



nature provides

**ecosystem
services**
and their
benefits to
humankind



**CONSERVATION
INTERNATIONAL**

delivering nature's benefits for everyone



Ecosystem services are the tangible benefits—both goods and services—that people receive from nature.

Conservation International works with societies to responsibly and sustainably care for natural systems so that the ecosystem services that flow from them are available for today's needs and for generations to come.

The 2005 Millennium Ecosystem Assessment categorizes these services as:

- **Provisioning services** are goods that people use or harvest from nature such as seafood, water, wild meat, timber and medicines.
- **Regulating services** control natural processes like floods and droughts, and the overall capacity of ecosystems to regulate our climate.
- **Supporting services** provide the foundation for all other services, and include things like the breakdown of organic waste, water purification, soil formation and nutrient cycling.
- **Cultural services** are the religious, spiritual, aesthetic, and recreation and tourism benefits people obtain from nature.

valuing the services that nature provides

Despite the critical importance of healthy ecosystems for human well-being and survival, unsustainable economic growth has placed a great burden on nature's delivery system and its ability to sustain life on Earth.

Why? In large part because we have not yet adequately identified, measured and valued the services that nature provides.



The world must place a value on ecosystem services.

The valuation of ecosystem services needs to happen at the local, regional and global level, and it must enable us to compare ecosystem services values to the values of other goods and services. For too long, conservation has been outcompeted by land use activities with known economic benefits like agriculture and cattle ranching. This is essentially because there is often no inherent financial incentive to protect ecosystems, and the individuals safeguarding nature's benefits are not typically compensated for that work. Land tenure and access rights are often unclear, making it difficult to lay claim to services.

Further, ecosystem services flow across and under boundaries and are often unregulated or are poorly managed: the consequences of upstream activities to downstream service users are not often taken into account. Each of these factors contributes to resource depletion and the loss or degradation of healthy ecosystems and the services they provide—a global problem affecting our climate, food, health and freshwater security, and costing us from 1.4 to 3.1 trillion dollars annually in lost GDP and the restoration of services that have been compromised. Recognition of this problem and of ecosystem services as valuable for human well-being has led to the advent of economic instruments, in the last few decades, as a way to encourage better management and protection of ecosystems.

payment for ecosystem services



The payment for ecosystem services concept helps address the destruction of Earth's habitats, landscapes and ecosystems by assigning a value to these services, and compensating the people, communities and countries whose actions enhance or protect ecosystem services and the costs that work incurs.

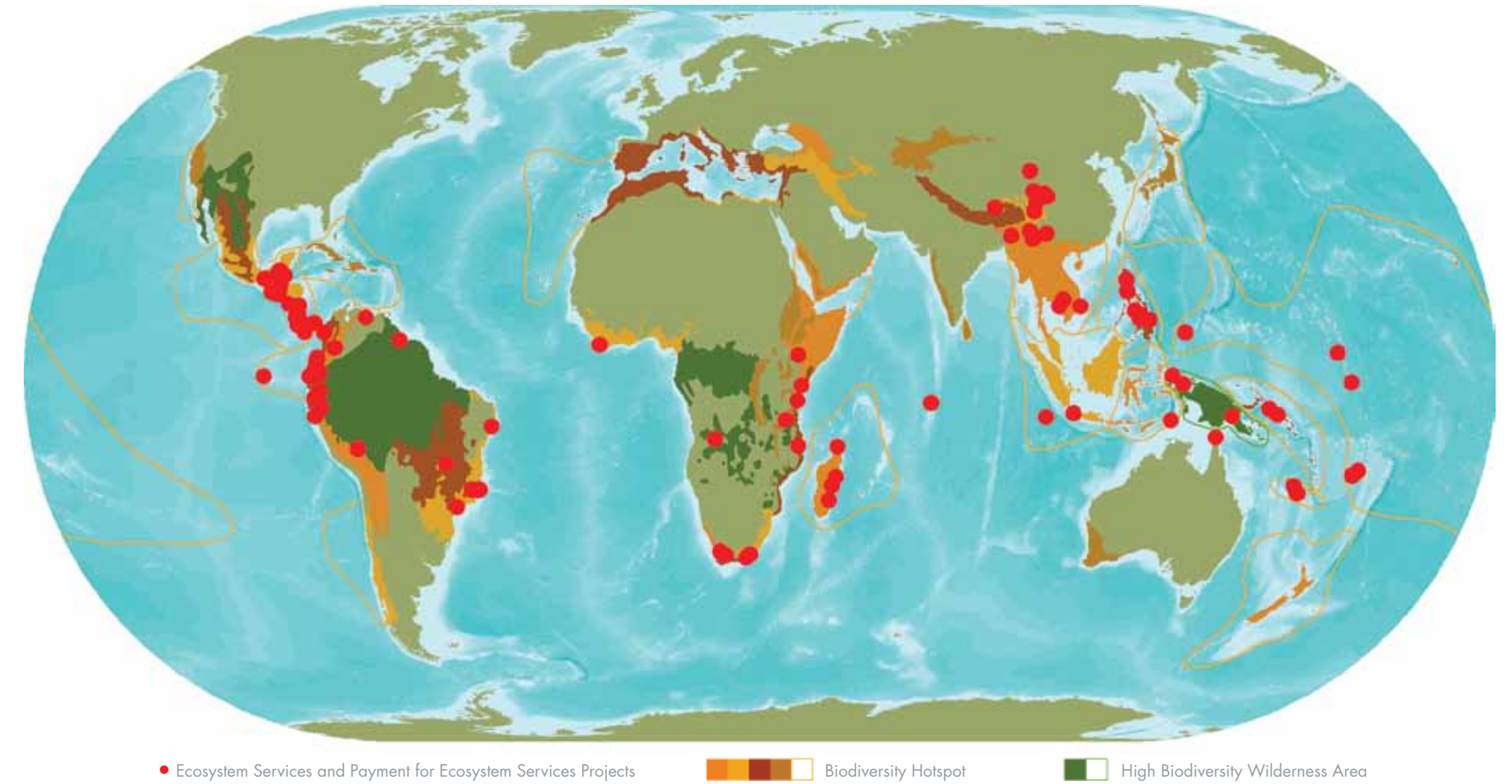
CI's work with payment for ecosystems services mechanisms have taken one of three forms:

- Direct payments and financial compensation (such as monetary payments and employment opportunities);
- In-kind payments (such as provision of social service benefits, livelihood support and capacity building); or
- Access to resources or markets (such as carbon markets and ecotourism opportunities).

All are designed to make the protection of nature a smart and sustainable economic choice.

Conservation International works in over 40 countries and with hundreds of partners to improve human welfare through the valuation and protection of natural ecosystems and service flows.

We employ sound science, influence policies and markets and implement projects to preserve ecosystem services such as drinking water and food, and address other benefits including regulation of climate and water flows through watershed and forest protection, biodiversity conservation, carbon sequestration, tourism and ecotourism and the recognition of nature's cultural, religious and inspirational values for humankind.



Proving the Value of Nature: [In the Water](#) and on the Ground

CI has a portfolio of nearly 130 ecosystem services and payment for ecosystem services projects in Hotspots and High Biodiversity Wilderness Areas (areas of high biodiversity and ecosystem service concentration) throughout the Asia-Pacific region, Central and South America and Africa.

creating tools,
assigning value

Artificial Intelligence for Ecosystem Services (ARIES) is a web-based technology that makes environmental decisions easier and more effective. It is offered to users worldwide to assist rapid ecosystem service assessment and valuation at multiple scales, from regional to global.

ARIES is being developed collaboratively by the Gund Institute for Ecological Economics, CI and Earth Economics with National Science Foundation funding, and is in a functional preview stage. It is expected to be available online for users in Spring 2010.

ARIES uses relevant ecological and socioeconomic knowledge to map ecosystem services' provision, use and benefit flows—all of which incorporate our latest understanding of ecosystem services. This is done through automated data integration from an extensive, globally available online database. Services to be modeled by ARIES include carbon regulation (sequestration and storage), sediment regulation, aesthetic views and proximity, food provision and culture (specifically salmon), nutrient regulation and water supply and regulation.

CI and its partners are currently incorporating the latest knowledge and most up-to-date data on ecosystem services for the island of Madagascar. The following ecosystem services were modeled in Madagascar: carbon sequestration and storage, flood regulation, sediment regulation, water supply and regulation, nutrient regulation and aesthetics factors. The individual models of the linkages between human well-being, biodiversity and these ecosystem services were developed with the help of local knowledge obtained during a workshop held in Antananarivo in September 2008.



Madagascar



The Agusan Marsh holds around 15 percent of Philippines' fresh water resources and is one of the most ecologically significant wetland areas in the country. The marsh is located in the middle of the largest river basin in Philippines, and acts as a filter for the fresh water coming from the surrounding watersheds that feed into the river basin and flow out to the two largest cities on Mindanao Island.

Based on an evaluation of current and anticipated land and resource use activities, CI generated a map of deforestation likelihood across the river basin and identified critical areas within the watersheds where deforestation may lead to increased incidences of natural hazards such as sedimentation, downstream flooding and landslides. This assessment provided a stronger understanding of the impacts of land and resource use activities on ecosystem function and the associated risk in loss of ecosystem service flows. The spatial analysis of these data layers also provided a better understanding of where loss of ecosystem function will impact habitats for the globally important species found within the marsh. This information is vital to ensuring not only the long-term maintenance of ecosystem service flows, but also the persistence of globally threatened and restricted-range species.

The study generated critical information on the economic and spatial trade-offs related to development, species conservation and ecosystem services and will be translated into specific guidance for donors and development banks in their investment decisions for the region. The baseline information that is generated will also be incorporated into the government's conservation management plans for the Agusan Marsh. Collaborators include provincial and local government agencies, the Save Mindanao Foundation Inc., the University of the Philippines System, the Philippine Eagle Foundation and the Northern Mindanao State Institute of Science and Technology.



Philippines



entrance fees: generating
tourism revenue

The Papuan Bird's Head Seascape (PBHS), located in northwest Papua in Indonesia, sits firmly in the global epicenter of marine biodiversity. With more than 1,500 recorded species of coral reef fishes and approximately 75 percent of the world's total coral species, the PBHS has the highest coral reef biodiversity recorded for an area of this size anywhere in the world.

The Seascape's rich coastal and marine resources also make it a target for economic development by external interests, ranging from fisheries and marine tourism to oil and gas extraction, mining and logging. Raja Ampat is an archipelago within the Seascape and the majority of its villagers are dependent on fishing and farming. With the support of CI and the Coral Reef Alliance, the Raja Ampat Regency officially launched the Raja Ampat Tourism Entrance Fee System in August 2007, the proceeds of which are shared among all 90 villages in Raja Ampat via the *Posyandu* system for improving health of pregnant and nursing mothers. In its first full year of operation, the entrance fee system raised more than \$100,000 from 2,406 international guests and 274 Indonesian guests, and in just the first six months of 2009, the system has already raised over \$72,000. The impressive gains in the Raja Ampat tourism entrance fee system have caught the eye of the Raja Ampat, Kaimana, and West Papua governments, and marine tourism is now finally being considered a serious economic sector.

Combined with conservation efforts, such as the installation of mooring buoys at dive sites and the promotion of best practices, the entrance fee system has significantly advanced sustainable economic development in the Seascape. In addition to receiving payment for ecosystem services, more Raja Ampat villagers than ever before are employed in environmentally sustainable livelihoods, including marine tourism, pearl farm operations, seaweed farming, and conservation initiatives ranging from marine protected area management to patrol teams.



Indonesia



water, biodiversity and carbon:
achieving results

Bogotá, Colombia's capital, is surrounded by Sumapaz National Park, Chingaza National Park and other reserves that are crucial for the city's water supply, and are important reservoirs of native biological diversity in the Andean forests and páramo ecosystems.

The protection of this important watershed from agricultural encroachment is crucial to ensure both the long-term supply of water to Bogotá and its surrounding municipalities, as well as the rich biological diversity of the area.

Due to the importance of the watershed, CI has undertaken an ambitious initiative with the city of Bogotá and the Colombian government, the Bogotá municipal water services company and other partners. The project seeks to restore forests around Bogotá to improve habitat for biodiversity and provide clean water, while also helping to mitigate global climate change. Over its 30-year life, the project will sequester carbon by planting and maintaining native trees on more than 15,000 hectares (about 37,000 acres) of previously deforested agricultural areas to form an intact habitat corridor between the three existing protected areas.

The project will create reforestation jobs and deliver certified emissions reductions for the carbon market. It will protect and enhance the major watersheds for the city of Bogotá through the creation of payment systems for water provision, and a fund for project implementation and maintenance. It will also benefit more than 1,000 plant, 47 mammal and 190 bird species.



Colombia



supporting governments,
influencing policy

Ecuador is one of the 12 most biologically diverse countries in the world, harboring amazing biodiversity and approximately 10 million hectares (nearly 25 million acres) of native forests that provide vital ecosystem services, including freshwater services.

Approximately 60 percent of these forests are privately owned by individuals and indigenous communities, and they are not currently included in Ecuador's protected area system. Some of the poorest people in the country rely on the forests and other natural resources to survive, and a lack of economic alternatives has resulted in high deforestation rates.

The government of Ecuador, supported by CI and other key partners, launched the national Forest Partners Program (Programa Socio Bosque) as an effort to stop deforestation and benefit those willing to actively conserve their forests in the poorest areas of the country. The Socio Bosque Program consists of 20-year agreements between the government and individual and communal land owners in which they voluntarily commit to protect their native forest in exchange for annual monetary incentives.

The program is a key element of the national avoided deforestation or REDD scheme, combining direct payments with enforced control of logging activities and detailed monitoring of forest cover. The program aims to conserve over 5 million hectares (about 12 million acres) of forest, to avoid 13.5 million tons of carbon emissions per year, and to provide additional income to 1 million people living in poverty and extreme poverty conditions.

The government of Ecuador has committed funding from their national budget for the implementation of the program and as of December 2008, the program has supported the conservation of over 150,000 hectares benefiting more than 15,000 people. In 2009, the program expects to reach over 300,000 people and protect 1 million hectares. The program targets areas with the greatest deforestation threat, carbon storage and other ecosystem services, and those with the highest poverty.



conservation incentives:
fisheries alternatives

The Phoenix Islands archipelago, located in the central Pacific between Hawaii and Fiji, is several hundred miles long. Eight of the archipelago's 10 atolls/reef islands belong to the island nation of Kiribati; the other two are part of the new United States' Pacific Marine National Monument.

The archipelago is one of the most remote and pristine coral reef archipelagos in the world, characterized by the sheer abundance of marine life and robust health of the reefs—a quality increasingly rare in the world today. Because of their remote location, Phoenix Islands' ecosystems have escaped much of the human-induced destruction seen elsewhere, and today both marine and terrestrial systems host species of global importance, including thousands of nesting seabirds which make the islands their home each night. Although human presence is minimal, the islands are threatened by pressure from commercial fishers, invasive species, improper waste disposal and climate change. In an effort to address some of these threats, the government of Kiribati, the New England Aquarium and CI developed a strategy to protect the Phoenix Islands through the creation of a protected area which includes a financial mechanism to offset foregone fishing license revenue by excluding commercial harvesting from a portion of the Phoenix Islands exclusive economic zone (called "reverse fishing licenses"). The effort allowed for the designation in 2008 of the world's largest marine protected area: the Phoenix Islands Protected Area, better known as PIPA.

Essentially, Kiribati's government will be reimbursed for the amount that they would have made from selling fishing licenses if PIPA were not protected. An endowment will be secured to cover the costs of the reverse licenses and to define obligations and standards for the long-term protection of the region's natural resources, as well as cultural resources within PIPA. A PIPA Trust Fund, established with private and public contributions, will hold the endowment funds and administer payments to the government from income accumulated in the Trust. The reverse fishing licenses and several other incentives are being assessed by CI to determine the effectiveness and impact of such incentives in marine conservation actions.



Phoenix Islands



Yujiashan Nature Reserve in Sichuan province, China, is a former logging concession turned private reserve that protects the Giant Panda (*Ailuropoda melanoleuca*) while supplying the only source of drinking water for people that live in the town of Pingwu.

Unfortunately, these freshwater resources are threatened by the dumping of untreated human waste and the application of chemical fertilizers, pesticides and herbicides in large quantities. High firewood demand, charcoal making and grazing are also indirectly affecting the quantity and quality of Yujiashan water resources.

CI estimates that by 2017, total water use, exceeding more than 4,100 tons per day, coupled with water quality problems of vegetation cover loss, soil erosion and sedimentation, will likely lead to ecological collapse in Yujiashan—creating a shortage of water for around 28,000 people. CI and partners are implementing a conservation agreement in which the former logging concessionaire and communities agree to adopt better agricultural practices and sustainable use of forest resources to protect the Yujiashan Reserve and its water services. A payment for ecosystems services plan is being designed to provide income for managing the reserve, incentives for upstream Yujiashan villagers to rehabilitate local flora and reduce chemical use in crop lands, and to improve the quality and reliability of the water source for downstream users in Pingwu.

A study was also conducted to identify the threats to water provision, carbon sequestration and biodiversity and to demonstrate that the benefits of protecting these services were likely to exceed costs of restoring them once they are lost. The results of this study suggest that water fees collected from Pingwu residents be invested more significantly in the protection and improvement of freshwater resources. An Ecological Compensation Fund was recommended to be financed by existing water fees paid by local residents and commercial interests, and supplemented by external funding from non-profits and other organizations.



Sierra de las Minas Biosphere Reserve, in northeast Guatemala, encompasses a large variety of ecosystems that harbor two-thirds of the known mammals and reptiles in Guatemala and Belize, as well as 63 rivers that feed important watersheds.

The Polochic River and the Motagua River watersheds supply water for approximately 400,000 people from 13 municipalities and support hydroelectricity generation, irrigation systems for cattle farms, coffee processing plants and bottling factories for local, national and international companies.

Fundación Defensores de la Naturaleza, CI, WWF and TNC, implemented an initiative to conserve resources and forest ecosystems, safeguarding the water and other resources fostered by the reserve, and promoting the social and economic well-being of the local populations. Main activities included establishing a water fund for the Motagua-Polochic watershed (Fondo del Agua) and creating watershed councils including municipalities, users, communities and the private sector among others. The water fund receives user fees from international companies, commercial and individual water consumers, and then channels these fee revenues to pay small farmers and landowners for conserving the forests and conducting watershed protection activities that help to maintain water flow and water quality, specifically in the core zone in the Sierra de las Minas Biosphere Reserve.

The water fund has compensated farmers through training and financial assistance. The fund has also financed six projects to reduce pollution and improve watershed conservation. The projects have focused on best management practices for coffee plantations, clean river campaigns, construction of ecological stoves and the prevention of forest fires. Three watershed councils were created and legally validated at the municipal level. This project is also part of Guatemala's Debt for Nature swap, in recognition for its ecosystem and biodiversity value within Guatemala and Central America.



the road ahead

CI and its partners have implemented a portfolio of nearly 130 ecosystems services projects that help to protect forest and water resources; safeguard biodiversity; and generate multiple benefits for people including drinking water, carbon sequestration, income, training and enhanced governance and management of local resources. But more still needs to be done.



It is vital that we continue to make advances in science, field demonstration, and in assessing and marketing the values of ecosystem services. Developing mechanisms for paying and financing natural resource and ecosystem stewards, and engaging communities will enable sustainable long-term management and service provision. We must also demonstrate the benefits of sustainable ecosystem management and resource protection in order to amplify the scale and impact of these results, and affect policy and practice change at national levels.

By proving the social and economic value of healthy ecosystems, we can protect and sustain our natural systems while providing a better life for all.

OUR MISSION

Built upon a strong foundation of science, partnership and field demonstration, CI empowers societies to responsibly and sustainably care for nature for the well-being of humanity.



**CONSERVATION
INTERNATIONAL**

conservation.org

2011 Crystal Drive, Suite 500
Arlington, VA 22202 USA
800.406.2306

PHOTO CREDITS LEFT TO RIGHT, FRONT TO BACK:

© CI/PHOTO BY HAROLDO CASTRO, © CI/PHOTO BY ENRICO BERNARD,
© CI/PHOTO BY RODERIC MAST, © CI/PHOTO BY STERLING ZUMBRUNN,
© ART WOLFE/WWW.ARTWOLFE.COM*, © CRISTINA G. MITTERMEIER*, © CI/PHOTO
BY CHEN QI, © CI/PHOTO BY STERLING ZUMBRUNN, © ART WOLFE/WWW.ARTWOLFE.
COM*, © CI/PHOTO BY RICARDO PETEROS, © CI/PHOTO BY RUSSELL A. MITTERMEIER,
© CI/PHOTO BY STERLING ZUMBRUNN, © CI/PHOTO BY ERDI LAZUARDI, © ISTOCK
PHOTO, © FUNDACION PROAVES, © ROBIN MOORE, © CI/PHOTO BY HAROLDO
CASTRO, © ISTOCK PHOTO, © CI/PHOTO BY STERLING ZUMBRUNN, © CI/PHOTO BY
KATE BARRETT, © ROBIN MOORE, © CI/PHOTO BY MARSHALL MAHER, © RONY MEJIA/
COUNTERPART INTERNATIONAL/GUATEMALA, © CONSERVATION INTERNATIONAL, ©
ROBIN MOORE, © DENNIS COX/ALAMY, © CI/PHOTO BY STERLING ZUMBRUNN,
© EDUARDO CALADAS

*MEMBER OF 

