

The Price Of Survival

How Much It Costs To Save Nature

At a global conference in Bonn, Germany, representatives of 191 nations are discussing a revolution in conservation. By making a highly profitable business out of saving forests, whales and coral reefs, environmentalists hope to put a stop to a dramatic wave of extinctions.

By Philip Bethge, Rafaela von Bredow and Christian Schwägerl

The envoy from Europe can hardly believe his eyes. Butterflies the size of dessert plates are fluttering around his nose. Orchids hang in cascades from towering trees. Hornbills sail across the treetops. The tropical air is filled with the saturated scent of growth and proliferation.

Biologists have already tracked down more than 10,000 plant and 400 mammal species in the Congo basin. These plants and animals are part of the world's second-largest uninterrupted rainforest, one of the planet's most potent carbon storage systems. Indeed, it is for precisely this reason that Hans Schipulle, 63, is tramping around in the wilderness near the Sangha River on a humid morning in the Central African Republic.

"This forest stores carbon dioxide, and thus helps to slow down global warming. It regulates the global water supply and holds valuable pharmaceuticals," says Schipulle, a veteran environmentalist who works for the German government. "We must finally realize that these are services that are worth something to us."

Schipulle is in the region on a sensitive mission. Since December, he has headed the Congo Basin Forest Partnership (CBFP), a group founded by Americans, Europeans and the countries along the Congo River. The alliance aims to prevent the Congo basin from being plundered and transformed into oil palm and coffee plantations by mid-century.

The Congo rainforest is still largely in one piece, but investors from around the world have already discovered the region's potential for big business -- ore, diamonds, plantations and lumber. But Schipulle and his partners have other plans for the Congo basin. They want international financial institutions or the world community to fork over money to preserve the rainforest as it is today.

The threat of clear-cutting poses a double risk for the world. First, destroying the Congo rainforest would eliminate one of the earth's most important cooling systems. Second, the carbon dioxide (CO₂) released as a result of slash-and-burn agriculture would further accelerate global warming.

Bayanga, a nearby village, is living proof of the traditional conflict between protecting the environment and fighting poverty. Until recently, its residents benefited from the destruction of the rainforest. A sawmill in Bayanga provided employment for 370 people, but the mill was shut down after Schipulle and his alliance presented an urgent appeal to the government in the capital Bangui to prevent a dubious logging company from being allowed to overexploit 4,520 square kilometers (1,745 square miles) of forest.

It was a small victory for nature, but village residents still need work and income. An eco-tourism project sponsored by the World Wide Fund for Nature (WWF) and the German Society for Technical Cooperation (GTZ) has created jobs for only 94 people so far,

providing the community with about €10,000 (\$15,500) in annual revenue -- but not enough to reduce poverty.

How can Schipulle explain to the people of Bayanga what their forest means for the rest of the world? Is it really possible that eco-tourism, environmentally responsible forestry and coffee plantations along the fringe of the future protected forest regions will be capable of feeding the men, women and children of the village?

An Emissions Trading Market for the Congo Rainforest

Schipulle firmly believes in this vision. The World Bank already plans to incorporate the entire Congo basin into its Forest Carbon Partnership program. The Washington-based organization wants to enter the emissions trading market with the CO₂ stored by the Congo rainforest. Because deforestation in tropical regions is responsible for about 20 percent of climate change, protecting the forest is synonymous with protecting the climate -- and the world community is increasingly willing to pay a lot of money to make that happen.

The possible rescue of the Congo rainforest is only one of many examples. A new age of conservation is dawning. For the first time, a value is being assigned to forests, plants and coral reefs, a value that makes them worthy of protection. It is nothing short of a paradigm shift in the environmental movement.

Romantic notions about nature and the environment aside, governments, conservationists and scientists are posing new questions, the answers to which will shape the future of mankind: How much is the Earth worth? Can the value of its diversity be quantified? How much should taking inventory of the planet be worth to us? Finally, who should foot the bill for decades of mismanagement at nature's expense?

Officials from around the world are currently addressing these crucial concerns at a United Nations conference on bio-diversity in Bonn, Germany. Representatives from 191 nations and roughly 250 environmental, conservation and development aid organizations are focusing on ways to stop the loss of species and natural habitats. Dozens of draft resolutions, many of them controversial despite being formulated in the dry language of international diplomacy, are under review. Even the name of the gathering belies its importance: the Ninth Conference of the Parties to the United Nations Convention on Biological Diversity.

At issue in Bonn is no less than the future of the planet and man's dramatic failure to leave a livable earth to his children. Wilderness, species, habitats and ecosystems are disappearing at an unprecedented rate. From one day to the next, human beings wipe out between three and 130 species, depending on which estimate you go by. Each year, virgin forest one-and-a-half times the size of Switzerland falls victim to logging. Moors are disappearing, rivers are being forced into concrete channels and erosion is transforming mountainsides into wasteland.

A Nail in the Coffin for the Amazon Rainforest?

Agriculture is taking up an ever larger portion of the Earth, especially now that plants are no longer grown solely as food, but also -- like sugar cane and oil palm -- to produce biofuel. Just last week, German Chancellor Angela Merkel signed an energy agreement in Brasilia with Brazilian President Lula da Silva. Under the agreement, Brazil can continue to supply Germany with biofuel as long as it complies with certain environmental standards.

But for many environmental protection groups, the deal is merely another nail in the coffin for the Amazon rainforest.

In addition, the destruction of nature and global warming tend to reinforce one another. When sea levels rise and mangrove forests disappear, coastlines become more exposed to the elements than ever before. As carbon dioxide continues to acidify the oceans, the calcium structures of corals, snails and mussels become brittle.

At issue is the survival of exotic species like the red-headed vulture, the Banggai cardinalfish, the Gulf of California harbor porpoise, the Santa Catalina rattlesnake and the Indian gharial. But the survival of mankind as a species is also at stake, as the example of the recent cyclone in Burma illustrates. If the mangrove forests that once protected the Burmese coastline had been intact, the flooding would likely have been much less devastating.

Without corals, many types of fish would not exist, because reefs protect fish as they mature. The flora and fauna of the oceans hold potential cancer drugs worth, according to economists' estimates, as much as \$1 billion (€645 million) a year. Many of the things humanity considers costly and desirable are also part of biodiversity, such as turbot fillets, teak garden furniture and caviar from Russian sturgeon. But we also value the song of the nightingale, the scent of lilac, a view of untamed mountains, empty meadows and dense jungles.

The parties to the Convention on Biological Diversity (CBD), well aware of these riches, hope to "significantly" slow down the loss of eco-systems and species by 2010. But what exactly does this "sufficiently fuzzy objective" mean, Jochen Flasbarth, head of nature protection at Germany's Environment Ministry (BMU) asks sarcastically?

At the Bonn conference, about 6,000 experts are debating exactly that question. Ideally, they will bring meaning to what might otherwise be empty words and phrases, but in the worst case scenario the conference will end in little more than bland declarations of intent. The parties can only adopt resolutions in consensus, and there are no mechanisms to apply pressure to obstructionists.

Despite the potential difficulties, some of the approaches being taken at the conference are at least promising:

- * One of the goals is to create a global network of sanctuaries with representative habitats.

- * Using the Intergovernmental Panel on Climate Change (IPCC) as a model, the delegates hope to establish a panel of experts for the biodiversity convention that brings together representatives of the scientific and political communities.

- * The agenda calls for the fair balancing of interests between developing countries, with their abundant diversity, and the industrialized nations, which want to exploit these resources.

- * The experts intend to search for new mechanisms to pay for the protection of diversity. Without new sources of funding, all negotiation can be nothing but empty talk.

"This conference deals with economic interests," says German Environment Minister Sigmar Gabriel. According to Gabriel, it is critical that we assign "a measurable cost to the loss (of environment)," or else we run the risk "of deleting data from nature's hard drive." Chancellor Merkel has already indicated that she will announce a significant increase in German government funding for the protection of the world's forests when she appears at

the conference next Wednesday. Norway, which invests \$500 million (€323 million) a year, is her benchmark. Back home, the government in Berlin is urging German states, responsible for domestic environmental protection issues, to allow 10 percent of forests owned by states and municipalities to return to nature.

Environment Minister Gabriel also plans to present the initial results of a study, initiated in collaboration with the European Union, on the global costs of species and habitat loss. According to an excerpt SPIEGEL has obtained of the document -- titled "The Economics of Ecosystems and Biodiversity" -- the loss of biodiversity costs the world 6 percent of global gross domestic product. Poor countries are the hardest-hit. The annual cost of species and habitat loss amounts to as much as half of their already modest economic strength.

"Protecting diversity is much cheaper than allowing its destruction," says Indian economist Pavan Sukhdev, who Gabriel and EU Environment Commissioner Stavros Dimas convinced to head the study. Biodiversity -- and efforts to preserve it -- could in fact become an enormous business in the future. The new conservationists hope to sell intact forests because they store the greenhouse gas carbon dioxide (CO₂). They also expect to see drugs developed from creatures like the cone snail and corals produce handsome profits in the future. The last oases of diversity are also expected to attract more and more well-heeled eco-tourists.

"Bonn has to push for a breakthrough," says Achim Steiner, the head of the United Nations Environment Program (UNEP). To this day, according to Steiner, the promises made at the Earth Summit in Rio de Janeiro 16 years ago, where both the Framework Convention on Climate Change and the Convention on Biological Diversity were born, have "not been kept or have been systematically broken."

Biodiversity is more than just the diversity of plant and animal species. It also encompasses the entire cornucopia of habitats, as well as the genetic information that lies hidden, as a biological treasure, in many organisms that have yet to be studied. Experts estimate that the planet's inventory includes between 10 and 20 million species of animals, plants, fungi and microbes. This diversity is not evenly distributed, however. Life is concentrated in so-called hot spots, which include regions like the Mediterranean coast, the tropical Andes and the Philippines.

And the future of diversity is not bright. Take Germany, for example. According to a study published in April by the German Federal Agency for Nature Conservation (BfN), titled "Facts about Nature 2008," 36 percent of all animal species studied in Germany are threatened. More than two-thirds of German habitats are considered threatened. Nature reserves make up only 3.3 percent of the country's land mass. Every day, 113 hectares (279 acres) of land disappear under asphalt and concrete.

The global situation is equally alarming. Last year, the International Union for Conservation of Nature (IUCN) red listed 16,297 plant and animal species as threatened, including almost a third of all amphibians, one in eight bird species and almost one-fourth of all mammal species. To develop its list, the IUCNB evaluated more than 41,000 species. The ones on its threatened list make up close to 40 percent of the total.

"A Sixth Global Mass Extinction Has Begun"

To make matters worse, the rate of decline is formidable. A current UNEP estimate concludes that species are becoming extinct 100 times faster today than would normally occur as a result of evolution.

"A sixth global mass extinction has begun," says UNEP Executive Director Steiner. The diversity of species has already been severely compromised five times in the past in the wake of meteorite collisions, volcanic eruptions and rising sea levels. But today it is the more than 6.6 billion people that are destroying nature at an unprecedented pace. They hunt and fish at uncontrolled rates. They transform more and more land into farmland to fill their bellies. They chop down the last virgin forests to produce biofuel for their automobiles. They pollute the water, the soil and the air with toxic substances. And they drag species from one part of the earth to another -- with sometimes devastating consequences.

Ascribing a Monetary Value to Nature

Man's footprint on the globe is growing inexorably. And Homo sapiens, the supposedly perceptive human race, have failed miserably to secure the Earth's biological diversity. But now a revolution is taking shape in the way we think, as environmentalists and economists discover the marketplace of nature. They are putting their heads together to translate the achievements of mangroves and nightshade, whales, moors and rainforests into monetary value. Under this new mindset, destroying nature will no longer be profitable while protecting it will. Pavan Sukhdev, the director of the joint German-EU study on biodiversity, considers this the obvious solution. It is now or never, says Sukhdev, that "the economic weapon must shoot in the right direction."

On a recent spring morning, the 48-year-old Indian pointed to the concrete wasteland of Berlin's Alexanderplatz square. "That's how desolate the entire earth will be if we don't succeed," says Sukhdev, who also heads the global markets division at Deutsche Bank's Indian office in Mumbai. Ten years ago, he says, a friend asked him the following question: "You're a banker. So tell me, why are some things worth something while others are not?" While searching for an answer to her question, he hit upon the idea of calculating prices for forests, wetlands and the courses of rivers.

Sukhdev's calculations, ridiculed at first, have since become the driving force behind the conservation revolution. Economists now perform detailed calculations to reflect what diversity does for people. Bees, for instance, are worth \$2 to \$8 billion (€1.3 to €5.2 billion) a year, because they pollinate important crop plants worldwide. Reeds growing along riverbanks are also considered valuable. Along the central part of Germany's Elbe River, for example, they are responsible for €7.7 million (\$11.9 million) in annual savings, because they filter the water, thereby eliminating the need to build additional sewage treatment plants.

On the coast of Pakistan's Beluchistan Province, one hectare (2.47 acres) of intact mangrove forest produces the equivalent of about \$2,200 (€1,420) in annual income. The ecosystem is a breeding ground for economically attractive fish species, as well as acting as a protective wall against flooding. Salt marshes in Scotland are worth about €1,000 (\$1,555) per hectare to the region's mussel industry.

Tourists visiting Germany's Müritzer National Park to marvel at sea eagles, ospreys, cranes and red deer contribute €13 million (\$20 million) in annual revenue. In Britain, a team of researchers working with conservation biologist Andrew Balmford has calculated that a global network of protected areas could produce about \$5 billion (€3.2 billion) in annual

revenue. The group's calculations reflected the reserves' economic benefits for tourism, climate protection, nutrient cycles and the water supply.

If the destruction of natural habitats continues unabated, even the key to the earth's future energy supply could go undiscovered. US geneticist Craig Venter has collected thousands of samples of microorganisms living in seawater during voyages on his yacht, the *Sorcerer II*. Venter hopes that the samples will contain genetic sequences that could be used to produce fuels for cars and airplanes in the future.

In 1997, American ecological economist Robert Costanza estimated the annual value of the services nature provides for mankind at \$33 trillion, a figure that was 1.8 times the world GNP at the time.

A Shift in Thinking

Despite their enormity, these numbers have been of little use to species and ecosystems in the past, because few have been willing to pay money for nature's assets. Indeed, the world's powerful corporations continue to treat animals, plants, forests, rivers and wetlands as a free resource. But at least some industries seem to be approaching an important watershed moment.

For instance, companies already earn \$43 billion (€28 billion) in annual revenues with plant-based natural remedies. The active agents in 10 of the world's 25 most successful drugs were originally derived from fungi, bacteria, plants and animals living in the wild. The precursors of aspirin came from willow bark and meadowsweet. The purple foxglove plant is the source of the agent in the heart drug digitoxin.

Companies spend billions searching for the next mega-drugs derived from nature's diverse sources. But does nature get anything out of the bargain? Initial models show that it can. In Costa Rica, for example, there is already a tradition to the search for miracle drugs from the jungle. The Instituto Nacional de Biodiversidad (INBio) was founded in the capital San José in 1989. In the 1990s the pharmaceutical company Merck invested \$4 million (€2.6 million) in the research institute, which has since acquired a global reputation. Merck executives pledged to donate 10 percent of the profits of potential discoveries to the country, with part of the proceeds to be earmarked for conservation.

Do Costa Rica's butterflies, forest plants and slime molds hold the key to new drugs to fight malaria and cancer, or can they at least provide the ingredients for new skin creams and anti-dandruff shampoos? World-renowned researchers at INBio continue to seek answers to these questions, constantly hunting for useful natural substances.

On a recent morning, for example, fungus specialist Jorge Blanco was carefully scrutinizing the leaves of *Monimiaceae siparuna*, a plant that resembles the laurel family. Using a scalpel, he cut apart the precious green leaves and placed the pieces into dishes of culture medium. Soon fungi that previously thrived only inside the leaves would sprout. To get the plant Diego Vargas, a biologist working at INBio, spent two hours on the previous day in an SUV, driving the winding roads in the Parque Nacional Braulio Carrillo along the slopes of the Barva volcano.

Vargas, wearing a baseball cap, a white T-shirt and blue rubber gloves, photographs plants in the virgin forest, then uses garden shears to snip off the seed heads of various plants and carefully places them in bags. Peering into the undergrowth, he finds *Monimiaceae siparuna*, a plant with tiny yellowish blossoms. He twirls his garden shears

like a cowboy wielding his Colt, then deftly cuts off the seed heads: a small snip for Vargas, but could it be a giant snip for mankind?

"Many of the fungi that live in the leaves of this plant have never been studied, because they are so hard to isolate," says Vargas. "They may very well produce many interesting substances with which we aren't even familiar yet."

Since INBio was established in the late 1980s, its scientists have examined thousands of insects in their quest for useful natural substances. Nowadays, the high-tech equipment at the institute's special laboratory in Heredia, a San José suburb, is used mainly to analyze plant extracts, microbes and fungi.

The great bio-boom has not materialized yet, prompting Merck and a few other major investors to withdraw their funding. "The pharmaceutical companies no longer want to pay for the long process that is needed to find promising substances in nature," says Giselle Tamayo, technical coordinator of INBio's biodiversity prospecting division.

Sharing the Blessings, While Protecting Biodiversity

Nevertheless, Tamayo insists that the research facility, which now works primarily with universities, is still "a model of success." The institute, says Tamayo, helps to demonstrate how developing countries can share in the blessings of biotechnology while simultaneously protecting their own biodiversity. A share of the licensing fees INBio receives goes into protecting Costa Rican forests.

Costa Rica is already considered a model country within the international conservation movement. In the country's booming ecotourism industry, about 1.5 million tourists spend close to \$1.5 billion (€970 million) a year to visit the natural wonders of Costa Rica's rainforests and montane forests. And protecting those forests has been elevated to a national doctrine in Costa Rica. In the 1970s and 1980s, loggers cleared almost 80 percent of the Costa Rican rainforest. Today more than half of the country is forested once again.

In the southern part of the country, the densely forested Osa Peninsula juts out into the Pacific. Deep in the jungle, in the mountains above the tiny village of Golfito, Jorge Marin Picado keeps watch over 46 hectares (114 acres) of primeval forest. A flock of pale red Aras flies over the site, where the smell of rotting vegetation fills the air. Lianas snake their way up giant trees. Picado, wearing the standard machete in his belt, is the manager of the finca, or farm, perched along the edge of the coastal range. Under an agreement the farm's owner has signed with the Costa Rican forestry agency, the government pays him \$350 (€225) per hectare each year to keep the forest undisturbed and prevent anyone from stealing plants or illegally cutting down trees.

Rewarding Farmers for Keeping Trees Untouched

The government calls the system its "Environmental Services" program, and conservationists consider it exemplary. Under the program, the government rewards landowners for planting new trees or leaving existing forest untouched. "We want to enlarge the forest area and offer farmers an alternative," says Katia Alegria of the forestry agency. As a result, pastureland where cattle have grazed until now is becoming forest once again. Instead of oil palms and banana trees, species like teak and the local ron-ron tree are growing in the new and preserved forests.

The program is funded with taxes on the sale of gasoline and funds from the World Bank and the Global Environment Facility, into which the CBD member states pay. But Costa Rica also hopes to turn a profit in the future from the carbon dioxide captured by trees.

Indeed, the ability to capture enormous amounts of CO₂ from the atmosphere and store it could ultimately be forests' lifeline in this era when man is desperately searching for ways to halt global warming. Bogs can also bind substantial amounts of CO₂. Restoring and preserving them "offers a cost-effective way of curbing climate change and protecting diversity," says UNEP Executive Director Steiner. This is also an opportunity for Germany. Researchers at Greifswald University have calculated that restoring one hectare of lowland bog in Germany and allowing the native alder forest to grow results in the capture of 30 tons of CO₂ a year.

The governments of countries with large tropical rainforests, like Guyana, Indonesia, Brazil and Papua-New Guinea, have become especially enthusiastic advocates of the revolutionary idea of selling their forests as greenhouse gas sinks. If the plan works, they could rake in billions in profits, which in turn could be spent on protecting forests.

A New Currency for Environmentalism

The currency in the new environmental age is called a "forest certificate," and a potential market for the green money already exists. In the EU emissions trading system, for example, industrial corporations and energy utilities are allocated carbon dioxide pollution rights known as CO₂ certificates. They define how much carbon dioxide a given company's factories are permitted to emit into the atmosphere. If a company's CO₂ emissions exceed its allocated limit, it must buy additional certificates to offset the difference. Unused pollution rights can be sold. In other words, the certificates have a real monetary value, which is currently at €25 (\$39) per ton of CO₂, but could increase to €60 (\$93) in the future.

The tropical rainforest countries are keenly interested in entering this growing market. At the next UN Climate Change Conference, in Copenhagen in 2009, the course could be set for the development of a market in forest certificates. Large electric utilities, like Germany's RWE, are already waiting in the wings. "Forests as a part of a global emissions trading system would be of interest to us," says Michael Fübi, the company's climate protection manager. The company would benefit by satisfying climate protection requirements more quickly and at a lower cost than through the installation of costly new technologies. In the medium term, however, this could not serve as a replacement for modernizing power plants, says Fübi.

How much money this forest certificate system would ultimately generate is still written in the stars. Experts estimate that it would cost \$10 billion (€6.45 billion) a year to truly benefit the world's forests. Otherwise it would be far more profitable for tropical countries to cut down their forests for lumber.

"Logging produces from \$100 to \$500 million (€65 to €322 million) a year in revenues for Papua-New Guinea," says Kevin Conrad, Papua-New Guinea's special envoy for climate protection and conservation, highlighting the country's dilemma. The country has to be offered more than this amount to make protecting its forests an attractive proposition, "otherwise the forest will be gone -- and it'll happen very soon."

Turning Canopies into Capital

In Brazil, the chainsaw is still winning out over conservation. Almost 20 percent of the country's 3.65 million square kilometers (1.41 million square miles) of Amazon rainforest have already been cut down and turned into pastureland and soybean fields. After taking office in 2003, Brazilian Environment Minister Marina Silva managed to reduce the rate of deforestation from 28,000 to 12,000 square kilometers (10,810 to 4,633 square miles) a year. She introduced new rules that allowed owners of forests to log on no more than 20 percent of their property, and imposed a credit freeze on violators. But last week Silva, an icon of the global forest protection movement, made the surprising announcement that she was resigning, saying that she was tired of "playing the green fig leaf" for President Lula da Silva.

As it happens, dead forests are more valuable than living forests on global markets, and it will take a lot of money to reverse this. There are, however, a few initial success stories. The World Bank, for example, has introduced its Forest Carbon Partnership, a program designed to protect both the climate and the environment simultaneously. One of the partnership's model projects could soon be that of Germany's Hans Schipulle, who hopes to transform the Congo basin rainforest into a cash cow.

In anticipation of a growing market for forest certificates, the US investment bank Merrill Lynch recently agreed to pay Indonesia's Aceh Province \$9 million (€5.8 million) a year for four years to protect the rainforest in its Ulu Masen preserve. Canopy Capital, a London-based company, has spent a sum numbering in the millions to secure the value that it believes Guyana's Iwokrama rainforest could soon have for mankind. Canopy's managing director, Hylton Murray-Philipson, explains the concept: "No one would pay anything for the intact forest today, but I believe that it is extremely likely that markets will soon take a different view of the value of nature." Experts predict that the trade in the natural assets of forests, bogs and reefs could translate into \$10 billion (€6.5 billion) in revenues by 2010.

Can such global financial transfers truly bring about change? "Once CO2 trading translates into large amounts of money, the question that inevitably arises is who actually owns the forest," says Tom Griffiths, who is with the human rights organization Forest Peoples Programme. "Is it the investors or the people who live in the forest?"

Future Power Struggles over Carbon Sinks

Griffiths fears that a highly profitable forest protection system could lead to power struggles over lucrative carbon sinks, which in turn would translate into more corruption, speculation, land grabs and conflicts. The logging company Asia Pacific Resources International, for example, clears forests and drains peat bogs in Indonesia to plant new tree plantations. Suddenly the company has launched a CO2 pilot project in which it plans to restore a few bogs. But the project smacks of an eco-scam, too, because Asia Pacific will only be able to pocket profits from CO2 trading as a result of the fact that it destroyed large swathes of the ecosystem in the first place.

To secure biological diversity in the long term, the parties to the Biodiversity Convention are also promoting classic methods of conservation. There are roughly 100,000 nature reserves around the globe. According to a recent study by the WWF, the world community spends \$6.5 to \$10 billion (€4.2 to €6.5 billion) a year on protected areas. This sounds like a lot of money, but in fact is well short of what is needed.

Experts estimate that at least twice as much will be required to protect nature in the long term. Professional environment police officers must monitor the reserves. Education is critical in helping local populations find new ways to live in harmony with nature. Microloans are needed to help people implement new business models compatible with the natural environment.

Connecting Countries that are Biodiversity Rich with those with Deep Pockets

But one of the most immediate goals should be to establish additional reserves in the world's biodiversity hot spots. BMU conservation strategist Flasbarth has high hopes for a German initiative called LifeWeb. The program is designed to bring together countries with great biodiversity and those with deep pockets.

"Every country can use the system to specify which areas it would protect, and at what price. The hope is that interested parties will then bid for the right to pay for conservation," says Flasbarth. The Democratic Republic of Congo, for example, is traveling to the Bonn conference with an offer to place 140,000 square kilometers (54,054 square miles) of rainforest under protection. But will it be able to attract investors for the project?

The CBD member states plan to place 10 percent of all the earth's land-based ecosystems under protection by 2010, as well as 10 percent of the ocean surface by 2012. It is a bold plan. The goal could be reached on land, albeit with great effort. But achieving such a goal in the oceans is pure illusion. Strict protections have only been applied to less than 1 percent of the world's oceans to date. Indeed, the oceans are where international conservation and species protection efforts have failed most markedly.

Declining Fish Stocks

Some experts estimate that if the current trend of overfishing continues, commercial ocean fishing will have become all but impossible by 2050. Meanwhile, the countries of the world pay more than €20 billion (\$31 billion) a year to subsidize the fishing industry -- and in doing so they pay for one in five fish caught in the world. Around the globe, there are about 4 million fishing boats routinely hunting down all manner of sea creatures. Experts say that to prevent the destruction of current populations, the global fishing fleet would have to be cut in half.

Overfishing threatens to destroy entire ecosystems. According to the UN Millennium Ecosystem Assessment study, 20 percent of the world's coral reefs have already been destroyed, while another 20 percent are severely compromised. The heavy equipment used by trawlers is destroying coral banks in the northeast Atlantic. Deep-sea fishermen are steadily scraping away at the unique natural wonders of underwater mountains.

"Imagine if hunters were to cut down entire forests to catch a few deer," says Carl Gustaf Lundin, head of the IUCN's Global Marine Program, "people would be outraged." But this is precisely the sort of devastation caused by the use of trawl nets, Lundin explains. "Many people have no concept of the destruction of the oceans."

Zoologists demand tighter controls on board trawlers to limit illegal fishing. Most of all, they hope to see the establishment of zones where fishing would be banned completely. The concept they envision would involve zones of intensive fishing alternating with these protected regions, where young fish could grow to maturity undisturbed and populations could recover. The international community is still hesitant when it comes to establishing

marine reserves and few laws govern the high seas. But opinions are gradually changing when it comes to the territorial waters of nations.

A Plan for the Caribbean

The goal of an initiative currently taking shape in the Caribbean, for example, is to place 20 percent of all ecosystems in the Caribbean Sea under protection by 2020. At issue are 5 million hectares (12.35 million acres) of waters complete with shimmering coral reefs, dense mangrove forests and so-called Blue Holes, often circular, underwater sinkholes inside atolls that can be up to 200 meters (656 feet) deep.

Details of the ambitious program, known as the Caribbean Challenge Marine Initiative, will be presented in Bonn next week. The countries that have signed on so far include the Bahamas, Grenada, the Dominican Republic, as well as St. Vincent and the Grenadines. Conservation groups like the US-based Nature Conservancy (TNC) are also involved. The effort centers around conservation funds, the proceeds of which would pay for rangers, patrol boats, research and environmental education.

"The funding must be secured for the long term, otherwise the entire idea will fail after a few years for lack of funds," says Eleanor Phillips, the director of TNC's Northern Caribbean program. She helps run the project from her office in Nassau, the capital of the Bahamas. The city is on New Providence, one of the islands in the Bahamas archipelago. The conservation problems faced by groups like TNC are concentrated on a few square kilometers in Nassau.

Tourists, especially from the United States, routinely overrun the city. They live in concrete hotels or gated residential communities. Entire mangrove forests, says Phillips, are cleared to make room for the houses of the rich. But the forests are breeding grounds for many Caribbean fish species. Every day in Nassau harbor, fishing boats bring in tons of Nassau grouper and Caribbean queen conch, which are then hawked as island specialties in every snack bar.

The two species were once abundant. The tropical waters used to be filled with enormous schools of Nassau grouper. Within hours, fishermen would bring up hundreds of the large fish, which can weigh up to 25 kilos (55 lbs.). The queen conch was so plentiful that islanders could gather an entire evening meal by snorkeling in the azure-blue ocean for a few minutes. Now, fishermen like Eudie Rolle, often to be found sitting on a quay in Nassau harbor behind a table covered with the tasty sea snails, are left to complain about how difficult the beautiful pink shells are to find. Rolle has been fishing for 57 years. "In the past," he says, "all we had to do was gather the conch in waist-high water. But now my sons have to sail 150 miles out to find any."

"We are very concerned," says Michael Braynen of the island nation's Department of Marine Resources. "In the long term, we need to reduce the number of fishermen in the Bahamas. But then we have to offer them alternatives."

Balancing Nature Protection with Livelihoods

This is the underlying problem. Those who seek to effectively protect nature, make ocean zones off-limits and allow forests to remain untouched must ensure that the people who

have depended on these facets of nature for their livelihoods are given new opportunities. The solution in the Bahamas is called ecotourism.

Andros is a short, 15-minute flight from Nassau. The island, roughly 170 kilometers (106 miles) long, is home to about 8,000 people and the world's third-largest barrier reef lies off its eastern coast. Islanders like Peter Douglas take the island's few tourists on tours of the colorful, luminescent coral banks and undersea bluffs. Enterprising islanders have developed eco-lodges in the bush behind the coast. Prescott Smith, for example, offers fly-fishing vacations for wealthy business executives. For \$1,600 (€1,030) a day, his customers can learn to elegantly cast their flies in the island's mangrove swamps for longfin bonefish or Atlantic tarpon. But instead of keeping their catch, they adhere to a "catch and release" policy.

The islanders are defending their small paradise against investors in mass tourism. They have found ways to profit from nature without destroying it. "Scientists, governments and the big conservation groups are fighting the locals," says Prescott Smith. "They come here and say: You're the problem." But true conservation, according to Smith, must incorporate the local population. "Only if the people here truly get the feeling that their own interests are at stake will they protect the country."

Indeed, even as the world gathers to discuss the CBD, such small-scale, bottom up projects may be the world's best hope. Such a grassroots approach is especially valid in places where poverty is widespread. The poor have no other choice but to live from the resources of nature and, if necessary, to destroy them. This too is an issue that will be discussed at the Bonn conference in the coming days.

Most of all, however, the CBD partners must attempt to establish a focus for the next two years. The 10th Conference of the Parties of the CBD takes place in 2010, presumably in Japan. By then, the group hopes to have implemented many of its ambitious environmental goals.

"In Bonn, it is especially important that the parties do not block one another on the major issues," says BMU conservation director Flasbarth. The sticking points are predictable. When the CBD came into being, for example, many of the parties wanted to see mechanisms established to ensure a fair balancing of benefits among industrialized and developing nations. The idea was that everyone ought to be able to benefit from the planet's genetic treasures. At the same time, the parties argued, the populations of the countries in which the profitable species originate should also share in the profits.

But it has been 16 years since the Rio Earth Summit took place, and still, rules to address this problem have yet to be established. The developing countries are suspicious, because bio-pirates have already hijacked parts of their biological treasures. In early May, for example, it was reported that residents of the South African village of Alice are challenging two patents, held by the German company Dr. Willmar Schwabe Arzneimittel, for the production of the drug Umckaloabo. Umckaloabo is made from the roots of the Capeland pelargonium. The locals claim that they have been preparing tinctures from the plant for centuries and using them to treat colds.

They claim that based on this knowledge, Spitzner, a subsidiary of Schwabe, now produces Umckaloabo. "The patents are illegal and must be revoked," says Mariam Mayet of the African Centre for Biosafety. Besides, says Mayet, the company owes the people of Alice a share of profits.

Another bone of contention is the biofuel boom. German Chancellor Merkel did little to ease tensions when she recently signed an energy treaty with Brazilian President Lula da Silva. The Brazilians see German concern for the Amazon rainforest as an attempt to corner the biofuels market. To produce bio-ethanol, they plan to have planted sugarcane in an area almost as large as Great Britain by 2025. "If we tell the Brazilians that we're boycotting this, the negotiations over rainforest protection will come to an abrupt end," warns German Environment Minister Gabriel. Merely the attempt to place the topic of bio-energy on the agenda at the Bonn conference was met with indignation in Brasilia.

The Pricetag of Curtailing Extinction: €30 billion

In short, a high level of diplomatic skill will be needed in Bonn to advance to the core issue: Who will pay how much and for what? The annual cost of curtailing species extinction by 2010 is estimated at €30 billion (\$46.5 billion). The EU heads of state are even more ambitious and want to put a complete stop to the loss of biodiversity in Europe by 2010. However, the WWF believes that this goal can only be reached "at a significant additional cost."

Mastering the crisis will likely require a wide range of funding models. Focusing on biodiversity as a source for new drugs and cosmetics is one possibility, the trade in CO2 certificates is another. Private sponsors can also have an important impact. The conservation group TNC, for example, manages a fortune of \$5.4 billion (€3.5 billion), some of it donated by wealthy patrons. In 2007 alone, TNC spent \$566 million (€365 million) to purchase land and protect it for future generations.

Others have chosen to engage in something akin to colonial megalomania and personally control the fate of nature. Patagonia, for example, appears to be firmly in the hands of billionaires. For years, Douglas and Kris Tompkins, the co-founders of the apparel companies North Face and Patagonia, have owned several thousand square kilometers of untouched wilderness in the region. Some of their neighbors are speculator George Soros, fashion magnates Luciano and Carlo Benetton, actors Sharon Stone and Christopher Lambert, and CNN founder Ted Turner.

The not-quite-fabulously-rich can acquire tropical islands or hectare-sized pieces of wild animal corridors through organizations like TNC or World Land Trust.

Economist Pavan Sukhdev also recommends levying, in addition to the value-added tax, a kind of value reduction tax in wealthy countries -- a way of compensating for the environmental damage associated with the production of a car or a refrigerator. The revenues from such a tax could flow directly into large-scale conservation projects.

Sukhdev also wants to force companies and consumers to assume more responsibility. "A coffee company could charge a small surcharge and invest the money in the rainforest next to its plantations," he says. When it comes to organic food, consumers are already prepared to pay a premium today. "So why not create an Eco-Plus label to test whether they are willing to pay an additional premium to fund conservation projects?"

Nowadays, people can already make their travel climate-neutral by offsetting the emissions from aircraft or rental cars through companies like the German firm global-woods. The company uses the revenues to support reforestation programs in Argentina, Paraguay and Uganda. Another example is the Marriott hotel chain. The company has paid \$2 million (€1.3 million) to the Brazilian state of Amazonas to protect the 589,000-hectare (1.45 million-acre) Juma preserve from loggers. In return, Marriott receives CO2

credits, which are then offered for sale to hotel guests so that they can continue to relax in their hotel saunas without suffering a bad conscience.

Fisheries experts, on the other hand, recommend only buying fish with the Marine Stewardship Council eco-label. Anyone hoping to enjoy eating marine creatures in an environmentally responsible way in the future will have to do without species like halibut or sole. When it comes to wood, most conservationists recognize the certification awarded by the Forest Stewardship Council.

According to estimates, within only two years consumers worldwide could be spending up to \$75 billion (€48 billion) on fish, wood, medicinal herbs and food produced in an environmentally friendly way. In addition, people have long been willing to pay directly for species protection. According to the BfN, every household in Germany would pay an average of €100 (\$155) a year to preserve biodiversity. This would amount to a total of €3.5 billion (\$5.4 billion). "That's three times as much money as we have had at our disposal so far for species and habitat protection," says Burkhard Schweppe-Kraft, an economist with the BfN.

If natural landscapes are increasingly assigned a value, they could lose their role as "the world's free garbage dump," as Gordon Shepherd of the WWF puts it. But Shepherd also warns that adding value to nature is "no panacea." Indeed, it raises many questions. For instance, developing countries would have to prove that their goal is not simply to rake in additional cash, but that they are serious about protecting diversity.

The industrialized countries, for their part, are likely to be accused of merely orchestrating an enormous green-washing of a failed industrial policy, which for decades treated nature as a cheap self-service shop. Are the mechanisms of the global economy truly suitable for ensuring diversity?

"Conservation based purely on profit could fail in places where, for example, it seeks to protect animals that collide with our interests," writes Douglas McCauley of Stanford University in the journal *Nature*. According to McCauley, nature that does no harm, but is also of no benefit to man would also fail the economic test.

When wolves kill sheep or cormorants wreak havoc in commercial fish ponds, it is nothing but nature at work. On the other hand, people would be unlikely to pay for conservation based solely on its benefit to man.

Economics and the preservation of diversity are often diametrically opposed. About 50 years ago, for example, the Nile perch was deliberately introduced into Lake Victoria in East Africa. Fishermen in the countries adjoining the lake, Uganda, Tanzania and Kenya, remain enthusiastic about the arrival of the edible fish to this day, because it helped fuel copious economic growth. But the new arrivals spelled ecological disaster for the lake's diverse and unique population of haplochromine cichlids, leading to what social biologist Edward Wilson once called "the most catastrophic wave of extinctions in recent history."

Making the economic value of ecosystems the sole basis of conservation would mean that "nature is only worth protecting if it is also profitable," warns biologist McCauley, referring to the risk of a sudden decline in value.

What happens to the rainforest, which we now want to see serving as a CO₂ storage system, if a cheaper technical solution is ultimately found to dispose of greenhouse gases? Will the forest then be liquidated, to borrow an economic term? The value of nature

-- its beauty, and its cultural and evolutionary importance -- cannot be estimated, says McCauley. "In the long run, we will achieve more progress if we appeal to human hearts and not their wallets."

In other words, it is up to man to decide what kind of world he wishes to inhabit. Anyone familiar with wilderness knows what will be lost if environmental destruction continues unabated. By the time the world community can agree to a business model to save biodiversity, it could be too late.

We should also consider the need to preserve "refuges for the soul," says Beate Jessel, the president of the BfN. The CBD partners should also take this to heart if they hope to avoid becoming lost in a jungle of international agreements and bilateral sensitivities in Bonn.

Are we negotiating ourselves to death? Words must soon be followed by deeds. Indian economist Pavan Sukhdev, at any rate, sees the situation as dead serious. We face a decision, says Sukhdev, one whether or not our civilization is to survive.

Sukhdev was in Berlin recently for a meeting with German Environment Minister Gabriel to discuss the crisis. The ministry lies across the barren Alexanderplatz square, past a gray, concrete desert. "It's an ideal place for an environment ministry," says Sukhdev. "Every day you see the things you want to prevent."

Translated from the German by Christopher Sultan.

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