety of endangered species. And California is not alone: State and Federal governments have also issued guidelines for their creation, and conservation banking is becoming a multimillion-dollar business. Conservation banks are springing up all over the United States, driven by State and private interests. For example, Alabama's Mobile Sewer and Water Commission established one conservation bank for gopher tortoise, and International Paper—the timber industry giant—is in the process of creating another for red-cockaded woodpeckers.

Environmental markets in biodiversity are slowly becoming a reality. The impact of this could be tremendous: If strong markets in biodiversity emerge, business will have succeeded in transforming the preservation of biodiversity from a financial burden into an economic boon. Now, that is a form of green alchemy worth striving for!

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A related challenge has to do with valuing the water-related service and finding the right level of payment. The Mexican case raised the issue of whether payments were excessive (above the opportunity cost to the landowner of not converting to nonforest uses) or misplaced (in places where the risk of deforestation was already low). In either case, the result is waste. What market framework most efficiently brings supply into balance with use?

Considerable research is needed if market-based solutions are to succeed, and the Forest Service's research stations have already begun exploring such questions. But the need is clear: As the world loses its forested ecosystems, we can no longer afford to take the services they deliver for granted. The future of our children—and theirs—will depend on the investments we make in the natural capital around us.

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exchange, and future prospects for carbon markets worldwide look promising: On the European exchange alone, carbon trading already exceeds the volume of trading for all U.S. agricultural commodities combined.[1]

U.S. cities and States are also getting in on the action. Dozens of cities have pledged to meet targets for reduced carbon emissions, and eight Northeastern States are putting the finishing touches on a State-regulated carbon market known as the Regional Greenhouse Gas Initiative. The Western States of California, Oregon, and Washington are also considering a regulated carbon market, as are several Southwestern States. California already has a carbon registry, the California Climate Action Registry, which could form the basis for carbon trading nationwide; it is considered more robust than its Federal counterpart, a voluntary registry known as 1605b. Federal research also supports the development of carbon trading and other markets for ecosystem services.

Voluntary carbon markets, coupled with Federal support as well as regional, State, and local initiatives, signal great things to come. The question is not whether regulated carbon markets will appear in the United States, but rather when, where, and how. The most sanguine observers foresee a Federal cap-and-trade system within 10 years; skeptics predict State-level actions for more than a decade before the Federal Government finally takes over. Either way, the smart money is on environmental markets playing a key role in the United States in the not-too-distant future. For more information on how these markets are evolving, come visit us at http://www.ecosystemmarketplace.com.

[1] According to an article in *Newsweek* (Karen Breslau, "It Can Pay To Be Green," 22 May 2006).

2007 International Seminar on Forest Administration and Management

October 1-19, 2007

Arizona, Colorado, North Carolina, and the District of Columbia, USA

Jointly offered by Forest Service International Programs and Northern Arizona University, this seminar presents a broad spectrum of natural resource management techniques and institutional arrangements so that participants may selectively gather ideas that can assist in the management of their lands. It focuses on strategies and methods to develop, manage, and conserve natural resources for the sustained delivery of goods and services to meet the full range of human needs. For application details, visit http://www.fs.fed.us/global/is/isfam/welcome.htm or write to Dr. Michael Wagner, P.O. Box 15018, 82 Huffer Lane, Flagstaff, AZ 86011, USA or e-mail at ISFAM@nau.edu.2005

2007 International Seminar on Protected Area Management

August 1-18, 2007

Missoula, Montana, USA

This seminar—jointly offered by the University of Montana, University of Idaho, Colorado State University, and Forest Service International Programs—is geared for senior-level managers and policymakers working in protected areas. The program examines and stimulates debate on management strategies, policies, and innovative institutional arrangements to address the conservation and use of the world's most special places. For application details, visit http://www.fs.fed.us/global/is/ispam/welcome.htm or write to Wayne Freimund, School of Forestry, The University of Montana, Missoula, MT 59812, USA, or e-mail at wayne@forestry.umt.edu.

2007 International Field Course on Wildlands and Protected Area Management

July 10-August 12, 2007

Fort Collins, Colorado, USA

Co-hosted by the Center for Protected Area Management and Training at Colorado State University and Forest Service International Programs, this course, held in Spanish, presents key concepts and methods of protected area management while emphasizing field-based practical exercises. For application details, visit http://www.fs.fed.us/global/is/field_course/welcome.htm or write to Ryan Finchum, Colorado State University, Center for Protected Area Management and Training, Fort Collins, CO 80523-1480, USA, or e-mail at finchum@cnr.colostate.edu.

The Global Leaflet presents highlights of policy, research, technical cooperation, development, and conservation activities in which the Forest Service is involved worldwide. Its purpose is to demonstrate the breadth and importance of international collaboration on natural resource management issues and to share information within the Forest Service and with our partners in the United States and around the world.

International Programs is dedicated to applying the wealth of skills within the Forest Service to foster sustainable forest management globally. We encourage linking the agency's researchers, foresters, wildlife biologists, hydrologists, policymakers, and disaster specialists with partners overseas to work on assignments in the areas of technical cooperation, policy assistance, and disaster coordination. Our focus is on key natural resource problems and issues in countries with significant forest resources and important forest-related trade with the United States. International cooperation results in improved sustainable natural resource practices in partner countries, develops the skills of Forest Service personnel, and brings back knowledge and innovative technologies to the United States.

Secretary of Agriculture: **Mike Johanns**
Chief of the Forest Service: **Dale N. Bosworth**

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