CRITICAL ECOSYSTEM PARTNERSHIP FUND

Ecosystem Profile

ATLANTIC FOREST BIODIVERSITY HOTSPOT

Brazil

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INTRODUCTION

The Critical Ecosystem Partnership Fund (CEPF) is designed to better safeguard the world's threatened biodiversity hotspots in developing countries. It is a joint initiative of Conservation International (CI), the Global Environment Facility (GEF), the Government of Japan, the MacArthur Foundation and the World Bank. CEPF provides financing to projects in biodiversity hotspots, areas with more than 60 percent of the Earth's terrestrial species in just 1.4 percent of its land surface. A fundamental purpose of the Fund is to ensure that civil society is engaged in efforts to conserve biodiversity in the hotspots. An additional purpose is to ensure that those efforts complement existing strategies and frameworks established by local, regional, and national governments.

CEPF will promote working alliances among community groups, NGOs, government, academic institutions, and the private sector, combining unique capacities and eliminating duplication of efforts for a more comprehensive approach to conservation. CEPF is unique among funding mechanisms in that it focuses on biological areas rather than political boundaries and will examine conservation threats on a corridor-wide basis for maximum return on investment. It will also focus on transboundary cooperation when areas rich in biological value straddle national borders, or in areas where a regional approach will be more effective than a national approach. CEPF aims to provide civil society with an agile and flexible funding mechanism complementing funding currently available to government agencies.

Although important projects are already being developed in the Atlantic Forest region, CEPF will make a key contribution to this hotspot, since current investments in this region are insufficient for effective conservation. In particular, CEPF funding will allow the coordination of projects supporting two biodiversity corridors in the Atlantic Forest — the Serra do Mar and the Central Corridor — in order to focus efforts on the richest biodiversity and critical regions within this hotspot. CEPF will fill a unique niche in the Atlantic Forest by providing incremental value within certain themes to projects that complement the objectives established by the existing PPG-7 (Pilot Program of the Brazilian Ministry of the Environment) subprogram for the Atlantic Forest. The CEPF niche will be to catalyze innovative NGO approaches to corridor conservation efforts, directing a majority of resources to the Central and Serra do Mar corridors. CEPF also expects to deploy a small portion of the funding to support initiatives that aim to intercede on behalf of critically important species and areas outside the selected corridors and to build local capacity in support of those initiatives.

Specifically to Atlantic Forest hotspot, CEPF will focus on providing resources to:

- support innovative economic incentives for conservation;
- expand and support the protected area system within the two biodiversity corridors;
- implement biodiversity corridor conservation strategies;
- conduct studies to fill gaps in biodiversity knowledge; and
- strengthen public awareness of biodiversity issues.

Also, CEPF will consider participating with the SOS Mata Atlântica Foundation and FUNBIO in the creation of an innovative Fund to support the management of existing Private Reserves and the creation of new ones.

In summary, CEPF offers an opportunity to promote the conservation of some of the most

important ecosystems in the world — places of high biodiversity and great beauty. CEPF will promote the engagement of a wide range of public and private institutions to address conservation needs through coordinated regional efforts.

The Ecosystem Profile

The purpose of the ecosystem profile is to provide an overview of the causes of biodiversity loss in a particular region and to couple this assessment with an inventory of current conservation activities in order to identify the niche where CEPF investments can provide the greatest incremental value. The ecosystem profile is intended to recommend broad strategic funding directions that can be implemented by civil society to contribute to the conservation of biodiversity in the targeted region. Applicants propose specific projects consistent with these broad directions and criteria. The ecosystem profile does not define the specific activities that prospective implementers may propose in the region, but outlines the conservation strategy that will guide those activities. For this reason, it is not possible or appropriate for the ecosystem profile to be more specific about the site or scope of particular interventions or to identify appropriate benchmarks for those activities. Applicants will be required to prepare detailed proposals that specify performance indicators.

The Corridor Approach to Conservation

The corridor approach to biodiversity conservation seeks to provide a practical and effective solution to the universal difficulty of maintaining extensive areas of pristine habitat. It is recognized that large habitat parcels are essential for maintaining biodiversity and large-scale ecological processes, and that every opportunity to protect large bodies of habitat in perpetuity should be taken. Nevertheless, few such opportunities exist. Existing protected areas are often too small and isolated to maintain viable ecosystems and evolutionary processes; indeed, in many hotspots, even the remaining unprotected habitat fragments are acutely threatened. In such circumstances, conservation efforts must focus on linking major sites across wide geographic areas in order to sustain these large-scale processes and ensure the maintenance of a high level of biodiversity. Such networks of protected areas and landscape management systems are *biodiversity corridors*.

The main function of the corridors is to connect biodiversity areas through a patchwork of sustainable land uses, increasing mobility and genetic exchange among individuals of fauna and flora even in the absence of large extensions of continuous natural habitat. Such corridors not only promote the immediate goals of regional-scale conservation based on individual protected areas, but also help maintain the ecosystem processes needed in order to sustain biodiversity into the future. In this context, small habitat fragments within corridors perform several related functions — connecting or reconnecting larger areas, maintaining heterogeneity in the habitat matrix, and providing refuge for species that require the unique environments present in these fragments.

Large-scale intervention through biodiversity corridors, ecoregional planning, and landscape conservation is therefore one of the highest conservation priorities at the regional level in many of the world's hotspots and wilderness areas. From an institutional perspective, CEPF's adoption of the corridor approach aims to stimulate new levels of civil society participation in practical and political processes as a way to support government and corporate responses to conservation. The corridor approach relies on strategic partnerships with key stakeholders to build a support framework and to coordinate activities in the field. The active involvement of local stakeholders and the development of their capacity of planning and action implementation skills are essential to the sustainability of the biodiversity corridor.

BACKGROUND

The identification of priority actions and areas for conservation has become a significant tool for biodiversity protection in Brazil and around the world. In the past decade, conservation opportunities in the Atlantic Forest were assessed through priority-setting workshops. The first large-scale analysis for the biome was conducted at "Atlantic Forest Workshop" in Atibaia, São Paulo, coordinated by the SOS Mata Atlântica Foundation, and the first action plan was carried out also in 1990. Other studies identified priority areas for conservation in the Atlantic Forest: the Northeastern Atlantic Forest (1993), the Southern and Eastern Atlantic Forest (1996), and others.

The biome-level assessments have been incorporated as government policy through the National Biodiversity Program and financed by the GEF since 1997. All workshops were led by consortia of NGOs, government agencies, universities, and research organizations. This cycle of prioritization for Atlantic Forest culminated in *Evaluation and Priority Actions for Conservation of the Biomes of the Atlantic Forest and Campos Sulinos*, established as part of the Project on the Conservation and Sustainable Use of the Brazilian Biological Diversity of the Ministry of the Environment. The project was intended to consolidate information on the biological diversity of the Atlantic Forest and identify knowledge gaps; identify priority areas and actions based on biological importance, ecosystem integrity, and opportunity to conserve biodiversity; identify and evaluate current and alternative uses of natural resources compatible with conservation; and promote greater awareness and effective participation of society in conservation.

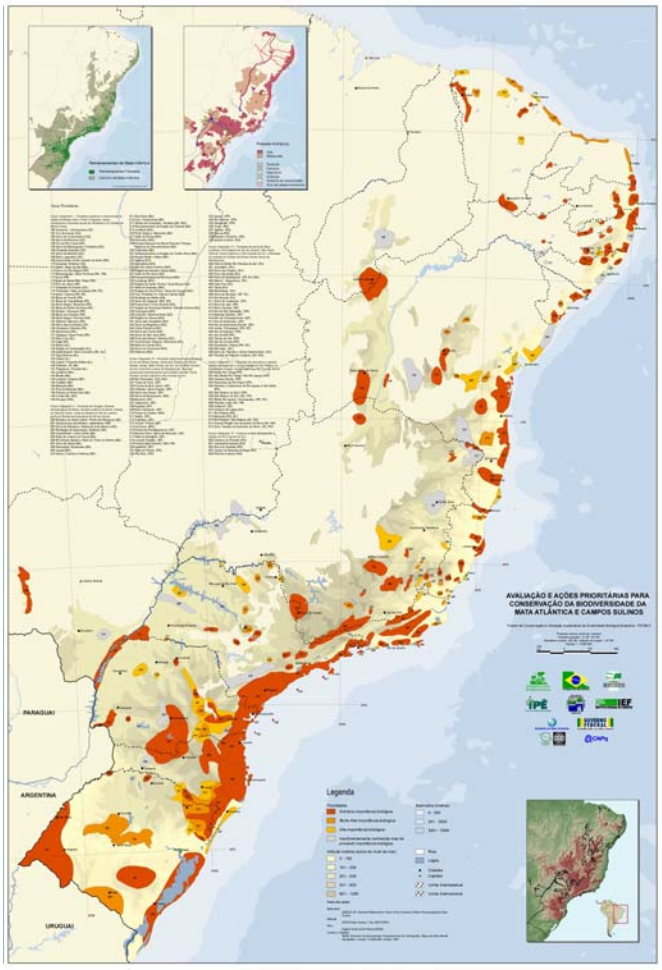

Figure 1: Conservation Priorities in the Atlantic Forest

Representatives of government agencies, NGOs, research institutions, universities, and the private sector attended the Atibaia workshop. Initially, 182 priority areas were identified as part of this prioritization process. Of these, 99 were deemed of extreme biological importance. This effort of more than 200 scientists provided the best consensus of site-based biodiversity assessment and priority conservation action for Atlantic Forest. The results are being published as maps, technical reports, and online databases.

The work is being used by the Ministry of the Environment, state governments, and environmental NGOs to define biodiversity corridors, select sites for new protected areas, assess environmental impact, and establish institutional priorities and projects.

The CEPF strategy will focus on expanding the work in two biodiversity corridors and ensure the conservation of key forest remnants of the Brazilian Atlantic Forest within these corridors: the Central Corridor including southern Bahia, north-central Espírito Santo, and a portion of northeastern Minas Gerais; and the Serra do Mar Biodiversity Corridor, including south-central Rio de Janeiro State, southeastern Minas Gerais and northeastern São Paulo State.

The CEPF strategy seeks to complement activities underway as part of the International Pilot Program to Conserve the Brazilian Rain Forests (PPG-7), adopted in 1990 at the G-7 summit in Houston. Initial funding commitments to the program were made in 1991 at the London economic summit, and the program was developed in greater detail by the Brazilian Inter-Ministerial Conference, the EU Commission, and the World Bank to slow the destruction of Brazilian rainforest and to encourage sustainable use of their resources.

The delimitation of the Central and Serra do Mar corridors is based on the original limits proposed by Biodiversity Corridors projects of PPG-7, and on a biogeographic analysis that delimited the biogeographic regions of the Atlantic Forest by overlaying maps of the distribution of endemic passeriform birds, primates, and forest butterflies. The vegetation map of IBGE, based on orbital imaging data from the Radambrasil project, was used to draw the limits between the areas considered biogeographic centers and those considered transition areas, since these limits could not always be clearly delimited on the basis of species distribution alone.

BIOLOGICAL IMPORTANCE OF THE ATLANTIC FOREST HOTSPOT

The high biodiversity in the Atlantic Forest is a function of the extreme environmental variation in this biome. One of the most important factors in this variation is the 38º latitudinal span of the hotspot. The geographic distribution of lizards in the Atlantic Forest, for example, is significantly affected by latitude, with only one wide-ranging species in this area. The second major source of variation is elevation, as forests extend from sea level up to 1,800 meters, with corresponding gradients of biodiversity. Finally, inland forests differ considerably from coastal ones. These factors combine to generate a unique diversity of landscapes supporting extraordinary biodiversity.

The complexity of this biome can be illustrated by the definition and delimitation of Atlantic Forest vegetation in the Federal Decree 750/93, which regulates the use of natural resources and deforestation in the region: “The Atlantic Forest is to be considered as forest formations and associated ecosystems inserted in the Atlantic Forest domain, with the following delimitations established by the Brazilian Vegetation Map of IBGE (1988): ombrophilous dense Atlantic forests, mixed ombrophlilous forests, open ombrophilous forests, semidecidual stational forests, decidual stational forests, mangroves, restingas, altitudinal grasslands, the countryside swamps, and the northeastern forest enclaves.”

Less than 8% of the original forest now remains, and it occurs mostly in isolated remnants scattered throughout a landscape dominated by agricultural uses. Deforestation is much more

severe in the states of northeastern Brazil, where only 1-2% of the original cover remains, mostly in southern Bahia. In the states of the Central Corridor (Bahia and Espírito Santo) and Serra do Mar Corridor (Rio de Janeiro, part of Minas Gerais and São Paulo), the amount of remaining forest ranges from 2.8% in Minas Gerais to 21.6% in Rio de Janeiro.

Despite these disturbances, the Atlantic Forest and its associated ecosystems (*restingas* and mangroves) is still extremely rich in biodiversity, sheltering a significant proportion of the national total, with high levels of endemism. The Atlantic Forest contains an estimated 250 species of mammals (55 endemic), 340 amphibians (90 endemic), 1,023 birds (188 endemic), and approximately 20,000 trees, half of them endemic. More than two-thirds of the primates' species are endemic.

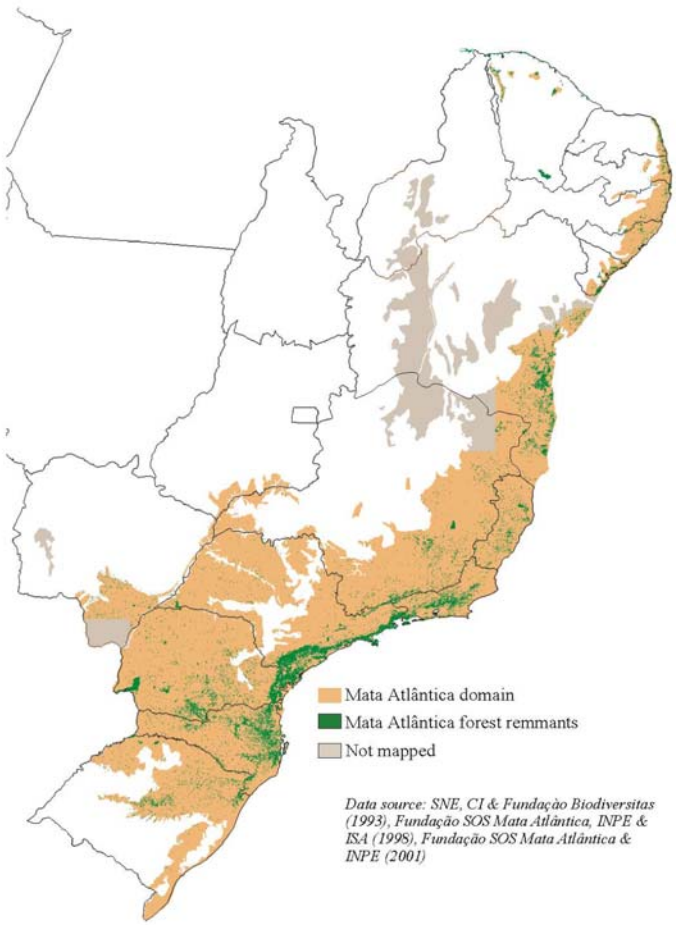

Figure 2: Atlantic Forest Domain and Remnants

Centers of endemism have been recognized in the Atlantic Forest. Scientists believe that during the much drier conditions of the Pleistocene, there was a drastic reduction of the forest area in the Amazon and in the Atlantic Forest regions, resulting in "island" refuges in which only a few species could find favorable conditions. The long period of isolation led to species differentiation. When more favorable climatic conditions returned, thousands or millions of years later, vast areas of forest recovered, linking fragmented refuges. The extent and position of these centers is a matter of controversy, but most experts believe that at least four centers can be recognized in the Atlantic Forest, considering information for terrestrial vertebrates, forest butterflies, and plants: one in the northeast (Sergipe/Alagoas/Pernambuco), one in southern Bahia, one in northern Espírito Santo (Rio Doce center), and one in São Paulo (Paulista center). The region of the Central Corridor includes, therefore, one or two centers of endemism, and the Serra do Mar Corridor is located in another center.

Prioritization of Corridors Within the Hotspot

Very recent analysis suggests that the distribution of wild birds, mammals, and butterflies — the most well-documented animal groups in the Atlantic Forest — indicates the existence of six bioregions: the Northeastern Swamps, Pernambuco, São Francisco, Diamantina, Bahia, and Serra do Mar. Bahia and Serra do Mar overlap, partially, with the Central and Serra do Mar corridors, respectively. The corridors are dominated by dense ombrophilous forest, including wet forests in flat, low-lying terrain in the Central Corridor (less than 200 meters above sea level) or in the forested slopes of Serra do Mar and Serra da Mantiqueira (200-2,000 meters above sea level), and small forest formations over recent marine sediments close to the sea, generally called *restingas*, as well as mangrove forests along estuaries.

Central Corridor

The Bahia Bioregion is an area of 120,954 square kilometers extending from Sergipe to Espírito Santo. Originally, 83% of this region was covered with dense ombrophilous forest, with small patches of mangroves, *restingas*, semideciduos forest, *cerrados*, and open ombrophilous forest. Currently, about 12% of the area remains covered by native forest. The region is known as an important area of endemism for several groups, including vertebrates, forest butterflies, and plants. The Central Corridor is part of this bioregion, being limited in the north by the Jequiriçá River, the agrosystem division limit according to Ceplac for Southern Bahia. The Central Biodiversity Corridor of Atlantic Forest covers about 8.6 million hectares and represents about 75% of the Bahia Bioregion (see map).

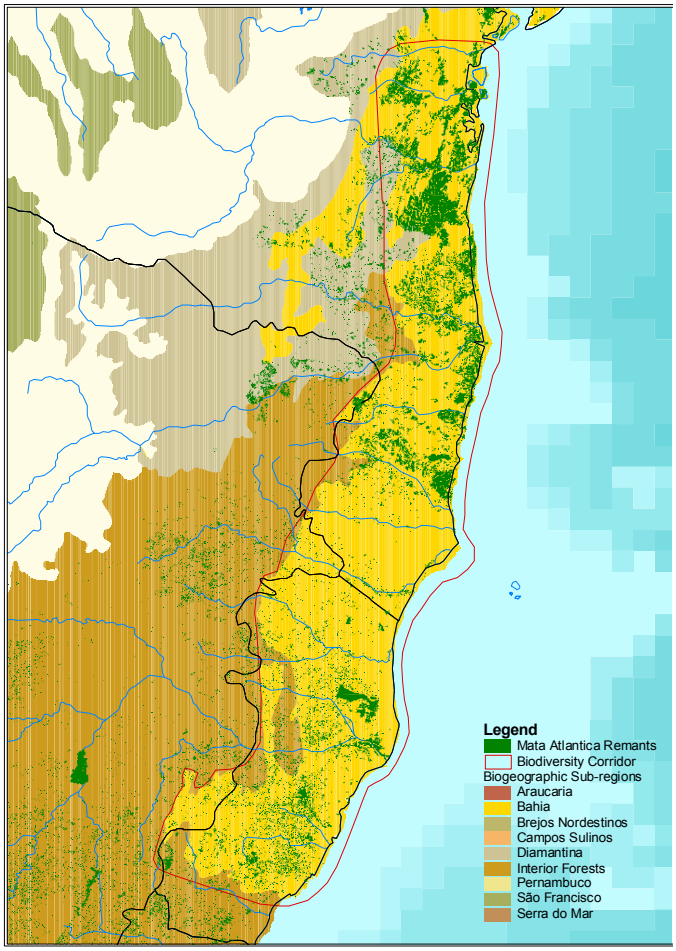

Figure 3: Central Corridor

The Central Corridor is biologically diverse and supports many threatened species or of restricted distribution. In a survey carried out in a privately owned reserve near Ilhéus, Bahia, 454 species of trees were found in a plot of one hectare, a world record for plant species richness. Another study conducted in a lower montane habitat (600-900 meters) in north-central Espírito Santo (Santa Lúcia Biological Station) revealed 443 tree species in an area of equivalent size.

Between Bahia and Espirito Santos States, the region is also unique because of the presence of several Amazonian taxa typically associated with the Atlantic coast, and by great species diversity. The central Espírito Santo is one of the main sections of *Tabuleiros* Forest (a variation of dense ombrophilous forest) in the Corridor, including the 44,000 hectares encompassed by the *Reserva Biológica de Sooretama* and *Reserva Florestal de Linhares*. When compared with other Neotropical forest formations, the *Tabuleiros* Forest is unusual in its high diversity of species and high density of lianas.

The Central Corridor presents a high number of endemic and threatened species of mammals and birds. The communities of primates in Southern Bahia and in the highlands of Espírito Santo are particularly interesting, because these are among the very few areas where all six Atlantic Forest genera of primates occur in sympatry. Twelve primate species occur in the region and represent 60% of the primates endemic to the Atlantic Forest.

Bahia is exceptionally high in bird diversity, with five new species and a new genus (*Acrobatornis fonsecai*) recently described in the mountainous and coastal cocoa-growing regions in the south and central parts of the state. The Central Corridor contains more than 50% of the birds endemic species of Atlantic Forest. The corridor is also particularly rich in amphibians and reptiles, with high level of endemism for these animals. At least 12 new species of anuran amphibians have been described recently in the Central Corridor.

The states of Bahia and Espírito Santo combined have 61 protected areas, 43 of which are strictly protected. In terms of area, state-owned protected areas cover 68% of the total protected land, and they have, in the average, 8,711 hectares. The federal government manages 11 protected areas, which cover 110,608 hectares.

Southern Bahia is the region where most Brazilian cocoa is produced, in a system known locally as *cabruca*. In this system, only 25-35 native species of trees are left per hectare to provide shade for the cacao tree, which dominates the undergrowth with 891 cacao trees per hectare. About 650,000 hectares of cocoa are cultivated in Bahia, 70% under the *cabruca* system. Although significantly disturbed, the *cabruca* forest supports a variety of native plants and animals, and helps to connect protected areas (such as Una Biological Reserve and Nova Esperança Ecological Station).

In extreme southern Bahia lies one of the most important protected areas in the Central Corridor, including four national parks — Descobrimento, Monte Pascoal, Pau-Brasil, and Abrolhos — protecting a total of nearly 50,000 hectares of forest and 90,000 hectares of marine areas. The small river basins protected by these national parks are extremely important not only to Atlantic Forest biodiversity, but to the coral reefs and other marine ecosystems in the Abrolhos Bank and the Abrolhos Marine National Park, the richest coral reef area in the South Atlantic.

The entire territory of Espírito Santo lies within the Atlantic Forest; proportionally, this is the state most devastated. Pastures, coffee, and *Eucalyptus* have replaced most of the forest. Only 8.4% of the original forest remains, and most of it is fragmented. Of the 372,862 hectares of native forest in the state, only 19.4% (72,263 hectares, or 3% of the state) are currently managed and officially protected with public access; the remaining 300,000 hectares are private property.

The devastation of the Atlantic Forest in Espírito Santo and Bahia makes the enforcement of

protected areas, as well as the creation of new ones, a top priority. Suitable new protected areas have already been identified; however, there are not enough human and financial resources to manage the existing ones. Central problems include lack of financial resources to implement management plans; insufficient technical personnel and equipment to direct and guard the units; poaching of forest products; and intentional fires.

Serra do Mar Corridor

The Serra do Mar Bioregion is an area of 111,580 square kilometers extending from Rio de Janeiro to northern Rio Grande do Sul. Currently, about 30.5% of the area remains covered by native forest. Originally, 95% of this region was covered with dense ombrophilous forest, including patches of mangroves and *restingas*. The Serra do Mar Biodiversity Corridor partially overlaps with this bioregion. For the purposes of CEPF, this Corridor is defined in the south by the Paraíba do Sul watershed and in the north by the Paraíba do Sul river. The area covers about 7.5 million hectares and represents about 35% of this bioregion (see map). The area proposed to be treated by CEPF does not include northern Paraná and southern São Paulo, because those areas have many NGOs, academic institutions (some with the greatest technical capacity in Brazil), and state governments with strong environmental programs. Furthermore, compared with other regions in Atlantic Forest, the excluded areas have access to considerable funding for conservation projects.

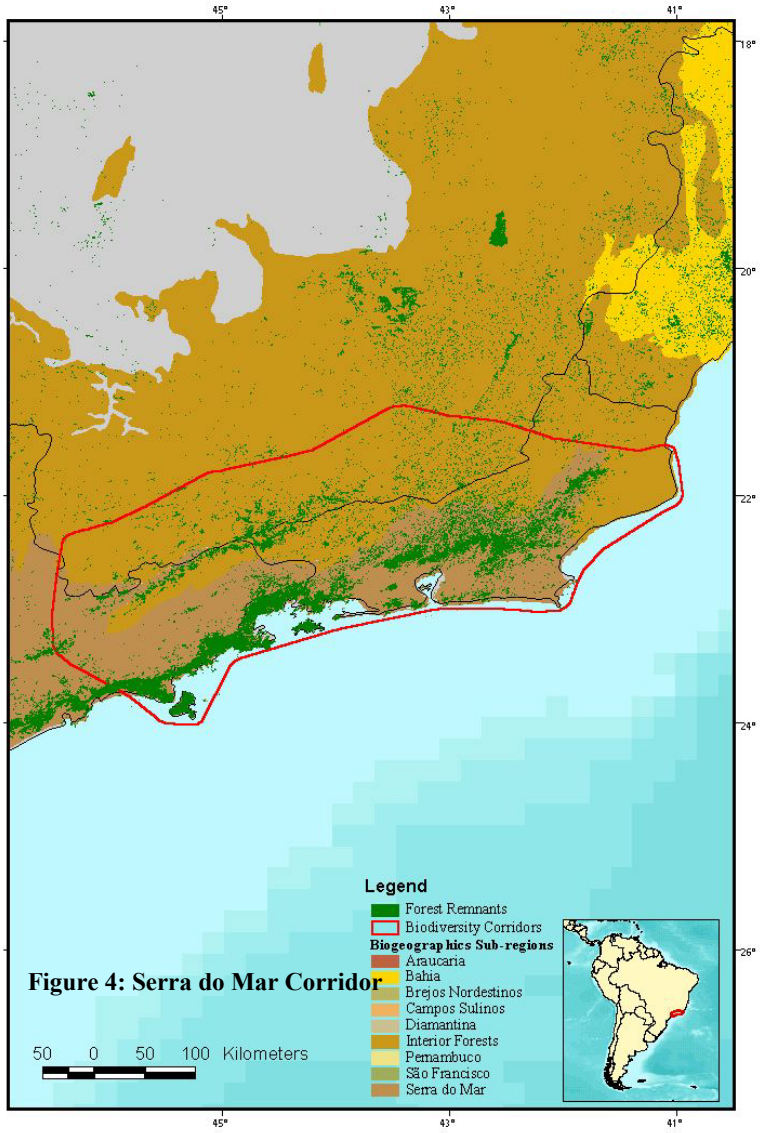

Figure 4: Serra do Mar Corridor

The Serra do Mar Corridor is one of the richest biodiversity areas in the Atlantic Forest. It encompasses several distinct ecosystems, such as submontane forests, montane forest, *restingas*, and mangroves. The northern Serra do Mar, especially in Rio de Janeiro state, is the subregion of the Atlantic Forest with the greatest concentration of endemic species for many groups and the greatest concentration of threatened species of birds.

The coastal streams in the state of Rio de Janeiro have the highest level of fish endemism in the Atlantic Forest. An example is the São João river basin, a priority area identified in the Conservation Priority-Setting Workshop for the Atlantic Forest, where the lowland rivers and hillside streams are of extreme biological importance owing to their high diversity, high level of endemism and the presence of unique fish communities. Twelve areas in the Serra do Mar Corridor were assigned the highest priority for conservation within the Atlantic Forest, based on biodiversity and endemism. The Serra dos Órgãos, for example, stands out as a continuous forest of the montane and high montane type, showing impressive levels of endemism, richness of invertebrates, and numbers of threatened species of mammals, amphibians, and reptiles. In this region, many forest fragments are now part of protected areas, making them suitable for long-term conservation action and investment — particularly the implementation of corridors to increase connections. The Itatiaia region, between Rio de Janeiro and Minas Gerais, also features high levels of endemism.

The Serra da Mantiqueira, located in the Serra do Mar Corridor, was also considered a conservation priority for the state of Minas Gerais. This region also has high diversity of plants and animals, including many endemic species of amphibians and reptiles and the greatest diversity of small mammals in the Atlantic Forest.

The *restingas* also support important endemics. The Restinga of Jurubatiba, on the north coast in Rio de Janeiro State, is one of the best-preserved *restingas* of Brazil. Jurubatiba National Park shows a great mosaic of well-defined ecosystems, with many rare, endemic, or threatened species. This area can be considered a refuge for species already extinct in other regions of Rio de Janeiro, where the *restingas* are degraded or have already disappeared.

The Serra do Mar region includes the largest remaining block of Atlantic Forest *sensu stricto* (dense ombrophilous forest), formed by the slopes and tops of Serra do Mar and Serra da Mantiqueira, and adjacent flat lowlands. Although these forests are near the two largest metropolitan areas in Brazil (the cities of São Paulo and Rio de Janeiro), they remain well-preserved, thanks to steep slopes that are not suitable for agriculture.

In the Serra do Mar Corridor, the federal government owns 38%of the existing protected areas, and the average size of the protected areas is over 35,000 hectares. The region presents one of the most extensive protected areas of the Atlantic Forest (e.g. Serra dos Órgãos National Park, Serra da Bocaina National Park, and Itatiaia National Park) that harbor an extremely high concentration of endemic and endangered species. This presents a more favorable prospect for long-term survival of native species in this part of the Atlantic Forest than in other regions.

SYNOPSIS OF THREATS

The conservation status of all biomes in Brazil is of great concern. The original 1.4 million square kilometers of the Atlantic Forest region has been reduced to 7.3% of its original forest cover. The problem is exacerbated by the fact that the Atlantic Forest region is home to approximately 70% of Brazil's 169 million people, mainly in the megacities of São Paulo and Rio de Janeiro in the Serra do Mar Corridor. About 80% of the Brazilian GDP is generated in the Atlantic Forest. The area now shelters the largest industrial and silvicultural centers of Brazil, and the most populous urban centers. Most of the natural ecosystems have already been eliminated. During the last three decades, there have been severe alterations in the

biome, including fragmentation of the habitat and loss of biodiversity, with species exterminated locally. The vast majority of the animals and plants threatened with extinction in Brazil are represented in the Atlantic Forest. The major threats to the Atlantic Forest in the corridors today are logging, poaching and animal trading; urban and industrial development; and deforestation driven by agriculture and expansion of pasture land.

Deforestation

Deforestation in Bahia began with commercial exploitation of brazil-wood and expanded due to agriculture and cattle grazing. The Brazil-wood was originally used in charcoal production, but more recently as building material for homes. Cocoa and *Eucalyptus* plantations and cattle pastures are the predominant land uses in the region. Despite legal protection, the deforestation rate in southern Bahia was greater in the early 1990s than in the 1980s.

The human settlements resulting from the Land Reform Law in southern Bahia have coincided, disastrously, with forested areas in the region. Although areas deforested as a result of these policies are comparatively small, such areas are often of great ecological importance. Rural incentives have also contributed to deforestation. The "Pro-cacau" program, for example, has led to the devastation of 215,000 hectares of native forest in southern Bahia because credit lines were offered to farmers without adequate consideration of environmental issues.

Forest remnants in the Espírito Santo highlands are in better condition, and under better protection, than those in the lowlands — largely due to the mountainous landscape, which makes exploitation difficult and expensive. However, forest remnants continue to decline, particularly in the *tabuleiros* region — lowlands covering 25% of the state. Satellite images from the SOS Mata Atlântica Foundation suggest higher rates of deforestation in 1996-2000 than in previous years.

The expansion of pastures in southern Minas Gerais has been a principal cause of environmental degradation in the region, affecting the native vegetation, soil, and aquatic systems and extending into all types of landscape. More recently, the widening of Fernão Dias highway has led to an increase in tourism in the Serra da Mantiqueira, causing various environmental problems.

The Paraíba do Sul basin was originally almost entirely covered by the Atlantic Forest; however, the original vegetation remains only in isolated patches in hilltops and other remote areas. Even so, the remaining forest is still subject to inordinate exploitation - according to the Fundação SOS Mata Atlântica, about 2,000 hectares of native vegetation were cleared in the region from 1990-'95.

The most intense deforestation in the Sate of Rio de Janeiro is now concentrated in some municipalities of Angra dos Reis, Carmo, Santa Maria Madalena, and Campos de Goytacases. Cattle ranchers and small landowners in the Serra do Mar Corridor contribute to deforestation through the extraction of timber for fence stakes and subsistence agriculture. This type of extraction activity is constant, widespread, and difficult to monitor, since extraction is selective and made in the interior of the fragments.

Logging

Although logging has been practiced for five centuries in Brazil, it has become especially intense in the past 30 years. In Bahia, for example, particularly with the movement of logging

companies into southern Bahia from the devastated northern Espírito Santo. In 1990, the federal government banned logging in the Atlantic Forest; however, logging companies successfully lobbied the government to be allowed to continue operating if they adopted a sustainable management plan — but they have not necessarily followed the recommended technical process.

In 1985, logging companies extracted 225,000 cubic meters of wood in southern Bahia, nearly 75% of it illegally. In 1994, the Socio-Environmental Institute of Bahia (IESB) found that all logging companies with permits in this region were operating in areas supporting endangered primates. In 2001, 315 approved management plans were evaluated by an expert committee, and only 32 were considered adequate. Furthermore, logging companies, legal or not, remain active in southern Bahia, showing clear expansion from 2000-2001.

Intensive Land Use

At the start of the 19th century, coffee was a cash crop in Minas Gerais. Cultivation of coffee spread throughout the Zona da Mata and the Serra da Mantiqueira. Coffee plantations expanded through the forests, but were cultivated in foothills between mountain ranges, restricting native forests to hilltops. However, the uneven land and unsustainable cultivation techniques caused serious erosion and soil depletion. Coffee plantations then gave way to pastures, which extended to the hilltops, fragmenting forest remnants.

In Espírito Santo, coffee is a major source of income, and plantations represent a serious threat to the forest. In the 1960s, when the coffee industry was affected by declining prices, cattle grazing emerged as an alternative, causing new and extensive deforestation in the state; today, pastures occupy 50% of the area once used for agriculture. Proportionally, this is the state most intensely devastated. Pastures, coffee, and *Eucalyptus* monoculture replace today most of the area previously covered by Atlantic forest.

Grazing is also one of the most intensive land uses in the state of Rio de Janeiro, and fires are used to clear pastures. More than 1.8 million head of cattle occupy the region, grazing on 19,300 square kilometers (44.5%) of the Rio de Janeiro territory, and represent some 30% of the rural production.
Land use in the Paraíba Valley is very intensive and diversified, with cultivations of corn, potato, bean, manioc, and banana. These are all low-yield crops, but they impede forest regeneration and involve the use of fire. Intentional fires to clear pastureland have also caused extensive damage along the frontier between Minas Gerais and Rio de Janeiro states.

Of the 2-7% of the original Atlantic Forest remaining in the Central Corridor, nearly 80% is in remnants owned by cocoa farmers. Cocoa has been cultivated in this area since the 19th century, occupying 600,000 hectares in 1992. Of this, nearly 70% was maintained as *cabruca*, a system where cocoa trees are cultivated in the shadowed environment of the forest. Even though these areas support a low diversity of species compared to the pristine environment, the *cabruca* system is less damaging than deforestation and can support reasonable levels of biodiversity. A *cabruca* ecosystem can even function as a corridor, expanding or connecting original habitats of threatened species, and, when abandoned, its biodiversity tends to increase over time, eventually approaching the level of a native forest. Farmers with large properties (averaging 1,430 hectares) cleared about 67% of their land to sell the timber from the *cabruca*. Farmers in southern Bahia have converted up to 45% of their *cabruca* to pastures or other uses.

Monoculture planting of *Eucalyptus* began in Espírito Santo in the 1960s and in Bahia in the 1980s. By 1995, some 173,000 hectares in Espírito Santo — almost 4% of the state's land area — were occupied by this crop; recently, further plantations of *Eucalyptus* were outlawed in the state. Conditions in Bahia, meanwhile, are ideal: perfect edaphoclimatic characteristics; a tradition of logging; low costs of land, personnel, energy, and taxes; and the world's lowest production costs. In 20 years, *Eucalyptus* monocultures in southern Bahia have already consumed 313,000 hectares. The cellulose industry continues to expand operations in extreme southern Bahia, and the *Eucalyptus* plantations dominate the landscape in this portion of the Central Corridor.

Urban Expansion and Industrialization

Increasing human presence near forested areas is a constant threat to biodiversity, mostly due to small-scale extraction activities such as hunting, collecting ornamental and medicinal plants, capturing songbirds and ornamental birds, and poaching. Serious water pollution from untreated sewer emissions, intentional embankment of lakes, and deforestation of mangroves and *restingas* are also common effects of urban expansion in this area. Fire — including campfires and accidental forest fires — also hampers reforestation efforts.

Coastal forests in particular are threatened by intensifying and poorly planned development. The Espírito Santo coastline extends for 411 kilometers and drains 12 river basins. Coastal development has caused occupation or destruction of fragile ecosystems; pollution of rivers and beaches by industrial, municipal, and human waste; and deforestation. Additional urban and industrial projects are planned in the *restingas* of Espírito Santo.

The Rio-São Paulo region is the most industrialized in the country, and the pollution produced in the area often results in impacts on the forest remnants. The Paraíba do Sul basin is one of the most industrialized areas. The São Paulo portion of this basin has 2,730 industrial sites, which account for 10% of the nation's exports. The central Paraíba region, with its high concentration of industrial sites, is the most heavily polluted.

Fuelwood Harvesting

Most of the wood extracted in Espírito Santo is used as firewood or charcoal. Today, much of the wood used as an energy source is wood rejected by the cellulose industry; yet this is not enough to meet the demand for firewood for residential heating, and the Santa Maria and Jucu Rivers, for example, are still under intense deforestation pressure as a result.

Low income has been one of the major factors in the use of firewood in forest regions in Rio de Janeiro. In the past, exploitation of forests for charcoal production has been a serious problem in the state.

Slash-and-Burn Clearing

This has been a serious and constant threat to the Atlantic Forest in Espírito Santo. In the Caparaó National Park and 10 adjacent counties, 485 fires were detected by satellite imaging in September 2001. These fires destroyed dozens of hectares of native forest, as well as pastures. Nevertheless, the area authorized for controlled burning has increased; in 2000, for example, the area increased by 40% from the previous year. Both the number of permits — mostly for clearing for sugarcane plantations and cattle pastures — and the number of fines for illegal burning have increased.

Subsistence Agriculture

Agriculture occupies 9.4% of the total area of Rio de Janeiro state, but the land use is far from homogeneous. Subsistence agriculture is practiced by a social segment closely associated with the forest remnants, the practice of polycultivation, and use of fallow and *coivara*, allowing the vegetation to grow back to a certain point and then setting fire to increase soil fertility. Many Atlantic Forest remnants are surrounded by small properties where these practices are common.

Palm Heart Poaching

In the municipalities of Resende and Itatiaia, illegal extraction of palm heart trees is now a serious problem. Organized gangs invade and camp in the forest, transport the palm hearts, and process and sell the product. In a few days, poachers can cut down thousands of palm trees, extract the heart of palm, and pack it for transportation. Even local communities, accustomed to traditional exploitation of the forest, usually mobilize against the poaching, helping local authorities to curb the illegal trade.

Degradation of Mangroves and *Restingas*

The deforestation also threatens the associated ecosystems of Atlantic Forest, such the mangroves and *restingas*. The *restinga* consists of all kinds of plant formations occurring in the littoral zone, and includes beaches and dunes. With its sandy soils, it is highly vulnerable to anthropogenic impact. A large percentage has already been cleared for mining, real estate development, and agriculture. *Restinga* vegetation is generally smaller and lower in height than other types of forest in the region, making it a prized source of timber and of firewood for homes or small industries.

Invasion of mangrove areas, particularly by poor families looking for a place to live, is common in Espírito Santo. Wood is extracted from the mangroves to build homes, fish traps, and shrimp nurseries, and for firewood. The use of mangrove trees for firewood is increasingly popular due to the rising price of bottled gas. Mangroves are also exploited for tannin, widely used in pottery and to dye and protect fishing nets. The bark of *Rhizophora mangle* is the richest known source of tannin; the bark is often removed haphazardly, causing the plant to desiccate and die.

Poaching and Animal Trading

Wild animal trade is the third-biggest illegal trade in the world, now on the order of $10 billion per year, of which $1 billion is derived from the Brazilian market alone. The volume of illegal animal trade doubled in Brazil from 1996-2000 and it is estimated that 50 million animals were trapped during this period — i.e., 10 million animals per year. Wildlife trade affects more than 200 Brazilian species directly; of these, 171 — including at least 88 endemic birds — are officially threatened.

In Brazil, the animals are exploited in local fairs, and many are typical species from the Atlantic Forest. A 1998 study identified 174 species of Brazilian fauna being exploited commercially in Bahia alone. In February 2000, an operation by IBAMA in Bahia rescued 2,000 wild animals illegally held in captivity — including threatened species, such as capuchin monkeys and golden lion tamarin.

In 1999, Espírito Santo was one of the leading states in number of penalties applied to poachers and people who collect or maintain wild animals in captivity. In 2000, the environmental police of Espírito Santo rescued about 6,000 wild animals in illegal captivity, and in the first quarter of 2001 the number exceeded 2,000 animals.

Hunting has also contributed to the decline of fauna in the Una Biological Reserve and adjacent areas in Bahia. In recent interviews, 42% of local residents admitted to hunting, and 66% reported that game animals are becoming less abundant in the region. Small farmers hunt more often than large farmers, because they have more acute subsistence needs.

Although not practiced on a large scale, sport hunting has also been a problem, as it contributes to local extinction. This kind of hunting is greatly selective, and hunting areas in Espírito Santo are small and highly fragmented, so hunting poses a serious threat to small populations of hunted animals there. Animals like the solitary tinamou, for example, are threatened by selective hunting as well as by habitat loss.

Infrastructure

Roads divide ecosystems and isolate many animals in fragmented habitats, not only as a result of clearing, but also due to road kills and pollution caused by traffic. Several highways and roads cross the Serra do Mar and Serra da Mantiqueira; many, notably in southern Minas Gerais, have been built without necessary environmental impact reports, and many are left unfinished, leaving adjacent areas vulnerable to severe erosion. The opening of the federal highway BR-101 in 1973 greatly intensified the devastation in southern Bahia.

Mining

In the Serra do Mar Corridor; extraction of sand, clay, and granite (from hillsides) causes deforestation, erosion, flooding, and silting of rivers and streams — particularly in the *restingas* and beaches of Região dos Lagos. The extraction of sand from the Paraíba River has lowered the riverbed, draining smaller tributaries, and rendering agricultural areas unviable. The damage is usually intense, destroying the vegetation along the river to an extent that makes regeneration nearly impossible.

Dams

Dams are also a potential threat. For example, the state power company of Minas Gerais and private investors plan to build 15 new hydroelectric dams in southern Minas Gerais, promising energy in abundance and stimulating further urbanization. It is estimated that 20,000 new businesses will be launched in this region in the next few years.

Tourism Development

Vacation homes and tourist accommodations are a direct threat to precious forest remnants in Rio de Janeiro, particularly because outstanding landscapes are selected for such enterprises, and because exotic plant species are often introduced to change the surrounding landscape. Suppression of the understory forest, introduction of exotic tree species, impoundment of streams and creeks, trail construction, and feeding of wildlife disrupt the integrity of the affected forest fragments.

The northern coast of the São Paulo state extends for 161 kilometers, encompassing 164 beaches and 17 islands, receiving about one million visitors in the peak season (January and February). The city of Caraguatatuba — the most populous in the region, with approximately 80,000 people — receives some 500,000 tourists in the summer, generating about $20 million in revenue, or 25% of the city's annual budget. The largest areas of continuous deforestation along the northern coast coincide with real estate enterprises in the area. Untreated sewage pollutes the beaches, and the construction of vacation homes, hotels, resorts, and other

amenities creates additional pressure on the Atlantic Forest.

Introduction of Alien Species

Apiculture involving alien species, particularly *Apis mellifera*, often interferes with the ecology of native bees and threatens dozens of native bee species. Riparian fish hatcheries also threaten biodiversity in the area, since exotic species often occupy the niches of native species. At least 16 exotic fish species are thought to be established in the rivers of the Paraíba do Sul valley. In highland areas, trout are intentionally released in estuaries, or escape from trout farms, and compete with native species.

Many domestic animals are intentionally released in the forest by their owners, sometimes displacing or competing with local species. This seems to be the case, for example, with the tamarin *Callithrix jacchus* — native to the northeast, but now occurring in Rio de Janeiro and competing with the threatened and endemic golden lion tamarin (*Leontopithecus rosalia*).

The adaptation power of ornamental plants introduced on properties near forest remnants makes them potentially threatening to native flora. This is the case, for example, with *Impatiens balsamica*, an exotic species colonizing the banks of streams and creeks. There is also a proliferation of exotic tree species, such as almond trees, casuarina, and leucena — highly resistant species with great capacity for dispersal. Cultivation of these trees around lagoons has threatened mangroves as a result of competition for sunlight.

SYNOPSIS OF CURRENT INVESTMENTS

In the 1990s, funding for conservation and environmental protection in Brazil began to increase (e.g., through FUNBIO and PPG-7), as did the number of government agencies and NGOs dealing with biodiversity issues. However, the available resources are still insufficient to protect the biodiversity in Central and Serra do Mar Corridors. Some effective ideas have been implemented, e.g. the Ecological ICMS (which returns tax revenue to localities with protected areas), but innovative approaches are needed to expand conservation efforts.

Institutional Capacity

Many agencies in Brazil play crucial roles in the conservation of natural areas, especially the NGOs. Most of these institutions are operating in the Atlantic Forest and associated environments. Over 30% of the government agencies, but only 4% of NGOs, have an annual budget of $500,000 or more. Nearly 70% of the NGOs have budgets no greater than $50,000 per year.

Most of these organizations are active in several distinct areas of conservation. In the biodiversity corridors, for example, the focal areas include biodiversity, forest management, water resources, waste, urban environment, protected areas, environmental legislation and public policy, sanitation, agriculture and rural development, pesticides and herbicides, alternative technology in agriculture and conservation, traditional farming methods, indigenous people, energy, and climate change.

The public administration of State Environmental Agencies contains insufficient staff and resources, and enforcement can only be carried out with considerable support from civil society, if at all. The problem is the same in the federal administration, which openly admits that its enforcement system lacks the capacity to halt deforestation. The Brazilian

Environmental Institute has not been able to hire new personnel since its creation in 1989. The shortage of personnel and equipment limits the effectiveness of protected areas. In some strategic areas, it has been necessary to involve the army, as well as state and federal police, civilian officials, and NGO volunteers.

Current Projects and Programs

The Atlantic Forest supports most of the Brazilian human population, and this is reflected in the number of government agencies, NGOs, universities and projects being developed in the region. However, most of these are small projects, focused on local action, making a broad assessment difficult. Here, only the most relevant or wide-ranging projects will be discussed.

Several projects have been developed by government agencies and NGOs in the region of interest for CEPF. In terms of investment volume, the only programs with substantial resources for a long duration are those supported by federal organizations such as the National Fund for the Environment (FNMA), the Project on the Conservation and Sustainable Use of Brazilian Biological Diversity (PROBIO) and the PPG-7 Atlantic Forest Sub-Program. The $8.8 million investment by FNMA is available for applications from all of the Atlantic Forest for 10 years. The $3 million investment by PROBIO also covers projects in the entire Atlantic Forest, that do not necessarily overlap in CEPF's geographic focus. At the same time, the $9.4 million investment by the Atlantic Forest Subprogram of PPG-7 is still being negotiated with international agencies. This project will focus on the entire Atlantic Forest over a duration of five years.

With the exception of these major programs, and of those projects for which the investment information could not be assessed, the budget for biodiversity projects in the Central and Serra do Mar Corridors are still insufficient. Most of the programs registered do not exceed, individually, $200,000; five have budgets between $200,000 and $400,000, and only two have more than $400,000.

Most projects address conservation by a *sensu lato* approach. Basic research, management and monitoring of biodiversity are part of projects of only few organizations. The difficulties encountered by these projects vary, but there is a general need for better infrastructure and technical personnel, and for improved fundraising capacity in most organizations.

Multilateral Donors

Global Environment Facility and G-7 partners (World Bank as implementing agency): The World Bank and G-7 countries, in conjunction with the Brazilian Ministry of the Environment (MMA), plan to invest $900,000 in a PPG-7 Phase I project to implement the Atlantic Forest Central Biodiversity Corridor in southern Bahia and Espírito Santo. An action plan is in development, but funding is subject to challenging management and decision-making processes. The World Bank and G-7 also support PPG-7 demonstration projects in resource management and sustainable use.

The GEF with the World Bank as implementing agency, in conjunction with the MMA, launched the National Biodiversity Program (PRONABIO) 1996, establishing the Project on the Conservation and Sustainable Use of the Brazilian Biological Diversity (PROBIO) to leverage financial resources and technical knowledge to evaluate conservation priority areas and actions for the Brazilian biomes. PROBIO is currently investing in 14 projects, some of them in the Central and Serra do Mar Corridors, but will not fund their continuation next year.

The PPG-7 Atlantic Forest Subprogram plans to invest $9.4 million for conservation and sustainable use of biodiversity in this hotspot. The subprogram will be developed in five years and will involve projects in sustainable development, management, and monitoring. Some demonstration projects have been funded by PPG-7 to generate knowledge of conservation and sustainable resource management in the Atlantic Forest.

In conjunction with Conservation International's Center for Applied Biodiversity Science and the Institute for Socio-Environmental Studies of Southern Bahia (IESB), the World Bank Development Economics Group has invested $250,000 in efforts to establish the Central Corridor and to reverse forest fragmentation in southern Bahia. Projects include the compilation of an environmental database for Bahia published on CD-ROM; technical reports on anurans, birds, and mammals; and improved enforcement plans.

United States Agency for International Development (USAID): USAID's environment program for 2001-2002 will include investments in biodiversity conservation and reduction of the threat of climate change. Investments will support sustainable management of natural resources and conservation in four of Brazil's ecosystems including the Atlantic Forest. Conservation International in partnership with the IESB, and with support of USAID, invests $300,000/year in activities of economic alternatives for the conservation of the Atlantic Forest of southern Bahia. The objective is to obtain conservative commitment from landowners and communities in strategic fragmented forest areas of the Atlantic Forest through the activities of field technicians offering sustainable alternatives.

UNESCO: The UNESCO project for the Brazilian World Natural Heritage Sites will provide a program to be developed over the next four years. The project aims to improve management of existing information, establish permanent communication systems, initiate monitoring of the sites, train administrative staff in conservation management, and structure the regional planning and administrative forum in each site. $700,000 will be invested in the Central Corridor in restoration of protected areas and establishment of Legal Reserves, increasing connections between Descobrimento National Park and Monte Pascoal National Park, and protecting biodiversity in the region of Sooretama Biological Reserve.

Germany: The *Kreditanstalt für Wiederaufbau* (KfW) is the Germany government agency for financial cooperations between Germany and developing countries. The KfW provides financial support in various states in the Atlantic Forest. The investment focuses on consolidation of protected areas, e.g. in São Paulo State, which cover a region from the Vale do Ribeira to the north through the Serra do Mar State Park. A similar project is planned for Rio de Janeiro State with a budget of $10 million.

Government Agencies

Ministry of the Environment: The MMA's National Fund for the Environment (FNMA) provides small and medium-sized grants to government agencies and NGOs for projects in sustainable resource use, protected areas, research, and environmental education. The FNMA has financed 660 conservation projects in the Atlantic Forest in the past 10 years, with a combined budget of $8.8 million. Several projects are currently in progress. In partnership with PROBIO, the fund is supporting projects with endangered and invasive species, and will invest in biological inventories in priority areas in 2002.

The MMA is finalizing the discussion of the first phase of Brazil's Second National

Environmental Program (PNMA II), which aims to improve environmental quality in priority areas by increasing the effectiveness of environmental institutions at local, state, and national levels in Brazil. The project focuses on institutional strengthening, including monitoring, licensing, and coastal zone management (CZM) and the identification and prioritization of environmental problems.

Bahia Centre of Environmental Resources (CRA): The CRA administers nine state protected areas in the Central Corridor, covering more than 180,000 hectares. These areas are managed predominantly by private companies and allow exploitation of natural resources, but on a planned and regulated basis. The CRA is also responsible for environmental licensing in Bahia.

State Department for Environmental Affairs (SEAMA), Espírito Santo: SEAMA is developing enforcement plans for protected areas; taking inventory of flora and fauna in Espírito Santo; and studying the role of the Atlantic Forest as a carbon sink. This $452,000 effort is expected to produce publications on biodiversity in Espírito Santo. SEAMA and the CVRD are also partners in a $173,000 geoprocessing center, already in operation, supporting protection and restoration of forest remnants, and in a $69,000 effort to improve training of enforcement personnel in protected areas.

Instituto Estadual de Florestas de Minas Gerais: The Institute for Study of Forests is involved in several projects to take inventory of forest remnants in northeastern Minas Gerais, mapping remnants and assessing endangered and endemic species. These efforts are currently insufficiently funded and staffed.

Nongovernmental Organizations

Many NGOs in both corridors have been performing multiple functions in natural resource management — including functions typical of the state, such as mediating conflicts on the use and conservation of natural resources; monitoring and enforcement of regulations (e.g. Gambá and Cepedes); joint management of protected areas; and training, technical support and dissemination of appropriate technologies (as, for example, IESB and Fundação Pró-Natura); compiling and distributing environmental information to different users and stakeholders (as IESB, Associação Mico-Leão Dourado, Fundação Biodiversitas and the SOS Mata Atlântica Foundation have done). NGOs have shown the capacity to attract substantial funding to such endeavors. The major obstacle to the replication of the successful efforts is the small number of professionalized NGOs in the field, coupled with the intermittent nature of the major funding sources.

Academic and Scientific Institutions

Program Biota of São Paulo State: A joint project of many academic institutions, the Program Biota is a broad biodiversity study of São Paulo and neighboring areas. The project's $280,000 budget covers many publications, web sites, databases, scholarships, and the collection of specimens.

Jardim Botânico do Rio de Janeiro: The Botanical Garden's Project Mata Atlântica includes plant biodiversity studies in the Serra do Mar region and the establishment of an information center. The Taxonomic Diversity Project is intended to build capacity for biodiversity research in academic institutions. The Botanical Garden also maintains a large herbarium and substantial human resources, and issues many publications.

Centro de Primatologia do Rio de Janeiro: The CPRJ is a scientific institute administered by the Rio de Janeiro state environmental agency (FEEMA) and is dedicated to conservation research and the breeding of the primate species of Brazil. The Primate Center currently has more than 240 primates of 23 species, many endangered and genetically valuable. Animals captured illegally in the wild and confiscated by the government are often placed with the CPRJ. The Center has a budget of $900,000 during 2002-2003.

Museu de Biologia Mello Leitão: The MBML, in partnership with the Espírito Santo Federal University and the National Council for Scientific and Technological Development, has invested $80,000 in biodiversity studies of Atlantic Forest fragmentation in Espírito Santo, leading to the publication of several papers in specialized periodicals. The effort is not sufficiently funded to support participating researchers and students.

Universidade Federal de Minas Gerais, Universidade Estadual de Campinas, Escola Superior de Agricultura Luiz de Queiroz / Universidade de São Paulo, Instituto Agronômico de Campinas, and Grand Valley State University: This consortium has invested $180,000 in biodiversity studies of Atlantic Forest fragmentation in the Camanducaia Basin in Minas Gerais, leading to increased knowledge of local flora and socioeconomic factors of this region, located in the western of Serra do Mar Corridor. Continued funding is uncertain.

Universities: The Zoology Museum of São Paulo University, Museu Nacional of the Rio de Janeiro Federal University, Rio de Janeiro State University, and other major academic institutions are situated in the Atlantic Forest and have conducted important qualitative and quantitative analyses of the plant and animal communities and environmental processes. These institutions generally lack sufficient funding to expand the studies to different areas of the Central and Serra do Mar Corridors.

Private Sector Donors

The Brazilian Biodiversity Fund (FUNBIO): FUNBIO is a private fund, conceived by the Brazilian government and the World Bank with funding from the GEF, to attract private investment in conservation as a strategic element of the National Biodiversity Program. Its mission is to support associations between government agencies, NGOs, academic institutions, and businesses for the conservation and use of biodiversity in Brazil.

The MacArthur Foundation: The John D. and Catherine T. MacArthur Foundation has a program focusing on population growth and increasing demand for resources, recognizing that the world is in danger of losing much of its genetic, species, and ecosystem diversity. To address this challenge and to increase understanding of the strong relationships between the health of the biosphere and the welfare of human communities, the Foundation has established the Conservation and Sustainable Development program area, dedicated to conserving biodiversity; enhancing knowledge of sustainable use; and promoting sustainable economic growth with social equity.

The foundation has extensive experience supporting biodiversity conservation in Brazil. One recent grant was $105,000 in support of a forestry certification program of the *Instituto de Manejo e Certificação Florestal e Agrícola*, Piracicaba. The foundation also invested $245,000 in the *Instituto Socioambiental*, São Paulo, to provide legal services to organizations working to protect the Atlantic Forest.

BioAtlantic Institute: In partnership with other industrial companies, Aracruz and partners will invest $250,000 to the planned BioAtlantic Institute, still in the design phase. The Institute will develop management plans offering mutual benefit to biodiversity and economic development, especially in coastal areas in Espírito Santo and Bahia.

CEPF NICHE FOR INVESTMENT IN THE REGION

CEPF's niche is the opportunity to increase the number of conservation priority areas under protection and management in the two defined corridors through innovative public/private alliances and partnerships. An important element of this niche is the opportunity to complement existing corridor efforts such as the PPG-7.

The threats to biodiversity, and investments in conservation, in the Central and Serra do Mar biodiversity corridors reflect a complex situation where many programs lack integration and synergy. Furthermore, insufficient resources are directed to key conservation priorities, such as corridor-scale conservation planning; creation and maintenance of protected areas; and conservation of individual species. CEPF can address these needs not only by addressing key conservation issues directly, but also by influencing important large-scale projects, which will start soon or are still in a final design and operationalization phase.

CEPF intends to encourage NGOs to increase their participation in conservation in the corridors through innovative public/private alliances and partnerships. NGOs are particularly capable of promoting and enforcing regulatory mechanisms in protected areas, such as national parks, biological reserves and natural heritage private reserves (RPPNs); of identifying and developing economic alternatives for conservation; of mediating conflicts; and of disseminating information to users and stakeholders. Furthermore, NGOs have shown the capacity to attract substantial financial support for conservation actions; those participating in CEPF projects in the Atlantic Forest will be required to demonstrate leveraging opportunities to complement the CEPF effort.

The recommended CEPF investment will focus, preferentially, on key projects determined by the Atlantic Forest Priority-Setting Workshop in the Central Corridor and the Serra do Mar Corridor, which aim to secure corridor systems, protect microcorridors, consolidate key protected areas and create new ones, and protect reference sites for long-term scientific study.

CEPF INVESTMENT STRATEGY AND PROGRAM FOCUS

CEPF STRATEGIC DIRECTIONS	CEPF INVESTMENT PRIORITIES
1. Stimulate landscape management initiatives led by civil society in Central and Serra do Mar Corridors	1.1 Support civil society initiatives that evaluate spatial relationships in land use, local biodiversity, and the dynamics of fragments within a corridor context. 1.2 Support projects led by civil society that focus on low-impact land use, such as ecotourism. 1.3 Promote economic incentives that contribute to conservation. 1.4 Support efforts to disseminate and increase technical knowledge of innovative tools for reforestation through civil society and recuperation of degraded areas. 1.5 Compile and analyze biodiversity knowledge within and between forest fragments for conservation planning and management of biodiversity corridors. 1.6 Support civil society efforts to establish management strategies for endemic, endangered, and critically endangered species. 1.7 Support efforts to build institutional capacity of civil society. 1.8 Strengthen public awareness of biodiversity issues from a civil society perspective.
2. Improve management of existing and future public protected areas through targeted civil society efforts	2.1 Stimulate efforts by civil society to create and implement new public protected areas within the two biodiversity corridors. 2.2 Support activities led by civil society participants that increase viability, connectivity and forest cover in buffer zones of protected areas. 2.3 Compile and analyze biodiversity knowledge in protected areas for conservation planning and management. 2.4 Support efforts to establish management strategies for endangered and critically endangered species in protected areas.
3. Increase the number of private protected areas through civil society efforts	3.1 Stimulate the creation and implementation of RPPNs in the two biodiversity corridors. 3.2 Together with the SOS Mata Atlântica Foundation and FUNBIO, catalyze and operationalize an “Action Plan and Alliance” to support management and administration of RPPNs.
4. Create an Action Fund to improve civil society identification and management of critical habitats	4.1 Create action fund to build the capacity of NGOs, grassroots initiatives, community outreach, and other small-scale efforts to improve management of critical habitats. 4.2 Provide small-scale support for projects and interventions in habitat of endangered and critically endangered species outside the two biodiversity corridors

Stimulate landscape management initiatives led by civil society in Central and Serra do Mar Corridors

CEPF has the opportunity to complement the objectives of the Pilot Program (PPG-7) of the Brazilian Ministry of the Environment for the Central Corridor of Atlantic forest by focusing on biodiversity corridors. This program is an innovative multisectoral and multidisciplinary partnership involving universities, NGOs, federal and state environmental agencies, and

forest policymakers in the states of Bahia and Espírito Santo.

CEPF will support projects that consider spatial relationships in land use, local biodiversity, and the dynamics of forest fragments within a corridor context. Investments will also be made in nested levels of actions ranging from microcorridors to larger-scale approaches. To maintain or restore connections across the landscape, however, it will also be necessary to stimulate the creation of new protected areas, the introduction of low-impact land use plans, and the recuperation of degraded forests in key sites. Possible activities addressing this larger theme include support for projects that focus on low-impact land uses such as ecotourism; enforcement and monitoring; economic incentives that contribute to biodiversity conservation; institutional capacity-building; and environmental education. Proponents should demonstrate how such activities will secure habitat in the most appropriate places for threatened, endemic, and key species, and how they will guarantee protection over the long term.

CEPF should support technically sound efforts to restore degraded areas where such efforts will increase viability and forest cover and reconnect fragmented habitats to provide maximum support for biodiversity. This will be achieved predominantly through efforts to disseminate and increase technical knowledge of cost-effective and innovative tools for reforestation. The viability of reforestation efforts requires not only low-cost and technically sound approaches, but also the interest and participation of the local community. It is therefore crucial to raise awareness of technically advanced forest restoration methods among key stakeholders.

CEPF should support projects focusing on levels of fauna and flora exchange in areas with different degrees of connection and forest cover; the status of flora and fauna species; and identify appropriate landscape management activities for their conservation.

Within the broader corridor concept, CEPF will also support projects that protect aquatic habitats. Frequently, programs to conserve terrestrial environments do not include plans to conserve aquatic systems. In general, aquatic habitats have been drastically affected by human impact — for example, eutrophication, silting, pollution, over-exploitation, and degradation of gallery forests. Due to increasingly intensive land use and resulting pollution, protection of aquatic systems is a major priority in both the Central and Serra do Mar corridors. CEPF can play an important role by supporting the development of the plans to protect aquatic habitats and to implement watershed management plans. Such management imperatives are directly related to the conservation of forest environments in both proposed corridors.

Weak technical capacity in some key areas has limited conservation mechanisms in the Atlantic Forest. The CEPF strategy will enhance regional technical capacities of NGOs and other stakeholders in conservation and resource management. Training programs, courses, and other educational activities will be supported in order to develop and implement effective strategies to protect biodiversity, resulting in a critical mass of conservation science professionals.

A recent study revealed pervasive ignorance of biodiversity issues in the Atlantic Forest despite the region's high species richness and endemism. Awareness programs are needed to build local pride in the region's many backyard endemic species (through the "nowhere else on Earth" approach), to foster greater community commitment to these species and their

habitats. Such programs can also train local people to help evaluate and monitor flagship species, leading to the selection of new private reserves.

At the same time, the dissemination of information will be considered an integral component of all CEPF strategic directions. The exchange of information about new conservation techniques is essential to success in both biodiversity corridors.

Improve management of existing and future public protected areas through targeted civil society efforts

A key "building block of conservation" in the Atlantic Forest is the system of public protected areas. However, it is necessary to support and expand the system through activities that secure additional baseline information on biodiversity and refine policies and guidelines.

The current strictly protected forests (national parks, biological reserves and ecological stations) are insufficient in number and area to conserve biodiversity in the Atlantic Forest and in the biodiversity corridors. It is crucial to support and expand the system through activities that ensure the adequate management of these areas and their buffer zones.

The system of protected areas in the Atlantic Forest is fragile, due to the lack of capacity of government agencies to provide adequate management and protection. NGOs play an important role by helping federal and state governments incorporate conservation principles in their actions, and by providing technical and political support for new protected areas. This support can include compiling baseline information about local biodiversity and data to fill the gaps in environmental, economic, and social knowledge; mapping land cover and habitats; selecting indicators to monitor biodiversity; and identifying areas for official protection considering the biodiversity representation and viable habitats at the landscape scale.

CEPF will seek to catalyze innovative public/private alliances and partnerships led by civil society to improve and strengthen state agencies' and IBAMA's efforts to manage specific protected areas within the Central and Serra do Mar corridors.

CEPF will stimulate the creation, and support implementation, of new public protected areas within the two corridors and support activities that increase viability and forest cover in buffer zones of protected areas.

CEPF will also support studies evaluating the status of flora and fauna species and projects that support their conservation. The lack of information about Brazilian biodiversity makes most of the evaluations of extinction threats largely speculative. Current predictions of extinction trends are mostly based on projections of habitat loss rates and on relationships between species richness and habitat size. However, little or nothing is known about the populations of key species in the forest remnants within public protected areas or the long-term impact of neighboring urban areas on their survival.

Increase the number of private protected areas through civil society efforts

The challenges in establishing new public protected areas are daunting; therefore, the creation of RPPNs, which are officially recognized as part of the National System of Conservation Units, must be emphasized as an effective and relatively simple means of increasing the

amount of habitat under protection. An RPPN is usually sited because of the importance of the area for biodiversity protection, its landscape value, or other variables which depend on protection or restoration to maintain fragile or threatened ecosystems. They can therefore play a key role in complementing the existing system, providing increased connectivity as well as increase the representation of priority areas included in the protected areas network. The two biodiversity corridors currently have 63 RPPNs covering 13,000 hectares. Landowners have been organizing associations of private reserves in some states (Bahia, Minas Gerais, Paraná, Rio de Janeiro and São Paulo). CEPF will contribute, with other organizations, in the creation of an Action Plan to support the management of existing private protected areas and to create new ones. Landowners have made increasing requests for funds that support this specific purpose, and there has been little response from donors so far.

CEPF will also stimulate the use of economic incentives to increase land held in private protected areas. CEPF should contribute to ongoing efforts of local NGOs to increase compliance with regulations concerning "Legal Reserves" and "Areas of Permanent Preservation" by promoting environmental education projects; working with law enforcement to augment the effectiveness of legal protection; and developing economic instruments for conservation in order to protect biodiversity at a low opportunity cost to development.

Create an Action Fund to improve civil society identification and management of critical areas of habitat

NGOs can perform several simultaneous functions in resource management initiatives, providing stability and increasing the likelihood of the conservation actions success. The major obstacle to replication of successful projects in different regions is the small number of professional NGOs coupled with the intermittent nature of major funding sources.

As part of an Action Fund for Conservation, there should be a program of small-scale investment (with no individual grant greater than $10,000) in specific civil society efforts to strengthen local organizations to bring critical conservation areas under improved management. Such a program should be technically and financially administered by an accredited NGO within one of the two corridors. This effort would learn from the UNDP-GEF Small Grants Program currently operating in the Brazilian Cerrado.

The Atlantic Forest hotspot is acknowledged as an area of truly exceptional levels of biodiversity and yet under truly enormous levels of stress. Both these elements are, however, patchily distributed within the hotspot; thus for example the geographically relatively small sector in the northeast is acknowledged as being a distinct center of endemism and also of having the highest levels of deforestation, with only a few percent forest cover remaining. In the northeast, and indeed in some other areas outside the selected biodiversity corridors, assemblages of highly restricted-range (often therefore Critically Endangered) species may be exposed to serious depletion and even extinction as a result of anthropogenic activities. Moreover, in these areas NGO and other civil society representation may be unusually weak. Accordingly, CEPF expects to deploy a small amount of funding to support initiatives to intercede on behalf of critical species in areas outside the selected corridors, and to build local capacity in support of those initiatives.

SUSTAINABILITY

Many conservation efforts funded by international agencies are interrupted when global economic conditions weaken. It is therefore advisable that new investment mechanisms be

planned in advance, to ensure the continuity of conservation efforts in the regions addressed by CEPF after the fund is exhausted. Conservation professionals in each corridor will support this effort by seeking additional partners for the projects; supporting NGOs in their fundraising efforts; creating an endowment fund for the Private Protected Areas that will support their operations in perpetuity; and making proactive innovative outreach efforts to attract new investors. FUNBIO — a private foundation supporting the conservation and sustainable use of biodiversity in Brazil — is interested in participating in the creation of this fund to support the management of RPPNs.

Attracting and involving many stakeholders in the creation and maintenance of the biodiversity corridors is vital to the success of the projects to be funded. In fact, it seems obvious that isolated organizations cannot achieve the conservation aims for these corridors. Partnerships can combine efforts and maximize efficiency, producing truly long-standing results.

In Brazil, there are several levels of possible institutional agreements that can lead to cooperative and financial actions. The presence of numerous NGOs, private enterprises, and state and federal agencies in the biodiversity corridors — many with strong environmental programs and good working relationships with NGOs — is also a great advantage.

Finally, CEPF investment in the Atlantic Forest should persuade new stakeholders to invest and participate in NGO efforts in the Central and Serra do Mar Corridors, as this and other initiatives accelerate changes in favor of protection and conservation of the biodiversity of the Atlantic Forest.

CONCLUSION

In recent years, Brazil has entered into a new period of environmental revitalization, particularly in the search for effective means of protecting biodiversity. This revitalization is the result of many new initiatives provided in the form of small— but regionally significant — funds as well as nationwide strategies that address large-scale conservation needs. However, the available resources remain insufficient to assure biodiversity conservation, particularly in the Atlantic Forest, given intense socioeconomic pressure on forest resources and the region's exceptional biodiversity. Therefore, it is strongly recommended that CEPF investment in the Brazilian Atlantic Forest focus on two geographic corridors and builds on the results of regional workshops that identified priority areas for conservation.

These regional workshops, "Project for Conservation and Sustainable Use of the Brazilian Biodiversity" (part of the National Program for Biodiversity conducted for the Atlantic Forest), identified gaps in the available knowledge of biodiversity; targeted priority areas for conservation; and outlined strategies and recommendations. Implementing the results from this workshop will greatly contribute to environmental policy and protection for this region. Such initiatives have also been useful in promoting partnerships between organized civil society (through NGOs), government agencies, and major research centers in the country — a circumstance that should be maintained and stimulated during the implementation of CEPF projects.

The Atlantic Forest is already targeted by many conservation strategies, but these strategies still leave critical gaps — opportunities for additional investment by CEPF. Most importantly, however, CEPF offers the region a responsive and flexible funding mechanism, and the Action Fund for small initiatives outside the selected biodiversity corridors reflects

this. Bureaucratic and time-consuming funding mechanisms have undermined conservation efforts and impeded new initiatives, mainly because many organizations lack the capacity to accommodate the administrative burdens imposed by most donor agencies' procedures. In this context, CEPF will not stand alone, but will significantly enhance other ongoing mechanisms and strategies, raising expectations of successful conservation actions of the two most important biodiversity corridors of the Atlantic Forest and ensuring continued protection of the biodiversity in this hotspot.

LIST OF ACRONYMS

CEPF	Critical Ecosystem Partnership Fund
CI	Conservation International
CPRJ	Rio de Janeiro Center of Primate Studies
CRA	Center of Environmental Resources (Bahia)
FNMA	National Fund for the Environment
FUNBIO	Brazilian Biodiversity Fund
G-7	Group of Seven
GEF	Global Environment Facility
IBAMA	Brazilian Environmental Institute
IBGE	Brazilian Institute of Geography and Statistics
ICMS	Tax on Circulation of Goods and Services
IESB	Socio-Environmental Institute of Bahia
KfW	Kreditanstalt für Wiederaufbau
MBML	Mello Leitão Museum of Biology
MMA	Brazilian Ministry of the Environment
NGO	nongovernmental organization
PPG-7	G-7 Pilot Program (MMA)
PROBIO	Project on the Conservation and Sustainable Use of Brazilian Biological Diversity
PRONABIO	National Biodiversity Program
RPPN	Natural Heritage Private Reserve
SEAMA	State Department for Environmental Affairs (Espírito Santo)