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PIMS no. 3990
Title: Enhancing the Prevention, Control and Management of Invasive Alien Species in Vulnerable Ecosystems in Cuba

Brief description

This project will protect vulnerable marine, freshwater and terrestrial ecosystems, species and genetic diversity within Cuba from negative impacts of invasive alien species. More specifically, the project will safeguard globally-significant biodiversity in vulnerable ecosystems, by building capacity at the systemic level to prevent, detect, and manage the spread of IAS in Cuba. This goal and objective will be met by strengthening the institutional policies and technical capacities needed to manage IAS, while stimulating multi-stakeholder, cross-sectoral cooperation for effective implementation in the field. Reaching this state will require pursuing the following broad operational strategies: (i) strengthen the policy and legal framework on IAS; (ii) build sound and effective coordination mechanisms across concerned sectors, between relevant institutions and in partnership with key actors; (iii) enhance scientific knowledge on IAS introduction, spread, impacts and management options among key stakeholders charged with control; (iv) build general public awareness on IAS and their impacts, and; (v) improve management effectiveness in the field to ensure safeguarding of biodiversity.

List of Acronyms

ACPA	Cuban Association of Animal Production
ACTAF	Cuban Association of Agriculture and Forestry
AGR	General Customs
AMA	Environmental Agency
ANAP	National Association of Small Farmers
ANC	National Aquarium of Cuba
ANP	National Port Authority
APR	Annual Project Report
AWP	Annual Work Programme
BD	Biodiversity
BIOECO	Centre for Biodiversity and Ecosystems of Santiago
CBD	Convention on Biological Diversity
CCS	Cooperative of Credit and Services
CECM	Executive Committee of the Council of Ministers
CGB	Forest Protection Unit
CICA	Environmental Inspection and Control Centre
CIEC	Coastal Ecosystems Research Centre
CIGEA	Centre for Environmental Information, Management and Education
CIM	Marine Research Centre
CITMA	Ministry of Science, Technology and the Environment
CNAP	National Centre for Protected Areas
CNSV	National Plant Protection Centre
CP	Cuban Pesos (non-convertible)
CPA	Agricultural Production Cooperative
CSB	National Centre for Biosafety
CUC	Cuban convertible currency (CUC 1 = USD 1.08)
DMA	Environmental Directorate
DNCP	National Port Authority
DNF	National Forest Directorate
ECOVIDA	Centre for Biodiversity and Ecosystems of Pinar del Rio
ENFI	Integrated Forestry Enterprise
EIA	Environmental Impact Assessment
ENPFF	National Flora and Fauna Protection Enterprise
EPD	Executive Project Director
ERP	Poverty Reduction Strategy
ES	Executive Secretariat
FSP	Full-Sized Project
IAS	Invasive Alien Species
ICA	Institute for Animal Sciences
IdO	Institute of Oceanology
IES	Institute of Ecology and Systematics
IGT	Institute for Tropical Geography
IMV	Institute for Veterinary Medicine
INCA	National Institute of Agricultural Sciences
IR	Inception Report
IUCN	International Union for Conservation of Nature

IW	Inception Workshop
JBN	National Botanical Garden
LAC	Latin America and the Caribbean
M&E	Monitoring and Evaluation
MES	Ministry of Higher Education
METT	Management Effectiveness Tracking Tool
MINAG	Ministry of Agriculture
MINAL	Ministry of the Food Industry
MININT	Ministry of the Interior
MINTUR	Ministry of Tourism
MINCEX	Ministry of Foreign Trade and Investment
MNHN	National Museum of Natural History
MPA	Marine Protected Area
MSP	Medium-Sized Project
NEX	National Execution modality
NGO	Non-Governmental Organization
NPAS	National Protected Areas System
ONIP	National Fisheries Inspection Office
OP	Operational Programme
ORP	Office of Fisheries Regulations
ORA	Office for Environmental Regulation (at provincial level)
ORASEN	Office for Environmental Regulation and Nuclear Security
PA	Protected area
PIR	Project Implementation Report
PMU	Project Management Unit
PSC	Project Steering Committee
PTA	Principal Technical Adviser
PZN	National Zoological Park
RCU	Regional Coordination Unit
RE	Ecological Reserve
REDS	Special Region for Sustainable Development
RF	Fauna Refuges
RFM	Managed Flora Reserves
RTA	Regional Technical Adviser
SEF	State Forestry Service
SP	Strategic Priority
SRF	Strategic Results Framework
TGF	Border Control Troops
TPR	Tripartite Review
UAH	Agriculture University of Havana
UBPC	Basic Units of Cooperative Production
UMA	Environmental Unit (at provincial level)
UNDP	United Nations Development Programme
UNDP-CO	UNDP Country Office
ZN	National Zoo

SECTION I: Elaboration of the Narrative

PART I: Situation Analysis

Globally Significant Biodiversity

1. Cuba is the largest and most biologically diverse island in the Caribbean basin, with more than 50% of the priority ecosystems and 55% of the endemic species of the Insular Caribbean. The Cuban archipelago comprises 4,196 islands and keys. The main island (Cuba), which stretches 1,250 km from East to West, is fringed by four island groups: Los Colorados and Jardines del Rey to the North and Jardines de la Reina and Los Canarreos to the South. The archipelago covers an area of 110,921 km^2, accounting for 89% of the total surface area of the Antilles. Much of the land area consists of wide plains, which cover some 79 % of the total land surface. The remaining land area encompasses four mountain ranges. Five terrestrial ecoregions, of global importance as defined by WWF, are recognized, namely Cuban Moist Forests, Cuban Dry Forests, Cuban Wetlands, Cuban Pine Forests and Cuban Xeric Shrub. All but the last ecoregion are ranked amongst the highest priorities for conservation at a regional scale on account of their high species richness, endemism and vulnerability[1]. Furthermore, Cuba is part of one of the 34 global hotspots, the Caribbean Islands, as defined by Conservation International (regions with at least 1,500 endemic plant species that have lost at least 70% of their original habitat)[2].

2. Cuba has the highest species diversity in the West Indies, with over 6,500 species of higher plants recorded, possibly 2.2% of the world total, 350 species of birds, including many migratory species, 147 species of reptiles and amphibians, 42 of mammals and perhaps as many as 13,000 species of invertebrates. Much of the biota is unique: for instance, Cuba harbors the world's smallest bat (the Butterfly Bat: *Natalus lepidus*), frog (*Eleutherodactilus iberia*), bird (The Bee Hummingbird: *Mellisuga helenae*) and scorpion (*Microfityus fundorai*). Over 50% of the flora and 32% of the vertebrate fauna are endemic to Cuba. This high rate of floral endemism places Cuba as the main centre of evolution and speciation in the Antilles and as one of the most important islands in the world. Endemism is particularly high amongst the vascular plants and herpetofauna although it is also significant amongst some other taxonomic groups, including for instance, the spiders, insects and molluscs.

3. The main ecosystems of the island are marine, marine-coastal, and terrestrial. Among the most important of the marine ecosystems are the coral reefs, which border more than 95% of the Cuban landmass. Seagrass beds dominated by *Thalassia testudinum* comprise half of the insular platform and constitute along with the coral reefs and mangroves the three most productive ecosystems of the ocean.

4. Among the main marine-coastal ecosystems are the Cuban wetlands with the most significant ones located in the Zapata Wetland (Matanzas Province), the Delta del Cauto Wetland (Granma and La Tunas Provinces), and the Lanier Swamp (Isle of Youth), all three of which are classified as Ramsar sites. These ecosystems are marked by their species richness, productivity and high levels of concentration of bird life, mostly aquatic and migratory. The Zapata Wetland not only has the highest species richness of birds on the island (258 of 368 reported in the archipelago), it also has the highest number of endemic bird life. Of the 30 species of endemic birds, 23 exist in the Zapata region, and two of these are local endemics: the

[1] Dinerstein, Eric; David Olson; Douglas J. Graham; et al. (1995). *A Conservation Assessment of the Terrestrial Ecoregions of Latin America and the Caribbean.* World Bank, Washington DC.

[2] Mittermeier, R.A., Robles-Gil, P., Hoffmann, M., Pilgrim, J., Brooks, T., Goettsch-Mittermeier, C., Lamoreux, J. and G.A.B. Da Fonseca. 2005. Hotspots revisited: Earth's biologically richest and most endangered terrestrial ecoregions. University of Chicago Press: Chicago.

Zapata Rail (*Cyanolimnas cerverai)* and the Zapata Wren *(Ferminia cerverai).* These wetlands also support habitats for the American crocodile (*Crocodylus acutus*) and the Cuban crocodile (*Crocodylus rhombifer*), the latter being endemic to Cuba and classified as critically endangered by the International Union for Conservation of Nature (IUCN). The Zapata Wetland also houses a great diversity of herpetofauna (lizards, camelions, and small lizards). In these ecosystems the mangroves are of great importance, not only for their contribution of organic matter to the productivity of coastal areas, but also, for the role they play in protecting and stabilizing coastal zones, in particular from the many hurricanes that are active in this region.

5. Another important marine-coastal ecosystem is the cay system formed of more than 4000 small islands and islets grouped in 4 archipelagos: Canarreos, Sabana-Camaguey, Jardines de la Reina, y los Colorados. These islands support populations of several endemic terrestrial vertebrates and other terrestrial ecosystems associated with the coast (coastal evergreen microphyllous forests, coastal plains and semi-deciduous forests).

6. Among the main terrestrial ecosystems the lowland plains constitute the most extensive area of the island with the remaining territory encompassing four mountain ranges: the Sierra Maestra and Nipe-Sagua-Baracoa in the east, Guamuhaya in the central region, and Guaniguanico in the west. The main forests of the island include tropical and subtropical dry and moist forests, pine forests, and cactus scrublands. The moist forests are found in patches of differing sizes in all four mountain ranges of the island. Notable birds of the moist forests include the Cuban Trogon (*Priotelus temnurus*), Cuban Tody (*Todus multicolor*), and the Cuban Parakeet (*Aratinga euops*). The Cuban Solenodon (*Solenodon cubanus*), a small mammal, is endemic to the eastern montane forests. The dry forests were once the predominant forest type on the island covering more than 50% of the territory. The roughly 10% of dry forest remaining on the island provides habitat for important endemic species including the plant ceibon (*Bombacopsis cubensis*), which grows on the giant carst rock formations known as "mogotes", and the little goblin bat (*Mormopterus minutus*), which is listed by the IUCN as vulnerable. The pine forests of Cuba are located in the western province of Pinar del Rio in the Guaniguanico mountain range, and in the eastern mountain ranges of the Sierra Maestra and Nipe-Sagua-Baracoa. There are four species of pine endemic to Cuba. Pino macho (*Pinus caribaea*) is endemic to Pinar del Rio while the Pino de la Maestra (*Pinus maestrensis*) and the Pino de Mayari (*Pinus cubensis*) are endemic to the Sierra Maestra and Nipe-Sagua-Baracoa ranges. Notable endemic bird species include the olive-capped warbler (*Dendroica pityophila*), the Cuban kite (*Chondrohierax wilsonii*), and the ivory-billed woodpecker (*Campephilus principalis*), the last two of which are critically endangered. The cactus scrublands, although covering less than 3% of the territory, harbor important endemic species. The cactus scrublands are primarily located in the southeastern part of the island, with presence also in the central and western areas of the island, and are associated with dry coastal climates.

Threats to Cuba's Biodiversity

7. The extreme climatic conditions, the diversity of habitats, the geological evolution and geographic isolation of the island are factors that made possible the high rate of endemism but at the same time condition the fragility and vulnerability of many of Cuba's ecosystems. Over 75% of the endemic biota is now threatened, and 36% classed as globally endangered[3]. The IUCN red list[4] indicates that 294 species are currently threatened, including 163 species of plants, 49 species of amphibians, 28 species of fish and 17 species of birds. It also reveals that 131 species of animals and 163 species of plants are classified as critically endangered, endangered or vulnerable. As is often the case in island ecosystems, many Cuban

[3] M. Vales, A. Alvarez, L. Montes y A. Avila (eds.). 1998. Estudio Nacional sobre la Diversidad Biológica en la República de Cuba. UMA/CENBIO/IES/AMA/CITMA. Habana, Cuba.
[4] http://www.iucn.org/about/work/programmes/species/red_list/review/index.cfm

plants and animals have naturally localized distributions and small source populations, being restricted to small patches, such as a single mountain range. Habitat loss within these rangelands threatens these species with global extinction. Other species, once widespread, have been extirpated from much of their former ranges. For instance, the Cuban Crocodile (*Crocodylus rhombifer*) is now found only in the Zapata Wetland in southern Cuba, and the unique Almiquí or Cuban Giant Shrew (*Solendon cubanus*), an endangered insectivore considered a living fossil, is found only in montane rain forests in the country's North Eastern territory. Cuba also provides an important refuge for migrating birds in the boreal winter, particularly passerines, raptors and waterfowl, harbouring the largest Caribbean populations of many species. Several of these species have restricted winter ranges, centred on Cuba. Loss or degradation of these areas could cause the extirpation and possible extinction of sub-species and races of these birds. Finally Cuba harbours the largest populations of a number of extant, non-endemic endangered or vulnerable birds, including the Plain Pigeon (*Columba inornata*), which is endangered.

8. Cuba's globally important biodiversity is threatened by a range of anthropogenic activities including overfishing resulting in declines in marine populations, deforestation for infrastructure development resulting in fragmentation and loss of habitat as well as sedimentation in coastal areas, nutrient runoff from agricultural areas resulting in eutrophication of coastal areas and hence declines in flora and fauna populations, dam construction which contribute to changes in water volumes, salinity levels, and nutrient content which in turn contributes to declines in flora and fauna populations, and finally the introduction and spread of invasive alien species (IAS) which contribute to loss of habitat and declines in species populations through direct predation, competition for resources, and displacement of native species. The introduction and spread of IAS is in many cases directly linked to the anthropogenic activities mentioned above due to their propensity to favour disturbed and degraded areas and their greater resilience compared to native species to survive under stressful conditions. However, the introduction and spread of IAS are also facilitated by natural activities such as hurricanes and forest fires. Furthermore, the effects of climate change may further favour the introduction and spread of IAS.

9. Invasive alien species have been identified by Cuba's National Environmental Strategy and its 2007-72010 Action Plan, as a serious threat to Cuban biodiversity, and are considered to be one of the principal causes for biodiversity loss in the country. This vulnerability is mainly due to the insular character of the country and its high level of endemism, as well as its vast diversity of species and ecosystems. The biological diversity and ecosystems of the island are particularly susceptible to IAS because of the lack of native competitors and predators that could control IAS populations. Furthermore, many island native species have never faced strong competitors or predators and therefore are more prone to invasion by alien species. In the Global Invasive Species database of the IUCN Invasive Specialist groups[5], 70 invasive species have been identified in Cuba. At least 43 of them are considered IAS; among them, trees, grasses, amphibians, insects, birds, fish, reptiles, aquatic plants, corals, and mammals. This, in turn, is posing serious threats to many vulnerable ecosystems on the island.

Institutional Context

10. Given the complexity of the IAS issue on the island a wide range of stakeholders have important roles to play. The main institutional stakeholder involved in the prevention, control and management of IAS is the Ministry of Science, Technology and Environment (CITMA) with its many research institutes, regulatory bodies, and management centres working at national and provincial levels. According to Environmental Law No. 81/1997, CITMA is charged with the direction, control and promotion of environmental management aimed at the sound use of natural resources, the protection and conservation of ecosystems and the reduction of pollution. In relation to IAS, CITMA controls or prevents the introduction or extraction of species that can threaten or modify ecosystems, habitats, or species and

[5] http://www.issg.org/database/species/search.asp?sts=sss&st=sss&fr=1&sn=&rn=cuba&hci=-1&ei=-1&lang=EN&x=20&y=10

regulates the use of biological resources for the conservation of biological diversity inside and outside of protected areas in order to guarantee its conservation and sustainable use. Under CITMA, the centres and agencies charged with environmental policy and management are the Environmental Agency (AMA), the Centre for National Protected Areas (CNAP), the Centre for Environmental Information, Management, and Education (CIGEA), and the Environmental Directorate (DMA). The two main regulatory bodies under CITMA are the Environmental Control and Inspection Centre (CICA) and the Centre for Biological Security (CSB) both of which are under the direction of the Office for Environmental Regulation and Nuclear Security (ORASEN). CICA and CSB implement State Environmental Inspections and approve or deny environmental licenses. Some of the key research institutes under CITMA include the Institute of Oceanography (IdO), the Institute of Ecology and Systematics (IES), the Institute for Tropical Geography (IGT), and the Provincial Centres of Environmental Services. The provincial centres have their own research institutes including the Centre for Biodiversity and Ecosystems of Santiago (BIOECO), the Coastal Ecosystems Research Centre (CIEC), and the Centre for Biodiversity and Ecosystems of Pinar del Rio (ECOVIDA). The following are recreational and educational institutes that also carry out research - the National Aquarium of Cuba (ANC), the National Museum of Natural History (MNHN), and the National Zoo (ZN). Finally, CITMA is represented at the provincial level by Territorial Delegations each with its own Centre for Environmental Services focused on research, an Office for Environmental Regulation (ORA), an Environmental Unit (UMA), and where pertinent, a Mountain Zone Unit. These last two units are focused on policy and management.

11. Several ministries have regulatory bodies that play an important role in the prevention, detection, and management of IAS. Under the Ministry of Agriculture (MINAG), the National Forest Directorate (DNF), the Institute for Veterinary Medicine (IMV), and the National Plant Protection Centre (CNSV) all with their respective provincial level offices are charged with approving licenses to introduce plant and animal species, implementing a quarantine system, and monitoring, controlling, and managing plant and animal species. The CNSV and IMV are the two institutions that implement inspection and quarantine activities at border points in conjunction with the General Customs Department of the Republic (AGR) and the CSB. Cuba has a total of 41 entry points, represented by international airports, seaports, and other ports of entry, that are attended by 24 border checkpoints. Currently the CNSV has 176 inspectors, the IMV has 974 inspectors, and the CSB has 40 inspectors who work in coordination with IMV and CNSV. The Ministry of the Food Industry (MINAL) has national and provincial level offices for Fisheries Inspection, ONIP and OPIP. The Ministry of Transport (MITRANS) has the Directorate of Marine Security and Inspection (DISM) with its four regional units. Finally, the Ministry of the Interior (MININT) has the Forest Protection Unit (CGB), the Border Control Troops (TGF), and the National Port Authority (DNCP). This last regulatory body plays an important role in the control of ballast water discharge, a potential entry pathway for IAS.

12. The Ministry of Higher Education (MES) with its many universities and research institutes is a source of information regarding the behaviour, management and control of IAS as well as a conduit for education, communication, and public awareness raising around IAS. Important institutes include the National Institute of Agricultural Sciences (INCA), Institute for Animal Sciences (ICA), Agriculture University of Havana (UAH), National Botanical Garden (JBN), and the Centre for Marine Research (CIM).

13. State-owned companies such as the National Flora and Fauna Protection Enterprise (ENPFF) and the National Integrated Forestry Enterprise (ENFI), both of which belong to MINAG, and PESCACUBA, which belongs to MINAL, play a role in the introduction of IAS for commercial use, but also play a role in the detection, control, and management of IAS.

14. Several important non governmental organizations are key stakeholders in the prevention, control, and management of IAS, including the National Association of Small Farmers (ANAP), Cuban Association of

Animal Production (ACPA), Cuban Association of Agriculture and Forestry (ACTAF), Antonio Nunez Jimenez Foundation of Nature and Man, and Pro-natura. The activities of these NGOs include research, education, extension, and community development.

15. In addition to the abovementioned institutions, there is the National Group on Biological Diversity with representation from all Central Organisms of the State, from the academic sector and from NGOs, and a subgroup focussed on IAS has recently been established. This group was formed under a CITMA resolution and has as its fundamental function the monitoring of the implementation of the National Strategy on Biological Diversity and its Action Plan and the implementation at the national level of different thematic programmes and transversal activities of the Convention on Biological Diversity, mainly through working groups. This group is also responsible for organizing and developing the production of the national reports to the CBD and proposing its approval by the government.

Policy, Legal and Regulatory Context

16. As is the case in many countries, national laws that directly or indirectly address IAS issues have been developed by sector and in general fall under biodiversity conservation, water resources, agriculture and forestry, fisheries, trade and quarantine legislation. In Cuba, the key institutions that enact and enforce these laws are CITMA (environment), MINAG (agriculture and forestry), MINAL (fisheries), MINSAP (public health), MININT (interior via forest guard), and MITRANS (transportation). The Government of Cuba began work on the IAS environmental regulatory system in 1995. Specific phyto- and zoosanitary regulations were implemented many years ago to regulate and control the arrival of plants and animals. Ministerial resolutions governing environmental inspections by the Government were adopted, defining the criteria for Environmental Impact Assessments (EIA), as well as for environmental and biosafety licenses. Cuba has developed within its existing biosafety legislation varying measures for the prevention, control and management of IAS. These include the Decree Law No. 190/99 on “Biological Security”, Resolution 76/00 “Regulation on the Biological Security Authorization”; and Resolution 132/2009 of CITMA “Regulation for the Process of Environmental Impact Assessment”. Quarantine mechanisms are dictated via Decree 153 of Plant Protection Regulations and Decree 137 of Veterinary Medicine Regulations as well as in Resolution No. 434/94 Rule for exporting plants and other quarantined materials. Environmental Law 81 dictates several measures for the introduction of exotic species, including Environmental Impact Assessments. The following table summarizes laws and resolutions from key sectors in the country that directly or indirectly address IAS issues.

Table 1. Summary of Legislation Governing IAS

Law/ Decree/ Resolution	Relation to IAS	Competent Authority
Environmental Law 81	Article 28 subsection o) states that new construction projects or agriculture, forestry, aquaculture or mariculture activities, in particular those involving the introduction of exotic species are subject to an EIA	CITMA
	Article 86 describes the dispositions related to the importation or introduction to the environment of new species	CITMA MING MINSAP
	Article 88 subsection o) states the CITMA, in coordination with competent organisms, will direct actions pertaining to the control or prevention of the introduction or extraction of species that may threaten or modify ecosystems, habitats or species	CITMA SNAP
Forestry Law 85	Article 52 and 53 describe the responsibilities to maintaining forest health	MINAG (CNSV)
	Article 55 requires prior authorization for the introduction to forests of species coming from outside the country or from other localities on the island	MINAG-CITMA (SEF, CICA, CNSB)

Decree-Law 137 "Veterinary Medicine Regulations"	Article 3 and 5 describe the responsibilities to maintaining animal health, including responsibilities of airlines and transport ships Articles 11 thru 22 describe animal health quarantine system including the early warning system and describe regulations associated with importation, exportation, and internal movement of animals	MINAG (IMV)
Decree-Law 153 "Plant Protection Regulations"	Article 2, 19, and 21: Protect the national territory from the introduction and dissemination of pests; prevent, detect, control and eradicate plant pests; regulate the importation of plant material; regulate the establishment and implementation of plant quarantine, early warning system, and emergency systems	MINAG (CNSV)
Decree-Law 200 "Environmental Violations"	Describes in detail acts of violation and associated fines with regard to EIA, environmental licenses, protected areas, and coastal zones. Examples include: failure to request an EIA and license for new construction projects, enter protected areas without proper authorization; collect samples of flora or fauna without prior authorization;	CITMA (ORSAEN, CICA, Delegaciones Territoriales del CITMA) MININT (CGB) MINAL (ONIP)
Decree-Law 201 "National System of Protected Areas"	Describes the surveillance and protection regimen of the National System of Protected Areas	CITMA MININT MINAL
Decree-Law 212 "Coastal Zone Management"	Article 16, subsection h) states that it is prohibited in coastal zones to introduce exotic species, without first complying with the requirements of this activity	CITMA
Decree 180 "Regulations regarding Forest Heritage and Wild Fauna"	Article I, subsection II states that the introduction of exotic flora or fauna into the natural environment without the proper authorization will be fined and be responsible for the extraction of that species or cooperate in the extraction of that species	MINAG MININT (CGB)
Decree 207 "Administrative Customs Infractions"	Article 1: Describes the infractions related to the importation or exportation including the illegal importation or exportation of prohibited species of flora and fauna	
Resolution 435/1994 del MINAG "Regulations for Importation of Plants, parts of Plants, products originating from Plants and other Products that may threaten the phytosanitary state of Cuban plants"	Describes regulations associated with importing plant material including the need for permits, plant certificates from abroad and the responsibilities of inspectors of the Plant Quarantine Service of the State Plant Protection System	MINAG
Resolution 111/1996 del CITMA "Regulations regarding Biodiversity"	Chapter III: Introduction of Species, Article 15 and 16 state that the introduction of species that may or may not alter the diversity of native species is subject to approval by CITMA. Article 17 states that it is prohibited to introduce species, exotic or from another ecosystem on the island, into protected areas that are under strict management, such as Natural Reserves, National Parks, Ecological Reserves, or others whose ecosystems are fragile.	CITMA (ORASEN-CICA)
Resolution 330/1999 del MINAG "Regulations associated with the Forestry Law"	Article 121 thru 124 describe the regulations associated with the introduction of species from other areas of the country into forested areas, including the responsibility of the SEF to track and control the introduction of these species	MINAG (SEF)
Resolution 132/2009 del CITMA "Regulation for the process of conducting EIAs"	In correspondence with article 28 of the Environmental Law, in this resolution Article 5 describes the activities that require an Environmental Impact Assessment to be conducted, including subsection o) which states that agriculture, forestry or fisheries activities that include the introduction of exotic species require an EIA	CITMA (ORASEN-CICA)

17. The legal and regulatory foundation that has been established in recent years, notwithstanding its existing gaps and weaknesses, has facilitated the insertion of IAS activities into national strategies. The 2007-2010 National Environmental Strategy sets ambitious and precise targets and activities to address the IAS issue before 2010. In addition, the National Protected Areas System Plan (2003-2008) identifies IAS as a priority with defined objectives, expected results, and outlined activities geared towards IAS. To date, a National Strategy specifically for IAS is in the process of development.

18. Although an IAS policy, legal, and regulatory framework exist there are many gaps that need to be addressed, including enforcement, compliance, and coordination, for the establishment of a successful national system to prevent, detect and manage IAS. These issues will be discussed further below in the threats and barriers sections.

Protected Areas

19. Cuba's National Protected Areas System (NPAS), includes 263 sites (155 terrestrial and 108 marine and coastal), encompassing approximately 22% of the national territory. The NPAS is coordinated by the National Council of Protected Areas (CNAP), a dependency of the Ministry of Science, Technology and Environment (CITMA). The NPAS is responsible for the conservation and sustainable use of the biological diversity of the country and functions through a National Coordinating Body which has representation at provincial levels as well. The National Coordinating Body is composed of numerous agencies whose functions include control, inspection and regulation, and use and access to natural areas. These agencies include the Ministry of the Food Industry (MINAL) represented by the National Offices of Fisheries Regulation and Inspection (ONIP and ORP), the Ministry of Agriculture (MINAG) represented by the National Service for the Protection of Flora and Fauna (ENPFF) and the National Forest Directorate (DNF), the Ministry of the Interior (MININT) represented by the Forest Protection Body (CGB), and Ministry of Science, Technology and Environment (CITMA) represented by National Office of the Environment (DMA) and the Environmental Control and Inspection Center (CICA). The National Service for the Protection of Flora and Fauna (ENPFF) administers 24 protected areas covering approximately 635,000 hectares.

20. Invasive alien species have been identified in many of Cuba's protected areas including the Sierra de Rosario Biosphere Reserve, Zapata Wetland Biosphere Reserve which is also a Ramsar Site, Topes de Collantes, Alejandro Humboldt National Park, Baconao Biosphere Reserve, Hatibonico Ecological Reserve, and the Siboney-Jutici Ecological Reserve. Only some protected areas have management plans that are approved and implemented and of these few include IAS prevention, detection or management activities.

Productive Sectors

21. The three main sectors with implications for the control and management of IAS are fisheries, forestry, and agriculture and livestock. All three actively introduce and use alien species, many of which do not become invasive, however some do become invasive as a result of weaknesses in the legal and regulatory system for IAS, limited capacity to enforce regulations and implement systems (early warning, rapid response, monitoring, information), and limited knowledge of potential threats posed by alien species. Due to the active role these sectors play in the introduction and use of potentially invasive species they are key stakeholders in the prevention, detection, and management of IAS.

Fisheries

22. The fisheries sector falls under the responsibility of the Ministry of the Food Industry (MINAL), previously known as the Ministry of Fisheries (MIP). Fishing is the fourth largest economic sector in Cuba, with production reaching close to 50,000 tons in 2004, with an approximate value of US$100 million. Primary fishing resources include lobster, lane snapper, mutton snapper, groupers, jacks, grunts, rays, commercial sponges, blue crabs, and queen conch. There are three main categories of fisheries operators: commercial fishermen supplying the Ministry of Fisheries through PESCACUBA, "sport fishermen" who largely fish for subsistence needs, and unauthorized fishermen operating illegally. The country's commercial fishing fleet is owned by the State company PESCACUBA, which rent boats out to fisheries operators, who are in turn responsible for investing in equipment and fuel. These operators then sell their catch to PESCACUBA.

23. Inland fisheries also form a significant part of the fisheries sector with 148,000 hectares of fisheries reservoirs managed throughout the country. In general the largest contributors to fish catches in these reservoirs are introduced exotic species such as tilapia and catfish. In 1997 catfish (*Claria gariepinnus*) was legally introduced for food production and was successfully contained until 2001 when Hurricane Michelle caused the destruction and overflow of reservoirs containing catfish and led to the spread of this species into the natural landscape. Since 2001 it has exponentially multiplied and now inhabits large areas of the Zapata Wetlands and the Cauto River Delta. Although this species was legally introduced, the lack of a comprehensive risk analysis, rapid response, and monitoring system in part led to this species escape from containment and accelerated spread.

Forestry

24. The protection and management of Cuba's forests fall under the responsibility of Ministry of Agriculture (MINAG) through the National Forestry Directorate (DNF) and the State Forestry Service (SEF), as well as the National Integrated Forestry Enterprise (ENFI). Most of the forests belong to state companies, however with recent changes in land tenure legislation more lands are being distributed to cooperatives and workers under usufruct. Economic activities, both in terms of forestry initiatives and forest resources harvesting, are carried out by specialized State forestry enterprises, other farming and livestock enterprises of the Ministry of Agriculture and other bodies, the private sector, smallholders and forest land usufructuraries.

25. Although the private sector has traditionally participated in forestry activities, their participation over the past decade has increased in particular due to a new financing system for such activities that was established in 1996. This system includes the payment of up to 30 percent of the costs of establishing forest plantations, forest management measures and forest protection, and the possibility for the owners of forest land to market their produce as was done previously, i.e. through the specialized forest enterprises. It also includes some new juridical measures to promote the establishment of protection or production plantations. In 2002, approximately 33 600 people worked in the forestry sector or 8.7 percent of all those employed in the agriculture sector[6].

26. The State Forestry Service (SEF) authorizes what species are to be used in reforestation efforts. In 1960 the island's forest cover was between 11 and 13%, whereas today it is at 22% (approximately 2.35 million hectares) due to reforestation efforts using predominantly exotic species. Although many exotic species are attractive for reforestation and restoration due to their ability to quickly colonize areas, this also makes them very likely to become invasive. This has been the case with *Casuarina equisetifolia* used to restore mined lands.

[6] http://www.fao.org/forestry/country/57478/en/cub/

Agriculture and Livestock

27. The Ministry of Agriculture is responsible for the use, conservation and improvement of agricultural and forest lands; plant protection; veterinary medicine; the protection and increase of the cattle heritage and livestock raising, and other functions related to forestry. MINAG has extensive experience and technical capacity in these areas with strong research and regulatory agencies at work including, the Institute for Plant Protection Research (INISV), the Institute of Soils (IS), and the National Institute for Fundamental Research on Tropical Agriculture (INIFAT), the Pasture and Forage Research Institute (IIPF), the National Center for Plant Protection (CNSV) with its provincial level offices, the Institute of Veterinary Medicine (IMV) with its provincial level offices. The CNSV and IMV are the two institutions that implement inspection and quarantine activities at border points in conjunction with the AGR and the CSB.

28. Since the fall of the Soviet bloc the State has prioritized the increased production of foodstuffs for internal consumption. A key strategy to increasing production was a modification in land tenure so that more land is worked by small farmers and cooperatives. Today, the farmer cooperative sector occupies 41% of the agricultural lands and contributes to 70% of the production value from agriculture and livestock production. These cooperative farms come in three main forms: Basic Units of Cooperative Production (UBPC) which were created by dividing and distributing parcels of state farms, Agricultural Production Cooperative (CPA) which are collectively worked, and Credit and Service Cooperatives (CCS) which are individually worked.

29. Although there is a strong research and regulatory system in place for the agriculture and livestock sector there are still limitations in the regulatory system, in knowledge about IAS, and in particular the interconnectedness of agriculture, biodiversity, and IAS. Productive landscapes, particularly agricultural lands, can serve as reservoirs for invasive alien species of flora which in turn facilitates their spread to nearby natural areas. Therefore, in order to safeguard biodiversity it is particularly important to work on prevention and management of IAS in agricultural landscapes. For example, the IAS Ipil Ipil *Leucaena Leucocephala* was introduced for livestock fodder and shade, however due to its rapid colonization it has spread beyond the control of farmers both within agricultural lands and into neighboring natural landscapes, affecting the biodiversity in the agricultural and natural landscapes. However, because Ipil Ipil is in many ways an ideal species for silvopastoral systems it is important to identify effective management options.

Threats and Root Causes

30. Cuba's globally important biodiversity is threatened by the introduction and spread of IAS. The impact of IAS on Cuba's biodiversity is cause for alarm. The major types of impacts can be categorized as: direct predation of native species, competition for resources, uncontrolled hybridization with native species, fragmentation or loss of habitat, interference with ecosystem services (i.e. Carbon sequestration and climate regulation, purification of water and air, pest and disease control, provisioning of food), and acceleration of the spread of other alien species (see Table 2). Many sectors are affected, both directly and indirectly, by the displacement of native species by IAS and their colonization of ecosystems, including agriculture, fisheries, energy, water, tourism and trade. Their impact on the most fragile ecosystems (mountains, moist soils, coastal and marine ecosystems) can be severe. It is important to emphasize that IAS in general affect specific ecosystems; their invasive behaviour is not necessarily uniform across landscapes. Therefore, the impacts of IAS on Cuban biodiversity depend mainly on ecosystem characteristics, resilience, and vulnerability.

Table 2. Key IAS and their impacts

IAS	Pathway	Impact	Where	Uses	100 World's Worst Invasives[1]
FLORA					
Marabú *(Dichrostachys cinerea*)	Ornamental in homegardens	Invades natural habitats and becomes dominant displacing native vegetation; forms monospecific forests; affects productive capacity of soils; affects Plain Pigeon	Forests, productive landscapes	Livestock feed, firewood, living fence, wood, nitrogen fixer, erosion control	No
Aroma *(Acacia farnesiana)*	Introduced with livestock	Colonizes agricultural landscapes; less aggressive than Marabu or Weyler	Mostly productive landscapes as well as dry coastal zones, savannas, and plains	Flowers for perfume; pods for artisanal products; bark and flowers have medicinal properties	Yes, of *mearnsii* sp.
Weyler *(Mimosa pellita)*	Introduced with livestock	Colonizes agricultural landscapes; Invades natural habitats and becomes dominant displacing native vegetation; forms monospecific forests; affects productive capacity of soils	Mostly productive landscapes in humid zones		Yes, of *pigra* sp.
Pomarrosa *(Syzygium jambos*)	Ornamental or fruit brought by french in late 18th to early 19th century	Invaded gallery forests of Pinar del Rio province causing elimination of >45 tree species resulting in a monospecific forest; loss of trophic niches of terrestrial and aquatic fauna; cause change in water flows	Riparian zones	Edible fruit	No
Charagüito *(Inga punctata)*	Entered in last half of 20th century for livestock	Invades natural habitats and becomes dominant displacing native vegetation and areas where Pomarrosa is dying	Riparian zones		No
Ipil ipil *(Leucaena leucocephala)*	Introduced for reforestation in second half of 20th century	Colonizes quickly, displaces native vegetation and causes decreases in associated fauna	Non forest ecosystems	Shade and fodder for livestock; controls growth of Aroma and Weyler; nitrogen fixer; suitable for reforestation in dry ecosystems: within silvopastoral systems can serve as biological corridors	Yes

Cayeput *(Melaleuca quinquenervia)*	Introduced as ornamental in early 20th century	Invades natural habitats and becomes a monospecific forest; disrupts native flora and fauna habitats; very high evapotranspiration rates has potential to decrease the quantity of fresh water stored and in turn be dangerous to species such as the Cuban crocodile, manjuari, turtles, local fish, amphibians, and birds	Wetlands	Medicinal, natural insecticide	Yes
Casuarina *(Casuarina equisetifolia)*	Introduced for reforestation in early 20th century	Habitat fragmentation, displacement of native vegetation, acidification of sands, accelerates beach erosion	Coastal	Suitable for reforestation, nitrogen fixer, living fence, firewood	No
Tulipan Africano *(Spathodea campanulata Beauv*)	Introduced to reforest Topes de Collantes	Aggressively invades agricultural and forested lands; reportedly linked to increased mortality rates in bees and small birds	Tropical agriculture and forests	Ornamental, shade in coffee, living fence	Yes
Malva de Caballo *(Sida acuta)*	Carried in with agricultural seeds	Displacement of native vegetation; toxic to sheep, goat, and sometimes horses	Forests, pastures, riparian zones		No
Pina de raton, Maya *(Bromelia pinguin)*	Introduced for use as living fence	Displacement of native vegetation; provides a niche for rats and mongoose	Semi deciduous forests, savannas	Medicinal properties; living fence	No
Algarrobo de la India *(Albizia procera)*	Introduced as shade plant for livestock	Unknown	Colonized disturbed areas	Suitable for reforestation; suitable wood for furniture, tools, posts, paper; fodder	No
Jacinto de agua *(Eichhornia crassipes)*	Introduced as ornamental	Block water flows and hence movement of boats, fish; blocks sunlight from reaching below water surface hence reducing biodiversity; reduces available oxygen and ability of other plants to photosynthesize	Freshwater ecosystems	Improve water quality due to ability to absorb contaminants; animal feed; artesnal uses	Yes
FAUNA					
Catfish *(Claria gariepinnus)*	Introduced by MINAL for	Omnivore predator causing elimination	Wetlands and rivers	Human consumption	Yes, of *batrachus* sp.

	aquacultures, later escaped into natural water systems	of native and endemic species, in particular cave dwellers; threatens in particular the manjauri, an ancient fish considered a living fossil only found in the Cienaga de Zapata			
Green Mussel *(Perna viridis*)	Ballast water discharge or hull cleaning	Highly invasive, colonizes root systems of mangroves, displacing native species; in Bay of Cienfuegos affecting industrial installations	Coastal zones	Human Consumption; artesanal uses; animal feed	No
Lion fish *(Pterois volitans)*	Aquarium fish released into natural system in Florida and made way to coasts of Cuba	Voracious predator; direct predation on native species; competition; overpopulation; affecting lobster business due to competition for habitat	Marine ecosystems, in particular coral reefs	Human consumption	No
Buffalo *(Bubalus bubalis*)	Introduced by MINAG for meat and milk production	Deteriorates natural ecosystems; invades agricultural systems and destroys crops; acts as vector of diseases (rabies and tuberculosis) to cattle	Predominantly agricultural systems	Human consumption of meat and milk	No
Wild dog *(Canis familiaris)*	Entered with colonizers who brought them as mascots	Predator of native and endemic species such as the almiqui (*Solenodon cubanus*) jutia, terrestrial birds, reptiles, and crabs; vector for rabies and other diseases	Throughout the island's ecosystems		Yes, of *lupus familiaris*
Wild Cat *(Felis silvestres catus)*	Entered with colonizers who brought them as mascots	Predator of native and endemic species such as the almiqui (*Solenodon cubanus*) jutia, terrestrial birds, reptiles, and crabs; vector for rabies and other diseases	Throughout the island's ecosystems		Yes
Wild Boar *(Sus scrofa)*	Entered with colonizers for human consumption	Predator of small vertebrae and invertabrae (mollusks, crabs); rooting pigs dig up large areas of native vegetation and spread weeds,	Throughout the island's ecosystems		Yes

		disrupting ecological processes such as succession and species composition.			
Mongoose *(Herpestes auropunctatus)*	Introduced to control rat populations in sugarcane plantations	Caused extinction of species on other islands of the Antilles; Predator of many species including small mammals, birds, lizards, molluscs, insects; linked to disappearance of dwarf jutia and predator of almiqui	Throughout the island's ecosystems		Yes, of *javanicus* sp.
Black rat *(Rattus rattus)*	Entered via ships	Consumes molluscs; predator of bird eggs, reptiles, many invertebrae, plant species and mammals including the almiqui and hutia; Pest in sugarcane, cacao, and fruit plantations and storage sites; vector of diseases	Throughout the island		Yes
Gray rat *(Rattus norvegicus)*	Entered via ships	Pest in rice and sugarcane plantations; pest in food storage sites; vector of leptospsirosos	Throughout the island		No
House mouse *(Mus musculus)*	Entered via ships	Consumes seeds of native species; Disperses IAS of plants; agricultural pest; vector of diseases	Predominantly in agricultural landscapes and human settlements		Yes
Shiny Cowbird *(Molothrus bonariensis)*	Entered flying	Competition for nidification with other species hence affecting reproduction and behaviour; direct threat to endemic Cuban trogon	Forest habitats		No
Fire Ant *(Wasmannia auropunctata)*	Entered via agricultural seeds	Competes for resource with other ants; in other countries is a pest in disturbed forests and agricultural areas	Disturbed forests; agricultural lands		Yes

[1]according to Invasive Species Specialist Group of the IUCN

31. In the case of marine and coastal ecosystems, for example, IAS are particularly affecting the ecological integrity of coral reefs, sea grass beds, and mangrove swamps. Some of the key invasive species affecting these areas are Cayeput (*Melaleuca quinquenervia*), lion fish (*Pterois volitans, Pterois Miles*), and catfish (*Claria sp.*)**.** Melaleuca is highly invasive in the Zapata Wetland transforming the

wetland and mangrove ecosystems to monoculture Melaleuca forests. The widespread presence of Melaleuca has caused the displacement of endemic species, loss of habitat, and changes in the hydrology of the wetland, particularly in the evapotranspiration regimes due to Melaleuca's high levels of transpiration. Lion fish was reported for the first time in 2007 in the eastern part of the island and since then its dispersal has been rapid and is currently present in almost all the coastal zones except just south of Havana Province. Its impacts on native fish communities include direct predation (lion fish is a generalist), competition, and overpopulation. Catfish is an aggressive omnivore that has rapidly spread through the waters of the island, particularly in the Zapata Wetland and the Cauto Delta. Catfish was introduced by the fisheries sector as a food source for the Cuban population, but an insufficient monitoring and control system led to its dispersal. *Perna viridis* is a green mussel that was introduced unintentionally via either ships ballast waters or hull fouling in the southern part of the island near Cienfuegos. This mussel directly affects biodiversity on the coast by completely covering the roots of mangroves. It is currently only present in the Bay of Cienfuegos. Casuarina is a fast growing tree that invades coastal zones causing fragmentation of habitats, displacement of native vegetation, and deterioration of sands via acidification. In freshwater ecosystems the Jacinta de agua is an aggressive invader and due to its vegetative propagation become islands of plants that disturb the natural water flow of rivers. This IAS commonly invades areas suffering from eutrophication caused by deforestation of riparian zones or runoff from agricultural lands.

32. In the upland and mountainous regions of the island several invasive species are threatening biodiversity. Pomarrosa has been in Cuba since 1875 and invades riparian zones and semicaducifolios mountain zones where it displaces native vegetation. In the western province of Pinar del Rio Pomarrosa has invaded the gallery formation of most of the mountainous areas of the province causing the elimination of 45 species and converting the galleries into mono specific areas affecting natural water currents and the loss of niches of fauna. Animal IAS, like rats, wild cats and dogs, mongoose and other predators, can be devastating to the avifauna and small fauna, reducing levels of recruitment of wildlife populations, of important mammals, endemic species, and domesticated fauna living in human settlements around natural areas. They also carry serious diseases that can be passed onto livestock and humans.

33. Important IAS are also present in productive landscapes throughout Cuba, in particular, Ipil ipil *(Leucaena leucocephala)*, Buffalo *(Bubalus bubalis*), Marabú *(Dichrostachys cinerea*), Aroma *(Acacia farnesiana)*, Weyler *(Mimosa pellita)*, Malva de Caballo *(Sida acuta)*, Pina de raton, Maya *(Bromelia pinguin)*, Blue mold (*Peronospora hyoscyami*), Black sigatoka (*Mycosphaerella fijensis*) and small mammals such as Mongoose *(Herpestes auropunctatus)*, wild dog and cat, and rats. These species cause serious problems for the agricultural sector, rural livelihoods, and agricultural diversity. The management of IAS in productive landscapes is important from a biodiversity point of view due to the potential of a source-sink dynamic developing between agricultural patch and natural patch where IAS easily colonize an agricultural patch and then spread into an adjacent natural patch particularly where a localized disturbance, anthropogenic or natural, facilitates the entry of that IAS.

34. Several IAS have been introduced through aerial transportation such as *Hemileia vastatrix* and *Peronospora tabacina*, which are important pathogen agents for agriculture. The pathogens *Averia respiratoria* virus and the *Berroasis* of the bees are also transmitted through the air. These aerial contamination patterns are further exacerbated by climate change, which alters the general circulation flow of the atmosphere and increases the incidence and frequency of extreme events in specific regions, such as fires, droughts, and floods in the ecosystems. This, in turn, has the potential to accelerate the spread of IAS. Climate change can affect introduction patterns and geographic expanse of dispersal.

35. Changing weather patterns may exacerbate the threat of terrestrial and marine IAS as well, including the risk that exotic species in Cuba that are not currently invasive may become so in the future. Rising

temperatures and the increased incidence of extreme weather events may cause stresses to natural ecosystems making them more vulnerable to IAS infestations. Increased drought may lead to an increased frequency of forest fires that could, in turn, favor IAS invasion. Rising temperature in sea surface water can cause coral bleaching which may create ecological gaps into which more adaptive IAS may establish. Rises in sea levels will inundate wetland areas and could result in the establishment of IAS plants that are more salt tolerant. Rising air temperatures and changes in humidity and atmospheric gases can accelerate the spread of insects and fungi and particularly cause great economic losses for the agricultural sector.

36. The introduction of IAS in Cuba is the result of intentional or unintentional acts. The introduction and spread is in large part due to the following root causes: a weak legal and regulatory system particularly in the approval of licenses, the monitoring of introduced alien species, and control of ballast waters and hull fouling; a lack of coordination between sectors and institutions and across provinces necessary for a coherent system of prevention, detection, and management; deficits in technical capacity and knowledge, and lack of institutional capacities. Although work on the creation of an Environmental Regulatory System began in 1995 including State Environmental Inspections, procedures for Environmental Impact Assessments, and the granting of licenses and permits regarding biosafety, the regulation and authorization processes are largely unclear and unenforced. While many different sectors and institutions are mandated to deal with specific aspects of IAS there is little policy, budgetary or management priority accorded to IAS by any of these agencies, and coordination between them is lacking. For example, a license was authorized by CITMA for the introduction of Claria sp. by MINAL, however, because of weaknesses in the monitoring and control system that should follow these introduced species, Claria spread into natural areas of the island.

Long Term Solution

37. Many problems remain unsolved with IAS in Cuba – systems for prevention, control, management and removal are not yet fully effective. The long-term solution to address these shortcomings is to strengthen the institutional policies and technical capacities needed to manage IAS, while stimulating multi-stakeholder, cross-sectoral cooperation for effective implementation in the field. Reaching this goal will require pursuing the following broad operational strategies: (i) strengthen the policy and legal framework on IAS; (ii) build sound and effective coordination mechanisms across concerned sectors, between relevant institutions and in partnership with key actors; (iii) enhance scientific knowledge on IAS introduction, spread, impacts and management options among key stakeholders charged with control; (iv) build general public awareness on IAS and their impacts, and; (v) improve management effectiveness in the field to ensure safeguarding of biodiversity.

Barriers

38. Despite the mandates in place for addressing IAS and the experiences in controlling certain IAS, several key barriers[7] obstruct reaching the desired state wherein strengthened capacities in IAS prevention, control, and management result in tangible benefits to biodiversity, namely:

Barrier 1: Capacity Deficits at the Systemic Level

39. Although a policy and regulatory framework for the conservation of biological diversity exists, the regulation and authorization processes for the introduction and control of IAS are unclear and largely unenforced. In particular, they present inadequate safeguards and measures to control entry, manage invasions once established, penalize against illegal introduction, or comply with global standards and best

[7] These barriers were identified at a national stakeholder meeting held in Cuba in May 2007 and further expanded on during the PPG phase.

practices (such as provisions of the WTO Sanitary and Phytosanitary Agreement or the International Plant Protection Convention). There is currently no black list for IAS. The quarantine system in place does not have sufficient safeguards in place to protect against species that threaten native biodiversity. Several key legislative gaps identified during the project preparation phase include: lack of policies regarding ballast waters and hull fouling, lack of economic incentives, limited focus on preventative measures, inadequate processes for the development, approval, implementation, and monitoring of management plans particularly outside protected areas. These legislative gaps are the result of three main issues: a lack of implementation of global standards, lack of instrumentation of existing laws, and obsolete, incomplete or non-existent laws necessary for the prevention, control, and management of IAS.

40. While many different sectors and institutions are mandated to deal with specific aspects of IAS, as described above, there is little policy, budgetary or management priority accorded to IAS by any of these agencies, and coordination between them is lacking. Notably, there are no coordination mechanisms with legal backing in place for effective information sharing and coordinated decision making between different regulatory authorities. Furthermore, there is no systemic focus for control at border points. The absence of an approved National IAS Strategy and Action Plan, as well as a coordinating unit mandated with overseeing all IAS activities, acts as a major obstacle to integrated and effective action and collaboration between stakeholders in the prevention, control, and management of IAS. Moreover, differing interests between the environmental and production sectors will be a challenge for the coordination of IAS efforts.

Barrier 2: Technical Capability and Knowledge Systems

41. There are massive gaps in key data about IAS in Cuba. Very little is known about the presence of IAS, their ecology and biology, broader impacts, and the trajectory of their spread. Such information as is available remains inaccessible to many of the stakeholders whose actions impact on IAS, or is not disseminated in a practical and policy relevant form that can be used to support planning and management action. At present, there is limited technical capacity and financial resources to measure the threats and impacts of IAS, identify pathways, commodities and organisms that present an IAS risk, develop and evaluate the effectiveness of management systems, and capture and adapt practices to ensure effective prevention, control and eradication measures. This is compounded by a failure to document “lessons learned” or “best practices” for control of IAS. Meanwhile the general public and economic actors responsible for the introduction, use and spread of IAS remain largely unaware of the threats they pose, the laws relating to them, or international best practice. In particular members of the small-scale and large-scale industries who import and use IAS (such as agriculture and livestock, forestry, tourism, transport & shipping, and fisheries) as well as decision-makers in finance, economic and trade ministries who set the conditions under which markets operate, remain unaware of the threats that IAS pose to development, the economy and business, or of the national regulations governing the introduction and use of IAS. Furthermore, broader participation in IAS planning and decision-making by civil society is also lacking. Finally, there is no coordinated information management system for IAS (database, GIS, networks). Although there have been site-specific and species-specific studies conducted, there is no systematic standardization of survey methodologies, data compilation and data access. The absence of a comprehensive information system on IAS, coupled with economic data on the relative costs and benefits of IAS control, is a constraint to effective mainstreaming of control efforts and management strategies in natural and productive landscapes.

Barrier 3: Limited Capacities at the Institutional Level

42. The low technical and financial capacity among the many government agencies and sectors mandated to tackle IAS, including those dealing with land use and natural resources management, industry and investment, and customs and enforcement, prevents the effective implementation of IAS activities. In particular, knowledge is lacking about best practices and effective measures to assess risks and threats, identify and detect potentially invasive species, apply existing regulations, and employ appropriate

techniques and technologies to control the introduction of IAS and manage their impacts once established. There is no monitoring system in place to measure the success of management practices across institutions. Regulatory authorities do not have sufficient technical capacity and material resources to implement IAS activities. For example, despite training for customs personnel, their capacities are still insufficient to adequately implement legal instruments relative to frontier control. Quarantine stations do not have the appropriate equipment to function effectively and the protocols need to be updated to establish a successful quarantine system. Currently, fumigation of regulated pests and incineration of quarantined pests are conducted. The equipment used for inspections are basic and scarce including backpack fumigators, microscopes, and incubators. Of the two institutions responsible for border inspections and quarantine activities, the National Plant Protection Centre and the Institute of Veterinary Medicine, only the former has quarantine stations. There are no environmental units or environmental authorities at border points to conduct inspections and assessments. Finally, infrastructure, financial, and material resources for the establishment and implementation of an IAS information management system are needed at national and provincial levels as well as the technical capacity to manage the information and employ this information for decision making.

Baseline analysis

43. In the baseline situation, incomplete legislative and institutional mandates and the lack of a coherent or integrated strategic planning and management framework, combined with a weak awareness of the threat posed by IAS and a low capacity and information base with which to tackle the problems associated with IAS, would result in the loss of biodiversity of global and national importance. As Cuban markets become increasingly integrated into the global economy, and in the face of on-going biodiversity loss and ecosystem degradation in the country, it is likely that the threats posed by alien species invasions will rise still further in the future. The added value of the proposed GEF intervention will be to address the main root causes and barriers to implementation of effective IAS control, by strengthening institutional capacities, enhancing coordination mechanisms, increasing awareness among all relevant actors, and consolidating the organization of all the IAS-related actions in the country to successfully control the introduction and spread of invasive species in Cuba. GEF support will thereby make a major contribution to safeguarding globally important biodiversity and reducing the risks to endemic species and unique ecosystems.

PART II: Strategy

Project Rationale and Policy Conformity

44. Biodiversity and ecosystems on the island are under serious threat from the introduction and spread of IAS. Depending on the IAS and the ecosystem they invade, the impacts include one or more of the following: direct predation of native species, competition for resources, uncontrolled hybridization with native species, fragmentation or loss of habitat, interference with ecosystem services (i.e. Carbon sequestration and climate regulation, purification of water and air, pest and disease control, provisioning of food), and acceleration of the spread of other invasive species. Under the baseline situation, these threats are likely to continue, due to Cuba's limited ability to systemically prevent the introduction of, detect the arrival of, and manage the spread of IAS. The introduction and spread of IAS in Cuba is the result of intentional anthropogenic or unintentional anthropogenic or natural occurrences. The introduction and spread is in large part due to the following root causes: a weak legal and regulatory system particularly in the approval of licenses, the monitoring of introduced alien species, and control of ballast waters and hull fouling; a lack of coordination between sectors and institutions and across provinces necessary for a coherent system of prevention, detection, and management; deficits in technical

capacity and knowledge, lack of awareness of IAS threats amongst the public and IAS-using sectors, and lack of institutional capacities to implement an IAS strategy. While many different sectors and institutions are mandated to deal with specific aspects of IAS there is little policy, budgetary or management priority accorded to IAS by any of these agencies, and coordination between them is lacking. In meeting these challenges, the project will change the institutional trajectory and IAS management dynamics at the systemic level as well as in biodiversity-critical areas by consolidating policies and coordination mechanisms while improving technical knowledge and capacities to effectively prevent the introduction of IAS, quickly detect IAS, and manage priority IAS on the island.

45. As such, a unifying element in the overall project strategy is the creation of an enabling environment via a systemic, multi-sector approach directed at strengthening the policy and legal framework on IAS, building effective coordination mechanisms across sectors and institutions, enhancing scientific knowledge on IAS introduction, spread, impacts and management options among key stakeholders, building awareness on IAS and their impacts amongst the public and IAS-using sectors, and improving prevention and management effectiveness in the field to ensure safeguarding of biodiversity. The project focuses heavily on building the enabling environment and stakeholder and institutional capacities for preventing the entry and early detection of potential IAS, agreed to be the most efficient and cost effective strategy[8]. In doing this, the project will build capacity at the national level and at the provincial level aimed at designing and implementing an early warning and rapid response system, an IAS information system and an IAS monitoring system. The project will also support the design and implementation of management strategies targeted at 26 priority IAS in 7 biodiversity important areas of the island in protected and unprotected natural landscapes as well as productive landscapes. Depending on the IAS and the ecosystem, management strategies will include one of the following: eradication (elimination of the entire population in the managed area), containment (keeping species within a regional barrier), control (suppressing population levels defined as distribution and/or density), and mitigate (diminish the impacts of IAS on native organisms and ecosystems).

46. Using a systemic approach the project will implement activities associated with enhancing stakeholder capacity, building IAS knowledge and executing an education and communication campaign (outcome 2), as well as the implementation of prevention and management actions (outcome 3), by targeting national level issues and institutions as well as provincial and local level issues and institutions. Onsite interventions will not only include management actions for key IAS, but will include the implementation of an early warning system, an information system, a monitoring system, the implementation of a communication and education campaign, as well as the building of capacity of those institutions charged with preventing the entry and spread of IAS. Thus these onsite interventions will contribute to building the country's systemic capacity to prevent and control IAS by strengthening the parts that make up that system at the municipal and provincial levels, as well as at the protected area and productive sector levels. Implementation of local level activities associated with outcomes 2 and 3 will target 26 priority flora and fauna IAS currently threatening 7 priority areas of the country (see Table 3). These species and areas were chosen through broad stakeholder consultation during the PPG phase. Included in the list of IAS are 13 species that are ranked by the Global Invasive Species Program (GISP) as 100 of the world's worst IAS. Likewise the selected ecosystems and their associated biodiversity are particularly vulnerable due to high levels of endemism, existence of threatened species, important ecosystem services, and presence of IAS that are directly competing with and predating on native species as well as altering ecosystem services (more information in Section IV, Part III). The selection criteria used was a mixed species/site based approach. First the most threatening IAS were chosen and subsequently the most vulnerable ecosystems

[8] Wittenberg, R., Cock, M.J.W. (eds.) 2001. Invasive Alien Species: A Toolkit of Best Prevention and Management Practices. CAB International, Wallingford, Oxon, UK, xvii - 228.
Clare Shine, Nattley Williams and Lothar Gündling (2000), A Guide to Designing Legal and Institutional Frameworks on Alien Invasive Species. IUCN, Gland, Switzerland Cambridge and Bonn. xvi + 138 pp.

where they are present were chosen. This mixed based approach is particularly important due to the fact that total eradication of a species will only rarely be cost-effective. However, localized eradication in biodiversity important areas where endemic or migratory species have localized and limited ranges will be effective and extinction prevented. Furthermore, the diversity in ecosystems represented across the project sites will allow for different management approaches to be tested in various ecosystems to measure cost-effectiveness and feasibility under different compositions of IAS and habitat types.

Table 3. List of priority areas and species

	Southern Pinar del Rio and Sierra del Rosario	Havana Matanzas Plain	Zapata Wetland	Cienfuegos-Trinidad Coastal Zone and Topes de Collantes	Ciego de Avila-Camaguey-Las Tunas	Delta Rio Cauto	Alejandro de Humboldt National Park and Baconao Biosphere Reserve.
Ecosystem	M, W, P	P	W	C, M	P	W	M, C
FLORA							
Marabú *(Dichrostachys cinerea*)	X*			X*	X*	X	X*
Aroma *(Acacia farnesiana)*				X	X		X*
Weyler *(Mimosa pellita)*				X	X		X
Pomarrosa *(Syzygium jambos*)	X			X			X
Charagüito *(Inga punctata)*	X						
Ipil ipil *(Leucaena leucocephala)*		X*		X			X*
Cayeput *(Melaleuca quinquenervia)*			X*				
Casuarina *(Casuarina equisetifolia)*			X*				X
Tulipan Africano *(Spathodea campanulata Beauv*)	X			X*			X
Malva de Caballo *(Sida acuta)*					X		
Pina de raton, Maya *(Bromelia pinguin)*					X*	X	
Algarrobo de la India *(Albizia procera)*					X*		
Jacinto de agua *(Eichhornia crassipes)*						X	
FAUNA							
Catfish *(Claria gariepinnus)*	X		X*			X	X
Green Mussel *(Perna viridis*)				X*			
Lion fish[1] *(Pterois volitans)*	X		X	X	X	X	X
Buffalo *(Bubalus bubalis*)	X*				X*		
Wild dog *(Canis familiaris)*						X	X
Wild Cat *(Felis silvestres catus)*						X	X

Wild Boar *(Sus scrofa)*							X
Mongoose *(Herpestes auropunctatus)*					X*		X
Black rat *(Rattus rattus)*					X		X*
Gray rat *(Rattus norvegicus)*							X
House mouse *(Mus musculus)*							X
Shiny Cowbird *(Molothrus bonariensis)*							X
Fire Ant *(Wasmannia auropunctata)*				X*			

Ecosystems: W=Wetland; C=Coastal-Marine; M=Mountain; P=Productive (Forestry, Fisheries, Agriculture, Livestock)
[1]Lion fish will be worked on in all the coastal areas of the project; *Experimental management actions for IAS in these areas have been tested

47. An overarching goal of all management strategies will be the safeguarding of biodiversity, including agrobiodiversity, and ecosystem function, including agroecosystem function, which will be reached through eradication, containment, or control in conjunction with recuperation, restoration or rehabilitation actions. The following guiding principles[9] will be adhered to in the development of management strategies in order to ensure cost effectiveness, high probability of success, and no detrimental impacts on non-target species or the ecosystem:

- Invasive species will be arranged in a priority list that takes into consideration the extent of the area infested by the species, its impact, the ecological value of habitats invaded, and the difficulty of control. Species with the highest priority would be those known or suspected to be invasive but still in small numbers, species which can alter ecosystem processes, species that occur in areas of high conservation value, and those that are likely to be controlled successfully.
- Priorities will be set in the hope of minimizing the total, long-term workload, and hence cost of an operation, in terms of money, resources and opportunities. Therefore, priority will be given to existing infestations that are the fastest growing, most disruptive, and affect the most highly valued area(s) of the site.
- Eradication, containment and control options will be evaluated on cost effectiveness, including possible impacts on non-target species, other possible detrimental effects, and the likelihood of success, before decisions are made.
- Integral to the design of management strategies will be the review of available literature on strategies employed, an assessment of all potential methods, and the identification of the best method or combination of methods to achieve the target level of control. Managing an invasive species is not the management goal, but only one tool in the process to achieve a higher goal, such as habitat restoration, preservation of an undisturbed ecosystem, reinstallation of the natural succession rate and time, etc.
- In order to evaluate the success or failure of a management strategy, the project will develop a monitoring system that will monitor changes and evaluate to what extent the targets set at the beginning of the efforts have been met. Simultaneously monitoring the impact of an eradication or

[9] Adapted from information gathered through the PPG process and from the following literature: IUCN Guidelines for the Prevention of Biodiversity Loss caused by Alien Invasive Species, Information Paper, Fifth Meeting of the Conference of the Parties to the Convention on Biological Diversity, Nairobi, Kenya 15-26 May 2000.; Wittenberg, R., Cock, M.J.W. (eds.) 2001. Invasive Alien Species: A Toolkit of Best Prevention and Management Practices. CAB International, Wallingford, Oxon, UK, xvii - 228.; and Clare Shine, Nattley Williams and Lothar Gündling (2000), A Guide to Designing Legal and Institutional Frameworks on Alien Invasive Species. IUCN, Gland, Switzerland Cambridge and Bonn. xvi + 138 pp.

control effort will keep the intervention on track and will identify negative unexpected results, giving an opportunity to change and adapt the management strategy as necessary.

- In cases where there are well-established IAS populations and large areas of infestation control measures rather than eradication measures will be employed.
- Where possible, in order to increase cost effectiveness, management strategies will incorporate revenue generating streams through the use of IAS that will then fund the management strategies. For example, the catfish and lion fish are good sources of fish meat for human consumption.
- Community members and volunteer brigades will be used for labor in management actions wherever possible.
- The project will strengthen the capacity for early detection of new introductions of potential or known alien invasive species, together with the capacity to take rapid action, key to successful and cost-effective eradications. The best opportunities for eradicating or containing an alien invasive species are in the early stages of invasion, when populations are small and localized.
- Lack of scientific or economic certainty about the implications of a potential biological alien invasion should not be used as a reason for postponing eradication, containment or other control measures.
- Eradication should not be attempted unless it is ecologically feasible and has the necessary financial and political commitment to be completed.
- Local knowledge and community awareness will be used to detect new alien invasions.
- Control methods will be socially, culturally and ethically acceptable, efficient, non-polluting, and should not adversely affect native flora and fauna, human health and well-being, domestic animals, or crops
- The project will facilitate an increased exchange of information between scientists and management agencies, not only about alien invasive species, but also about control methods. As techniques are continuously changing and improving it is important to pass this information on to management agencies for use**.**

48. The prevention, detection, and management of IAS play a fundamental role in plans of adaptation to climate change. Successful management of IAS will reduce the vulnerability of natural ecosystems and ensure their capacity to offer goods and services and mitigate the negative impacts on biological diversity. The project will address the issue of climate change primarily through the establishment of an early warning system and a national IAS monitoring system.

49. The project is consistent with the GEF's Strategic Objective 3 "To safeguard biodiversity", and fulfills the eligibility criteria under Strategic Program 7 "Prevention, control and management of invasive alien species". Cuba's current framework to prevent, detect and manage IAS is not sufficiently effective, and Cuban biodiversity remains threatened by IAS in several ecosystems. The proposed project will contribute to strengthening the institutional and policy framework, enhancing the capacities of relevant actors, and coordinating the actions of all stakeholders in order to prevent, detect and effectively manage IAS in Cuban ecosystems. It will ultimately contribute to the mitigation or removal of current threats to Cuban biodiversity, as required by the GEF in its 3rd Strategic Objective. In its capacity to strengthen knowledge about IAS, increase awareness among stakeholders, strengthen policy and regulatory frameworks, and empower the production sector to join efforts for controlling and managing IAS, this project will also contribute to the Strategic Objective 2 "To mainstream biodiversity in production landscapes/seascapes and sectors", and its Strategic Program 4 "Strengthening the policy and regulatory framework for mainstreaming biodiversity". Moreover, the project conforms to the orientations of the Convention on Biological Diversity (CBD), which dedicates special attention to the IAS issue. The identification and monitoring of contamination pathways, early detection and response methods, implementation of management plans for the control of IAS, and importance of raising awareness among all relevant actors, are extensively discussed. All parties of the CBD are encouraged to join forces in the prevention, control, or removal of IAS that threaten ecosystems, habitats, or native species (art. 8h).

50. The incremental contributions that will result from GEF involvement are focused heavily on safeguarding globally important biodiversity and reducing the risks to endemic species and unique ecosystems. Specifically, inputs target the strengthening of an enabling environment at the systemic level and the building of both local and national technical capacities to prioritize, manage and monitor the impacts of IAS on biodiversity and ecosystems. The project is designed such that the GEF contribution adds tangible and measurable inputs aimed at ensuring that the investments made comply with international standards for IAS prevention and management and contribute to the safeguarding of globally significant biodiversity in productive and natural landscapes. Greater detail on the GEF increment is provided below.

Project Goal, Objective, Outcomes and Outputs/activities

51. The project will contribute to the overall goal of protecting vulnerable marine, freshwater and terrestrial ecosystems, species and genetic diversity within Cuba from negative impacts of invasive alien species. The specific objective is to safeguard globally-significant biodiversity in vulnerable ecosystems, by building capacity at the systemic level to prevent, detect, and manage the spread of IAS in Cuba. This objective will be achieved by pursuing three complementary strategies, corresponding to the three operational outcomes of the project presented in the Strategic Results Framework presented below in Section II.

Outcome 1: Policy, legal and regulatory frameworks, and coordination mechanisms are strengthened to prevent, detect, control, and manage the spread of IAS

The first operational component of the project is focused on strengthening the policy, legal and regulatory frameworks, as well as coordination mechanisms, in order to better prevent the introduction of new IAS and manage current IAS to reduce inter specific competition with and predation on native species and mitigate other negative impacts on globally significant biodiversity. This outcome will be delivered by the following outputs: IAS regulations relating to black list and gray list, risk analysis, EIA, protocols and quarantine mechanisms, monitoring and surveillance, early warning and rapid response system, ballast waters and ship hulls, plant protection/health legislation, and management plans' procedures will be established, updated and complemented; a National IAS strategy will be developed, approved and implementation will begin; economic incentives and disincentives will contribute to the control and use of IAS in productive sectors; and an integrated institutional framework will be developed for IAS control.

52. Output 1.1: IAS regulations established, updated and complemented. The goal of this output will be to establish new IAS regulations where necessary (i.e. ballast water management, processes for development of IAS management actions or plans), update regulations so that they better address IAS issues (i.e. Plant Protection legislation), and complement existing regulations with methodologies that guide the application of these regulations and ensure a focus on IAS and biodiversity issues (i.e. risk analysis and Environmental Impact Assessments). This will include the establishment of guidelines for the classification and development of official lists of prohibited species **(blacklist)** and official list of species which have low levels of invasiveness or unknown levels of invasiveness **(gray list).** As part of this process it will be necessary to define methodologies for the classification and development of these lists. This work will be coordinated by CICA-CSB with participation from other regulatory bodies, research institutes and the academic sector.

53. The processes for **risk analysis and Environmental Impact Assessments (EIA)** will be strengthened by: (i) aligning them with international standards, (ii) ensuring these are conducted prior to granting a permit or license, (iii) clearly outlining the appropriate methodologies, criteria, and administrative aspects, (iv) ensuring the use of the precautionary principle and cost benefit analysis when

appropriate, (v) incorporate analysis of impact of IAS on BD, and (vi) streamlining procedures so that applicants do not have to go through a series of separate regulatory stages for different regulatory authorities. Procedures will be transparent and provide opportunities for public input and participation. This work will be coordinated by CIGEA with participation from the regulatory bodies, research institutes, academic sector, and key NGOs such as Pro-Naturaleza and the Foundation of Antonio Nunez Jimenez.

54. Another key action for IAS prevention will be the strengthening of **protocols, normative documents and quarantine mechanisms** so that adequate safeguards are in place against species that threaten native biodiversity and quarantine regulations are harmonized with international agreements and standards. This will include the establishment of guidelines by which quarantine mechanisms can be applied in natural and protected areas of the island and are not solely limited to productive landscapes. This will be coordinated by CICA-CSB, CNSV-IMV-IFF with participation from CGB, SEF, CNSV, IMV, INISAV, DNF.

55. The project will enable regulatory support for the system of **monitoring[10] and surveillance** in order to detect IAS in terrestrial and aquatic ecosystems and to collect information on the behavior of IAS in these ecosystems. This will be coordinated by IES and BIOECO with participation from CIGEA, CNAP, MNHN, ENPFF, JBN, PZN, ANC, the national and provincial level centers of research and environmental services, the academic sector and NGOs. The system of monitoring and surveillance will be directly linked to the early warning and rapid response systems as well as the IAS Information System (output of outcome 2).

56. The project will define and establish approaches for the strengthening of an **early warning system and rapid response system**. An integral part of the early warning system will be the monitoring of movement of selected species taking into account potential changes in behavior caused by changes in climate. An early warning system is an important mechanism for surveillance of the behavior of IAS that are not present in Cuba but are in the region and for the monitoring of the movement of these species so that if necessary specific preventative measures or strategies to confront entry can be employed. An early warning system does exist for IAS that affect human, animal, and plant health but not biodiversity. However, with the system already in place it will be a matter of inserting the issue of surveillance and monitoring of IAS in relation to their potential impacts to biodiversity and ecosystem function. This will function for both IAS that are in the region but not yet on the island and for IAS that currently have a focal area of invasion, as is the case with *Perna viridis* in the Bay of Cienfuegos, but whose movement needs to be monitored so as to prevent its spread and focus on eradication should the species be identified in another area of the island. This work will be coordinated by CSB-IMV-CNSV with participation from MINFAR (Civil Defense), MININT (CGB, CGF), MINAG (CNSV, IMV, ENPFF), MITRANS (DSIM).

57. Special attention will be given to **Protected Areas** (PA) on the island by developing legislation that requires PA management plans to include a strategy for the prevention, detection, control, and management of IAS, which may include the prohibition or strict regulation of the introduction of IAS to PAs. This will be coordinated by CNAP with participation from CIGEA, CSB, CICA and research institutes.

58. In addition to strengthening procedures for regulating intentional introductions, as has just been

[10] The term monitoring in this document is used in four distinct contexts: i: Monitoring as part of an early warning and rapid response system; ii: Monitoring IAS impact on biodiversity and ecosystem; iii: Monitoring IAS biology, behavior, invasion levels: iv: Monitoring results of implemented management actions

outlined, the project will also aim to strengthen procedures for regulating unintentional introductions. A key intervention will be to develop and agree on a proposed judicial resolution/regulation for the control and management of **ballast waters and the biological contamination from ships hulls** and to submit this to the Directorate of Maritime Security and Inspection at MITRANS. This will be coordinated by the projects coordination unit in Cienfuegos - Directorate of Maritime Security and Inspection (DSIM) of MITRANS with participation from CEAC, CSB, CIGEA.

59. The **Plant Protection legislation** will also be updated so that it is harmonized with the standards of the International Plant Protection Convention, an international plant health agreement, established in 1952, which aims to protect cultivated and wild plants by preventing the introduction and spread of pests. Cuba is a signatory to this convention but has to date not ratified or implemented the standards of this convention.

60. In addition to the aforementioned strategies for prevention and detection of IAS, the project will also aim to strengthen the legal framework behind management. The project will establish a process with legal backing for the development, approval, implementation, and monitoring of IAS **management plans**. This will be coordinated by CSB, CICA, ORASEN with participation from CNAP, CIGEA, ENPFF, JBN, PZN, IES, IdO, CIM, CIP, ECOVIDA, CEAC, BIOECO, ANC.

61. In order to monitor and evaluate the performance and observance of the laws and regulations, the project will develop methodologies that will guide the development of indicators to be submitted for approval to the National Group on Environmental Indicators. This will allow for an adaptive management of the legal and policy framework for IAS so that reasons for successes and failures of certain legislations can be identified and addressed as necessary. This will be coordinated by CIGEA-ORASEN with participation from DMA, CICA, CSB, CNAP, CGF, ONIP, CGB, IMV, CNSV, DSIM.

62. Output 1.2 National IAS strategy approved. All of the above actions aimed at establishing a comprehensive IAS legal framework will lay the groundwork for the development of a national IAS strategy. In the past IAS actions have formed part of national strategies but in a fragmented way. Currently there is a draft national IAS strategy that is in an early stage of development. The project will support the completion of this strategy along with an action plan and the implementation of at least 50% of the planned activities. This will require the review of existing policies, broad stakeholder consultation, and government approval. A national IAS strategy and action plan may take one of the following forms: the IAS strategy and action plan form part of the National Environmental Strategy; the IAS strategy and action plan form part of the National Biodiversity Strategy; the IAS strategy and action plan form part of both of these national strategies; the IAS strategy and action plan is a stand-alone national strategy. In addition to this IAS strategy, the project will work with key sectors involved with the introduction or management of IAS to develop IAS strategies and action plans that will form part of sector environmental strategies.

63. Output 1.3 Economic incentives and disincentives contribute to control and use of IAS in productive sectors. The focus of this output involves developing appropriate economic incentives and disincentives for the use and introduction of IAS in productive sectors, which would complement legal measures to control IAS and generate financial resources for sustainable IAS control. A first order of action here will be to review and evaluate existing alternatives and economic incentives currently implemented from which lessons may be drawn to apply in the context of IAS control (i.e. taxation in the Bay of Cienfuegos, Integrated Forestry Farms). In conjunction with representatives from forestry, agriculture, fisheries, and maritime sectors potential incentive and disincentive mechanisms will be drafted and proposed, including the incentivization of the use of native species in reforestation and restoration efforts, in order to regulate the introduction and use of potential IAS as well as the management and eradication of IAS. Economic incentives for management of the lion fish and other key IAS will be prioritized. This will be coordinated

by ECOVIDA with participation from CNAP, CIGEA, CNSV, IMV, SEF, IIF, BIOECO, IES and ACTAF. A second order of action will be the development of proposed economic measures that correspond to economic and environmental damage caused by inadequate management of IAS.

64. Output 1.4 Integrated institutional framework developed for IAS control. The focus of this output is the integration of an institutional framework that will streamline national level IAS activities between stakeholders and across sectors and ensure efficient implementation of actions. This will be achieved via three key actions. First, an inter-sectoral, multi-stakeholder advisory forum on IAS will be established to support national control efforts and will include the participation of productive sectors such as agriculture, livestock, fisheries, and forestry sectors as well as academics, researchers and commercial actors. This will be coordinated by CIGEA with participation from ONIP, IMV, CNSV, CGB, CICA, CSB, SEF, ENPFF, IES, IIF, and NGOs.

65. Second, a National IAS Subgroup will be established to coordinate the development and implementation of the IAS National Strategy. The IAS National Subgroup, a subgroup within the National Group on Biodiversity, will function as the focal coordination group to coordinate IAS prevention, early detection, management and eradication efforts, disseminate information as well as coordinate the development and implementation of the national IAS strategy. The IAS National Subgroup will work in coordination with other groups such as the Coordinating Committee for National Protected Areas System, the Commission for National Reforestation, and the Council on Watersheds.

66. Third, coordination mechanisms for early warning system and information system will be established between 9 key regulatory authorities[11] and other key actors. These coordination mechanisms will have the appropriate legal backing and will ensure effective implementation of the early detection and warning system, and use of the national IAS information system (SIMEEI)[12]. Coordination mechanisms will be established between the following key regulatory authorities: CSB, CICA, CNSV, DSIM, IMV, ONIP, CGB, CGF, AGR, and SEF.

Outcome 2: Stakeholder capacity, know-how, and communications are enhanced for effective IAS prevention, detection, and management

The second operational component of the project is focused on enhancing stakeholder capacity, know-how, and communications in order to improve IAS prevention, detection, and management. This outcome will be achieved through the following outputs: Methodologies will be standardized and implemented for IAS management tools including IAS inventory, ecosystem vulnerability assessments, risk analysis, EIA, economic valuation and cost –benefit analysis, and management actions for 26 IAS; an IAS Information System will be developed to guide improved IAS management decisions; an IAS monitoring systems will be developed for tracking IAS management performance and impacts; Key stakeholders understand and apply technical, legal, and administrative tools which increases prevention and control of IAS and reduces contamination and spread; Public knowledge, participation and stakeholder support for IAS management will be strengthened through the implementation of an education and communications campaign.

67. Output 2.1 Methodologies are standardized and implemented for IAS management tools. The goal of this output is to standardize methodologies that increase knowledge about IAS biology, behavior, levels

[11] CSB, CICA, CNSV, DSIM, IMV, ONIP, CGB, AGR, and SEF

[12] The GEF funded project entitled, "BS Completion and Strengthening of the Cuban National Biosafety Framework for the Effective Implementation of the Cartagena Protocol" is targeting the strengthening of coordination mechanisms of the same actors for the processing of licenses, permits, and authorizations and therefore will not be a focus of this project.

of contamination and contamination pathways, threats and potential management options. This will include the finalization of a national IAS inventory, indicating priority species and ecosystems, proposed management options, and levels of restriction based on risk analysis. The IAS inventory will build on work already conducted by many institutions including the Preliminary Inventory of Plant and Animal Species coordinated by the National Center for Biosafety (CSB), the Official List of Biological Agents that affect humans and animals, inventories conducted by research institutes such as BIOECO, ECOVIDA, IES, as well as an inventory conducted by the Plant Quarantine agency[13]. As part of the project, each project area will conduct an IAS inventory. These individual inventories will be compiled and complemented to comprise the national IAS inventory. This work will be coordinated by the IAS Subgroup of the National Group on Biodiversity.

68. In addition, standards for ecosystem vulnerability assessments, environmental impact assessments (that include ecological and economic impacts), risk analysis (that include impacts from changing climatic conditions), economic valuation and cost-benefit analysis (to measure economic costs of different management options and to measure negative impacts caused by IAS in key vulnerable ecosystems of the island) and participatory management actions[14] (for 26 IAS each with its own guidelines) will be developed. In general the standardization of these methodologies will include: (1) identification of institutes and experts who will participate in the elaboration of the methodologies, (2) consultations with international organizations and experts where necessary, (3) elaboration of the proposed standardization of the methodologies based on lessons learned from existing methodologies, (4) finalization and approval of methodologies by key actors, and (5) implementation of these methodologies in selected areas of the project.

69. Output 2.2 IAS Information System guides improved IAS management decisions. The goal of this output is to design a National Information System for IAS (SIMEEI) to provide existing information, as well as information generated by the project, to enable decision makers and IAS users to make better informed decisions regarding the prevention, detection and management of IAS in order to safeguard biodiversity and ecosystems on the island and in particular in project areas. Information generated as part of the first strategic area of intervention will be a key source of data for the SIMEEI, as will existing isolated databases on IAS, and information generated by the National IAS Monitoring System (see below for more information). Key information that will form a part of this information system will include information regarding species lists, quarantine mechanisms, risk analysis and EIA, early warning response, monitoring and control, management, and coordination between institutions.

70. The creation of the SIMEEI will involve the collation of information regarding IAS (status, distribution, biology, invasive characteristics, impacts, and control options), the acquisition of appropriate equipment and software, the development of information sharing and coordination mechanisms, the meeting by experts to design and establish the systems, and the training of stakeholders on the use of the information system and the implementation of the monitoring system.

71. The SIMEEI will allow for the monitoring and evaluation of the impacts of IAS and IAS management actions on biodiversity and ecosystems, the evaluation of coordination units and regulatory authorities actions and be an integral part of risk analysis, environmental impact assessments, quarantine, early warning, and rapid response systems. The coordination of this intervention will be primarily from CIGEA with wide ranging participation and training of stakeholders involved in regulation, policy and

[13] A study prepared by the National Center on Biodiversity-Institute for Ecology and Systematics for the National Biodiversity Information Network (RIMBIO) categorized 570 invasive or exotic flora species and 139 invasive fauna species.

[14] Management plans will identify targets to ensure equal participation of women and men in the implementation of management actions.

management.

72. Output 2.3 IAS monitoring systems for tracking IAS management performance and impacts. The goal of this output is to design a national IAS monitoring system that will track IAS impact on biodiversity and ecosystems, IAS research, and the results of implemented management actions. The SIMEEI will be a crucial tool for the implementation of the monitoring system. The monitoring system will use a participatory approach in its design ensuring an adequate balance between a centralized methodology and a decentralized implementation of the methodology that takes into consideration local level priorities, environmental problems and available resources. Much of the information that will be collected as part of the standardization and implementation of methodologies described above will provide baseline data for the monitoring system. Key indicators will be identified and monitored at established time intervals to track changes and evaluate IAS biology, behavior, invasion levels, IAS impacts on ecosystems, habitats, species, and genetic diversity, the effects of management actions, and the behavior of IAS in relation to natural occurrences (hurricanes, droughts, floods, increased salinity, climate change related occurrences) and anthropogenic occurrences (fires, construction sites, mining, etc.) which increases prevention and control of IAS and reduces contamination and spread.

73. Output 2.4 Key stakeholders understand and apply technical, legal, and administrative tools. The goal of this output is to increase key stakeholder skill-sets and knowledge on scientific bases, legal tools and management approaches for IAS prevention and management by way of trainings and production and distribution of educational materials in order to increase prevention and control of IAS and reduce contamination and spread. The target audience will include researchers, decision makers, local governments, representatives of regulatory authorities at national and local levels, lawmakers, representatives of productive sectors at local and national levels, and NGOs. The trainings will focus on building capacity regarding updated legal, technical, and administrative aspects of prevention, detection, and management including, but no limited to, how to:
(i) implement the new IAS quarantine system and new legislation on ballast waters and ship hulls. Importation of goods and ballast water and ship hulls are important pathways of entry for IAS, therefore increased capacity of key stakeholders, including CSB, CICA, CNSV, DSIM, IMV, ONIP, AGR, SEF, and CGB will lead to reduced entry rates of IAS;
(ii) conduct EIAs and risk analysis that are in accordance with international standards, take into account natural areas, threats to biodiversity, and potential effects from climate change, and use the precautionary principle. This will be particularly important for potential IAS pathways such as infrastructure development or introduction of exotic species for forestry, agriculture, aquaculture, or tourism sectors. Trained personnel coupled with improved regulations for EIA and risk analysis will result in improved implementation and hence decreased risk of entry or spread of IAS;
(iii) conduct cost benefit analysis in the context of risk analysis and EIA as well as in the evaluation of different eradication and management options;
(iv) appropriately grant licenses and permits;
(v) apply monitoring and control systems for current IAS and introduced species that may become invasive;
(vi) implement the IAS early warning and rapid response systems;
(vii) conduct taxonomic classification and identify the ecology, distribution, behavior, and reproductive biology of IAS;
(viii) use Geographic Information Systems and
(ix) carry out control and management plans for targeted species in targeted ecosystems.
Trainings will be targeted to the following: 50 ballast water and ship hull contamination control specialists; 200 specialists in IAS science[15]; 100 specialists in monitoring of IAS; 30 technicians in GIS[16];

[15] On issues of taxonomy, IAS ecology, distribution, behavior, and reproductive biology, as well as Management methods, biogeography, and evaluation of biodiversity

800 regulatory authorities, environmental managers, and representatives of the productive sectors trained in current IAS legislation; 60% of inspectors technically qualified to apply IAS regulations; at least 35% personnel trained are men and 40% of personnel trained are women.

74. Output 2.5 Public knowledge, participation and stakeholder support for IAS management strengthened. The goal of this output is to increase public knowledge and participation and stakeholder support for IAS prevention, detection, management and eradication through a national communication and education campaign. A variety of posters, awareness materials, identification guides and a master curriculum on IAS will be developed and used as part of the national communications and education campaign to raise awareness and aid in IAS control. This will include the production of educational materials and events geared towards the general public as well as local stakeholders (farmers, fisherman, etc.) through radio, television, informational booklets, newspapers, fairs, community trainings, etc. An IAS curriculum will be proposed for insertion into primary schools, technical schools, and universities. One avenue by which public participation will be fostered is through their involvement in the early warning system[17], particularly in the monitoring and reporting of existing and potential new IAS. Trainings will be held with targeted audiences in the project areas in order to establish the capacity for voluntary monitoring and reporting. This will be coordinated by CNSV with participation from CIGEA, IES.

75. Through this intervention the project will also increase knowledge on IAS threats, management options and best practices among IAS-using stakeholder industries and enterprises across sectors (farming, transport, custom, tourism, etc.). Educational materials aimed at increasing basic knowledge regarding threats and risks posed by IAS as well as the laws and responsibilities of stakeholders will be developed. Periodic exchanges and discussions will be organized through workshops, debates, and conferences which will bring together decision makers, researchers, producers, workers, and other IAS-using stakeholders.

76. Finally, as part of this outcome, the project will document the results and best practices for dissemination at the national and international level with the goal of sharing lessons learned, facilitating the application of best practices, and enriching scientific exchanges.

Outcome 3: Institutional capacities are strengthened to ensure the effective implementation of prevention, detection and management of IAS to safeguard biodiversity

The third operational component of the project is focused on strengthening institutional capacities to ensure effective implementation of prevention, detection and management of IAS to safeguard biodiversity. This will be achieved through the following output: institutions have improved inspection and containment capacity; early warning system monitors key IAS species; management actions for controlling, containing and eradicating key IAS; and effectiveness of IAS management actions and IAS behavior monitored for key IAS.

77. Output 3.1 Institutions have improved inspection and containment capacity. Regulatory authorities, and in particular inspectors, are key actors in ensuring the effective implementation of prevention and detection measures. However, most inspectors do not have the capacity to prevent or detect the presence

[16] Geographic Information System

[17] As described in outcome 1 an early warning response system does exist to track and respond to threats caused by IAS to plant, animal, and human health, but not for threats to biodiversity and ecosystems. Through outcome 1 the project will establish the legal backing necessary for the inclusion of threats from IAS to biodiversity and ecosystems in early warning systems and through outcome 3 this early warning system will be implemented.

of IAS due to lack of knowledge about contamination pathways, inability to identify potential IAS, and lack of adequate equipment for inspections, diagnoses, and treatments. The focus of this intervention will be to build the human and infrastructural capacity needed to effectively prevent the entry of IAS by building the capacity to detect illegal entries at border points, to impose violations of existing regulations (in particular those regulating use and movement of IAS), to adequately conduct risk analysis, and to correctly authorize permits. This increased capacity will result in reduced entry rates of IAS and reduced spread of IAS within national boundaries. Key institutions to be targeted are the regulatory authorities at border points and within the national boundaries, namely Veterinary Medicine Institute (IMV), the National Pant Protection Centre (CNSV), the General Customs Department of the Republic (AGR), the Environmental Control and Inspection Centre (CICA), the Centre for Biological Security (CSB), the National Fisheries Inspection Office (ONIP), the Ministry of Transport (MITRANS), the Forest Protection Unit (CGB), and the Border Control Troops (TGF).

78. Output 3.2 Early warning system for monitoring key IAS species. The goal of this output is to strengthen the capacities of key institutions that will be involved in implementing an early warning system. Ten of the 26 species prioritized for the project will be selected to form part of the early warning system. The purpose is to avoid the spread of dangerous IAS already on the island to new areas that island that correspond to biodiverse important ecosystems. The selection of these 10 species will be conducted through a broad stakeholder consultation at inception of the project. The early warning system will involve a wide range of actors including plant and animal health inspectors, quarantine officials, scientists (botanists, entomologists, gardeners, and crop pest consultants), environmental managers, farmers, community members, and NGOs. Human and infrastructural capacity will be built via trainings and the provisioning of monitoring and surveillance equipment.

79. Output 3.3 Management actions for controlling, containing and eradicating key IAS. The goal of this output will be the actual implementation of IAS management actions in order to contain, control and/or eradicate existing IAS species threatening native flora and fauna in 7 biodiversity critical protected wildlands, unprotected wildlands, and productive areas. These management actions will be implemented for 10 IAS and will result in reduced predation, reduced loss of habitat, and/or reduced inter-specific competition. These site interventions will not occur as isolated projects but instead will work with each other in order to share lessons learned to find cost-effective means of control and will contribute to building the systemic capacity to control IAS by developing the coordination, networks, human and infrastructural capacity from the ground up. The review and development of appropriate management actions for priority species in priority ecosystems are an integral part of outcome 2. In this outcome the focus is on the actual implementation of the management actions. As it would be cost prohibitive to implement management actions for all 26 priority IAS species, the project will facilitate the implementation of 10 management actions. However, as part of outcome 2, management actions for all 26 species will be developed. The success of the management actions lies heavily on the institutional capacity of the executing agencies. First and foremost the knowledge to implement management actions will need to be raised through field trainings. The operational capacity will be established through the acquisition of appropriate equipment necessary for eradication, containment, and control (i.e. small boats, machetes, tractors, traps, tents, compasses, maps, etc.).

80. As a cost effective measure, management plans will focus on one species, but where possible will also include the control of associated IAS that share the same habitat. For example, in the Havana Plains where an important species to manage is the Ipil ipil (*Leucaena leucocephala)* but associated species can also be controlled including Marabu (*Dichrostachys cinerea)*, Aroma (A*cacia farnesiana)* and pasture species. As another cost-effective measure different management options for certain species will be tested over different sites in order to determine threshold populations and the cost-effectiveness of controlling these levels. In addition in certain cases it will be much more cost effective to contain a species rather than to eradicate, as is the goal with Perna viridis.

81. A number of species on the IUCN red list have ranges that correspond to the site interventions of the project. For example, the endangered Almiqui (*Solendon cubanus*) is only found in the eastern mountains of Cuba where the project will be working in two important sites for the Almiqui – the Alejandro de Humboldt National Park and the Baconao Biosphere Reserve. The critically endangered Cuban crocodile (*Crocodylus rhombifer*) is principally distributed in the Zapata Wetland within a range of approximately 360 km². The Manjuari (*Atractosteus tristoechus*), also known as the Cuban gar, is endemic to Cuba and has its principal range in the Zapata Wetland. The Plain Pigeon (*Columba inornata)* is classified as near threatened and has limited ranges throughout the Carribbean including the lowlands of the province of Camaguey where the project will work. For other of the project sites the endemic, migratory, or red listed species affected by IAS are still to be identified as part of the project. Special attention will be given to these important species when developing the management plans in these areas in order to maximize the direct benefits to these species from management of particular IAS. The eradication of IAS in these specific sites will produce enormous global benefits at limited cost.

82. The successful implementation of management actions supported by the project will directly result in reduced predation, reduced inter-specific competition, reduced loss of habitat, and reduced spread of IAS in the most vulnerable and biodiverse important sites in the country. The sustainability of onsite eradication or containment is enabled by the parallel project actions to build a monitoring and early warning system to alert when re-introductions at these sites occur. The management actions will also include rehabilitation and/or restoration actions for the affected ecosystem as well as recuperation of affected native species where appropriate. Finally, the management plans will cover a medium term time scale with adaptive operational plans and annual evaluations that allow for any required adjustments to be made. (see Table 4 for more information on areas of intervention).

Table 4. Globally important sites identified to demonstrate IAS management (see Section IV, Part II and IV)

Area	Site	Total Extent	Targeted IAS	Level of Infestation
Southern Pinar del Rio and Sierra del Rosario	Sabanalamar – San Ubaldo	5 212 ha	Marabú	60% of the total area
	Fisheries Enterprise Punta de Palma	7 194 ha	Buffalo	1 500 individuals
			Marabú	30% of area
			Catfish	High densities
	Sierra del Rosario	25 000 ha	Pomarrosa	20% of area
			Charagüito	10% of area
			Tulipán africano	5% of area
Havana Matanzas Plain	Havana Matanzas Plain	37 000 ha	Ipil ipil	70% of area
Zapata Wetlands	Zanja de Santo Tomás	1700 ha	Catfish	80% of area
	Canal Magistral Australia	3000 ha	Catfish	20% of area
	Zapata Wetland Nature Reserve	452 000 ha	Catfish	1% of area
	Las Salinas Wildlife Sanctuary	36 000 ha	Casuarina	1% of area
	Río Hatiguanico	3800 ha	Casuarina	4% of area
			Melaleuca	Low densities
	Herbazal de La Boca	181 933 ha	Melaleuca	2% of area
Bay of Cienfuegos-Trinidad – Topes de Collantes	Bay of Cienfuegos	9 000 ha	Green Mussel	15 000 ind/m2
	Topes de Collantes.	3 000 ha	Tulipán africano	100% of area
			Santanilla	100% of area
			Marabú	50% of area
			Pomarrosa	25% of area
	Península de Ancón	340 ha	Marabú	60% of area
			Ipil-Ipil	Medium infestation level
	Área de arenas silíceas de Casilda, Trinidad	4 438 ha	Marabú	16% of area
			Weyler	Information not available

			Aroma blanca	Information not available
Llanura de Camagüey	Empresa Rectángulo Municipio Guáimaro.	1 858 ha	Aroma	15% of area
			Weyler	5% of area
			Marabú	30% of area
			Malva	10% of area
			Piña de ratón	5% of area
	Cordón agroproductivo del Municipio Camagüey	42 ha	Aroma	10% of area
			Ipil-Ipil	10% of área
			Marabú	100% of area
	Sabana serpentinosa (buffer zone of Limones Tuabaquey Ecological Reserve)	938 ha	Marabú	50% of area
			Wild cat.	Information not available
			Perros jíbaros	Information not available
			Cerdos jíbaros	Information not available
Las Tunas (Monte Cabaniguán Sector, La Isleta and Llanura Central Protected Areas)	Monte Cabaniguán	14 500 ha	Marabú	4% of area
		14 500 ha	Piña de ratón	8% of area
	Ecological Reserve La Isleta Bahía de Nuevas Grandes	6 500 ha	Casuarina	1% of area
			Marabú	1% of area
	Llanura central de Las Tunas	50 390 ha	Malva de caballo	40% of area
	Agroecosystems of the north coast of Las Tunas	6 000 ha	Marabú	High 12 indiv/m² Medium 7 indiv/m² Low <3indiv/m²
Central Plain of Ciego de Ávila	Loma de Cunagua. Municipio Bolivia	8 200 ha	Algarrobo de la India	20% of area
	Emp. La Cuba, Municip.Baraguá.	1 744 ha	Sigatoka negra	30% of area
	Emp. Cítricos Ciego de Ávila	9150 ha	Tristeza de los Cítricos	90% of area
	Emp. Agropecuaria Ruta Invasora	8782 ha	Búfalo de agua	96% of area
	Municipalities of Ciro Redondo, Morón, and Chambas	100 ha	Mongoose	Information not available
Delta del Rio Cauto	Laguna Leonero	6 070 ha	Catfish	100% of area
			Jacinto de agua	8% of area
	Biramas	12 477 ha	Wild dog	200 indiv
			Wild cat	Information not available
			Marabú	2% of area
	Cayo Carena	420 ha	Wild cat	Information not available
			Wild dog	20 indiv
	Atejitos	307 ha	Wild cat	Information not available
			Marabú	26% of area
	Los Cañitos	700 ha	Wild cat	Information not available
			Marabú	15% of area
	El Mango	21 111 ha	Marabú	2% of area
	UZC “La Cuenca”	14 247 ha	Marabú	1% of area
	Monte Cabaniguan	14 500 ha	Piña de ratón	2% of area
Ecological Reserve Siboney – Juticí	All the Reserve	2 075 ha	Ipil Ipil	1% of area
			Marabu	Information not available
			Aroma	Information not available
			Lion fish	Information not available
			Wild dog	Information not available
			Wild cat	Information not available
			Black rat	Information not available
Alejandro de Humboldt National Park	Mucaral - Piedra la Vela	2 671 ha	Casuarina	0.5% of area
			Ipil Ipil	0.2% of area
			Black Rat	0.1% of area
			House Mouse	0.5% of area
			Mongoose	0.6% of area
			Wild cat	0.5% of area
			Wild dog	0.1% of area
			Catfish	62 invid/m²
	Yamaniguey-Santa María	4 625 ha	Casuarina	0.7% of area

			Tulipan Africano	0.2% of area
			Ipil Ipil	0.2% of area
			Black rat	0.2% of area
			Gray rat	0.2% of area
			House mouse	Information not available
			Mongoose	Information not available
			Wild cat	0.1% of area
			Catfish	62.5 indiv/m2
Hatibonico Ecological Reserve	La Redonda	600 ha	Marabu	70% of area
			Wild dog	Information not available
	Monitongos and monterverde areas	1000 ha	Marabu	40% of area
			Aroma	30% of area
			Ipil Ipil	10% of area
			Wild dog	Information not available
			Shiny cowbird	Information not available
	Litoral Sur	1000 ha	Aroma	80% of area
			Black rat	15 ind/ha
			Gray rat	10 ind/ha
			Wild dog	Information not available
			Shiny cowbird	Information not available

83. Output 3.4 Effectiveness of IAS management actions and IAS behavior monitored for key IAS. The goal of this output involves the successful implementation of the SIMEEI and the national IAS monitoring systems. Operational and infrastructural capacities across institutions for the coordinated use of the SIMEEI and national IAS monitoring system will be established. Although these systems will be of utility to a wide range of stakeholders on the island and in the region, the project will focus on building capacity in targeted institutions that will play a key role in its management and use, including regulatory authorities, border control representatives, institutions involved in environmental management and research at national and local levels, and the productive sector. The target is to monitor and measure the effectiveness of the management of at least five IAS and measure at least five indicators that track IAS impacts on ecosystems, habitats, species, and genetic diversity.

Project Indicators, Risks and Assumptions

84. The overall measures of project success will be monitored using a set of indicators presented in the Strategic Results Framework (SRF) presented below. The following is a list of key indicators that will be used to measure project success in achieving the objective and the three outcomes:

Project Objective

-Increased effectiveness of IAS management framework measured through GEF Tracking tool
-Increase in area under improved IAS management
-investments in IAS activities by MINAG, MINAL, MITRANS, CITMA y MINSAP
-% of quarantine, risk analysis, and EIAs that incorporate analysis of impact of IAS on BD
-% of management plans that include species recuperation and/or ecosystem restoration and rehabilitation activities

Outcome 1

-establishing, updating, and/or complementing the following regulations: black list and gray list, risk analysis, EIA, protocols, normative documents and quarantine mechanisms, monitoring and surveillance, early warning and rapid response system, ballast waters and ship hulls, plant protection/health legislation, and procedures for elaboration of management plans
-new national IAS strategy and action plan
-IAS strategy and action plans within key sectors' and institutions' environmental strategies

-Economic incentives and disincentives control the introduction and use of IAS in production sectors and facilitate management of IAS
-Institutional framework for IAS control between stakeholders and across sectors legally backed

Outcome 2
- Number of knowledge products developed
-Increased skill-set and knowledge on scientific bases, legal tools and management approaches for IAS control
-Increased public knowledge and participation and stakeholder support for IAS prevention, detection, and management

Outcome 3
- # of penalties enforced related to violation of IAS regulations
-# of illegal point of entry detections
-# of IAS under monitoring and surveillance as part of early warning system
-IAS management actions are implemented to eradicate, contain and/or control existing IAS species threatening native flora and fauna in 7 biodiversity critical wildlands and productive areas

85. In addition to the abovementioned project based indicators, the project will also develop indicators that will measure compliance with environmental legislation and an IAS monitoring system that will measure the effects of management actions and will track IAS impact on ecosystems, habitats, species, and genetic diversity. These sets of indicators will form part of the national IAS strategy and therefore ensure continual monitoring and evaluation beyond the life of the GEF intervention.

Risks	Level	Mitigation measures
Conflict of interest with production sectors could delay the implementation of the project.	Medium	The project will improve the institutional capacities of the different stakeholders involved and will establish more efficient coordination mechanisms to deal with the management of IAS across different production sectors. Furthermore by improving the legal framework and by providing training, the project will contribute to increase the understanding on how to respond efficiently and in a coordinated manner to the risks that IAS represent for the island. Economic incentives and disincentives will be developed with participation from production sectors in order to control the introduction and use of IAS.
Shift in national priorities and loss of the support from the government.	Medium	The project will implement cost effective control and eradication alternatives, and evaluate the negative impacts caused by invasive species on the local and national economy and on endemic species and fragile ecosystems. It will demonstrate the lasting benefits (environmental, economic, and therefore social) of an effective and efficient invasive species management system, and therefore establish this project as a stable national priority.
Cuba is likely to witness sea level rise and extended dry spells, which may yield more suitable conditions for the colonization of certain IAS due to increased forest fires, sea water temperature rise, import of more drought tolerant plants, changed tolerance levels for new pathogens, and changes of ecosystem composition, structure and dynamics.	High	The project will promote and strengthen capacities for the management and application of adaptation measures, not only based on the actual diagnostic, but also by taking into account changes in the ecosystems, risks linked to IAS, or any other modification, in order to implement an adaptable system for prevention, control and management of IAS that can evolve according to identified needs. The early warning system and the monitoring system that will be developed and

		implemented will directly serve the information and response needs necessary to mitigate risks associated with climate change prior to reaching threatening levels.
The high cost of IAS control and eradication actions might prevent their adoption and dissemination in the country.	Low	The actions to prevent, control, manage, and remove IAS will be pragmatically analyzed, according to cost-effectiveness criteria, to ensure they are reasonable and replicable.

Incremental Reasoning and Expected Global, National, and Local Benefits

86. In the baseline situation, incomplete legislative and institutional mandates and the lack of a coherent or integrated strategic planning and management framework, combined with a weak awareness of the threat posed by IAS and a low capacity and information base with which to tackle the problems associated with IAS, would result in the loss of biodiversity of global and national importance. As Cuban markets become increasingly integrated into the global economy, and in the face of ongoing biodiversity loss and ecosystem degradation in the country, it is likely that the threats posed by alien species invasions will rise still further in the future. The added value of the proposed GEF intervention will be to address the main root causes and barriers to implementation of effective IAS control, by strengthening institutional capacities, enhancing coordination mechanisms, increasing awareness among all relevant actors, and consolidating the organization of all the IAS-related actions in the country to successfully control the introduction and spread of invasive species in Cuba. GEF support will thereby make a major contribution to safeguarding globally important biodiversity and reducing the risks to endemic species and unique ecosystems.

87. The GEF increment contributing to reaching this desired state consists of the following:

- The establishment of a comprehensive national IAS strategy and action plan as well as the establishment of IAS strategies within key sectors
- The establishment of a national coordination unit that will coordinate the development and implementation of the national IAS strategy
- The establishment of a national IAS information system that will provide current information about IAS and facilitate the processes of conducting risk analyses, EIAs, early warning responses, monitoring, management, and coordination between institutions
- Increased knowledge capacities amongst key stakeholders on scientific bases, legal tools, and management approaches and raised awareness amongst general public and IAS-using sectors will lead to improved prevention, detection and management of IAS
- Improved border point detections and establishment of early warning response system will prevent the entry of potentially harmful species and potentially allow for a more cost effective eradication of newly established species

88. Global environmental benefits will be reaped by decreasing IAS threats to globally-important Cuban biodiversity in vulnerable natural and productive ecosystems. Building capacity to control the introduction and spread of invasive species in Cuba will make a major contribution towards safeguarding globally important biodiversity, by reducing the risks to endemic species, unique and threatened ecosystems, and protected areas which are internationally recognized to be critical to biodiversity conservation. The seven areas the project will work in represent the most important types of ecosystems on the island, including two of Cuba's largest wetlands, coral reefs, mountain ecosystems, key forestlands (tropical and subtropical dry and moist forests, pine forests, and cactus scrublands), all of them highly fragile and vulnerable and lowland plains areas important for agricultural production. Two of the areas the project will work, Zapata Wetland (Matanzas Province) and the Delta del Cauto Wetland (Granma and La Tunas Provinces), are Ramsar sites. The Zapata Wetland not only has the highest species richness of birds on the island (258 of 368 reported in the archipelago), it also has the highest number of endemic

bird life. The Zapata Wetland also houses a great diversity of herpetofauna (lizards, camelions, and small lizards). Other areas include the Sierra del Rosario Ecological Reserve in the Western part of the island, the Cienfuegos-Trinidad Coastal Zone and Topes de Collantes area which encompasses an important mountain-coastal zone in the southern part of the island, and the Alejandro de Humboldt National Park and Baconao Biosphere Reserve in the eastern part of the island.

89. A number of species on the IUCN red list have ranges that correspond to the site interventions of the project and are being affected by key IAS the project aims to manage. For example, the endangered Almiqui (*Solendon cubanus*) is only found in the eastern mountains of Cuba where the project will be working in two important sites for the Almiqui – the Alejandro de Humboldt National Park and the Baconao Biosphere Reserve. The critically endangered Cuban crocodile (*Crocodylus rhombifer*) is principally distributed in the Zapata Wetland within a range of approximately 360 km². The Manjuari (*Atractosteus tristoechus*), also known as the Cuban gar, is endemic to Cuba and has its principal range in the Zapata Wetland. The Plain Pigeon (*Columba inornata)* is classified as near threatened and has limited ranges throughout the Carribbean including the lowlands of the province of Camaguey where the project will work. For other of the project sites the endemic, migratory, or red listed species affected by IAS are still to be identified as part of the project. Special attention will be given to these important species when developing the management plans in these areas in order to maximize the direct benefits to these species from management of particular IAS. The eradication of IAS in these specific sites will produce enormous global benefits at limited cost. (see Section IV, Part III and IV for more information)

90. The project will generate major benefits at the national, provincial, and local levels by preventing or mitigating the negative environmental, economic, and social impacts caused by IAS. The systemic focus of the project along with focused interventions at provincial and local levels will ensure that the national IAS system for prevention and management reflects local contexts and in doing so will ensure the success of prevention and management strategies.

Cost-effectiveness

91. The cost of the project investment is modest in light of the global economic and biodiversity benefits associated with controlling the introduction and spread of invasive species in Cuba. Although the Government of Cuba has initiated IAS-related activities such as formulation of policies and regulations to perform its duties under applicable international conventions/laws and national legislation dealing with IAS, there is a need to improve the effectiveness of management strategies and responses. This is expected to improve the overall efficacy and cost effectiveness of interventions. Quantitative estimates of cost-effectiveness were not considered applicable for this project, due to the limitations with quantifying and monetizing immediate benefits and outcomes, hence the analysis is primarily qualitative. A more rigorous analysis of the cost-effectiveness of different management options for each species in each site will be carried out in the early stages of project implementation.

92. One project alternative was to focus only on eradication of IAS in vulnerable ecosystems. This would involve support only to field interventions designed to eradicate, control and manage existing invasions of species which have already spread and become established. However, this option is not cost-effective because in many cases such efforts are prohibitively expensive, deal with the effects rather than the causes of invasion, run the risk of failing to stop re-invasion occurring, and raise serious questions of future sustainability and financing. The IUCN indicates that economic losses resulting from IAS contamination amount to many billions of US dollars globally, and that the costs of preventing the entry

and spread of IAS are considerably less than the cost of control and eradication[18].

93. The selected project alternative tackles all stages in the progression towards invasion and has a particular focus on prevention and detection. The project focuses on establishing systems, plans, and institutional capacities at the national level in order to optimize the benefits from local level control work underway. This project will strengthen capacity to deal with IAS by building on existing regulations, policies, and institutions, addressing key stages in the progression towards invasion (with an emphasis on introduction), and tackling the underlying root causes of invasions. Cuba has already made substantial investments in eradicating IAS. This project will capitalize on previous and ongoing IAS efforts in order to optimize cost-effectiveness. A focus on IAS prevention via an effective IAS prevention/quarantine system for the entire country will help to protect those investments that have already been made, or are planned by other initiatives. It minimises the likelihood of costs and losses being incurred to the global economy as a result of the loss of globally significant biodiversity, and also reduces costs to both the international community and to Cuba in dealing with the impacts of IAS (including managing invasions, restoring degraded ecosystems and developing threatened species survival initiatives). The project will develop an early warning and response system as part of prevention. In addition, it is considered cost-effective to implement targeted control of key IAS species through containment, control, and/or eradication. Containment is more cost-effective than outright eradication and will be employed particularly in cases where an aggressive IAS has limited range on the island and therefore cost of containment are low and benefit of preventing spread are high. The control and eradication of other IAS will be employed only when there are direct benefits to site specific endemic or migratory species, avoiding extinction and protecting habitat for these globally important species. Several sites were chosen where eradication of key IAS over a small area that corresponds to the entire distribution of an endemic species, hence avoiding total extinction at a relatively low cost. Other sites are winter ranges for migratory species where site specific IAS eradication would produce benefits beyond Cuba also at a limited cost (see project strategy for more detail). The sustainability and cost-effectiveness of onsite eradication or containment is enabled by the parallel project actions to build a monitoring and early warning system to alert when re-introductions at these sites occur.

Country Ownership: Country Eligibility and Country Drivenness

94. This project proposal is consistent with national priorities and plans, and is endorsed by official documents and national strategies. The National Strategy on Biological Diversity in Cuba designates IAS as a major concern for Cuban ecosystems and a threat to biodiversity. It also mentions that studies are necessary to improve existing scientific and technical knowledge on the IAS issue. Consequently, the Action Plan of the National Strategy on Biological Diversity 2006-2010 includes activities to research, inventory, control and manage IAS that have been selected in prioritized areas. Furthermore, the 2007-2010 Environmental National Strategy (ENS), which is the main framework for Cuban environmental policy, and Environmental Law #81, both highlight the need to prioritize IAS issues for biological diversity management and forest management. The ENS estimates IAS-related actions and targets to be achieved before 2010: implementation of IAS negative impact mitigation measures, development of strategy and plans to control selected IAS, and implementation of at least 50% of the planned actions. It also proposes the development of an economically- and environmentally-sustainable fishing strategy by 2008, which takes into account the alien species already introduced into the country. Within the soil management component, the ENS calls for the control and management of pests and diseases in 100% of productive agricultural lands. Within the forestry component, the ENS recommends the creation of a program for managing and mitigating IAS by 2009. Moreover, the National Protected Areas System Plan

[18] IUCN Guidelines for the Prevention of Biodiversity Loss caused by Alien Invasive Species, Information Paper, Fifth Meeting of the Conference of the Parties to the Convention on Biological Diversity, Nairobi, Kenya 15-26 May 2000. http://www.issg.org/infpaper_invasive.pdf

for the 2003-2008 period acknowledges IAS as a priority issue for the system, and proposes a work program with an action plan to improve the efficiency of different management methods for controlling and regulating the spread of IAS in the PAs.

95. The project fits within an overall country program that includes several strategic ecosystem conservation initiatives. Care will be taken to ensure complementarity with these initiatives. Examples of such projects include, a) the GEF project " A*pplication of a regional approach to the management of marine and coastal protected areas in Cuba´s southern archipelagos*" which works in sites that overlap with the target sites of this project and therefore certain activities will be coordinated, b) the GEF project, "*Capacity Building for Planning, Decision Making and Regulatory Systems & Awareness Building/Sustainable Land Management in Severely Degraded Ecosystems*" c) The GEF project, "*Mainstreaming and Sustaining Biodiversity Conservation in three Productive Sectors of the Sabana Camaguey Ecosystem*", which works in sites that overlap with target sites of this project and addresses sectors of interest for the project such as Fisheries, Agriculture, and Tourism, d) *The Island Cooperation Initiative on IAS,* launched under the supervision of the IUCN Specialists Group on IAS, which facilitates international coordination and the dissemination of experiences and lessons learned and finally, e) the GEF project, "*Completion and Strengthening of the Cuban National Biosafety Framework for the Effective Implementation of the Cartagena Protocol*" which includes strengthening of coordination mechanisms of regulatory authorities for the processing of licenses, permits, and authorizations. These initiatives will benefit from the knowledge and lessons learnt generated by the project and will be used as a vehicle to disseminate the knowledge acquired more efficiently to the different stakeholders they target.

Sustainability

96. The project's holistic focus of investing in building capacities across sectors at the stakeholder, institutional, and systemic levels will ensure long-lasting and far-reaching development results. The project's emphasis on establishing a comprehensive IAS policy, legal and regulatory framework will contribute strongly to the sustainability of the project, in particular the establishment of a national IAS strategy and action plan which will guide Cuba's IAS actions into the future and ensure its financial sustainability by dispersing more funds for IAS to the operating budgets of key ministries. An important target of the project is to increase budget allocations of key ministries to IAS activities by 2%. Currently specific budget amounts are difficult to calculate but early in the project a methodology will be developed that allows this disaggregation. Using this baseline budget allocation will be calculated. The economic incentives and disincentives developed as part of outcome 1 will also contribute to the financial sustainability of the project in the long run. Furthermore, sustainability of the project will be guaranteed thru the various systems that will be implemented including the IAS information system, the IAS monitoring system, the early warning system, and the rapid response system.

Replicability

97. The approach presented in this project is designed to ensure that the important lessons to be generated will have potential for replication at different levels: local, national and international and in different types of ecosystems. Experiences will be replicated from locality to locality, and from province to province within Cuba, due to the multi-sectoral focus of the project and the elaboration of a national IAS strategy and sector specific strategies that will serve to guide operational plans of sectors and institutions across the island. In particular, lessons learned from management actions for specific IAS will be replicated across the island. A strong focus on the development of technical tools and delivery of trainings will ensure that national capacities exist to replicate the project successes in other areas of Cuba. Additionally, the project will actively identify lessons learned and knowledge generated in project areas through dissemination of materials via the GEF system and via national channels. As this project overcomes barriers and expands IAS prevention, detection and management actions, the project will

disseminate the experiences both within Cuba and to other countries in the Caribbean, Latin America and beyond.

PART III: Management Arrangements

98. The Project will be executed under NEX modality, according to the standards and regulations for UNDP cooperation in Cuba. The Ministry for Foreign Trade and Investment (MINCEX), which is the counterpart of UNDP in Cuba, is the national public authority in charge of coordinating international cooperation and its execution in Cuba. The Ministry of Science, Technology and Environment (CITMA) will provide technical coordination for the project. Execution of the project will be subject to oversight by a Steering Committee and a National Coordination Group, detailed below. Day to day execution will be carried out under the supervision of a Project Director and corresponding administrative staff.

99. Implementation will be carried out according to the general guidance of a *Project Steering Committee* (PSC), specifically formed for this purpose, which will be responsible for approving the operational plans and annual reports of the project. Co-chaired by one representative of CITMA, MINCEX, and UNDP, the PSC will meet at least two times per year and will be composed of MINAG, MINAL, MININT (CGB, CGF), MITRANS. The PSC will be in charge of the supervision of the project, providing strategic guidance for its implementation, ensuring that this proceeds in accordance with a coordinated framework of Government policies and programs, and in accordance with the agreed strategies and targets laid out above in this Project Document. The PSC will also approve and supervise the appointments and work of staff under the Project Management Unit, detailed below.

100. The *National Coordination Group (NCG)* will provide backup to the PSC and will meet four times per year in order to supervise the advances of the project in general terms, review periodic progress reports, monitor impacts and plans received from the Project Management Unit and review them prior to their presentation to the PSC for approval. The NCG will also be responsible for controlling and monitoring the financial and administrative performance of the project. The NCG will have the prerogative of inviting temporary members from other agencies and NGOs, with the aim of seeking support in regard to specific issues that may arise. Permanent members of the NCG will include CITMA (CNAP, ORASEN-CICA-CSB, FMA, AMA, IES, ANC, CEAC, MNHN), MINAG (SEF, CNSV, IMV), MININT (CGB), MINAL (Independent Department of Sciences of MINAL), MITRANS (DSIM)
MINSAP, and the following NGOs - Pro-Naturaleza, Fundación Antonio Núñez Jiménez, ACTAF, ANAP. CIGEA will chair the NCG and will report directly to the PSC.

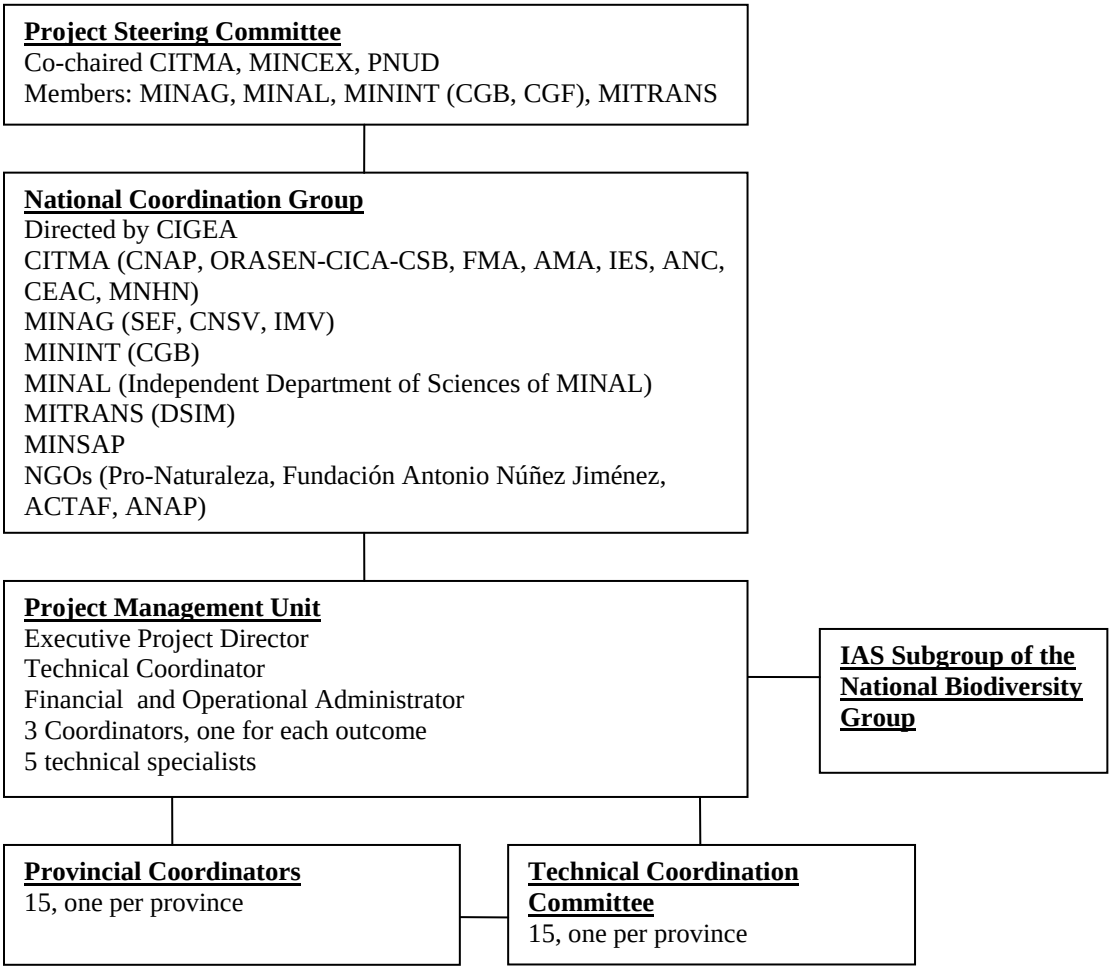
101. The CITMA will designate the *Executive Project Director* (EPD). In addition to chairing the NCG, responsibilities of this post will include ensuring that the project is carried out according to the approaches, timeframes and priorities established in the Project Document. The EPD will be the signing authority of requests to UNDP for disbursements of project funds.

102. In the CIGEA a *Project Management Unit* (PMU) will be established, to carry out the general administrative and technical actions of the project, such as the preparation of annual work plans and technical and financial reports, and the monitoring of project implementation at operational level, with the aim of ensuring that the advances in relation to the goals and key milestones of the project are achieved as foreseen. The PMU will report directly to the EPD and will be composed of a *technical coordinator*, a *financial administrator*, three *outcome coordinators*, one for each outcome, and five *technical specialists*. The five technical specialists will provide targeted technical support in the following areas: legal-political,

capacity building-communication-education, information management, and research-biological monitoring. The PMU will also include 15 *provincial coordinators*, one for each province participating in the project, and will be designated by the CITMA delegations with approval from the Technical Coordinator and EPD, to whom they will report directly. Each province will also establish a *Technical Coordination Committee* with representatives from the provincial Environmental Units (UMA), the State Forestry Service (SEF), and other key stakeholders from the research, academic, regulatory and productive sectors, and will function to back up and advise the work of the PMU, as required. Finally, as a sustainability measure, the IAS Subgroup of the National Biodiversity Group will track the projects advances, via the PMU, in order to ensure harmonization of the outputs of the project with the implementation of national strategies associated with IAS.

103. In addition to the specific positions outlined above, a series of sub-contracts will be necessary in order to ensure the technical capacity of the project coordination team. Additional institutions, firms and specialized entities will carry out a set of project activities that are currently outside of the capacities of the institutions that make up the CIGEA. These contracts will be entered into in accordance with the guidelines of UNDP and terms of reference defined by the EPD and the team, during the first month of the implementation phase or annually, in accordance with the project's work plan. Figure 1 below presents the project organigram, showing the relationships between the bodies to be established by the project.

Figure 1. Project Organigram



PART IV: Monitoring and Evaluation Plan and Budget

104. Monitoring and evaluation will be conducted in accordance with established UNDP and GEF procedures and will be undertaken by the project team and the UNDP Country Office (UNDP-CO) with support from UNDP/GEF. The Strategic Results Framework in Section II provides *performance* and *impact* indicators for project implementation with their corresponding *means of verification*. These will form the basis on which the project's Monitoring and Evaluation system will be built.

105. The below paragraphs outline the principle components of the Monitoring and Evaluation Plan that will be used to monitor *project performance*. The formal project *Monitoring and Evaluation Plan* will be finalized and presented in the *Project Inception Report* following a collective fine-tuning of indicators, means of verification, and the full definition of project staff M&E responsibilities.

Monitoring and Reporting

106. A Project Inception Workshop (IW) will be conducted with the full project team, relevant government counterparts, co-financing partners, the UNDP-CO and representation from the UNDP-GEF Regional Coordinating Unit, as well as UNDP-GEF (HQs) as appropriate.

107. A fundamental objective of the *Inception Workshop* will be to assist the project team to understand and take ownership of the project's goals and objectives, as well as finalize preparation of the project's first *Annual Work Plan* (AWP) on the basis of the project's Strategic Results Framework. This will include reviewing the logframe (indicators, means of verification, assumptions), imparting additional detail as needed, and on the basis of this exercise finalize the *Annual Work Plan* with precise and measurable performance indicators, in a manner fully consistent with expected project outcomes and established mid-term and end of the project indicator targets, as depicted in the Strategic Results Framework.

108. Additionally, the purpose and objective of the Inception Workshop will be to: (i) introduce project staff with the UNDP-GEF *expanded team* which will support the project during its implementation, namely the CO and responsible Regional Coordinating Unit (RCU) staff; (ii) detail the roles, support services and complementary responsibilities of UNDP-CO and RCU staff vis à vis the project team; (iii) provide a detailed overview of UNDP-GEF reporting and monitoring and evaluation (M&E) requirements, with particular emphasis on the Annual Project Implementation Reviews (PIRs) and related documentation, the Annual Project Report (APR), Tripartite Review Meetings, as well as mid-term and final evaluations. Equally, the IW will provide an opportunity to inform the project team on UNDP project related budgetary planning, budget reviews, and mandatory budget rephasings.

109. The IW will also provide an opportunity for all parties to understand their roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and project-based conflict resolution mechanisms. The Terms of Reference for project staff and decision-making structures will be discussed again, as needed, in order to clarify for all, each party's responsibilities and expected deliverables during the project's implementation phase.

110. Along with agreements reached at the IW, a detailed schedule of project reviews meetings will be developed by the project management, in consultation with project implementation partners and stakeholder representatives and incorporated in the *Project Inception Report*. Such a schedule will include: (i) tentative time frames for Tripartite Reviews, Steering Committee Meetings, (or relevant advisory and/or coordination mechanisms) and (ii) project related Monitoring and Evaluation activities.

111. *Day to day monitoring of implementation progress* will be the responsibility of the Project Coordinator, Director or CTA (depending on the established project structure) based on the project's Annual Work Plan and its indicators. The Project Team will inform the UNDP-CO of any delays or difficulties faced during implementation so that the appropriate support or corrective measures can be adopted in a timely and remedial fashion.

112. The Project *Coordinator* will fine-tune the progress and performance/impact indicators of the project in consultation with the full project team at the Inception Workshop with support from UNDP-CO and assisted by the UNDP-GEF Regional Coordinating Unit. Specific targets for implementation progress indicators in year one, together with their means of verification, will be developed at this Workshop. These will be used to assess whether implementation is proceeding at the intended pace and in the right direction and will form part of the Annual Work Plan. The local implementing agencies will also take part in the Inception Workshop in which a common vision of overall project goals will be established. Targets and indicators for subsequent years are to be defined annually as part of the internal evaluation and planning processes undertaken by the project team.

113. Measurement of impact indicators related to global benefits will occur according to the schedules defined in the Inception Workshop. The measurement, of these will be undertaken through subcontracts or retainers with relevant institutions or individual specialized expertise (e.g. populations of key species through inventories) and/or through specific studies that will form part of project activities.

114. *Periodic monitoring of implementation progress* will be undertaken by the UNDP-CO through quarterly meetings with the project proponent, or more frequently as deemed necessary. This will allow parties to take stock and to troubleshoot any problems pertaining to the project in a timely fashion to ensure smooth implementation of project activities.

115. UNDP Country Office, and the UNDP-GEF RCU as appropriate, will conduct yearly visits to projects that have field sites, or more often based on an agreed upon scheduled to be detailed in the project's Inception Report/Annual Work Plan to assess first hand project progress. Any other member of the Project Steering Committee (PSC) can also accompany, as decided by the PSC. A Field Visit Report will be prepared by the CO and circulated no less than one month after the visit to the project team, all PSC members, and UNDP-GEF.

116. *Annual Monitoring* will occur through the Tripartite Review (TPR). This is the highest policy-level meeting of the parties directly involved in the implementation of a project. The project will be subject to Tripartite Review (TPR) at least once every year. The first such meeting will be held within the first twelve months of the start of full implementation. The project proponent will prepare an Annual Project Report (APR) and submit it to UNDP-CO and the UNDP-GEF regional office at least two weeks prior to the TPR for review and comments.

117. The APR will be used as one of the basic documents for discussions in the TPR meeting. The project proponent will present the APR to the TPR, highlighting issues and recommendations for the decision of the TPR participants. The project proponent also informs the participants of any agreement reached by stakeholders during the APR preparation on how to resolve operational issues. Separate reviews of each project component may also be conducted if necessary.

118. A *Terminal Tripartite Review (TTR)* will be held in the last month of project operations. The project proponent is responsible for preparing the Terminal Report and submitting it to UNDP-CO and LAC-GEF's Regional Coordinating Unit (RCU). It shall be prepared in draft at least two months in advance of the TTR in order to allow review, and will serve as the basis for discussions in the TTR. The terminal tripartite review considers the implementation of the project as a whole, paying particular attention to

whether the project has achieved its stated objectives and contributed to the broader environmental objective. It decides whether any actions are still necessary, particularly in relation to sustainability of project results, and acts as a vehicle through which lessons learnt can be captured to feed into other projects under implementation of formulation.

119. The TPR has the authority to suspend disbursement if project performance benchmarks are not met. Benchmarks will be developed at the Inception Workshop, based on delivery rates, and qualitative assessments of achievements of outputs.

Project Monitoring Reporting

120. The Project Coordinator in conjunction with the UNDP-GEF extended team will be responsible for the preparation and submission of the following reports that form part of the monitoring process. Items (a) through (f) are mandatory and strictly related to monitoring, while (g) through (h) have a broader function and the frequency and nature is project specific to be defined throughout implementation.

(a) Inception Report (IR)

121. An IR will be prepared immediately by the project team following the Inception Workshop. It will include a detailed First Year/Annual Work Plan (AWP) divided in quarterly time-frames detailing the activities and progress indicators that will guide implementation during the first year of the project. This AWP would include the dates of specific field visits, support missions from the UNDP-CO or the Regional Coordinating Unit (RCU) or consultants, as well as time-frames for meetings of the project's decision making structures. The IR will also include the detailed project budget for the first full year of implementation, prepared on the basis of the AWP and including any monitoring and evaluation requirements to effectively measure project performance during the targeted 12 months time-frame.

122. The IR will include a more detailed narrative on the institutional roles, responsibilities, coordinating actions and feedback mechanisms of project related partners, in complement to those stated in the Project Document, as needed. In addition, a section will be included on progress to date on project establishment and start-up activities and an update of any changed external conditions that may effect project implementation. When finalized, the IR will be circulated to project partners who will be given a period of one calendar month in which to respond with comments or queries. Prior to this circulation of the IR, the UNDP Country Office and UNDP-GEF's Regional Coordinating Unit will review the document.

(b) Annual Project Report (APR)

123. The APR is a UNDP requirement and part of UNDP's Country Office central oversight, monitoring and project management. It is a self -assessment report by project management to the CO and provides input to the country office reporting process and the ROAR, as well as forming a key input to the TPR. An APR will be prepared on an annual basis by the project team prior to the TPR, to reflect progress achieved in meeting the project's AWP and assess performance of the project in contributing to intended outcomes through outputs and partnership work. The format of the APR is flexible but will include the following: (i) An analysis of project performance over the reporting period, including outputs produced and, where possible, information on the status of the outcome; (ii) The constraints experienced in the progress towards results and the reasons for these; (iii) The three (at most) major constraints to achievement of results; (iv) AWP, CAE and other expenditure reports (ERP generated); (v) Lessons learned, and; (vi) Clear recommendations for future orientation in addressing key problems in lack of progress.

(c) Project Implementation Review (PIR)

124. The PIR is an annual monitoring process mandated by the GEF. It has become an essential management and monitoring tool for project managers and offers the main vehicle for extracting lessons

from ongoing projects. Once the project has been under implementation for a year, a Project Implementation Report must be completed by the project team. The PIR can be prepared any time during the year (July-June) and ideally prior to the TPR. The PIR should then be discussed in the TPR so that the result would be a PIR that has been agreed upon by the project, the executing agency, UNDP CO and the concerned RCU staff member.

125. The individual PIRs are collected, reviewed and analysed by the RCU prior to sending them to the focal area clusters at the UNDP/GEF headquarters. The focal area clusters supported by the UNDP/GEF M&E Unit analyse the PIRs by focal area, theme and region for common issues/results and lessons. The TAs and PTAs play a key role in this consolidating analysis.

126. The focal area PIRs are then discussed in the GEF Interagency Focal Area Task Forces in or around November each year and consolidated reports by focal area are collated by the GEF Independent M&E Unit based on the Task Force findings.

127. The GEF M&E Unit provides the scope and content of the PIR. In light of the similarities of both APR and PIR, UNDP/GEF has prepared a harmonized format for reference, to avoid duplication of efforts.

(d) Quarterly Progress Reports

128. Short reports (100 words) outlining main updates in project progress will be provided quarterly to the local UNDP Country Office and the UNDP-GEF regional office by the project team. See format attached.

(f) Periodic Thematic Reports

129. As and when called for by the Implementing Partner, UNDP or UNDP-GEF, the project team will prepare Specific Thematic Reports, focusing on specific issues or areas of activity. The request for a Thematic Report will be provided to the project team in written form by UNDP and will clearly state the issue or activities that need to be reported on. These reports can be used as a form of lessons learnt exercise, specific oversight in key areas, or as troubleshooting exercises to evaluate and overcome obstacles and difficulties encountered.

(g) Project Terminal Report

130. During the last three months of the project the project team will prepare the Project Terminal Report. This comprehensive report will summarize all activities, achievements and outputs of the Project, lessons learnt, objectives met, or not achieved, structures and systems implemented, etc. and will be the definitive statement of the Project's activities during its lifetime. It will also lay out recommendations for any further steps that may need to be taken to ensure sustainability and replicability of the Project's activities.

(g) Technical Reports (project specific- optional)

131. Technical Reports are detailed documents covering specific areas of analysis or scientific specializations within the overall project. As part of the Inception Report, the project team will prepare a draft Reports List, detailing the technical reports that are expected to be prepared on key areas of activity during the course of the Project, and tentative due dates. Where necessary this Reports List will be revised and updated, and included in subsequent APRs. Technical Reports may also be prepared by external consultants and should be comprehensive, specialized analyses of clearly defined areas of research within the framework of the project and its sites. These technical reports will represent, as appropriate, the project's substantive contribution to specific areas, and will be used in efforts to disseminate relevant information and best practices at local, national and international levels.

(h) Project Publications (project specific- optional)

132. Project Publications will form a key method of crystallizing and disseminating the results and achievements of the Project. These publications may be scientific or informational texts on the activities and achievements of the Project, in the form of journal articles, multimedia publications, etc. These publications can be based on Technical Reports, depending upon the relevance, scientific worth, etc. of these Reports, or may be summaries or compilations of a series of Technical Reports and other research. The project team will determine if any of the Technical Reports merit formal publication, and will also (in consultation with UNDP, the government and other relevant stakeholder groups) plan and produce these Publications in a consistent and recognizable format. Project resources will need to be defined and allocated for these activities as appropriate and in a manner commensurate with the project's budget.

Independent Evaluation

133. The project will be subjected to at least two independent external evaluations as follows:-

(i) Mid-term Evaluation

134. An independent Mid-Term Evaluation will be undertaken at the end of the third year of implementation. The Mid-Term Evaluation will determine progress being made towards the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. The organization, terms of reference and timing of the mid-term evaluation will be decided after consultation between the parties to the project document. The Terms of Reference for this Mid-term evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF and the established standards reflected in UNDP-GEF's Programming Manual.

(ii) Final Evaluation

135. An independent Final Evaluation will take place three months prior to the terminal tripartite review meeting, and will focus on the same issues as the mid-term evaluation. The final evaluation will also look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental goals. The Final Evaluation should also provide recommendations for follow-up activities. The Terms of Reference for this evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF.

Audit Clause

136. The contribution and activities financed in this proejct shall be subject exclusively to internal and external auditing procedures provided for in the financial regulations, rules and directives of UNDP.

Learning and Knowledge Sharing

137. Results from the project will be disseminated within and beyond the project intervention zone through a number of existing information sharing networks and forums. In addition, the project will participate, as relevant and appropriate, in UNDP/GEF sponsored networks, organized for Senior Personnel working on projects that share common characteristics. UNDP/GEF shall provide such a platform and contacts for knowledge sharing. Furthermore, the project will identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks, which may be of benefit to project implementation though lessons learned.

138. The project will identify, analyze, and share lessons learned that might be beneficial in the design and implementation of similar future projects. Identify and analyzing lessons learned is an on- going

process, and the need to communicate such lessons as one of the project's central contributions is a requirement to be delivered not less frequently than once every 12 months. UNDP/GEF shall provide a format and assist the project team in categorizing, documenting and reporting on lessons learned. To this end a percentage of project resources will need to be allocated for these activities.

Table 5. Indicative Monitoring and Evaluation Work Plan and Corresponding Budget

Type of M&E activity	Responsible Parties	Budget US$ *Excluding project team Staff time*	Time frame
Inception Workshop *(There will be a series of inception workshops in the different project sites and duly tailored to the different stakeholder groups)*	▪ Project Coordinator ▪ UNDP CO ▪ UNDP GEF	$10,000	Within first two months of project start up
Inception Report	▪ Project Team ▪ UNDP CO	None	Immediately following IW
Measurement of Means of Verification for Project Purpose Indicators	▪ Project Coordinator will oversee the hiring of specific studies and institutions, and delegate responsibilities to relevant team members	To be determined in Inception Phase and Workshop. Total indicative cost $15,000	Start, mid and end of project
Measurement of Means of Verification for Project Progress and Performance (measured on an annual basis)	▪ Oversight by Project Coordinator - CO and RCU ▪ Measurements project team staff, or when so warranted specialized expertise/institutions	To be determined as part of the Annual Work Plan preparation. Indicative cost $40,000 (8,000 annually)	Annually prior to APR/PIR and to the definition of annual work plans
APR and PIR	▪ Project Team ▪ UNDP-CO ▪ UNDP-GEF (RCU/HQ)	None	Annually
TPR and TPR report	▪ Government Counterparts ▪ UNDP CO ▪ Project team ▪ UNDP-GEF Regional Coordinating Unit	None	Every year, upon receipt of APR
Steering Committee Meetings	▪ Project Coordinator ▪ UNDP CO	None	Following Project IW and subsequently at least once a year
Periodic status reports	▪ Project team	None	To be determined by Project team and UNDP CO
Technical reports	▪ Project team ▪ Hired consultants as needed	None	To be determined by Project Team and UNDP-CO
Mid-term External Evaluation	▪ Project team ▪ UNDP- CO ▪ UNDP-GEF Regional Coordinating Unit ▪ External Consultants (i.e. evaluation team)	$40,000	At the mid-point of project implementation.
Final External Evaluation	▪ Project team, ▪ UNDP-CO ▪ UNDP-GEF Regional Coordinating Unit ▪ External Consultants (i.e. evaluation team)	$40,000	At the end of project implementation
Terminal Report	▪ Project team ▪ UNDP-CO ▪ External Consultant	None	At least one month before the end of the project

Lessons learned	▪ Project team ▪ UNDP-GEF Regional Coordinating Unit ▪ Specialized partners/institutions	$5,000	Yearly
Audit	▪ UNDP-CO ▪ Project team	$5,000 (average 1,000 per year)	Yearly
Visits to field sites	▪ UNDP Country Office ▪ UNDP-GEF Regional Coordinating Unit (as appropriate) ▪ Government representatives	Paid from IA fees and operational budget	Yearly
TOTAL INDICATIVE COST ***Excluding project team staff time and UNDP staff and travel expenses***		US$ 155,000	

PART V: Legal Context

139. This Project Document shall be the instrument referred to as such in Article I of the Standard Basic Assistance Agreement between the Government of Cuba and the United Nations Development Program, signed by the parties on May 17, 1975. The host country implementing agency shall, for the purpose of the Standard Basic Assistance Agreement, refer to the government co-operating agency described in that Agreement.

140. The UNDP Resident Representative in Cuba is authorized to effect in writing the following types of revision to this Project Document, provided that he/she has verified the agreement thereto by the UNDP-GEF Unit and is assured that the other signatories to the Project Document have no objection to the proposed changes: (i) Revision of, or addition to, any of the annexes to the Project Document; (ii) Revisions which do not involve significant changes in the immediate objectives, outputs or activities of the project, but are caused by the rearrangement of the inputs already agreed to or by cost increases due to inflation; (iii) Mandatory annual revisions which re-phase the delivery of agreed project inputs or increased expert or other costs due to inflation or take into account agency expenditure flexibility, and; (iv) Inclusion of additional annexes and attachments only as set out here in this Project Document.

SECTION II: Strategic Results Framework and GEF Increment

Project Strategy	Objectively verifiable indicators				
Goal	Protect vulnerable marine, freshwater and terrestrial ecosystems, species and genetic diversity within Cuba from negative impacts of invasive alien species				
	Indicator	**Baseline (as of May 2010)**	**Target (at end of project)**	**Sources of Verification**	**Risks and Assumptions**
Project Objective: Globally significant biodiversity in vulnerable ecosystems safeguarded by building capacity at the systemic level to prevent, detect, control, and manage the spread of Invasive Alien Species (IAS) in Cuba	Increased effectiveness of IAS management framework measured through GEF Tracking tool	-Total score 10 (or 34%)	-Total score 23 (or 79%)	-GEF Tracking Tool for Safeguarding Biodiversity	-Institutional changes cause shifts in priorities -Extreme economic crises lead to reorientation of national priorities, reducing priority accorded IAS prevention and management
	Increase in area under improved IAS management	-less than 5 000 ha under IAS management	-at least 75 000 ha under IAS management	-Management Plans	
	Priority given to BD issues in the prevention, control, and management of IAS, measured by: -investments in IAS activities by MINAG, MINAL, MITRANS, CITMA y MINSAP -% of quarantine, risk analysis, and EIAs that incorporate analysis of impact of IAS on BD -% of management plans that include species recuperation and/or ecosystem restoration and rehabilitation activities	-tbd at start of project -0% of quarantine, risk analysis, and EIAs incorporate BD analysis - tbd at start of project	-2% increase in IAS specific investment -100% of quarantine, risk analysis, and EIAs incorporate BD analysis -100% of management plans for 26 species include these activities	-Budget Reports -Quarantine, risk analysis, and EIA reports -Management Programs or Plans	
	Native species addition or status change on IUCN list red list	-IUCN red list of threatened species for Cuba exists and continually updated	-No addition or status change to any native species on the red list due to effects of IAS	-IUCN Red List	- Climate change accelerates spread of IAS
Outcome 1: Operational IAS policy, legal, regulatory, and coordination frameworks that prevent, detect, and manage the spread of IAS and mitigate impact	Comprehensive national and sectoral policy and legal framework in place by establishing a national IAS strategy and establishing, updating, and/or complementing the following regulations: black list and gray list, risk analysis, EIA, protocols, normative documents and quarantine mechanisms, monitoring and surveillance, early warning and rapid response system, ballast waters and ship hulls, plant protection/health legislation, and procedures for elaboration of management plans	-key IAS regulations do not exist or are outdated -draft of National IAS strategy -indicators do not exist to	IAS regulations established, updated and complemented[19] National IAS strategy approved and 50% planned activities effectively implemented Methodologies proposed to develop indicators that	-Proposed Strategy -Documents with proposals	- Extreme economic crises lead to reorientation of national priorities, reducing priority accorded IAS prevention and management

[19] See project strategy narrative for details on actions to be taken for each legal instrument

of IAS on biodiversity are strengthened and implemented	Economic incentives and disincentives control the introduction and use of IAS in production sectors and facilitate management of IAS Institutional framework for IAS control between stakeholders and across sectors legally backed	measure compliance with environmental legislation -no economic incentives or disincentives regarding IAS exist -no advisory forum exists -no coordination group for IAS exists -no coordination mechanisms between regulatory authorities exist for the implementation and an early warning system and use of IAS information system	measure compliance with environmental legislation Three economic incentives or disincentives drafted and approved An advisory forum exists composed of experts from key sectors[20] National IAS Subgroup[21] coordinates the development and implementation of IAS National Strategy Coordination mechanisms for early warning system and information system established between 9 key regulatory authorities[22] and other key actors	-Document with proposal of methodology -Documents with proposals -Roster of advisory forum -Work Agenda -Work Agreements between key actors	-Productive sectors committed to participating in IAS prevention and management
Outcome 2: Stakeholder capacity, know-how, and communications are enhanced for effective IAS prevention, detection, and management	Number of knowledge products developed	-standardized methodologies for IAS do not exist -no IAS information system	Methodologies are standardized and implemented for IAS inventory, ecosystem vulnerability assessments, risk analysis, EIA, economic valuation and cost –benefit analysis, and management actions for 26 IAS IAS Information System	-Standardized Methodologies	

[20] Including black list and gray list, risk analysis, EIA, protocols and quarantine mechanisms, monitoring and surveillance, early warning and rapid response system, ballast waters and ship hulls, plant protection/health legislation, management plans' procedures. See project strategy narrative for details of key sectors

[21] A subgroup of the National Group on Biodiversity

[22] CSB, CICA, CNSV, DSIM, IMV, ONIP, CGB, AGR, and SEF

		exists	designed and includes information regarding species lists, quarantine mechanisms, risk analysis and EIA, early warning response, monitoring and control, management, and coordination between institutions	-IAS Information System	
		-no IAS monitoring system exists	IAS monitoring system contains baseline information and key indicators	-Monitoring system with baseline information and indicators	
	Increased stakeholder skill-set and knowledge on scientific bases, legal tools and management approaches for IAS control (Indicators for the success of the training will be developed as part of the programme and incorporated into the project M&E system)	-low skill-set and knowledge among key stakeholders	Training for and skills applied by: -50 ballast water and ship hull contamination control specialists -200 specialists in IAS science[23] -100 specialists in monitoring of IAS applying skills -30 technicians in GIS[24] trained and applying skills -800 regulatory authorities, environmental managers, and representatives of the productive sectors trained in current IAS legislation -60% of inspectors technically qualified to apply IAS regulations -at least 35% personnel trained are men and 40% of personnel trained are women 80% of participants in public	-Training reports -SIAE reports	-Productive sectors

[23] On issues of taxonomy, IAS ecology, distribution, behavior, and reproductive biology, as well as Management methods, biogeography, and evaluation of biodiversity

[24] Geographic Information System

	Increased public knowledge and participation and stakeholder support for IAS prevention, detection, and management	-low awareness among political leaders, IAS using sectors, schools and public	awareness campaigns and workshops report increased awareness of threats	Communication Campaign document -posters, paper articles, leaflets -Proposed IAS curricula	committed to participating in IAS prevention and management -Community willingness to participate in early warning system and management actions
Outcome 3: Institutional capacities are strengthened to ensure the effective implementation of prevention, detection, and management of IAS mitigate their impact on BD and ecosystem services	# of penalties enforced related to violation of IAS regulations # of illegal point of entry detections # of IAS under monitoring and surveillance as part of early warning system IAS management actions are implemented to eradicate, contain and/or control existing IAS species threatening native flora and fauna in 7 biodiversity critical wildlands and productive areas (impact indicators for each will be developed as part of the management plan and incorporated into project M&E system) Implementation of IAS monitoring system measures effect of management actions and tracks IAS impact on ecosystems, habitats, species, and genetic diversity Frequency of use of IAS Information System by key national and local actors: -regulatory authorities and management experts -academic and research institutes -productive sectors -other sectors	-tbd at start of project -lion fish has incipient early warning system -some management actions implemented -Perna viridis only in Bay of Cienfuegos IAS monitoring system is not implemented -0% -0% -0% -0%	Increased # of penalties imposed and increased # of point of entry detections Ten IAS monitored as part of early warning system Management actions implemented for 10 IAS results in reduced predation, loss of habitat, and/or inter-specific competition -containment of Perna viridis Management actions for 5 IAS monitored and evaluated and 5 indicators that track IAS impacts on ecosystems, habitats, species, and genetic diversity are measured -70% -70% -50% -30%	-SIAE reports -Customs reports -Early Warning System reports -Management control reports -Monitoring reports -Periodic monitoring reports Surveys Automatic counter	-Institutional commitment to IAS prevention and management -Productive sectors committed to participating in IAS prevention and management -Productive sectors committed to participating in IAS prevention and management

SECTION III: Total Budget and Workplan

Award ID:	00061732
Award Title:	GEF-PIMS3990-BD-FSP-Enhancing the prevention, control and management of Invasive Alien Species in vulnerable ecosystems in Cuba
Business Unit:	CUB10
Project Title:	GEF-PIMS3990-BD-FSP-Enhancing the prevention, control and management of Invasive Alien Species in vulnerable ecosystems in Cuba
Project ID:	00078464
Implementing Partner (Executing Agency)	National Center for Environmental Management (CIGEA)

GEF Outcome/ Atlas Activity	Responsible Party	Source of Funds	Budget Note	Atlas Budgetary Account Code	Atlas Budgetary Account Code	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Amount Year 5 (USD)	Total (USD)
1.Operational IAS policy, legal, regulatory, and coordination frameworks that prevent, control, and manage the spread of IAS and mitigate impact of IAS on biodiversity are strengthened and implemented	CIGEA	GEF	1	International Consultants	71200	15,000	15,000	15,000	15,000	-	60,000
			2	Travel	71600	20,000	20,000	15,000	15,000	20,000	90,000
			3	Contractual Services-Companies	72100	34,000	30,000	20,000	20,000	20,000	124,000
			4	Equipment and Furniture	72200	230,482	73,493	-	-	-	303,975
			5	Materials and Goods	72300	75,000	65,000	55,000	30,000	30,000	255,000
			6	Communication and Audiovisual Equipment	72400	45,000	23,000	-	-	-	68,000
			7	Supplies	72500	20,000	19,000	19,000	19,000	20,000	97,000
			8	Information Technology Equipmt	72800	121,775	-	-	-	-	121,775
			9	Rental & Maintenance-Premises	73100	12,000	12,000	12,000	12,000	12,000	60,000
			10	Rental & Maint of Info Tech Eq	73300	14,000	14,000	14,000	14,000	10,000	66,000
			11	Rental & Maint of Other Equip	73400	30,000	30,000	10,000	10,000	10,000	90,000
			12	Audio Visual&Print Prod Costs	74200	-	-	25,000	25,000	10,938	60,938

			13	Miscellaneous Expenses	74500	9,200	9,200	9,200	9,200	9,200	46,000
			14	Training, Worshops and Conferences	75700	129,000	64,000	32,250	24,000	8,062	257,312
	Subtotal GEF Outcome 1					**755,457**	**374,693**	**226,450**	**193,200**	**150,200**	**1,700,000**
2: Stakeholder capacity, know-how, and communications are enhanced for effective IAS prevention, detection, control, and management	CIGEA	GEF	15	International Consultants	71200	6,000	6,000	6,000	3,000	3,000	24,000
			16	Travel	71600	10,000	15,000	15,000	10,000	5,000	55,000
			17	Contractual Services-Companies	72100	25,000	25,000	15,000	15,000	15,000	95,000
			18	Equipment and Furniture	72200	200,000	66,750	66,750	-	-	333,500
			19	Materials and Goods	72300	55,000	37,000	36,000	36,000	36,000	200,000
			20	Communication and Audiovisual Equipment	72400	10,000	8,500	-	-	-	18,500
			21	Supplies	72500	15,000	15,000	15,000	15,000	15,000	75,000
			22	Information Technology Equipmt	72800	25,000	13,000	-	-	-	38,000
			23	Rental & Maintenance-Premises	73100	15,000	15,000	15,000	15,000	15,000	75,000
			24	Rental & Maint of Info Tech Eq	73300	12,000	12,000	12,000	12,000	12,000	60,000
			25	Rental & Maint of Other Equip	73400	12,000	12,000	12,000	12,000	12,000	60,000
			26	Audio Visual&Print Prod Costs	74200	-	-	35,000	30,000	16,000	81,000
			27	Miscellaneous Expenses	74500	7,000	7,000	7,000	7,000	7,000	35,000
			28	Training, Worshops and Conferences	75700	60,000	40,000	30,000	10,000	10,000	150,000
	Subtotal GEF Outcome 2					**452,000**	**272,250**	**264,750**	**165,000**	**146,000**	**1,300,000**
3. Institutional capacities are strengthened to ensure the effective implementation of prevention, detection, and	CIGEA	GEF	29	International Consultants	71200	12,000	9,000	9,000	6,000	-	36,000
			30	Travel	71600	20,000	20,000	20,000	20,000	20,000	100,000
			31	Contractual Services-Companies	72100	18,000	11,000	15,000	11,000	15,000	70,000
			32	Equipment and Furniture	72200	212,159	200,000	-	-	-	412,159

management of IAS mitigate their impact on BD and ecosystem services.			33	Materials and Goods	72300	83,000	75,000	60,000	40,000	40,000	298,000
			34	Communication and Audiovisual Equipment	72400	29,550	1,200	-	-	-	30,750
			35	Supplies	72500	40,000	40,000	40,000	40,000	40,000	200,000
			36	Information Technology Equipmt	72800	8,000	4,000	-	-	-	12,000
			37	Rental & Maintenance-Premises	73100	12,000	12,000	12,000	10,000	10,000	56,000
			38	Rental & Maint of Info Tech Eq	73300	10,000	10,000	20,000	30,000	30,000	100,000
			39	Rental & Maint of Other Equip	73400	10,000	10,000	20,000	30,000	30,000	100,000
			40	Audio Visual&Print Prod Costs	74200	-	-	30,000	30,000	16,455	76,455
			41	Miscellaneous Expenses	74500	5,000	5,000	5,000	5,000	5,000	25,000
	Subtotal GEF Outcome 3					**459,709**	**397,200**	**231,000**	**222,000**	**206,455**	**1,516,364**
4. Project Management	CIGEA	GEF	42	International Consultants	71200	-	-	18,000	-	18,000	36,000
			43	Travel	71600	8,200	5,000	7,100	5,000	7,100	32,400
			44	Contractual Services-Companies	72100	13,000	10,000	10,000	10,000	10,000	53,000
			45	Equipment and Furniture	72200	127,375	22,700	-	-	-	150,075
			46	Materials and Goods	72300	8,000	8,000	8,000	8,000	8,000	40,000
			47	Communication and Audiovisual Equipment	72400	2,000	600	-	-	-	2,600
			48	Supplies	72500	10,443	10,000	10,000	10,000	10,000	50,443
			49	Information Technology Equipmt	72800	14,100	-	-	-	-	14,100
			50	Rental & Maintenance-Premises	73100	4,000	3,400	3,400	3,400	4,000	18,200
			51	Rental & Maint of Info Tech Eq	73300	8,000	8,000	8,000	8,000	8,000	40,000
			52	Rental & Maint of Other Equip	73400	8,000	8,000	8,000	8,000	8,000	40,000
			53	Audio Visual&Print Prod Costs	74500	-	-	2,000	4,000	4,000	10,000

			54	Miscellaneous Expenses	74200	3,000	3,000	3,000	3,000	3,000	15,000
	Subtotal GEF Outcome 4					**206,118**	**78,700**	**77,500**	**59,400**	**80,100**	**501,818**
TOTALS BY SOURCE	**GEF**					**1,873,284**	**1,122,843**	**799,700**	**639,600**	**582,755**	**5,018,182**
	CO-FINANCING					**2,305,000**	**2,305,000**	**2,000,000**	**1,695,000**	**1,695,000**	**10,000,000**
TOTAL						**4,178,284**	**3,427,843**	**2,799,700**	**2,334,600**	**2,277,755**	**15,018,182**

Total Budget Summary

Donor Name	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Amount Year 5 (USD)	Total (USD)
GEF	1,873,284	1,122,843	799,700	639,600	582,755	5,018,182
Government of Cuba (CITMA)	690,000	690,000	590,000	490,000	490,000	2,950,000
Government of Cuba (National Forestry Development Fund FONADEF)	700,000	700,000	600,000	500,000	500,000	3,000,000
Government of Cuba (National Environmental Development Fund FNMA)	450,000	450,000	400,000	350,000	350,000	2,000,000
Government of Cuba (National Programs in Science and Technology Innovation)	450,000	450,000	400,000	350,000	350,000	2,000,000
UNDP Cuba	15,000	15,000	10,000	5,000	5,000	50,000
TOTAL	**4,178,284**	**3,427,843**	**2,799,700**	**2,334,600**	**2,277,755**	**15,018,182**

Summary Atlas Budget

ATLAS Budget Description	Atlas Budgetary Account Code	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Amount Year 5 (USD)	Total (USD)	%
International Consultants	71200	33,000	30,000	48,000	24,000	21,000	156,000	3%
Travel	71600	58,200	60,000	57,100	50,000	52,100	277,400	6%
Contractual Services-Companies	72100	90,000	76,000	60,000	56,000	60,000	342,000	7%

Equipment and Furniture	72200	770,016	362,943	66,750	-	-	1,199,709	24%
Materials and Goods	72300	221,000	185,000	159,000	114,000	114,000	793,000	16%
Communication and Audiovisual Equipment	72400	86,550	33,300	-	-	-	119,850	2%
Supplies	72500	85,443	84,000	84,000	84,000	85,000	422,443	8%
Information Technology Equipmt	72800	168,875	17,000	-	-	-	185,875	4%
Rental & Maintenance-Premises	73100	43,000	42,400	42,400	40,400	41,000	209,200	4%
Rental & Maint of Info Tech Eq	73300	44,000	44,000	54,000	64,000	60,000	266,000	5%
Rental & Maint of Other Equip	73400	60,000	60,000	50,000	60,000	60,000	290,000	6%
Audio Visual&Print Prod Costs	74200	-	-	92,000	89,000	47,393	228,393	5%
Miscellaneous Expenses	74500	24,200	24,200	24,200	24,200	24,200	121,000	2%
Training, Worshops and Conferences	75700	189,000	104,000	62,250	34,000	18,062	407,312	8%
TOTAL		**1,873,284**	**1,122,843**	**799,700**	**639,600**	**582,755**	**5,018,182**	**100%**

Budget Summary by GEF Outcomes

GEF Outcome	Budget	Percentage of total budget (%)
OUTCOME 1: Operational IAS policy, legal, regulatory, and coordination frameworks that prevent, control, and manage the spread of IAS and mitigate impact of IAS on biodiversity are strengthened and implemented	1,700,000	33.88
OUTCOME 2: Stakeholder capacity, know-how, and communications are enhanced for effective IAS prevention, detection, control, and management	1,300,000	25.90
OUTCOME 3: Institutional capacities are strengthened to ensure the effective implementation of prevention, detection, and management of IAS mitigate their impact on BD and ecosystem services.	1,516,364	30.22
Project Management Unit (includes MONITORING and EVALUATION)	501,818	10.00
TOTAL	**5,018,182**	**100.00**

Budget notes

Outcome		Category	Atlas Code	Notes
1.	1	International Consultants	71200	IAS Monitoring Specialist: 12 weeks to provide advice on the design of a national IAS monitoring system that will measure the effects of management actions and tracks IAS impact on ecosystems, habitats, species, and genetic diversity. In support of outputs 1.2, 1.8, 2.2 and 2.5. Environmental Economics Specialist: 8 weeks to provide advice on: (i) the design of economic incentives or disincentives (ii) methodologies for economic valuations aimed at measuring environmental and economic impact of IAS and (iii) methodologies for conducting cost benefit analysis in the context of risk analysis and EIA and the evaluation of different eradication and management options. Contributes to outputs 1.4, 1.5, 2.4 and 2.9. (Total cost: 60k USD)
	2	Travel	71600	Domestic travel of staff and consultants to field sites and stakeholders to workshops and meetings. The project area is very large and includes large numbers of stakeholders. In order to minimize costs, travel budgeted will be by bus. Travel costs for international consultant. (Total cost: 90k USD)
	3	Contractual Services-Companies	72100	Services associated with workshops, meetings, transport, web design, acquisition of reference bibliographies, acquisition of satellite imagery. (Total cost: 124k USD)
	4	Equipment and Furniture	72200	Equipment for IAS research and monitoring, establishment of coordination mechanisms and information sharing, and establishment of early warning system. (Total cost: 303.9k USD)
	5	Materials and Goods	72300	Consumables for workshops and meetings associated with integration of IAS policy, legal and regulatory framework and coordination mechanisms as well as the establishment of an IAS information system and early warning system. (Total cost: 255k USD)
	6	Communication and Audiovisual Equipment	72400	Digital and video cameras associated with information system and capacity building activities. Radios for communication and safety purposes. (Total cost: 68k USD)
	7	Supplies	72500	Office and laboratory supplies. (Total cost: 97k USD)
	8	Information Technology Equipmt	72800	Computing equipment for IAS advisory forum, IAS subgroup, establishment of information system, in particular its main nodes, and for project areas. (Total cost: 121.7k USD)
	9	Rental & Maintenance-Premises	73100	Hire of facilities for events and workshops. (Total cost: 60k USD)
	10	Rental &Maint of Info Tech Eq	73300	Maintenance of computing equipment. (Total cost: 66k USD)
	11	Rental &Maint of Other Equip	73400	Rental, maintenance, and fuel for boats and vehicles. (Total cost: 90k USD)
	12	Audio Visual&Print Prod Costs	74200	Design and printing costs and production costs of audiovisuals and other materials. (Total cost: 60.9k USD)
	13	Miscellaneous Expenses	74500	Insurance. (Total cost: 46k USD)
	14	Training, Workshops, and Confer	75700	Costs of training, workshops, and conferences associated with development of IAS strategy,

				strengthening of IAS regulations, development of legal indicators, building capacity regarding economic incentives, cost-benefit analysis, and economic valuations, establishment of inter-sectoral, multi-stakeholder advisory forum, strengthening IAS subgroup to develop and implement IAS strategy, establishment of coordination mechanisms between stakeholders, and establishment of information system and early warning system in order to prevent, detect, and manage the spread of IAS and mitigate impact of IAS on biodiversity. (Total cost: 257.3k USD)
2.	15	International Consultants	71200	Agronomist: 8 weeks to provide advice on options for the sustainable management of *Leucaena leucocephala* and other IAS in agricultural landscapes. (Total cost: 24k USD)
	16	Travel	71600	Domestic travel of staff and consultants to field sites and stakeholders to workshops and meetings. Travel costs for international consultant. (Total cost: 55k USD)
	17	Contractual Services-Companies	72100	Services associated with workshops, meetings, transport, web design, acquisition of reference bibliographies, acquisition of satellite imagery. (Total cost: 95k USD)
	18	Equipment and Furniture	72200	Furniture for training centers. Boats and vehicles (motorbikes and autos) for transport in project areas. Equipment associated with research and biological monitoring. (Total cost:333.5k USD)
	19	Materials and Goods	72300	Consumable supplies for workshops and meetings associated with development of methodologies, design of monitoring system, building scientific and legal capacity of stakeholders, and engaging local communities as key actors in early warning system. Costs of consumables for research and biological monitoring, including laboratory and materials for personal protection (helmets, gloves, boots). (Total cost: 200k USD)
	20	Communication and Audiovisual Equipment	72400	Digital and video cameras and editing equipment associated with the communication campaign. Contributes to outputs 2.1, 2.2, 2.5, 2.7, 2.8 and 2.9. (Total cost: 18.5k USD)
	21	Supplies	72500	Office and laboratory supplies. (Total cost: 75k USD)
	22	Information Technology Equipmt	72800	Computing equipment for classrooms used for trainings and workshops, for the development and implementation of the communication campaign, and for the project intervention areas. Contributes to outputs 2.4, 2.5, 2.7, 2.8 and 2.9. (Total cost: 38k USD)
	23	Rental & Maintenance-Premises	73100	Upgrading of classrooms used for trainings, workshop, and meetings. Hire of (Government owned) facilities for events and workshops. (Total cost: 75k USD)
	24	Rental &Maint of Info Tech Eq	73300	Maintenance of computing equipment. (Total cost: 60k USD)
	25	Rental &Maint of Other Equip	73400	Rental, maintenance, and fuel for boats and vehicles. (Total cost: 60k USD)
	26	Audio Visual &Print Prod Costs	74200	Costs associated with the design and printing of materials and the production of audiovisuals. Contributes to outputs 2.5, 2.7, 2.8 and 2.9. (Total cost: 81 k USD)
	27	Miscellaneous Expenses	74500	Insurance. (Total cost: 35k USD)
	28	Training, Workshops, and Confer	75700	Costs of trainings, workshops and conferences associated with activities aimed at increasing stakeholder knowledge about IAS biology, behavior, levels of contamination, contamination pathways, threats, potential management options, and legal framework and stakeholder capacities to implement IAS information system, monitoring system, and management actions for effective IAS prevention, detection, and management. (Total cost: 150k USD)

3.	29	International Consultants	71200	Biological Invasions Specialist: 12 weeks to provide advice on the design of management actions for key invasive species and on measuring the economic and ecological impacts of IAS. (Total cost: 36k USD)
	30	Travel	71600	Domestic travel of staff and consultants to field sites and stakeholders to workshops and meetings. Travel costs for international consultant. (Total cost: 100k USD)
	31	Contractual Services-Companies	72100	Services associated with workshops, meetings, and transport. (Total cost: 70k USD)
	32	Equipment and Furniture	72200	Furniture, laboratory equipment, and equipment for biological monitoring in project areas, vehicles (motorbikes) for transport to strengthen surveillance activities, and equipment for implementation of management actions. (Total cost: 412.1k USD)
	33	Materials and Goods	72300	Consumable supplies associated with field work, implementation of prevention and management actions and biological monitoring, including laboratory materials associated with quarantine and inspections and materials for personal protection (helmets, gloves, boots). (Total cost: 298k USD)
	34	Communication and Audiovisual Equipment	72400	Digital and video cameras. Radios for communication and safety purposes. Contributes to the following outputs 3.3, 3.4 and 3.5. (Total cost: 30.7k USD)
	35	Supplies	72500	Office and field supplies for meetings and biological monitoring activities. (Total cost: 200k USD)
	36	Information Technology Equipmt	72800	Computing equipment, photocopiers, and printers. (Total cost: 12k USD)
	37	Rental & Maintenance-Premises	73100	Hire of facilities for events and workshops. (Total cost: 56k USD)
	38	Rental &Maint of Info Tech Eq	73300	Maintenance of computing equipment. (Total cost:100k USD)
	39	Rental &Maint of Other Equip	73400	Rental, maintenance, and fuel for boats and vehicles. (Total cost: 100k USD)
	40	Audio Visual&Print Prod Costs	74200	Costs associated with production of images, in particular maps that will contribute to management actions, monitoring, and information system. Supports outputs 3.3 and 3.5. (Total cost:76.4k USD)
	41	Miscellaneous Expenses	74500	Insurance. (Total cost: 25k USD)
4	42	International Consultants	71200	International consultants for mid-term and final external evaluations (Total cost:36k USD)
	43	Travel	71600	Domestic travel of staff and consultants to field sites and stakeholders to workshops and meetings. Travel costs for international consultant. (Total cost:32.4k USD)
	44	Contractual Services-Companies	72100	Services associated with workshops, meetings, transport, and audits. (Total cost:53k USD)
	45	Equipment and Furniture	72200	Vehicles (car and motorbikes), furniture and equipment for project office. (Total cost:150k USD)
	46	Materials and Goods	72300	Consumable supplies for inception, monitoring, and evaluation activities. (Total cost:40k USD)
	47	Communication and Audiovisual Equipment	72400	Digital and video cameras for documentation of project activities, internet connection. (Total cost:2.6k USD)
	48	Supplies	72500	Office supplies for meetings and workshops. (Total cost:50.4k USD)

	49	Information Technology Equipmt	72800	Computing equipment, software, and printers for project management. (Total cost: 14.1k USD)
	50	Rental & Maintenance-Premises	73100	Upgrading of project office and hire of facilities for events and workshops (inception workshop, monitoring, external evaluations). (Total cost:18.2k USD)
	51	Rental &Maint of Info Tech Eq	73300	Maintenance of computing equipment. (Total cost:40k USD)
	52	Rental &Maint of Other Equip	73400	Maintenance and fuel for vehicles. (Total cost:40k USD)
	53	Audio Visual&Print Prod Costs	74200	Design and printing of project, audit, and evaluation reports. (Total cost:10k USD)
	54	Miscellaneous Expenses	74500	Insurance and storage and other minor office costs. (Total cost:15k USD)

SECTION IV: Additional Information

PART I. Terms of References for key project staff and main sub-contracts

1. EXECUTIVE PROJECT DIRECTOR (EPD) - (30% time assigned to this post, reports directly to PSC).

- Direct all project activities, with support from the Technical Coordinator and outcome Coordinators
- Budgeting and programming of project activities
- Direct project personnel
- Establish working relations between the project and Government representatives
- Produce directives for project implementation
- Reporting on Project execution and progress
- Supervision and coordination of the work of contracted external consultants
- Carry out periodic internal evaluations on technical outcomes and financial execution, with the participation of the executors.
- With authorized signature, review, subscribe and send requests for payment to UNDP via MINCEX.
- Coordinate external evaluations and inspection processes, in accordance with UNDP and CITMA requirements.

2. TECHNICAL COORDINATOR (TC) – Specialist of CIGEA (75% of time assigned to this post, reports directly to EPD).

- Advise the Project Director on issues related to the technical outcomes of the Project.
- Prepare and review Project documents and technical reports included in the Quarterly Reports and Annual Project Report/Project Implementation Review (APR/PIR), at least two weeks prior to the annual Tripartite Review (TPR) meeting.
- Responsible for the technical quality of the process and results of the project, including monitoring and evaluation. This includes the development of criteria for the participatory monitoring of project activities based on the Logical Framework Matrix and with particular attention to impact indicators.
- Planning, coordination and management of the technical execution of the project, including the preparation of annual work plans to be review by the EPD.
- Permanent interinstitutional coordination, through contacts by email and telephone, meetings and visits.
- Meet regularly with outcome and provincial coordinators to ensure that project activities are compatible at all levels and avoid duplication of efforts.

3. FINANCIAL DIRECTOR (FD) - Specialist of CIGEA (full time, reports directly to EPD).

- Ensure that all rules and procedures agreed with UNDP and known, understood and applied, in accordance with the contract document, for each project activity.
- Prepare financial information for monitoring and evaluation reports.
- Prepare direct payment requests for UNDP.
- Support the EPD in the preparation of operational and budgetary plans, together with project executors.
- Coordinate activities related to the legalization of contracts and other legal documents.

• Provide opportune financial recommendations for the optimal use of resources and the execution of budgets.
• Develop a financial system for accounting, transactions and project reporting, in accordance with the financial rules and regulations of UNDP and compatible with the established procedures of the implementing institutions, with the objective of optimizing efficiency and minimizing administrative load, ensure that rules are followed and develop institutional capacities.
• Control accounts, deposits and costs of sliding funds.
• Prepare financial information on project activities.
• Support project executors in the preparation of financial reports and budgets.
• Execute financial activities, as required, with regard to acquisitions, contracts, recruitment, events etc., once approved by the EPD
• Develop and sign accountancy reports, budgets and financial statements
• Organize administrative activities in relation to contracts: database management, invitations, selection, committees, etc.
• Prepare contracts and agreements, observing UNDP rules and providing follow up to their execution.
• Prepare cost planning.
• Prepare legal documents for provision and receipt of funds
• Assume responsibility for financial and administrative activities of the project
• Provide follow up to the disbursement of Project funds.

4. COORDINATOR OF OUTCOME 1 (CO1) – Specialist of CIGEA (50% of time assigned to this post, reports directly to TC).
• Coordinate the execution of Project activities related to Outcome 1: strengthen and implement an operational IAS policy, legal, regulatory, and coordination frameworks that prevent, detect, and manage the spread of IAS and mitigate impact of IAS on biodiversity
• Elaborate plans and reports for Outcome 1, with inputs and outputs, according to the annual work plan
• Member of the IAS Subgroup of the National Biodiversity Group

5. COORDINATOR OF OUTCOME 2 (CO2) – Specialist of CIGEA (50% of time assigned to this post, reports directly to TC).
• Coordinate the execution of activities related to Outcome 2: stakeholder capacity, know-how, and communications are enhanced for effective IAS prevention, detection, and management
• Elaborate plans and reports for Outcome 2, with inputs and outputs, according to the annual work plan
• Member of the IAS Subgroup of the National Biodiversity Group

6. COORDINATOR OF OUTCOME 3 (CO3) – Specialist of CIGEA (50% of time assigned to this post, reports directly to TC).
• Coordinate the execution of activities related to Outcome 3: institutional capacities are strengthened to ensure the effective implementation of prevention, detection, and management of IAS mitigate their impact on BD and ecosystem services
• Elaborate plans and reports for Outcome 3, with inputs and outputs, according to the annual work plan
• Member of the IAS Subgroup of the National Biodiversity Group

7. PRINCIPAL INTERNATIONAL CONSULTANT (1): INVASIVE ALIEN SPECIES MONITORING SPECIALIST – 12 weeks spread over 5 years.
The Consultant will advise project staff, mainly regarding the following issues:

(i) design of a national IAS monitoring system that will track IAS impact on biodiversity and ecosystems, IAS research, and the results of implemented management actions
(ii) use a participatory approach in its design ensuring an adequate balance between a centralized methodology and a decentralized implementation of the methodology that takes into consideration local level priorities, environmental problems, available resources, and facilitates adaptive management
(iii) identification of key indicators to be monitored at established time intervals to track changes and evaluate IAS biology, behavior, invasion levels, IAS impacts on ecosystems, habitats, species, and genetic diversity, the effects of management actions, and the behavior of IAS in relation to natural occurrences, in particular climate change (hurricanes, droughts, floods, increase salinity, climate change related occurrences) and anthropogenic occurrences (fires, construction sites, mining, etc.).

8. PRINCIPAL INTERNATIONAL CONSULTANT (2): ENVIRONMENTAL ECONOMICS SPECIALIST – 8 weeks spread over 5 years.
The Consultant(s) will advise project staff, mainly regarding the following issues:
(i) development of economic incentives or disincentives that will contribute to the control and use of IAS
(ii) development of proposed economic measures that correspond to economic and environmental damage caused by inadequate management of IAS
(iii) development and implementation of methodologies for the economic valuation of IAS impacts on biodiversity, natural and productive ecosystems, and productive sectors
(iv) development and implementation of methodologies for conducting cost benefit analysis in the context of risk analysis and EIA as well as in the evaluation of different eradication and management options

9. PRINCIPAL INTERNATIONAL CONSULTANT (3): AGRONOMIST - 8 weeks spread over 5 years.
The Consultant will advise project staff, mainly regarding the following issue:
(i) options for the sustainable management of *Leucaena leucocephala* and other invasive alien species affecting agricultural landscapes

10. PRINCIPAL INTERNATIONAL CONSULTANT (4): BIOLOGICAL INVASIONS SPECIALIST - 12 weeks spread over 5 years. The Consultant will advise project staff, mainly regarding the following issue:
(i) the design of management plans for key invasive species
(ii) the assessment of economic and ecological impacts of IAS

Part II: Stakeholder Involvement Plan

Stakeholder	Roles and functions	Interest in the project	Form of participation/impact
Organisms of the Central Administration of the State and National Entities			
Ministry of Science, Technology, and the Environment (CITMA): Center for Environmental Information, Management and Education (CIGEA)	Direction, control and promotion of environmental management aimed at the sound use of natural resources, the protection and conservation of ecosystems and the reduction of pollution. Environmental education, dissemination and the management of data and information on the environment. Implementation of the Country Pilot Partnership (CPP) on Sustainable Land Management (SLM)	The project will contribute to the implementation of Cuban policy in regards to the prevention, management and control of IAS, which CIGEA is a key actor.	National coordination of the technical and financial implementation of the project.
Ministry of Science, Technology, and the Environment (CITMA): National Center for Biosafety (CSB)	National regulatory authority in biosaftey.	The project will contribute to the implementation of coordination mechanisms between this national authority and other key regulatory actors.	Control and provision of information in relation to assessments for the introduction of IAS. Participation in elaboration of management strategies and implementation of juridical instruments regarding the elaboration and approval of IAS management plans.
Ministry of Science, Technology, and the Environment (CITMA): Environmental Inspection and Control Center (CICA)	Control, protection and inspection organ of CITMA. Ensures the enforcement of current regulations related to the environment. Oversees EIA processes. National CITES authority. Controls access to biodiversity.	CICA will collaborate with the project in ensuring the regulated use of natural resources by local actors.	Control, provision of information, training in relation to EIA and management of flora and fauna, participation in the national steering committee and that of the Project.
Ministry of Science, Technology, and the Environment(CITMA): National Center for Protected Areas (CNAP)	Lead Entity regarding the planning of Protected Areas in Cuba. Provides methodological direction, supervision and control to the National System of Protected Areas.	CNAP will collaborate with the project in ensuring the adequate management of IAS in PAs.	Control, provision of information, regarding IAS in PAs.
Ministry of Agriculture (MINAG) and its provincial levels.	Organism responsible for directing, executing and controlling State and Government policy in relation to the use, conservation and improvement of soils, the conservation, management, rational use of the forest estate and the conservation of wild fauna and flora.	The project includes a number of terrestrial areas that fall under the institutional responsibility of MINAG.	Supervision and control of project execution in accordance with institutional role.

Ministry of Agriculture (MINAG): National Plant Protection Center and its provincial and municipal levels	Plant protection with favorable environmental impact and the use of quality seeds and varieties, including Border Plant Protection, Territorial Plant Protection, and Diagnostics of pests.	The project will contribute to the strengthening of capacities that will facilitate the coordinated action with other regulatory authorities in the prevention, control and management of IAS.	Participation in the Early Warning System for IAS, and improved borer control. Will contribute information to the IA Information System.
Ministry of Agriculture (MINAG), National Forestry Directorate and offices of Forestry Services at provincial and municipal levels.	Ensuring compliance with the Forestry Law (#85) and its regulations, ensure the appropriate use of FONADEF, approve projects submitted to FONADEF for the forestry estate and wildlife and carry out certifications of resource holders in forests and protected areas.	Establishment of synergy with the project, through the financing of conservation projects in the PAs attended by the project.	Financing of conservation projects in Project areas. Contribution to the development of capacities for the sustainable use and management of forests.
Ministry of Agriculture (MINAG): Institute for Veterinary Medicine and its provincial and municipal levels	Protection of animal health with the goal of increasing the availability of innocuous food for man, as well as serving other veterinary necessities of society, including protection from exotic diseases and development of surveillance systems.	The project will contribute to the strengthening of capacities that will facilitate the coordinated action with other regulatory authorities in the prevention, control and management of IAS.	Participation in the Early Warning System for IAS, and improved borer control. Will contribute information to the IA Information System.
Ministry of the Food Industry (MINAL): National Fisheries Inspection Office (ONIP) (national and provincial body)	Inspection body of the MINAL. Protects and ensures the application of current fisheries legislation, in order to guarantee the sustainable use of fisheries resources.	The project will collaborate with MINAL in the realization of its regulatory role, which is essential for the management of IAS.	Control and vigilance of IAS, provision of information. Participation in the national steering committee and that of the Project.
Ministry of the Interior (MININT): Forest Protection Unit (CGB) (national, provincial and local body)	Control, protection and inspection organ of MININT. Ensures compliance with current regulations in relation to forestry, soils and environment issues.	The CGB and frontier troops will support the project through the provision of supervision of natural resource use and will also benefit from the planning and institutional coordination to be promoted by the project.	Control and vigilance of IAS, key actor in Early Warning System, provision of information. Participation in the national steering committee and that of the Project.
Ministry of the Interior (MININT): Border Control Troops (TGF) (national, provincial and local body)	Control, protection and inspection organ of MININT. Guarantees the protection of the coasts and national frontiers. Ensures national security.	The TGF will support the project through the provision of supervision of natural resource use and will also benefit from the planning and institutional coordination to be promoted by the project.	Supports the protection of coastal zones in the Project area. A very important actor of Early Warning System.
Ministry of Foreign Trade and Investment (MINCEX)	Coordination and advice on instrumentation and compliance with State and Government policies on economic collaboration	Responsible for ensuring that the Project is implemented in accordance with Government policies	Approval, supervision and control of the execution of project activities. Member of Project Steering Committee.
Minsitry of Transport (MITRANS): Directorate of Marine Security and Inspection (DSIM)	Direct, execute, and control the policy regarding terrestrial, maritime and river transport and civil marine navigation. Under the DSIM are the Territorial Units of Transport Security and Inspection.	Execution of State Inspection for the whole National System of Maritime-Port Transport, directed at fiscalizing the observance of the dispositions and norms.	Establish and control the observance of regulations regarding the management of ballast waters and the contamination of ship hulls.

General Customs (AGR)	Director of all customs materials, corresponding to competencies regarding international traffic of godos, passengers, post, and their means of transport, preventing, detecting and confronting fraud and contraband, as well as contributing to the national and international protection of the environment.	The project will collaborate with AGR in the formation of human resources so they are more competent en border detections of IAS and as key actors in the early warning system.	IAS border prevention and control.
Ministry of Higher Education (MES)	Direct, execute, and control the policies related to higher education. Various important research centers fall under MES who can play an important role in prevention, control, and management of IAS.	The project will provide technical assistance regarding the IAS subject matter that should be incorporated into higher education and will contribute to the replication of lessons learned about IAS management that come out of research.	Incorporation of IAS subject matter in formal education process at higher level.
Ministry of Education (MINED)	Leads and executes educational policy up to pre-university level.	Opportunity for collaboration in the development of awareness and knowledge of environmental and conservation issues, particularly relating to IAS.	Provision of human resources for the execution of training activities in localcommunities.
Regional and Provincial Entities			
Territorial Delegatoins of the Ministry of Science, Technology, and the Environment (CITMA): Environmental Units (UMA) and Office for Environmental Regulation (ORA)	Control and supervision of environmental management in the provinces. Coordinators of Provincial steering committees. Methodological control, coordination and supervision of provincial protected area systems.	Ensuring the correct implementation and control of the Provincial Pilot Site and the correct planning and management of IAS.	Coordination of activities with provincial actors. Coordination of the creation of new management strategies and their implementation.
Ciénaga de Zapata CITMA Organism	Management and control of natural resources in the Zapata Península MPA.	Opportunity to strengthen the management of IAS at PMAs and contribute to their correct planning and management.	Implementation of IAS management plan(s). Creation of capacities, execution of project activities, creation of infrastructure. Participation in monitoring programmes. Provision of human and material resources for the coordination and execution of environmental training, research and monitoring and evaluation.
Territorial Delegations of the Ministry of Agriculture (MINAG): State Forestry Service (SEF)	Promotion of the sustainable use of forest resources and the conservation of ecosystems and biodiversity.	Implementation of IAS management projects.	Participation in implementation of IAS regulation. Participation in developing economic incentives and/or disincentives regarding IAS use. Contribution to the creation of technical capacities for sustainable forest use and management.
Representatives of local government (Local Organisms of Popular Power: Councils of Municipal Administration;	Control and administer resources at local level	Ensuring that the project is implemented in accordance with the needs and priorities of local populations.	Principal channels for the expression of the needs and interests of local people in the decision-making of the project.

Popular Councils)			
Biosphere Reserve Sierra del Rosario	Management and control of IAS in PAs.	Opportunity to strengthen the management of IAS and contribute to their control in PAs.	Provision of human and material resources for the coordination and execution of environmental training, research, monitoring and education.
National Park Ciénaga de Zápata	Management and control of IAS in PAs.	Opportunity to strengthen the management of IAS and contribute to their control in PAs.	Provision of human and material resources for the coordination and execution of environmental training, research, monitoring and education.
Nacional Park Alejandro de Humboldt	Management and control of IAS in PAs.	Opportunity to strengthen the management of IAS and contribute to their control in PAs.	Provision of human and material resources for the coordination and execution of environmental training, research, monitoring and education.
Research Institutes			
Ministry of Science, Technology, and the Environment (CITMA): National Aquarium (ANC)	Research, environmental education and dissemination regarding the sea, its flora, fauna and ecology, with the objective of promoting culture and education regarding its care, conservation and sustainable use. Carries out exhibitions and technical, didactic and recreational activities.	Opportunity to conserve marine fauna and increase knowledge of marine biota and ecosystems, in particular about IAS in marine ecosystems.	Participation in monitoring Programmes and Early Warning System. Training in specific areas of marine ecology. Support to environmental education activities (dissemination and communication).
Ministry of Science, Technology, and the Environment (CITMA): Ecology and Systematics Institute (IES)	Increase of knowledge on biodiversity through integral, systematic and ecological studies, contributing to its conservation and sustainable use in natural and regenerated ecosystems, increasing contributions to scientific and socioeconomic development in Cuba and the Caribbean.	Opportunity to conserve and study terrestrial, marine and coastal biodiversity.	Provision of specialists and technicians for research, monitoring, workshops, courses and training activities.
Ministry of Science, Technology, and the Environment (CITMA): Museo Nacional de Historia Natural de Cuba (MNHNC)	Research, monitoring, teaching, higher education, environmental education, environmental consultancies, training and ecosystem and biodiversity management.	Opportunity to increase capacities and knowledge related to prevention, control and management of IAS.	Provision of human and material resources for the coordination and execution of training, research, monitoring and environmental education activities.
Ministry of Science, Technology, and the Environment (CITMA): Institute for Marine Research	Research, monitoring, teaching, higher education, environmental education, environmental consultancies, training and ecosystem and biodiversity management.	Opportunity to increase capacities and knowledge related to prevention, control and management of IAS.	Provision of human and material resources for the coordination and execution of training, research, monitoring and environmental education activities.
Ministry of the Food Industry (MINAL): Centre for Fisheries Research (CIP)	Research and monitoring necessary for ensuring the correct use of fisheries resources.	Opportunity to conserve and study marine and coastal biodiversity.	Provision of human and material resources for the coordination and execution of training, research and monitoring activities related to fisheries resources.
Ministry of Agriculture (MINAG): Institute for Forestry Research (IFF)	Research, monitoring, teaching, higher education, environmental education,	Opportunity to increase capacities and knowledge related to prevention, control	Provision of human and material resources for the coordination and execution of

	environmental consultancies, training and ecosystem and biodiversity management, specifically in forest ecosystem.	and management of IAS.	training, research, monitoring and environmental education activities.
Ministry of Agriculture (MINAG): Institute for Animal Science	Development and transfer of technologies in the field for tropical livestock production through research, extension, capacity building and dissemination.	Opportunity to increase capacities and knowledge related to management of IAS.	Provision of human and material resources for the coordination and execution of training, research and monitoring IAS.
Ministry of Science, Technology, and the Environment (CITMA): Oceanology Institute (IdO)	Establishes the scientific bases to guarantee the conservation and contribute to the sustainable use of coastal and marine resources and ecosystems of the Cuban platform and adjacent seas, through research into biological, physical, chemical and geological processes, evaluation and monitoring of biodiversity and environmental and sanitary quality, and the development of biotechnology and marine aquaculture.	Opportunity to conserve and study marine and coastal biodiversity.	Provision of specialists and technicians for research, monitoring, workshops, courses and training activities. The use of boats and technical equipment for marine research, as well as laboratories for the analysis of biological, water and sediment samples. Coordination and interchange with other institutions related to the marine-coastal zone.
Eastern Centre for Ecosystems and Biodiversity	Research, monitoring, environmental education, environmental consultancies, training and ecosystem and ecosystem and biodiversity management.	Opportunity to conserve and study terrestrial, marine and coastal biodiversity.	Provision of human and material resources for the coordination and execution of environmental training, research, monitoring and education.
Centre for Environmental Studies and Services (ECOVIDA)	Research, monitoring, environmental education, environmental consultancies, training, and ecosystem and biodiversity management.	Opportunity to strengthen the management of IAS and their economic value contribute to their correct planning and management.	Creation of capacities, execution of Project activities, creation of infrastructure. Participation in monitoring programmes. Provision of human and material resources for the coordination and execution of environmental training, economic value of biodiversity, research and monitoring and evaluation.
Cienfuegos Environmental Studies Centre. (CITMA-Cienfuegos)	Research, monitoring, environmental education, environmental consultancies, training and ecosystem management of coastal ecosystems.	Opportunity to monitoring IAS in Bay of Cienfuegos and conserve and study marine and coastal biodiversity.	Provision of human and material resources for the coordination and execution of environmental training, research, monitoring and education.
Camagüey Environmental Research Centre (CITMA-Camaguey)	Management of scientific and technological projects and services with an environmental profile. Participates in the co-management of Jardines de la Reina NP.	Opportunity to monitoring IAS and conserve and study marine and coastal biodiversity.	Provision of human and material resources for the coordination and execution of environmental training, research, monitoring and education.
Centro de Investigaciones en Bioalimentos (CIBA-Ciego de Ávila)	Environment protection and sustainable development of alternate systems of animal production.	Opportunity to increase capacities and knowledge related to management of IAS.	Provision of human and material resources for the coordination and execution of training, research and monitoring IAS.
Coastal Ecosystem Research Centre (CITMA-Ciego de Ávila)	Research, monitoring, environmental education, environmental consultancies,	Opportunity to conserve and study marine and coastal biodiversity.	Provision of human and material resources for the coordination and execution of

	training and ecosystem and management of coastal ecosystems.		environmental training, research, monitoring and education.
Provincial universities involved in the project, municipal university centres.	Oversee and execute educational policy at university level.	Opportunity to conserve and study terrestrial, marine and coastal biodiversity.	Provision of scientific tools for decision making. Provision of human and scientific resources for decision making and the execution of training activities.
Non Governmental Organizations			
National Association of Small Farmers (ANAP)	Represents small farmers.	Agricultural and livestock production on agricultural lands belonging to cooperatives or under usufruct.	Development of sustainable agricultural production and rational soil use in the project area.
ProNaturaleza	Development of programs and actions that foment values that protect the local, national and international environment.	The project will contribute to the reproduction of materials about IAS for the development of capacity building processes with citizens and local communities.	Capacity building for increased IAS knowledge amongst local communities so that they may actively participate in its prevention, control and management.
Fundación “Antonio Núñez Jiménez de la Naturaleza y el Hombre”	Research and development of programs and actions that foment values towards an environmental culture in local, national and international levels.	The project will contribute to the reproduction of materials about IAS for the development of capacity building processes with citizens and local communities.	Capacity building for increased IAS knowledge amongst local communities so that they may actively participate in its prevention, control and management.

Part III: Biological importance of the project area

AREA I. Southern Plain of Pinar del Río – Sierra del Rosario

Biosphere Reserve "Sierra del Rosario". Pilot site

The Sierra del Rosario is one of the oldest focal points of terrestrial populations or biotypes in the Cuban territory, this is why it was declared a Biosphere Reserve by UNESCO on February 15 1985 through the program MAB "Man and the Biosphere", becoming the first region in Cuba to receive this category. The Biosphere Reserve "Sierra del Rosario" is located in the eastern most part of the Cordillera de Guaniguanico in the Sierra del Rosario, with an extension of 25 000 ha (250 $km^{2)}$, belonging, according to the present political divisions, to the province of La Habana and in greater proportion to Pinar del Rio.

In this area there is an integration of different economic activities, promoters and communities, occupying and using interior and peripheral spaces of the Reserve, causing a constant interaction with it.

The area includes 5 plant formations: Evergreen Tropical Forest, Semideciduous Forest, Coniferous Forest made up of pine trees, Cuabal or xeromorphic thicket over serpentinitas, and sets of mogotes, giant carst rock formations. The flora has 889 plant organisms, grouped in 608 higher plants (trees, shrubs and herbaceous) and 281 lower ones (fungi, moss and lichens). 11% of the plants are endemic, although there are areas that reach up to 34%. These endemic plants are mostly distributed nationally, although 17 of them represent species from Pinar del Río, among which the *Pinus caribaea* (Pino Macho), a forest species with various economic interests, stands out.

The most studied fauna groups of this area are: birds, reptiles, amphibians and mammals. There have been 117 species of birds reported, in 17 orders and 30 families, of which 12 are endemic. There are 33 species of reptiles, of which 27 are endemic, with 81.8% of endemism, grouped in 2 orders, one suborder, all belonging to 10 families. Overall, there are 16 species of amphibians with 81.7% of endemism, grouped in one order and 4 families.

Among the mammals, the bats predominate with 11 species and two representatives of the genus *Capromys*, among others. 90 species of mollusks have been reported, belonging to 26 families in different locations of the two forest ecosystems.

Within this protected area there are other areas with more restrictive categories: Natural Reserve El Mulo, Natural Reserve Las Peladas and Ecological Reserve El Salón.

Invasive Species
The invasive species that are proposed to be prioritized in the project are the Charaguito, which is in a phase of dispersion and it is estimated that it will continue to expand and displace species, and the Pomarrosa, which is already stabilized, in monospecific formation, in the riparian forests. This species eliminates all types of competition, erodes the riverbeds with its roots, contaminates the waters with tannins and transforms the niche of many species that live in the formation. Finally, the African Tulip will also be targeted for management.

Managed Floristic Reserve San Ubaldo-Sabanalamar - Bailén Boca de Galafre. Pilot Site

The Managed Floristic Reserve San Ubaldo-Sabanalamar, is located in the southwestern part of the Southern Plain of Pinar del Río and takes up an area of 5212 Ha. (which administratively belongs to the municipalities of Sandino and Guane), predominately with pine tree ecosystems on white sand with a high index of local endemics, mangroves and lagoon ecosystems.

This protected area is framed in the Sabaloense District, which is characterized by its elevated fragility when faced with natural or anthropogenic impacts, the elevated number of endemic species of the district and the highest percentile of species with some category of threat in Pinar del Rio, determined by the lack of nutrients and changing seasons rainy/dry, all of which determines a very specialized flora.

The flora of the area is made up of 321 species belonging to 87 botanic families. Of the total number of species, 20 are endemic to Cuba, 20 to Western and Central Cuba; 36 are autochthonous to Western Cuba, 5 endemic to Pinar del Río and 11 local endemic species.

Even though the fauna in this area are not very relevant, there are some species in it that deserve our attention. 89 bird species have been observed, both migrant and permanent dwellers. For instance, the Cartacuba *(Todus multicolor)* and the Tocororo (*Priotelus temnurus).* The most charismatic species is the American crocodile (*Crocodylus acutus),* which has been profoundly studied.

The Sabanalamar area – San Ubaldo - Bailén Boca de Galafre is very affected by the **Marabú** and presents the early stages of a **Claria** invasion, therefore these will be the species to address in the project.

South Area of Pinar del Río Municipality. Replica Site

In the Southern part of the municipality Pinar del Río there are low and muddy areas with livestock farming, where the **water buffalo** has been introduced. The lack of control has allowed this species to move northwards and to the neighboring municipalities, affecting the various crops of the peasants and of companies, destroying the fences and becoming a threat for the livestock producers and giving rise to the illegal commerce of its meat. In these municipalities **Marabú** is also present, forming continuous populations from the coast, behind the mangrove and residues of the coastal swamp close to the central road, depending on the land uses and the effectiveness of the tenants. The **Claria** is present in all of the water systems, even in brackish lagoons and has impacted the fauna of these water systems, for example, frog populations, which have been driven to the limits of extinction. These are the species that will be targetted in this area, applying the results and experiences of the pilot areas.

<u>AREA II. Southern Plain of Habana – Matanzas.</u> Pilot Site

This project site constitutes agricultural ecosystems, principally dedicated to livestock, where there are many years of experience managing the **Leucaena leucocephala.** The goal in this area is the ecological monitoring of these ecosystems, the design of strategies to manage *L. leucocephal* in order to use it for a more effective production of milk and meat and for recuperating degraded pastures, forest restoration from degraded pastures, the creation of biological corridors and control of other invasive species.

Work will be done in two communities, in which the following ecosystems will be selected:

1. Silvopastoral system *Leucaena-Panicum maximum* Jacq. for milk production.

2. Silvopastoral system *L. leucocephala*-star pasture y *Pennisetum purpureum* Schumacher vc. Cuba CT-115 for milk production, with the variant of protein banks.

3. Silvopastoral system Leucaena- star pasture for fattening.

4. Silvopastoral system *Leucaena-Brachiaria* Sp. for fattening.

5. Silvopastoral system *L. leucocephala*- star pasture and other trees for growing females.

6. Forestry system in which a free development of the undergrowth is allowed, and with that the formation of a forest whose superior stratum is dominated by *L. leucocephala*.

AREA III. Ciénaga de Zapata. Pilot Sites and Replica Sites

The Ciénaga de Zapata is one of the most noteworthy geographic units of Cuban territory because of its extension, integrity and development of its ecosystems. Because it holds a great potential of highly valued natural resources it has been given the title of Biosphere Reserve and Ramsar Site as an important international wetland. Moreover, a large part of its territory has been declared a National Park. It is the biggest wetland of Cuba and of the Caribbean islands. Total area: 481,921 ha of these 281,861 are land and 137,060 are marine.

This is one of the most significant places in Cuba because of the quantity and diversity of ecosystems that it contains, as well as the presence of many local endemic species important for conserving the genepool of the Cuban biota and of the Caribbean in general.

The flora is represented by 1000 species of which 15 are considered rare or endangered species, 130 are endemic to Cuba and five are local endemic species.

The most valuable endemic species within the fauna are amphibians (86%) and of the 58 species identified in Cuba one fourth of them live in the Ciénaga de Zapata. The reptiles have an endemism of 36% and of the 156 species reported for Cuba 26% live in the region. This group includes the Cuban crocodile (*Crocodylus rhombifer*) an endemic species of Cuba, considered to be the most endangered species of crocodiles due to its restricted habitat. There are also many freshwater species: the manjuari or Cuban gar (*Atractosteus tristoechus)* which is of special biological interest especially from an evolutionary viewpoint, as it is considered a living fossil. It represents a rare group of vertebrates that could be one of the most ancient freshwater fish of Cuba.

The Ciénaga of Zapata is not only one of the richest places in bird species in Cuba (258 of 368 reported for the archipelago), but it is also the area in the Caribbean with the highest number of endemic bird species. Of the 30 species of endemic birds in Cuba 23 are found in the Zapata region. Two of these are local endemics: the Gallinuela of Santo Tomás *(Cyanolimnas cerverai)* and the Ferminia (F*erminia cerverai)*.

Regarding the coral reefs, 36 species of scleractinian corals have been registered in the area, in comparison with the 60 species of corals described for Cuba.

Invasive Alien Species

The invasive species that the project proposes to deal with are: the Melaleuca, the Casuarina, the Marabú and the Claria, of which work has already been done in research, monitoring and control funded by the National Fund for Forestry Development (FONADEF). It is also proposed to deal with the Myriophylum, a native species with invasive behavior that is found silting up the natural freshwater lakes north of the Ciénaga of Zapata.

AREA IV. Coastal area south of Cienfuegos – Trinidad – Topes de Collantes

Bahía of Cienfuegos. Pilot Site

The Bay of Cienfuegos, represents the most important natural resource of the province due to fishing activities, marine transport, the tourist industry and the protected area in which it is located. The bay is situated in central southern Cuba; it is a semi-closed bay with an area of approximately 90 Km^2. It is divided in two well defined lobes: the north lobe is exposed to severe anthropogenic impacts from the city of Cienfuegos, from the industrial pole and from the Damuji and Salado rivers. The south lobe has less of an impact, due to the waters transported by the Arimao and Caunao rivers. Part of the south lobe is the refuge for the fauna of the Laguna Guanaroca, niche of conservation of different species, including migrant birds.

Since 2005, a new problem has come up in the bay of Cienfuegos, the introduction of the IAS Green Mussel, which was apparently brought in through the ballast waters or by the ship hulls that enter the Bay.

This invasive species represents a potential danger for the biodiversity of the area and has caused a considerable amount of economic losses in the energy sector. Its wide range of adaptation to temperature and salinity, its great capacity to reproduce combined with its rapid growth and absence of predators have been key aspects for its successful colonization of the substratum, therefore limiting the space for autochthonous species. Even though this species has not been reported outside of the Bay of Cienfuegos, we must take into consideration that the waters of the Cuban shelf have the ideal conditions for the growth of this species, and if we add to this the marine traffic that exists in the area, it gives us a clear idea that all of the Cuban coast is exposed to the threat of it spreading.

Area of siliceous sand, Casilda, Trinidad. Pilot Site

In the province of Sancti Spíritus, municipality of Trinidad, near the village of Casilda, there is an area of siliceous sands, supported by calcareous rock, where there are terrestrial plant communities with a savannah-like aspect, typical of this kind of substratum, as well as aquatic communities in its lagoons. This area borders the bay of Casilda and is extended to the mouth of the Manati river, in the municipality of Trinidad, province of Sancti Spíritus, occupying an area of 4 438.93 ha.

This area has been of great interest to botanists for generations because of the high endemism of the flora and because of the particular physiognomic and ecological traits it presents. The flora in this locality is composed of 234 species, of which 41 are endemic, including five local endemics.

Currently in the town the silica sand mine is being exploited, while some sites have been used for growing fruit trees and others in the grazing of cattle, thus facilitating the spread of invasive species that have become one of the most serious problems for the maintenance and preservation of this unique ecosystem. These are: *Dichrostachys cinerea* (Marabú), *Mimosa pellita* (Weyler), *Acacia farnesiana* (Aroma blanca), *Typha dominguensis* (Macío).

Topes de Collantes. Pilot Site

The Protected Area Topes de Collantes, covers an area of 20 000 ha (about 200 km^2), covering areas of the provinces of Villa Clara, Cienfuegos and Sancti Spiritus, mostly in the central part within the massif mountains of Guamuhaya.

The importance of the flora in this area is highlighted by the abundance of local endemic species. Analysis of the centers of local endemic species of this district show that:

In Pico Potrerillo, 25 endemic species have been reported of the Guamuhaya sector, including unique species of the town, like *Vernonia potrerilloana, Rondeletia potrerilloana, Psychotria martii y Koanophyllon atroglandulosum.*

Mogote Mi Retiro, with a flora of great wealth and diversity, also has species of restricted distribution to this town and Pico Potrerillo, like *Coccothrinax trinitensis, Karwinskia potrerilloana* y *Daphnopsis alainii* (a new scientific discovery was reported there: an endemism strictly from the town, belonging to the Ouratea Aublet genus).

Codina also has a high endemism, finding mountainous elements like *Ocotea acunaii, Magnolia cubensis sp. acunae, Junglaus insularis ssp. jamaicensis, Sapium daphnoides, Xilopia acunae, Cyathea insignes, Nephelea woodwardioides var. cubensis* y *Calyptronoma plumeriana*.

Special Case Study: Arboretum

In 1939, a botanical garden was planted which is located in the heart of the protected area. Home to 300 species including wood, fruit and ornamental; 60% of these introduced in Topes de Collantes and 56% introduced in Cuba.

The lack of care and control of the species that live there has led to the spread of seeds and bits of genetic material by wind, wildlife and runoff, as the garden is planted in its entirety in a mountainous area.

The Arboretum is a germplasm of incalculable value, of which some of the seeds necessary for the reforestation of areas of the project where IAS will be eliminated can be sourced. It is also important for the preparation of the staff involved in the control of invasive species and at the same time it is the central area of intervention. It is proposed to recover the original inventory of the Arboretum and to create a nursery with a capacity for 10 000 plants.

The invasive species proposed to be dealt with by the project are: the Tulipán africano, the Marabú, the Rauwolfia, the Guapuruvú, the Pino macho, the Pomarrosa, the Santanilla.

Coastal area of the Ancón Peninsula. Pilot Site

The geographic area where the UEB Silvícola Trinidad is found, in the southern part of the province, is not free from global environmental problems, the ones with the greatest impact are: climate change, soil degradation, and the loss of biological diversity, the latter is accentuated because of the high level of infestation in forest areas and savannahs with invasive species: Marabú (*Dichrostachys cinerea*) and Ipil ipil (*Leucaena leucocephala)*. The Marabú affects around 60% of the coastal ecosystem of the Ancón peninsula, with an area of 200.0ha. The Ipil ipil is found towards the interior of the forest, this infestation is classified as average.

AREA V. Central Plain Ciego de Ávila – Camagüey – Las Tunas.

In this area the project is primarily dedicated to productive ecosystems, agriculture and forestry.

Ciego de Ávila Province

Agroproductive ecosystems of the Livestock Enterprise Ruta Invasora. Pilot Site

The proliferation of buffalo in the Ciego de Avila is evident, but not its milk production due to erroneous application of technologies, as well as the management of animals and pastures. Thus, the food potential of the ecosystem where these animals are exploited is insufficient and deteriorated products are found from the extensive exploitation that was initially implanted in the province.

The Algarrobo de la India, the Mongoose and the Black Sigatoka are also proposed for this area.

Camaguey Province.

The work areas will be located in 3 municipalities:

Guáimaro includes 2 Basic Units of Cooperative Production (UBPC) of the Enterprise Rectángulo, the UBPC "Constitución de Guáimaro", meat producer and the UBPC "La Angelina", milk producer, in which invasive species are reported, such as Aroma (*Acacia farnesiana*), Weyler (*Mimosa pigra*), Marabú (*Dichrostachys cinerea*), Malva, Caguazo (*Paspalum virgatum*) and la Piña de ratón (*Bromelia pinguin*). Pilot Site

In Camagüey, the Finca Forestal "Circunvalante" and a farm of suburban farming that is located near the city of Camagüey which is a pilot experience for the town's food supply. This area is infested with Aroma, Ipil-Ipil, Marabú, ciperáceas and gramíneas, as well as mongoose, which after the disappearance of sugar refinery activities, have migrated to the city and affect agricultural production. Moreover support measures are proposed by the Camaguey Experimental Station and the Soils Experimental Station (analysis of the soil, transplant production). Pilot Site.

In the Sierra de Cubitas, in the areas of Lesca, a buffer zone of one of the developing protected areas in the province, the Marabú (*Dichrostachys cinerea*) and feral species (cats, dogs and pigs) are targeted, which are more and more invasive and affect crops and homes. Here actions for restoring the ecosystem are proposed and farm production. Pilot Site

Las Tunas Province

The province of Las Tunas is located in Eastern Cuba with soils that are predominantly sandy, eroded and with low fertility. The rainfall fluctuates between 1000-1038mm annually, with 12-15% during the less rainy months (November-April). It has around 97 000 has of soil within the livestock invaded by the Marabú (*Dychrostachys cinerea*), which causes a lot of damage to this aspect of agriculture, due to the reduction in fodder, increasing the stocking and decreasing the different productive parameters (milk and meat production).

The central area of Las Tunas between Majibacoa, Las Parras and the old Livestock Enterprise Gustavo Fraga, there are more than 20155 hectares affected, to a higher or lesser extent, by the Malva de caballo. Faced with the serious consequences that this species causes to the livestock, many farmers supported by the Cooperative of Credit and Services (CCS), have ceased to raise livestock. Pilot Sites and Replica Sites

AREA VI. Delta del Cauto –Monte Cabaniguán Sector. Replica Site

The Delta del Cauto is the largest, most complex and best conserved delta system of Cuba and of the West Indies, moreover, it is the second largest wetland, Ciénaga de Zapata being the largest one. Total area: 66,370 ha. Of them 53,830 are land and 12,540 are marine.

It is made up of a complex of estaurines, lagoons, marshes and swamps which is part of the biggest river system of Cuba (Río Cauto) and it is considered the most important element for the balance of substances and energy in the Guacanayabo golf, the richest and most productive area for fisheries activities in the country.

The mangroves are among the most important plant formations there, which have a high level of conservation, with stands that exceed 30 m in height, considered by some specialists to be the most vigorous and best conserved in the country. The swamp grassland areas are also very well represented in diversity as well as in extension. It is one of the most important water bird reserves of Cuba, among which the high number of Pink Flamingos is notable, a bird from the West Indies of singular importance, with a population of more than 3500 that uses this area for its reproduction. It is also noteworthy that 45% of the endemic birds of Cuba are represented in this area, among which the ones that can be observed are the Cuban Parakeet (*Aratinga euops*), the Cuban Trogon (Priotelus temnurus) and the Snail Kite (*Rostrhamus sociabilis*), a threatened endemic subspecies that is relatively abundant in the area. In addition to a bird from the West Indies of great importance: the Flamingo (*Phoenicopterus ruber*), whose current population is close to 40 000.

There are 22 species of reptiles, among which the local endemic *Anolis birama* is found, restricted to the margins of the interior river bed of the Cuato river. Other important reptiles for conservation are the Iguana (*Cyclura nubila nubila*), the jicotea (*Trachemis decussata*), the Majá de Santa María (*Epícrates angulifer*) and the american crocodile (*Cocrodylus acutus*), of which more than 10 nesting places have been found and one of the highest populations in the Caribbean Basin. Among the mammals, the most interesting species is the manatí, an aquatic animal of significant importance because it is threatened, due to the reduction of its habitat because of contamination of its natural environment, poaching and involuntary mechanical harm from navigating; and this area has favorable conditions for its conservation.

In the southern areas there is a strip of savannah with more or less continuous palm trees, dominated by various species of the genus *Copernicia*, the majority of them threatened with extinction, and in some cases with populations of relevance for the preservation of them because of the number of individuals and the level of conservation they present, as are the cases *C. gigas, C. vespertilionum, C. oxicalyx* y *C. sueroana.*

In the area two main economic activities are carried out, the cultivation of rice and shrimp farms. The cultivation of rice is mostly carried out in the north part of the area and the shrimp farms in the southeastern part of the area.

Invasive Alien Species
The invasive plant species that are proposed to be dealt with by the project are: Marabú, Piña de ratón, Jacinto de agua (introduced species with invasive characteristics that are found highly disseminated in the Laguna de Leonero). The animal species are: Lion fish, Claria, Wild dog, Wild cat and Grey or Black rat.

AREA VII. National Park "Alejandro de Humboldt" –Baconao Biosphere Reserve

National Park "Alejandro de Humboldt" Pilot Site and Replica Site

The National Park "Alejandro de Humboldt" is distributed in two of the most eastern provinces of the country: Holguín (Sagua de Tánamo and Moa municipalities) and Guantánamo (Yateras, Baracoa and Guantánamo municipalities). It has an area of 70 680 ha, of which 2 250 ha are marine and 68,430 ha are land.

This park constitutes the most important protected area (Category II of the IUCN) of Cuba regarding its biodiversity, and it is noteworthy not only because it has the richest endemism of the country but also because it is the biggest conserved mountainous ecosystem remaining in Cuba. In 2001, the park was declared a World Heritage Site by UNESCO and moreover it is the center of the Biosphere Reserve of Cuchillas del Toa.

From a geomorphologic point of view a system of plateaus and long ridges (blades) have been developed and the highest and oldest planes of the West Indies region, with large weathered rock formations and a presence of karst and pseudokarst phenomenons over peridotites that constitute unique elements nationally and that are uncommon globally. The wide range of these phenomena is notable in the Mesetas del Toldo and Alto de Iberia, the latter being well-known for its flooded sinkholes (lagoons). Within the National Park the karst system of Gran Caverna de los Farallones de Moa is found, one of the five natural Monuments that exist in the country, and one of the biggest cave systems in eastern Cuba. In this protected area the springs for the biggest rivers of this region are found (Toa, Jaguaní, Moa, Jiguaní, Nibujón) composed of 13 hydrographic basins.

This territory has the most floristic diversity of the Cuban Archipelago and the Caribbean Islands, and the highest level of endemism in Cuba, constituting a primary center of evolution of the flora and serpentinicola vegetation. Approximately 870 infrageneric taxons of phanerogams with 579 endemic species have been collected, which represents a 66.6% of endemism for this group of plants in the National Park and 30.2% in all of the mountain massifs Nipe – Sagua - Baracoa. Of this region 4 endemic genus and around 200 local endemic species are known. There are many botanical gems in this area, the most notable ones are of the *Pinguicula* genus species (carnivorous plants); groups of the most primitive plant kingdom as is the case of *Podocarpus* and *Dracaena*, with the endemic species *Dracaena cubensis*, which is the only one of its genus on the American continent; the orchid *Dillomilis bissei* that is only found here, its population is very reduced since it is threatened. Of the 28 plant formations defined for Cuba, 16 are found here.

The richness of species and abundance of migratory land birds in the Park is high. It is estimated that approximately 150 species live here. Important endangered species and endemic birds have made their home here: Pato Agostero (*Nomonyx dominicus*), Gavilán Colilargo (*Accipiter gundlachi*), Gavilancito (*A. striatus*), Camao (*Geotrygon caniceps*), Cotorra (*Amazona leucocephala*), Catey (*Aratinga euops*), Pitirre Real (*Tyrannus cubensis*), el Carpintero Real (*Campephilus principalis*), relict subspecies, highly endangered local endemic (possibly extinct), and the Golondrina de Bahamas (*Tachycineta cyaneoviridis*), endemic species whose population has decreased so much that there may only be a few couples left. This is a critical area for migration ecology of neotropcial migratory birds that spend the winter in Cuba, and for the transitory ones of the region.

Twenty species of amphibians and forty-two species of reptiles have been registered. The amphibians registered represent 33.9% of the total number of species in Cuba and 64.5% of the total in Sagua – Baracoa, subregion in which the Park is located. The reptiles make up 30.7% of the total of Cuba and 68.8% of the total number of species in Sagua – Baracoa, which indicates the importance of this protected area for the herpetological fauna of Cuba.

Sixteen species of mammals have been registered in the Park, all with living populations; of them 11 are

native to this territory. For example the Almiquí (*Solenodon cubanus*), endemic and endangered insectivore; the Manatí (*Trichechus manatus manatus*); 2 species of hutias (*Mysateles melanurus* y *Capromys pilorides*) and 7 species of bats, 2 of them are endemic.

Invasive Alien Species

The invasive plant species that are proposed to be dealt with by the project are: the Casuarina, the Ipil ipil, Marabú, the Weyler, the Tulipán africano, the Pomarrosa. There are other proposals that should be further studied (Bejuco Poa, Bejuco Sernat, Tremas, Albaricoque, Tibisí y Eucalipto).

The animal species are: the Wild dog, the Black rat, the Grey rat, the Mongoose, the Catfish or Claria, the Wild cat, the Wild boar and the Shiny Cowbird.

Protected Area of Managed Resources Bocanao Bioshpere Reserve: Ecological Reserve Hatibonico and Ecological Reserve Siboney-Jutici

There is no inventory of invasive species for the Baconao Reserve, only isolated experiences in their management. Nevertheless, this aspect has been treated for some areas like: the Ecological Reserve Siboney Juticí and the Ecological Reserve Hatibonico, in which actions have been carried out by the administrators of these protected areas for the control and mitigation of some of the current populations of invasive species.

The Protected Area of Managed Resources Baconao Biosphere Reserve, is located to the east of the city Santiago de Cuba. It covers an area of 68 690 ha in the province of Santiago de Cuba and 13 640 ha of the province of Guantanamo. It is situated in the eastern part of the Sierra Maestra occupying areas of the Sierra de la Gran Piedra, the Alturas de Santa María del Loreto and part of the Terrazas Costeras del Sur de la Sierra Maestra, specifically in the Mar Verde – Baconao sector, as well as Monitongos de Hatibonico in Guantanamo.

In the Gran Piedra mountain range, crowned at 1 226 m by a block of volcanic breach that gives the area a valued landscape, the headwaters of the basins and sub-basins of various rivers are located there, among which the Baconao river in the northern part and the Daiquiri and Sigua rivers in the southern part stand out.

The flora of the Protected Area of Managed Resources includes approximately 1, 900 species of plants with flowers (phanerogams), 496 ferns and 277 Briofitas. More than half of the phanerogram flora reported for this reserve have medicinal, timber-yielding, folkloric, edible properties among others.

Regarding the pteridoflora for Gran Piedra 336 species have been reported, of them there are 16 infrageneric taxons of tree species where 3 hybrids are included of the 4 registered for Cuba; therefore the highest population of tree ferns of the country are found here. Approximately 11 endemic species are found here, all from Eastern Cuba including the tree fern *Cyathea strigillosa*. Recently an exclusive fern was reported here, still without a description, in the town of Alto del Ermitaño, the Thelypteris sp. As well as a rare hybrid Cyathea x wilsonii.

There are 3 endemic mosses reported that represent 19.7% of the total of Sierra Maestra and 11.5% of Cuba: *Dicranella hioramii var. hioramii, Fissidens duryae* e *Hymenodon aeruginosus var. Clementii* (are endemic species of multiple eastern districts). According to the Red List of Threatened Species of the IUCN (1994), of the 19 strictly moss species: 5 are categorized as Vulnerable, 4 Low Risk, 4 have Deficient Information, 1 In Critical Danger (*Braunia squarrulosa*) and 1 In Danger (*Thuidiopsis furfurosa*).

The hepaticological flora is very important not only because of its rich taxa, but also because of the presence of *Dactylolejeunea acanthifolia* Schuster, categorized as In Danger for the World Red List of Bryophytas.

In the Protected Area of Managed Resources Baconao Biosphere Reserve a total of 35 mollusk species have been reported. 15 species of amphibians have been reported. This total represents 37.5% of the species of eastern Cuba and 26.8% of Cuban amphibians. Of the 15 present species, 14 are endemic species. 38 species of reptiles live in the Protected Area of Managed Resources, of them two species have restricted distribution: *Sphaerodactylus ramsdeni*, y *Sphaerodactylus siboney*.
In this area there are other more strict areas that are: Gran Piedra National park, Siboney – Juticí Ecological Reserve, Pico Mogote Ecological Reserve in Santiago de Cuba and Hatibonico Ecological Reserve in Guantanamo.

The **Ecological Reserve Hatibonico** is located in the southeastern part of Guantánamo province, municipality Caimanera, which extends from Hatibonico to the southern coast of the municipality Maisí. It has a total extension of 6274 ha (62.74 Km^2), of which 884 ha belongs to the marine part and the remaining 5390 ha are land.

Because of the territory's relevant natural value and biodiversity, on November 25th, 1996 it was declared a Wildlife Refuge, protected by the Resolution 454/96, which was repealed in 2001 by the agreement 4262/01 of the Executive Board of the Council of Ministers of Cuba. The area was re-categorized and was approved under the category Ecological Reserve Hatibonico (Category II IUCN). Up until then it was managed by the National Protection Company of the Flora and Fauna of the Ministry of Agriculture, later transferring its management and tenure to the Ministry of Science, Technology and Environment, specifically to the Unit of Environmental Services Alejandro de Humboldt.

It is primarily characterized by the presence of relict elevations or hills of peculiar shapes that together with the flora and fauna typical of xerophyte environments, constitutes a singular element of Cuba's nature, of great landscape value.

Spiny shrub vegetation predominates and up to 11 different species of cacti are detected among which the *Melocactus evae* stands out, local endemic plant with scientific value. The floristic diversity of the spermatophyte is represented by 415 infrageneric taxons and the families with the most number of species registered are *Fabaceae, Euphorbiaceae, Rubiaceae, Boraginaceae, Asteraceae, Cactaceae, Sapindaceae, Rhamnaceae* and *Apocynaceae*, and the genuses less represented are: *Croton*, *Tabebuia, Thouinia, Belairia,* y *Guettarda.* As important species for conservation we highlight: fustete (*Chlorophora tinctoria*), dagame (*Calycophyllum candidissimum*), ébano carbonero (*Diospyros crassinervis*), abrojo (*Pereskia ziniaeflora*), *Mamillaria prolifera, Melocactus harlowii*. Within the plant formations semi-desert thickets and semi-deciduous forests predominate.

The semi-arid characteristics also condition the existence of a specialized fauna with an elevated ecological adaptability. Among the vertebrates we find endemic species of amphibians and reptiles like *Eleutherodactylus etheridgei, Cyclura nubila, Anolis centralis litoralis* y *Epicrates angulifer*. The sea turtles are present in the area when during spawning time they come to the beach to make their nests. The turtles that are classified as endangered species are the green turtle *Chelonia mydas*), carey (*Eretmochelys imbrincata*) and caguama (*Caretta caretta*). There are many endemic birds reported, the following ones are the most important: *Polioptila lembeyei* (sinsontillo), *Todus multicolor* (cartacuba), *Tiaris canora* (tomeguín del pinar), *Glaucidium siju* (sijú platanero) y *Gymnoglaux laurenci* (sijú cotunto), among others. Within the mammals there are the *Capromys pilorides* (hutia conga) and *Mysateles prehensilis* (hutia carabalí).

Among the invertebrate fauna the scorpions are the most important with three endemic species of the eastern region (*Cazierus gundlachii, Centruroides robertoi y Centruroides arctimanus*) and two local endemics (*Rhopalurus garridoi* y *Microtityus guantanamo*). This is a central area of biodiversity within the Baconao Biosphere Reserve.

The main socioeconomic activities of the area in the past were forestry activities, especially the production of charcoal and timber extraction. Presently, the work of conserving and protecting the area carried out by CITMA with the administrative unit of the Reserve predominates, as well as education, public health and other services.

Invasive Alien Species
All of these activities led to the decrease in population of native plant species, favoring the development and spread of invasive species that are resistant and fast growing like: the Marabú, the Aroma, the Ipil ipil, proposed by the project and others like the Guatapaná and the Uvita that should be further evaluated.

The invasive animal species found are: the Wild dog, the Black rat, the Grey rat, and the Shiny cowbird.

Ecological Reserve Siboney – Juticí. Pilot Site

The Ecological Reserve Siboney-Juticí is located to the east of the city Santiago de Cuba, between the 19°56'26'' and 19°58'13'' N and between the 75°49'32'' and 75°42'24'' W, in the province and municipality of Santiago de Cuba. The area is narrow and long: its axis east-west is 12.4 km and in the widest area north-south is 3 km, it includes the central part of the coast terraces to the South of Sierra Maestra, extending 16 km between Aguadores and Siboney beaches. The total length of the coastal line is 10.4 km. The total area: 1.854 ha. Of them 905 are land and 949 are marine.

This is a coastal area of karst. From a geographic point of view, the marine terraces are significant. There are many gullies, sinkholes, small canyons, depressions with red ground and drain lines that cross the terraces. The vegetation is framed in a bushy forest, xeromorphic, sclerophyllous, microphyll without root mats and generally deciduous with two stratums. There are many cacti and epiphytes.

For the Ecological Reserve Siboney-Juticí 667 plant species, subspecies and varieties are reported, belonging to 78 botanical families. This number is quite significant, since the area has 9.9% of the Cuban vascular flora and it is estimated that around 750 species exist.

In the Reserve, there are 159 endemic species of Cuba, which represents 23.6% of the total number of vascular plants reported and 5% of the Cuban ones. This endemism can be considered high if we keep in mind that the area the reserve occupies is insignificant with respect to the extension of the coastal District Media Luna – Cabo Cruz – Baconao.

According to the Red List of Cuban Vascular Flora (Berazaín et *al* 2005), in the Ecologlical Reserve Siboney-Juticí, there are a total of 19 species reported with some level of threat. Two of them are categorized as In Critical Danger (*Synapsis ilicifolia* y *Doerfeldia cubensis*), 12 are categorized as In Danger *Tabebuia polymorpha*, *Melocactus harlowii*, *Dendrocereus nudiflorus*, *Lasiocroton gracilis*, *Eugenia amblyophylla*, *Eugenia iteophylla*, *Jacquinia verticillaris*, *Rondeletia apiculata*, *Rondeletia rugelli*, *Byttneria microphylla*, *Pouteria aristata* and *Albizia cubana*), four are categorized as Vulnerable (*Drejerella maestrensis*, *Leptocereus maxonii*, *Consolea macracantha* y *Sloanea amigdalina*) and an almost threatened species (*Isidorea elliptica*).

53% of the local flora has ethnobotanic value reported in literature. The number of plants with various uses is notable, which shows the usefulness of the Reserve's flora.

There are five species of monilophytes (ferns) belonging to four botanical families, one of them endemic and one introduced.

Among the fauna there are 90 species of spiders registered, grouped in 29 families and 66 genuses. Of the 247 listed endemic species of Cuba 20 are found here, which represents 8.1% of the endemic species registered for the archipelago and 22% of the total endemic species for the Sierra Maestra. From other Orders (Scorpiones, Amblypygi, Schizomida, Solpugida, Ricinulei, Uropygi) 17 species are reported belonging to six orders, eight families and fourteen genuses.

There are 21 land species of mussels reported, which belong to 10 families and 18 genuses. 90.9% are endemic and 9.1% are introduced.

There is a total of 92 bird species reported. There are 22 endemic species to Cuba, of them 10 are present in the Reserve. It is worth noting the abundant number of Sinsontillo (*Polioptila lembeyei*), Pechero (*Teretistris fornsi*) and Juan Chiví (*Vireo gundlachii*), which would make research on their reproductive activities in the Reserve very useful for a conservation strategy for endemic birds of Cuba. Moreover, the geographic location of the Reserve could make this area extremely important for the migrant birds of North America that pass through the Caribbean in the spring and in the fall.

Another species reported is the Zunzuncito (*Mellisuga helenae*). Apparently, its presence in the Reserve fluctuates with time, it is especially present during the flowering season, particularly of *Agave underwoodii*.

The Reserve protects 55% of the Cuban Chiroptera species, an aspect that gives the area great importance for the conservation of bats in Cuba. Between the Cueva de los Majáes (with 11 species) and the Cueva de la Cantera (with 6) add up to 87% of the bat species registered in the Reserve. Of the total 3 are endemic: *Antrozous koopmani*, *Stenoderma falcatum*, and *Phyllonycteris poeyi*. The latter forms large colonies in the Cueva de los Majáes. *P. poeyi* is the one responsible for warming the place where it lives, due to its gregarious instinct and its high body temperature.

Invasive Alien Species

In the Ecological Reserve Siboney Juticí, the largest area invaded by *Leucaena leucocephala* is located in the Siboney sector and measures 11.23 hectáreas, which represents 0.57% of the land area of the reserve. This area also covers parts of different areas like: Conservation area Juticí, Public use area of the Siboney sector, Buffer zone and Administrative area.

There are various invasive species present in the fauna; lionfish in the marine area and in the land area rats, mongoose, wild cats and dogs, recent studies have shown their negative impact on birds that reproduce in the reserve and possibly to other groups.

Part IV: Characteristics of priority Invasive Alien Species

FLORA SPECIES

1. Marabú (*Dichrostachys cinerea)*

Impacts:
Many natural and semi natural places have been vastly occupied by marabu, and have lost their native plant formations. This invasive plant is of the most widespread in Cuba, and has had the greatest impact on Cuban agrocosystems. It has occupied around 10% of the Cuban territory, nearly 18% of the agricultural lands and affects 56% of livestock areas.

Possible benefits and uses of the Marabú:
- Pasture species that feed sheep, goats and cows.
- Excellent lumber and carbon high in calories.
- Provides natural poles to living fences.
- Provides wood for furniture.
- Nitrogen fixing leguminous plant.
- Helps control erosion.
- Shelters some wild fauna.

2. Aroma (*Acacia farnesiana*)

(Aroma amarilla, huisache, corona de cristo, pela, binorama, aromo, espinillo, espino blanco).

Impact:
It is spread across dry coastal areas, arid savannahs, low and stony lands. It is a powerful invasive in agroecosystems, due to its great power of colonization. It is less aggressive than the marabu and easier to control.

3. Weyler (*Mimosa pellita*)

Impact:
It is considered one of the species that causes the strongest impact to the Cuban agricultural ecosystems, in the wetlands, due to its great power of colonization.

4. Pomarrosa (*Syzygium jambos)*

Impact:
An invasive plant of rivers and stream banks and the entire water regulating border, where it establishes as a monoculture small and dense forests, outcompeting native vegetation. It also invades semi deciduous mountains over non-calcareous wet soils. In the province of Pinar del Río it has invaded all of the gallery formations of the province's mountain area, causing the elimination of more than 45 flora species, turning it into a mono specific formation, and affecting the riverbeds, contaminating the waters and causing the loss of food niches of fauna species.

5. Charagüito *(Inga punctata)*

Impact:
It has invaded the gallery formations and the ecosystem in general, also located in the paths and shady areas of the different existing formations in the Biosphere Reserve of Sierra del Rosario, where it continues an accelerated invasive process, even occupying the spaces where the pomarrosa is dying.

6. Ipil ipil *(Leucaena leucocephala)*

Impact:
It takes the place of the native plant species in unpopulated areas, as it is a heliophilous plant that doesn't occupy forest spaces. It causes a decrease of the neighboring fauna in the ecosystems which are not pastures. It allows other species to grow beneath it.

Benefits and possible uses:
In Cuba, it is an invasive plant which can offer many benefits if it is managed appropriately, especially for stockbreeding. This species adapts to alkaline soils, regenerates well after cyclones, and resists long time periods of drought without big problems. The leguminous tree species, among which the Ipil ipil is found, are of the most useful species for the reforestation of dry ecosystems, with low availability of N, P and other nutrients. This happens because they develop symbiotic partnerships with rhizobacterium and mycorrhizen fungi. The animals living in pastures where the tree stratum is dominated by *L. leucocephala* produce more milk and meat than the ones living in pastures without that species.
Another benefit produced by the silvopastures with *L. leucocephala* is the important increase of the associated biological diversity, which is greater than the traditional pastures. By cropping it, it is also possible to control other invasive leguminous plants of lesser economic value and more difficult to manage (*Dichrostachys cinerea*, *Mimosa pellita*, *Acacia farnesiana*). Furthermore, the silvopastoral systems with *L. leucocephala* can be used as corridors of biological diversity.

7. Cayeput (*Melaleuca quinquenervia*)

Impact:

It has been reported as highly invasive in Ciénaga de Zapata, directly affecting the swamp's grassland, the swamp forests and gallery forests.

Main effects produced:

- Disappearance of the grassland's ecosystem, affecting the flora and fauna living in those places.
- Changes of the evaporation/transpiration regimes of the wetland due to the extremely high level of transpiration that characterizes Melaleuca.
- Transformation of swamp forests, gallery forests and mangrove forests into forests of Melaleuca.

This is the main Cuban wetland which is also one of the areas with the most biodiversity, with a significant level of endemism, including several local endemic species. This is why it is a Biosphere Reserve in Cuba; RAMSAR Site; a National Park, and within it there are several protected areas of different management categories.

Benefits and possible uses:
The principal uses known are medicinal, with important essential oils. It is considered a natural insecticide. In some places it is also used for reforestation.

8. Casuarina (*Casuarina equisetifolia*)

Impact:
In coastal areas it is a major problem because of the fragmentation of the original habitat, the degradation of the landscape, the accumulation of plants on the sand, the displacement of native vegetation, the decreasing quality of the sand (acidification) and the interruption of its natural dynamism, accelerating the processes of beach erosion. The accumulation of plant residues affects the nesting process of sea turtles. The pollen has an allergic effect.

Benefits and possible uses:
The plants fix very well to the ground, and have allelopathic properties. It is a fast growing plant, very useful for rural and urban reforestation in the tropics, subtropics and temperate regions, especially used in Cuba for reforestation of mined areas; it also fixes atmospheric nitrogen in symbiosis with the bacterium Frankia. Its wood is used for plates, fences, and it is excellent firewood.

9. African Tulip, Gabon Tree (Spathodea campanulata)

Impact:
In Cuba, it is considered one of the most aggressive invasive land species to native biodiversity. This tree has a tendency to become invasive in truly tropical environments; in such places, it invades the abandoned farmlands and mature forests, where the seeds germinate rapidly and form low vegetation, from which a few individuals protrude that grow aggressively. The seedlings of this species are very competitive.

There are reports that indicate the possible relationship of the flowers of *S. campanulata* with the mortality of bees and small birds in different ecosystems in the world.

It is widely disseminated in the protected area Topes de Collantes, with densities that exceed 10 000 plants per hectare, where it is present in 50% of the area. The abundance and distribution of this species is associated with the highest and most fertile lands, in anthropogenic areas. In other important areas for biodiversity in Cuba, such as Alejandro de Humboldt National Park and other mountainous natural areas, its growing presence has been reported.

Benefits and possible uses:
The principal use in the territory is as an ornamental plant, besides being used as a shade for coffee and live fences.

10. Malva de caballo *(Sida acuta*)

Impact:
It invades pasture areas, forests and riverbanks until it becomes a serious problem for the livestock, pushing out the existent native plant formations in this area. According to the producers and peasants of Las Tunas, this species of malva causes death by intoxication of sheep, goats, cows and sometimes, even horses.

11. Piña de ratón, Maya (*Bromelia pinguin*)

Impact:
It invades areas of semi deciduous forest and savanna with palm trees, pushing out the natural vegetation. It constitutes an appropriate niche for rats, mice and mongooses.

Benefits and possible uses:

- It fights intestinal parasites.
- Anti-rheumatic syrup.
- Diuretic wine.
- The leafs and stalks are used as a detersive in ulcers
- It is widely used for constructing living fences in patios and properties.

12. Algarrobo de la India (***Albizia procera***)

Impact:
This species has been included in the project in order to gain more information about the potential invasive behavior of the species in order to then better plan its management. It was introduced recently for reforestation purposes.

Benefits and possible uses:
It has been classified in the group of colonizers, that is, the productive species that have the ability to colonize disturbed sites. It is also known as a restorer, as it colonizes the ecosystem and helps to restore it, enabling the further development of slow-growing species.

In reforestation trials, results show it is a species with a fast initial growth rate, both on saline and alkaline soils, and high rates of survival. Its ability to grow on dry, sandy, stony and superficial soils makes it a very useful species for the reforestation of difficult sites. It grows well in alluvial soils.

The wood can be used in rural construction: crossbeams, poles, furniture, agricultural implements and carpentry in general. Its pulp has great potential for manufacturing paper. The high protein content of the leaves makes it an excellent source of forage. In India it is mainly used for furniture, wheelbarrows, buildings, mallets, paddles and carving.

In recent years the species has taken prominence in the reforestation system of Cuba because of the scarcity of seeds of other species and the abundant presence of this one, and its high rates of growth and survival. Faced with this situation, and with the lack of official data records about the behavior of this species in the forest ecosystem, it is necessary to characterize it.

13. Jacinto de agua o malangueta (***Eichhornia crassipes***).

Impact:
It is considered one of the most harmful aquatic plants worldwide. The Jacinto de agua grows very quickly. Infestations of this species block waterways, limiting boat traffic, swimming and fishing. It also prevents sunlight and oxygen from penetrating the water’s surface and reaching immersed plants and fauna. The shade it produces and the agglomerations it forms on the native aquatic plants dramatically reduce the biological diversity in aquatic ecosystems.

Benefits and possible uses:

- Improves the quality of water, due to its high ability to concentrate pollutants.
- Used as animal feed.
- Its fibers are used for handicrafts, its tissue is used for making purses, bags, chair backs, etc.

FAUNA SPECIES:

1. Catfish (*Claria gariepinnus*)

Impact:
Claria is an omnivorous predator with a presence that extends through waterways of the whole country, under different circumstances and environmental conditions, affecting and directly eliminating populations of native species, including endemic and threatened species. It is considered that the main Cuban wetlands, Ciénaga de Zapata and Delta del Cauto, are among the most affected areas. One of the principal impacts to biodiversity is the damage to the cave-dwelling fauna, especially the blind fishes and other species that live in caves.

Benefits and possible uses:
The principal alternative use of this species in Cuba, which was the goal of introducing it, is fishing it for food.

2. Green mussel *(Perna viridis)*

Impact:
It principally affects the native diversity due to its high invasive level, colonizing the roots of the red mangrove, pushing out the natural populations of other species, especially in semi natural and semi closed ecosystems. In Cuba, the green mussel is only known to be present in the Bahía de Cienfuegos, which is of important fishing and economical value, because of the direct effects to industrial facilities of great economic and social importance.

Benefits and possible uses:
- For human consumption.
- For handicrafts.
- As a component of animal feeding.

3. Lion fish *(Pterois volitans*)

Impact:
It affects biological diversity in sea ecosystems – coasts, especially in coral reefs – due to its strong predatory nature.

- Direct predation
- Competition
- Overpopulation

In addition, the venom of their dorsal, ventral and anal bones can cause serious effects to humans. To date, several cases of people who have been poisoned with the venom of the fish have been reported, but

thankfully there have not been lethal accidents. Its competition with lobster for shelter has already resulted in negative economic effects to the lobster industry.

Its presence in Cuba was reported for the first time in 2007 in the eastern region of the country. Since that time, it has quickly spread and it can be currently found in most of the island's coasts.

Benefits and possible uses:
-Food use

4. Buffalo (*Bubalus bubalis)*

Impact:
It has significant effects, because it deteriorates natural ecosystems, especially agricultural ecosystems, by invading them and consuming the crops, as well as deteriorating the land due to the coarseness and strong physique of the species. In some areas, there are reports of the presence of sick animals, with tuberculosis and rabies, which are diseases that can be transmitted to cattle.

Benefits and possible uses of the species:
Used primarily for food, because of the high quality and productivity of their milk and meat, which is why it was introduced, but it requires proper management.

5. Wild dog (*Canis familiaris*)

Impact:
It stands among the 100 worst invasive species worldwide[25]. Wild dogs are extremely dangerous for corral animals, as well as for wildlife, mainly of vertebrates, especially, Cuban endemic species like almiqui (*Solenodon cubanus*), and jutia, a cave rodent. In a feral state they are predators of medium and small vertebrates. They prey on terrestrial and nesting birds, small reptiles, crabs, etc. They can carry the rabies virus. The stray dogs abandoned in cities and towns carry parasites and diseases dangerous to humans and pets, ruin public property and constitute an ethical problem for the authorities and the general population. Even though this group is not desired, it has been successfully established and it is difficult to remove it from the ecosystem. The causes of dispersal can be innate or environmental, or more frequently, a combination of both.

6. Wild cat (*Felis silvestris catus)*

Impact:

It stands among the 100 worst invasive species worldwide. It is an important predator of endemic threatened species like the almiquí, jutí, anolis, iguanas and other native species. Its climbing abilities endanger birds, terrestrial ones and the ones that nest in trees. It can invade caves and prey on bats. It can carry parasites and diseases. The wild cat is also a health and social problem, and constitutes an ethical problem for the authorities. It can carry the rabies virus.

7. Wild boar (*Sus scrofa*)

[25] From the Invasive Species Specialist Group (ISSG) of the IUCN

Impact:
It is among the 100 worst invasive species worldwide. They are omnivores and their diet can include endemic young terrestrial tortoises, birds and reptiles. The damage they cause is due to predation, especially on small vertebrates, invertebrates (crabs, mollusks), and soil fauna. Its rooting in and wallowing produces changes in the soil and in nutrient cycles, erosion, and spreads invasive plant species. Damages were observed in almiquí's burrows. They cause damage to crops, stocks and properties and transmit many diseases such as Leptospirosis and Foot and mouth disease.

8. Mongoose *(Herpestes auropunctatus)*

Impact:
It is among the 100 worst invasive species worldwide. Mongoose usually eats a wide variety of small animals, multiple vertebrates, snakes, mollusks, insects and herpetofauna, as well as fruits and plants. It also affects the nests and offspring of sea turtles. It is one of the principal wild carriers of rabies in Cuba.

In the Caribbean Islands, the mongoose has been blamed for:

- Extermination of owls from the tunnels of Antigua and Marie Galante, as well as the night falcon jamaiquino.
- Destruction of nests and baby flamingos among other species.
- According to Lever (1996) eight wall lizards have been extinct in the Caribbean Islands due to the mongoose's attacks, including earth wall lizards of the genus Ameiba and Mabuya.
- The mongoose in the West Indies has contributed to threaten or exterminate more mammals, birds and reptiles in a limited area than any other animal deliberately introduced by men in any part of the world.
- From an economic point of view there are big impacts on sugarcane plantations, as well as on cornfields and other crops.

Currently, the increased presence in certain urban areas of this species and other rodents included in the project has been reported with concern. This increased presence is due to land preparation around cities for the development of suburban agriculture plans, as well as to the decrease of areas formerly used for sugar cane plantations, because of the reorganization of the sugar production.

This species has always been more abundant in central - western Cuba, but there is an increase of it in the eastern region; mongooses were even captured in the buffer zone of Alejandro de Humboldt National Park, so the monitoring of them throughout the country should be increased.

The saliva of sick animals infected with the rabies virus is the main vehicle for the transmission which is past to the host by bites, scratches, or exceptionally by recent skin injuries or through the intact mucous membranes.

9. Black rat (*Rattus rattus*)

Impact:
It is among the 100 worst invasive species in the world. It is an extremely harmful species to humans and ecosystems. It is considered a vector of diseases such as typhus. It carries different ectoparasites such as mites and internal parasites such as nematodes. It coexists with endemic species of rats and can be a source of transmission of these diseases. It has noticeable molluscivore habits (consumers of mollusks); and prey on bird's eggs, nestlings, small reptiles, many invertebrates, and it consumes many plant species.

Although no specific studies about this species have been done in Cuba, it is known that it seriously affects populations of endemic species such as the rodent jutía and polymitas. It is a pest for many crops such as sugarcane, cocoa, fruit trees and other crops. It is also a pest in poultry farms and a danger to public health. It has caused significant losses in food storage sites. It brings a large number of diseases that affect humans and domestic animals.

10. Grey rat *(Rattus norvegicus)*

Impact:
It is one of the most known and common rats; it is associated to human activities, and due to this association, it has colonized the whole world, truly as a pest. This species has the characteristics of a pest, not only because it devours the food of houses and cellars, but also especially because it transmits serious diseases, such as Hantavirus, leptospirosis, criptosporidiosis, hemorrhagic viral fever, and Q fever. It is one of the most important pests among mammals. In very few cases, it has also caused bubonic plague, which is generally transmitted by common rats.

11. House mouse (*Mus musculus*)

Impact:
It is among the 100 worst invasive species in the world. It is not very abundant in natural areas but it is often unnoticed. It eats a lot of different seeds of native species. It acts as a disperser of invasive plant species. It can damage bird nests and prey on small vertebrates and invertebrates. It is a pest in agriculture (sugarcane, vegetables, meats, agricultural and commercial stores) and for public health because it transmits numerous parasites and diseases. It causes damage to buildings and properties.

12. Shiny Cowbird (*Molothrus bonariensis*)

Impact:
This bird is one of the most distinctive problems of our ornithological fauna. Its damage is based on the competition with other species for nesting, affecting their reproduction and behaviour, as it steals the nests of some of them, as the Tocororo (*Priotelus temnurus*), the mockingbird (*Mimus polyglottos*), the thrush zorzal real, (*Turdus plumbeus*), vireos and others.

13. Fire ant *(Wasmannia auropunctata)*
Impact:
In Cuba there is not enough information on this species and its behavior. In countries where it is native, *W. auropunctata* is a pest in disturbed forests and agricultural areas. Their density can be very high in sugarcane plantations and cocoa farms. In fragmented forests, the density of *W. auropunctata* is related with the scarce diversity of other ants.
This species is ecologically very successful. Its success is due to numerous reasons such as: generalist feeding, mating within the nest, reproductive cloning, lack of aggressiveness with ants of the same species, creation of supercolonies, recruitment of large numbers of individuals, activity at all hours, and opportunistic behavior that allows them to seize all the resources available in the environment to the detriment of competing species. The species is also a generalist in choosing nesting sites. These can be

found in a wide variety of habitats, from urban and rural housing and its surroundings, agricultural fields, thickets and even in forests that can be natural, artificial or disturbed. They can live in wet or dry habitats and coastal areas.

MICROORGANISMS

Tobacco Blue Mould (*Peronospora hiosciami*)

Mechanism of introduction: Cross-bordering atmospheric transport through the movement of weather systems. Four patterns of weather conditions have been identified as responsible for the transport of spores. It affects tobacco plantations across the country.

Economic impact produced: In the areas where the disease appeared, it caused serious and intense effects on over 90% of seedbeds and covered tobacco plantations, with losses in all the seedbeds affected.

Environmental impact: It is necessary to apply large quantities of phytosanitary products to fight the disease, with the consequent effect of emitting pollutants to the environment and producing toxic residuals.

Social impact: Tobacco is predominantly produced by independent farmers and their families, constituting a family tradition where rural communities are involved, and it has become the main source of income for them. The occurrence of an outbreak caused by this disease threatens their productive results and therefore their income.

Management experience: The application of an appropriate protection strategy based on an efficient use of early predictions about the effects of a disease or plague can significantly reduce chemical treatments. These should be combined with new biological products. It is important to design a proper plan of preventive medicines, which also avoid the impact of pathogen and reduce the costs of products, means of implementation, protection and other necessary expenses. This is an important way to minimize the environmental damages caused by products of high and residual toxicity.

Black Sigatoka, (*Mycosphaerella fijiensis and Paracercospora fijiensis)*

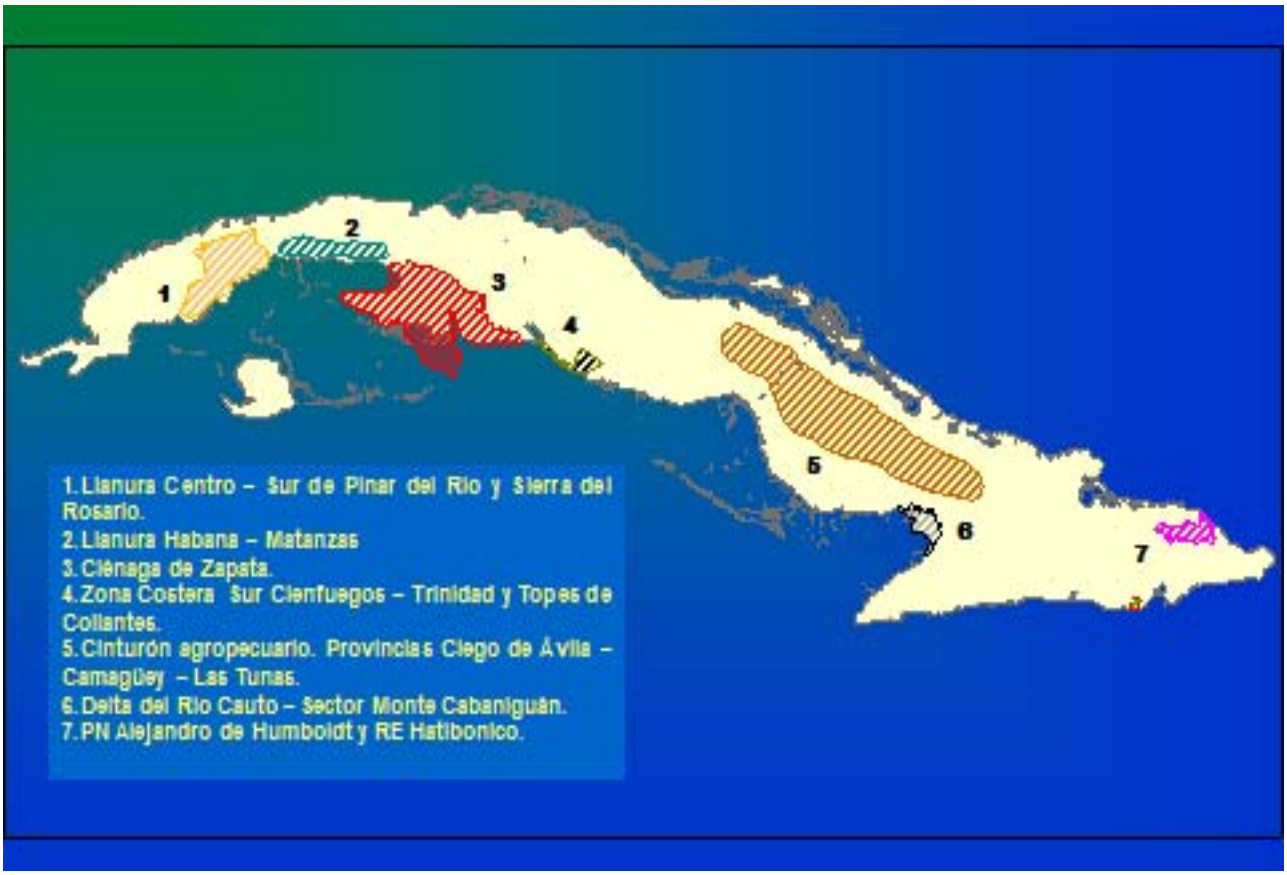
It is the most important disease that affects the commercial production of bananas and plantains (Musa spp.) in most regions of the world. The aggressiveness of the Black Sigatoka is so serious that without controlling it, the commercial production of bananas is impossible. The first existent report about the appearance of this disease was in 1963, in the Pacific islands of Fiji, near New Zealand. When the first epidemic of the disease occurred, there were production losses ranging from 50-100%. With the introduction of Black Sigatoka the programs of control were significantly modified and it was necessary to use more powerful fungicides, with shorter intervals of time between every application, thereby increasing production costs.

The appearance of Black Sigatoka in Cuba in 1991, as in other parts of the world, caused an increase in the costs and number of treatments (up to 27 treatments per year) in order to control the disease. At the same time, there have been strong impacts on the clones of bananas due to their greater susceptibility, with the consequent impact on production.

The management of Black Sigatoka in Cavendish bananas and susceptible clones is under an integrated management program based on cultural measures, prognosis of treatments and use of systemic fungicides,

all of which has allowed reducing the treatments and costs about 40% in recent years. At the same time, studies on agronomic behavior and resistance to Black Sigatoka, are also the most economical and environmentally sustainable solution to fight this disease. The massive introduction of these clones in the country has allowed to reduce the $ 2 million which were spent annually to control Black Sigatoka in 1990, down to $ 400 000 in 2002.

Part V. Map of project areas



Part VI. GEF Tracking Tools in GEF-4 for Safeguarding Biodiversity

Objective: To measure progress in achieving the impacts and outcomes established at the portfolio level under the biodiversity focal area. The following targets and indicators are being tracked for all GEF-4 projects submitted under Strategic Objective Three and the associated Strategic Programs.

Outcome Indicators for Strategic Objective Three and Associated Strategic Programs

Strategic Objective	Expected Long-Term Impacts	Indicators
To safeguard biodiversity	Potential risks posed to biodiversity from living modified organisms are avoided or mitigated	Biosafety: • Each request for intentional transboundary movement or domestic use is processed through a regulatory and administrative framework aligned with the CPB • For each request for intentional transboundary movement or domestic use risk assessments carried out in accordance with the CPB • For each request for intentional transboundary movement or domestic use, measures and strategies to manage risks established
	Potential risks posed to biodiversity from invasive alien species are avoided or mitigated	Invasive Alien Species: • Number of point-of-entry detections • Number of early eradications • Number of successful prevention and control programs
Strategic Programs for GEF-4	**Expected Outcomes**	**Indicators**
6. Building capacity for the implementation of the Cartagena Protocol on Biosafety	• Operational national biosafety decision-making systems that contribute to the safe use of biotechnology in conformity with the provisions and decisions of the CPB	• Percentage of participating countries with regulatory and policy framework in place • Percentage of participating countries that have established a National Coordination Mechanism • Percentage of participating countries with administrative frameworks in place • Percentage of participating countries with risk assessment and risk management strategies for the safe transfer, handling and use of living modified organisms (LMOs), specifically focused on transboundary movements • Percentage of participating countries that have carried out risk assessments • Percentage of participating countries that fully participate and share information on the Biosafety Clearing House (BCH)

Strategic Programs for GEF-4	Expected Outcomes	Indicators
7. Prevention, control, and management of invasive alien species (IAS)	• Operational IAS management frameworks that mitigate impact of IAS on biodiversity and ecosystem services	• National coordination mechanisms to assist with the design and implementation of national strategies for IAS • National strategies that inform policies, legislation, regulations, and management • Regulatory and policy frameworks for IAS in place • Point of detection mechanisms in place • Incorporation of environmental considerations with regards to IAS into existing risk assessment procedures • Identification and management of priority pathways for invasions

Rationale: Project data from the GEF-4 project cohort will be aggregated for analysis of directional trends and patterns at a portfolio-wide level to inform the development of future GEF strategies and to report to GEF Council on portfolio-level performance in the biodiversity focal area.

Structure of Tracking Tool: Each tracking tool requests background and coverage information on the project and specific information required to track the indicator sets listed above.

Guidance in Applying GEF Tracking Tools: GEF tracking tools are applied three times: at CEO endorsement[26], at project mid-term, and at project completion.

In GEF-4, we expect that projects will be fully aligned with specific Strategic Objectives and support Strategic Programs under each Strategic Objective hence only one tracking tool will need to be completed.

On *very rare occasions*, projects make substantive contributions to more than one strategic objective. In these instances, the tracking tools for the relevant strategic objectives should be applied. It is important to keep in mind that the objective is to capture the full range of a project's contributions to delivering on the targets set for each of the strategic priorities. The GEF Implementing Agency/Executing Agency will guide the project teams in the choice of the tracking tools. Please submit all information on a single project as one package (even where more than one tracking tool is applied).

Multi-country projects may face unique circumstances in applying the tracking tools. The GEF requests that multi-country projects complete one tracking tool per country involved in the project, based on the project circumstances and activities in each respective country. The completed forms for each country should then be submitted as one package to the GEF. Global projects which do not have a country focus, but for which the tracking tool is applicable, should complete the tracking tool as comprehensively as possible.

The tracking tool does not substitute or replace project level M&E processes, or GEF Implementing Agencies'/Executing Agencies' own monitoring processes. Project managers, consultants and project evaluators will likely be the most appropriate individuals to complete the Tracking Tool, in collaboration with other members of the project team, since they would be most knowledgeable about the project.

[26] For Medium Sized Projects when they are submitted for CEO approval.

Submission: The finalized tracking tool will be cleared by the GEF Implementing Agencies and Executing Agencies before submission. The tracking tool is to be submitted to the GEF Secretariat at three points:

1.) With the project document at CEO endorsement[27];
2.) Within 3 months of completion of the project's mid-term evaluation or report; and
3.) With the project's terminal evaluation or final completion report, and no later than 6 months after project closure.

[27] For Medium Sized Projects when they are submitted for CEO approval.

I. Project General Information

1. Project Name: Enhancing the prevention, control and management of Invasive Alien Species in vulnerable ecosystems in Cuba
2. Project Type (MSP or FSP): FSP
3. Project ID (GEF): 71327
4. Project ID (IA): 3990
5. Implementing Agency: Ministry of Science, Technology and Environment (CITMA), Center of Information, Management and Environmental Education
6. Country(ies): Cuba

Name of reviewers completing tracking tool and completion dates:

	Name	**Title**	**Agency/Institution**
Work Program Inclusion	Mr. Maria Abo	Director	Ministry of Science, Technology and Environment (CITMA), Center of Information, Management and Environmental Education
Project Mid-term			
Final Evaluation/project completion			

7. Project duration: ***Planned***___5____ years ***Actual*** _____ years

8. Lead Project Executing Agency (ies): Ministry of Science, Technology and Environment of Cuba

9. GEF Strategic Program:
□ Building capacity for the implementation of the Cartagena Protocol on Biosafety (SP 6)
X Prevention, control, and management of invasive alien species (IAS) (SP 7)

Strategic Program 7: Prevention, Control, and Management of Invasive Alien Species (IAS) Tracking Tool Guidance Note

Purpose of the Tracking Tool

The Invasive Alien Species Tracking Tool has been developed to help track and monitor progress in the achievement of the primary outcome of Strategic Program Seven of the GEF-4 Biodiversity Strategy: "Operational IAS management frameworks that mitigate impact of IAS on biodiversity and ecosystem services." This outcome will be achieved through GEF support to national/regional level projects that are aimed at: a) strengthening the enabling policy and institutional environment for cross-sectoral prevention and management of invasions; b) implementing communication and prevention strategies that emphasize a pathways and ecosystem approach to managing invasions; c) developing and implementing appropriate risk analysis procedures for non-native species importations; d) developing and implementing early detection and rapid response procedures for management of nascent infestations; and e) managing priority alien species invasions in pilot sites to ensure conservation and sustainable use of biodiversity.

Guidance on Applying the IAS Tracking Tool

The Tracking Tool contains a set of questions that have been designed to be easily answered by project staff and project evaluators. It depicts a best-case scenario of the required components of a fully operational management framework for IAS, and, within each component, a continuum of progress towards an IAS management framework that is fully effective.

As with the other tracking tools applied in the GEF biodiversity portfolio, the application of the tool is meant to facilitate an iterative process whereby the project staff and project evaluators carefully discuss each question about the IAS management framework to arrive at a carefully considered assessment, and in doing so, identify concrete steps forward for improvement. In most cases, a group of project staff, GEF agency staff, (and the project evaluators in the case of the application of the tool at the mid-term and final evaluation) should be involved in answering the questions in the Tracking Tool.

When the assessment is undertaken at the mid-term and the final evaluation, we recommend that some of the same team members who undertook previous assessments be involved to provide continuity of analysis. Where this is not possible the information provided by previous assessors in the comments section of the Tracking Tool will be particularly valuable in guiding the assessment and ensuring consistency in the evaluation being made.

Structure and content of the Tracking Tool

The Tracking Tool addresses four main issues in one assessment form:

1) National Coordination Mechanism;
2) IAS National Strategy Development and Implementation;
3) Policy Framework to Support IAS Management; and
4) IAS Strategy Implementation: Prevention, Early Detection, Assessment and Management.

Assessment Form: The assessment is structured around six (6) questions presented in table format which includes three columns for recording details of the assessment, **all of which should be completed**.

Questions and scores:

The assessment is made by assigning a simple score ranging between 0 (poor) to 3 (excellent) in response to a series of six questions that measure progress in the four main issues listed above: 1) National Coordination; 2) IAS National Strategy Development and Implementation; 3) Policy Framework to Support IAS Management; and 4) IAS Strategy Implementation: Prevention, Early Detection, Assessment and Management. Four alternative answers are provided for each question to help assessors to make judgments as to the level of score given. In addition, there are supplementary "bonus" questions which elaborate on key themes for each issue and provide additional information and points.

This is, inevitably, an approximate process and there will be situations in which none of the four alternative answers appear to fit the project conditions very precisely. We ask that you choose the one answer that is nearest and use the comment/explanation section to elaborate. The maximum score from the six main questions and supplementary "bonus" questions is 29. A final total of the score from completing the assessment form can be calculated as a percentage of 29.

The whole concept of "scoring" progress is however fraught with difficulties and possibilities for distortion. The current system assumes, for example, that all the questions cover issues of equal weight, whereas this may not necessarily be the case. Scores will therefore provide a better assessment of effectiveness if calculated as a percentage for each of the elements of an IAS framework.

Most importantly, the assessment, when applied over time in the context of one project, allows us to gauge progress in achieving the strategic program's expected outcome. GEF will use this information and subsequent analysis in assessing and better understanding the design of IAS projects, the strategic program itself, and the tracking tool as a means to measure progress.

Comment/explanation:

The **comment/explanation** box next to each question score allows for ***qualitative judgments to be explained*** in more detail. This could range from local staff knowledge (in many cases, staff knowledge will be the most informed and reliable source of knowledge), a reference document, monitoring results or external studies and assessments – the point being to give anyone reading the report an idea of why the assessment was made.

It is **very important** that this box be completed – it can provide greater confidence in the results of the assessment by making the basis of decision-making more transparent. More importantly, it provides a reference point and information for local staff in the future. This column also allows for ***comments***, such as why a particular question was not answered when completing the questionnaire.

Next Steps:

For each question respondents are also asked to identify any intended actions that will improve performance of the IAS management framework.

Strategic Program 7: Prevention, control, and management of invasive alien species (IAS) Tracking Tool

Issue	Scoring Criteria	Score: Tick only one box per question	Comment/Explanation	Next Steps
National Coordination Mechanism				
1) Is there a National Coordination Mechanism to assist with the design and implementation of a national IAS strategy? (This could be a single "biosecurity" agency or an interagency committee).	National Coordination Mechanism does not exist	0*	No coordination mechanism specifically for the design and implementation of IAS strategy exists, however the goal is to build on existing structures and therefore the IAS National Subgroup recently formed under the National Group on Biodiversity shall assume this role.	Institutionalize and build capacity of the IAS National Subgroup in order to ensure the design and implementation of a national IAS strategy.
	A national coordination mechanism has been established	1		
	The national coordination mechanism has legal character and responsibility for development of a national strategy (*roles and responsibilities of the different institutions/divisions are well defined within the coordination mechanism)*	2		
	The national coordination mechanism oversees implementation of IAS National Strategy	3		
	Bonus point: Contingency plans for IAS emergencies exist and are well coordinated	+1*	No proper mechanism in place to act on an unforeseen event. But *ad hoc* management arrangements are there when and where necessary.	Establish an institutionalized mechanism
IAS National Strategy Development and Implementation				
2) Is there a National IAS strategy and is it being implemented?	IAS strategy has not been developed	0		
	IAS strategy is under preparation or has been prepared and is not being implemented	1*	Draft IAS strategy is under preparation	Obtain stakeholder comments and finalize the IAS national strategy

Issue	Scoring Criteria	Score: Tick only one box per question	Comment/Explanation	Next Steps
	IAS strategy exists but is only partially implemented due to lack of funding or other problems	2		
	IAS strategy exists, and is being fully implemented	3		
Policy Framework to Support IAS Management				
3) Has the national IAS strategy lead to the development and adoption of comprehensive framework of policies, legislation, and regulations across sectors.	IAS policy does not exist	0		
	Policy on invasive alien species exists (Specify sectors in comment box if applicable)	1		
	Principle IAS legislation is approved (Specify sectors in comment box if applicable. It may be that harmonization of relevant laws and regulations to ensure more uniform and consistent practice is most realistic result.)	2*	National laws exists that directly or indirectly address IAS issues in the following sectors: biodiversity conservation, water resources, agriculture and forestry, fisheries, trade and quarantine legislation. However, there are key legislative gaps which are the result of three main issues: a lack of implementation of global standards, lack of instrumentation of existing laws, and obsolete, incomplete or non-existent laws necessary for the prevention, control, and management of IAS	Establish comprehensive framework of policies, legislation and regulations by establishing new IAS regulations, update existing regulations so they better address IAS and biodiversity issue, complement existing regulations with methodologies that guide the application of these regulations, and improve enforcement.
	Subsidiary regulations are in place to implement the legislation (Specify sectors in comment box if applicable)	3		
	The regulations are under implementation and enforced for **some** of the main priority pathways for IAS (Specify sectors in comment box if applicable)	4		
	The regulations are under implementation and enforced for **all** of the main priority pathways for IAS (Specify sectors in comment box if applicable)	5		

Issue	Scoring Criteria	Score: Tick only one box per question	Comment/Explanation	Next Steps
	Enforcement of regulations is monitored (Specify sectors in comment box if applicable)	6		
4) IAS Strategy Implementation				
Prevention				
4) Have priority pathways for invasions been identified and actively managed and monitored?	Priority pathways for invasions have not been identified.	0		
	Priority pathways for invasions have been identified using risk assessment procedures as appropriate	1*	Some priority pathways for invasions have been identified at key border points and are managed by the National Plant Protection Centre and Institute for Veterinary Medicine in collaboration with General Customs and National Centre for Biosafety. Proper risk assessment technique is not implemented Absence of an integrated management and monitoring mechanism	Appropriate risk assessment procedures to be developed, together with mechanisms to identify pathways of invasions.
	Priority pathways for invasions are being actively managed and monitored to prevent invasions (Please specify methods for prevention of entry: quarantine laws and regulation, database establishment, public education, inspection, treatment technologies (fumigation, etc) in the comment box.)	2		
	System established to use monitoring results from the methods employed to manage priority pathways in the development of new and improved policies, regulations and management approaches for IAS	3		
Early Detection				
5) Are detection, delimiting and monitoring surveys conducted on a regular basis?	Detection surveys[28] of aggressively invasive species (either species specific or sites) are not regularly conducted due to lack of capacity, resources, planning, etc	0		
	Detection surveys (observational) are conducted on a	1		

[28] Detection survey: survey conducted in an attempt to determine if IAS are present.

Issue	Scoring Criteria	Score: Tick only one box per question	Comment/Explanation	Next Steps
	regular basis			
	Detection and delimiting surveys[29] (focusing on key sites: high risk entry points or high biodiversity value sites) are conducted on a regular basis	2*	Detection surveys are conducted regularly at points of entry by the National Plant Protection Centre and Institute for Veterinary Medicine in collaboration with General Customs and National Centre for Biosafety. Few detection and delimiting surveys have been done for high biodiversity sites.	Capacity building on technical & planning aspects including early warning and response system and monitoring system
	Detection, delimiting and monitoring surveys[30] focusing on specific aggressively invasive plants, insects, mammals, etc are conducted on a regular basis	3		
	Bonus point: Data from surveys is collected in accordance with international standards and stored in a national database.	+1	Data collection takes place in an *ad hoc* manner and stored in respective agencies but not in a systematically developed national database.	Stakeholder consultation to develop a national database with proper standards.
	Bonus point: Detection surveys rank IAS in terms of their potential damage and detection systems target the IAS that are potentially the most damaging to globally significant biodiversity	+1		
Assessment and Management: Best practice applied				
6) Are best management practices being applied in project target areas?				
	Management goal and target area undefined, no acceptable threshold of population level established	0*	Target areas have been defined and management goals for some but not all priority IAS. No acceptable threshold of population level established	Define management goals and conduct research on population threshold levels at selected sites
	Management goal and target area has been defined and acceptable threshold of population level of the species established	1		
	Four criteria are applied to prioritize species and infestations for control in the target areas: 1) current and potential extent of the species; 2) current and potential	2		

[29] Delimiting survey: survey conducted to establish the boundaries of an area considered to be infested or free from a pest.
[30] Monitoring survey: survey to verify the characteristics of a pest/IAS.

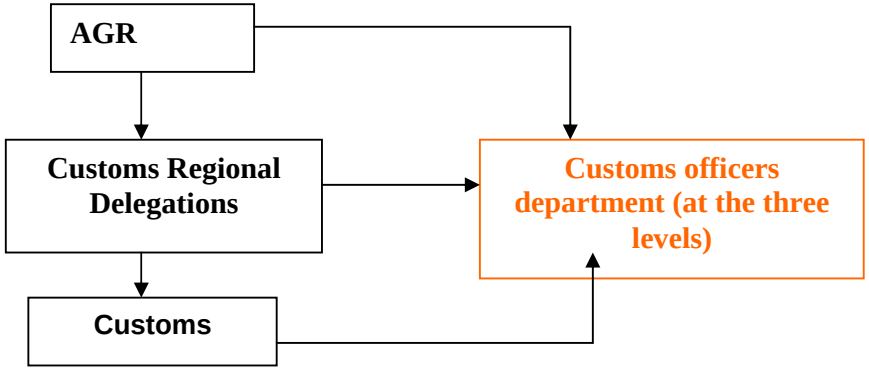
Issue	Scoring Criteria	Score: Tick only one box per question	Comment/Explanation	Next Steps
	impact of the species; 3) global value of the habitat the species actually or potentially infests; and 4) difficulty of control and establishing replacement strategies.			
	Eradication, containment, control and management strategies are considered, and the most appropriate management strategy is applied to achieve the management goal and the appropriate level of protection in the target areas (Please discuss briefly rationale for the management strategy employed.)	3		
	Bonus point: Monitoring system (ongoing surveys) established to determine characteristics of the IAS population, and the condition of the target area.	+1	Several studies have recorded characteristics of IAS populations. But no monitoring system in place.	National monitoring system to be established
	Bonus points: Funding for sustained and ongoing management and monitoring of the target area is secured.	+3		
	Bonus point: Objective measures indicate that the restoration of habitat is likely to occur in the target area.	+1	Restoration activities are possible and are to be an integral part of management plans	Where possible the goal of restoration of habitat will be an integral part of the management goal. Establishment of nurseries to reforest with native species.
TOTAL SCORE		8		
TOTAL POSSIBLE		**29**		

Part VII. Flow Charts for Key Central Administrative Organisms of the State of Cuba

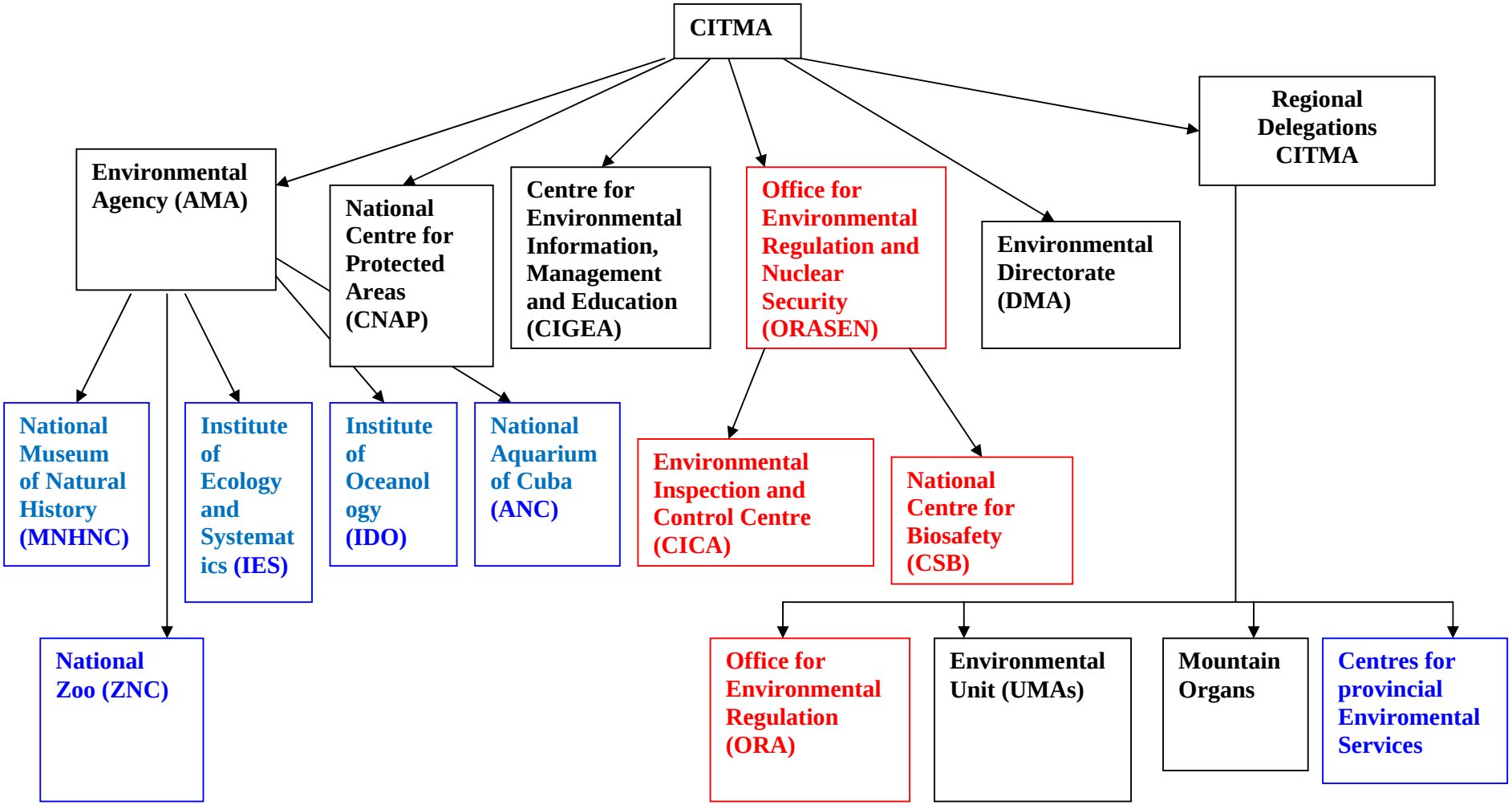
1. General Customs (AGR)
2. Ministry of Science, Technology and the Environment (CITMA)
3. Institute of Civil Aeronautics of Cuba (IACC)
4. Ministry of Higher Education (MES).
5. Ministry of Construction (MICONS).
6. Ministry of Agriculture (MINAG).
7. Ministry of the Food Industry (MINAL).
8. Ministry of the Revolutionary Armed Forces (MINFAR).
9. Ministry of the Interior (MININT).
10. Ministry of Public Health (MINSAP).
11. Ministry of Transportation (MITRANS).

Note: Items in blue represent Research entities, items in red represent Regulatory entities, items in black represent Policy and Management entities.

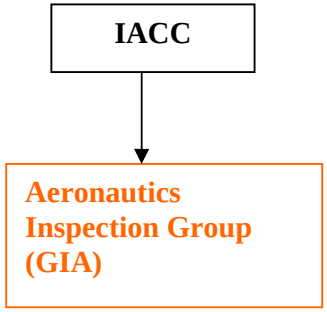
1. General Customs (AGR)



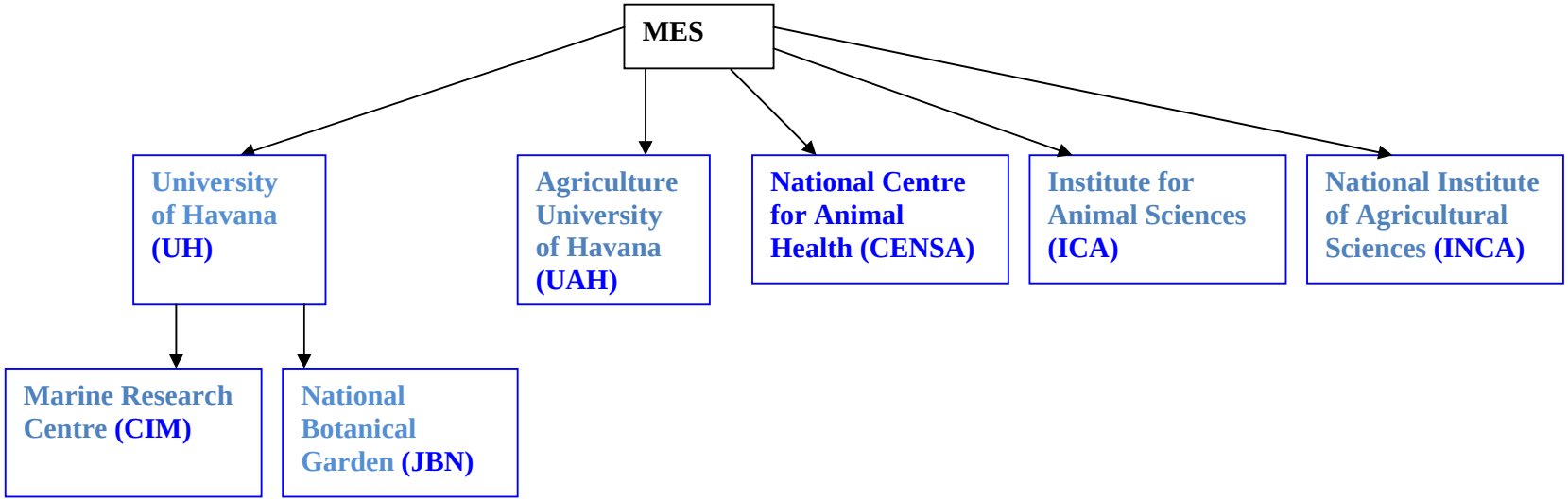
2. Ministry of Science, Technology and the Environment (CITMA)



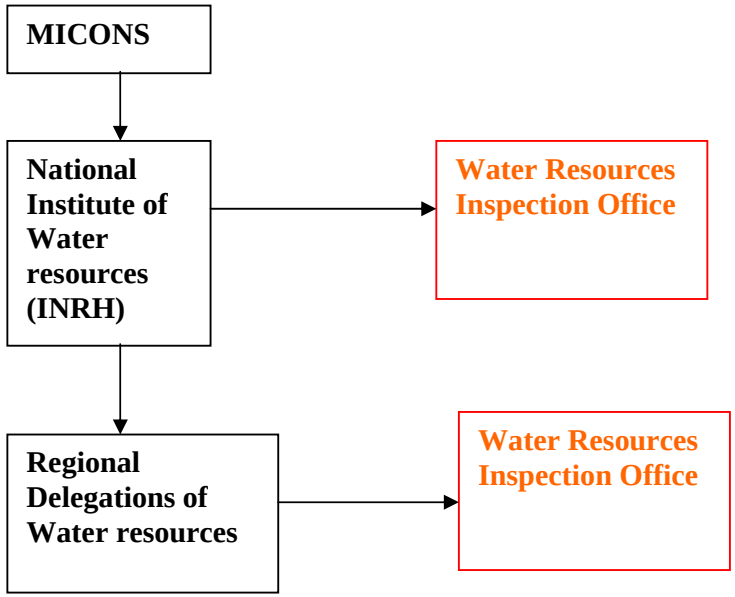
3. Institute of Civil Aeronautics of Cuba (IACC)



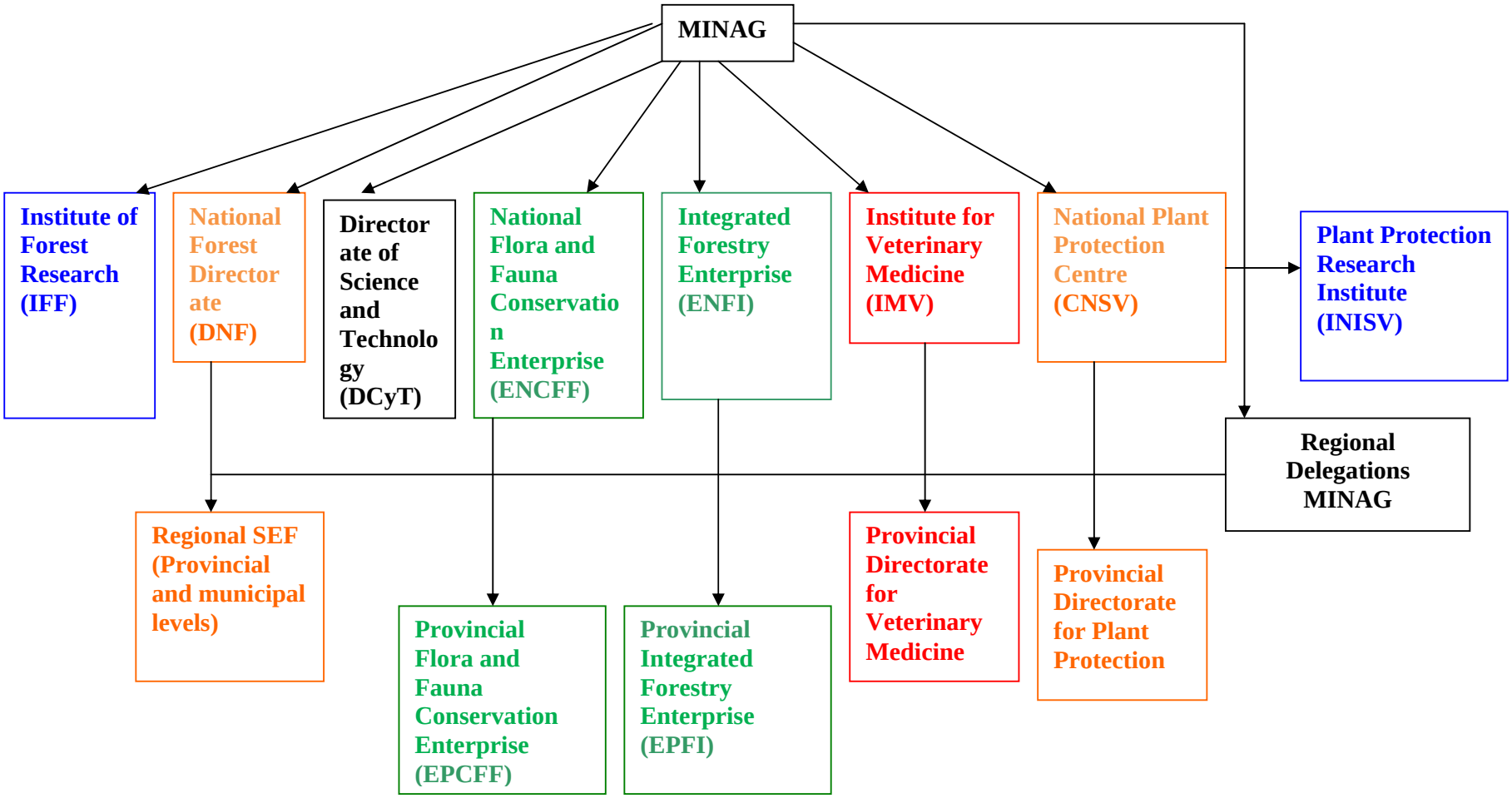
4. Ministry of Higher Education (MES).



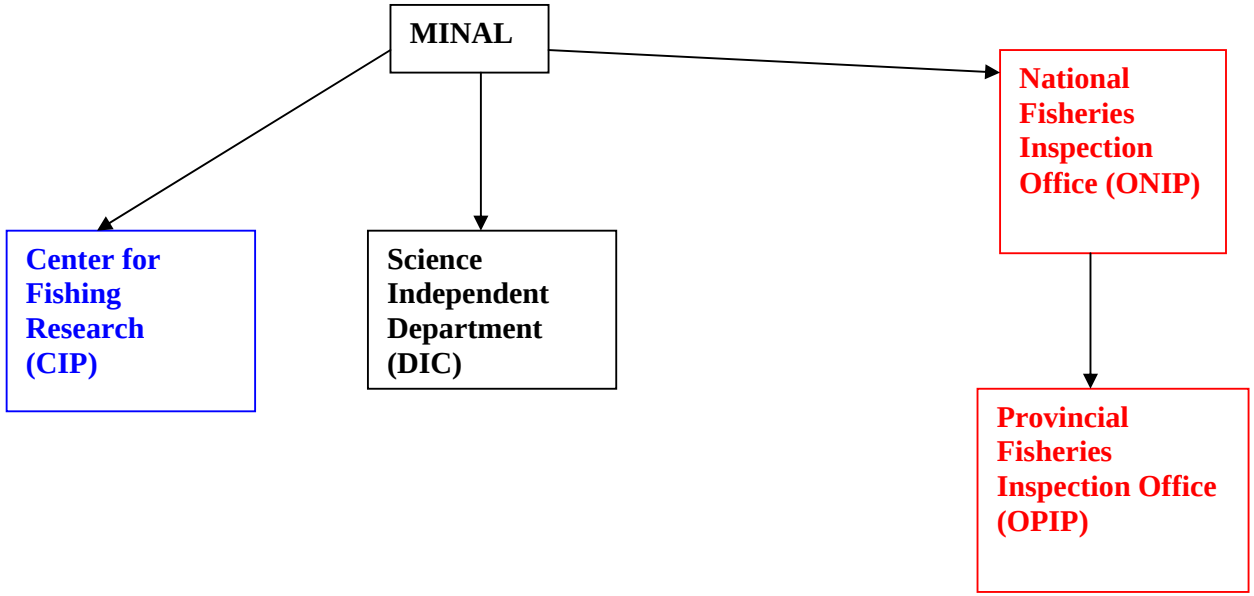
5. Ministry of Construction (MICONS).



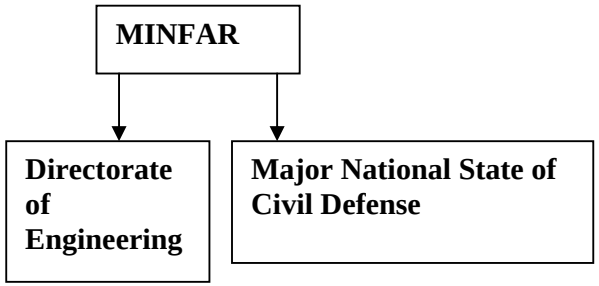
6. Ministry of Agriculture (MINAG).



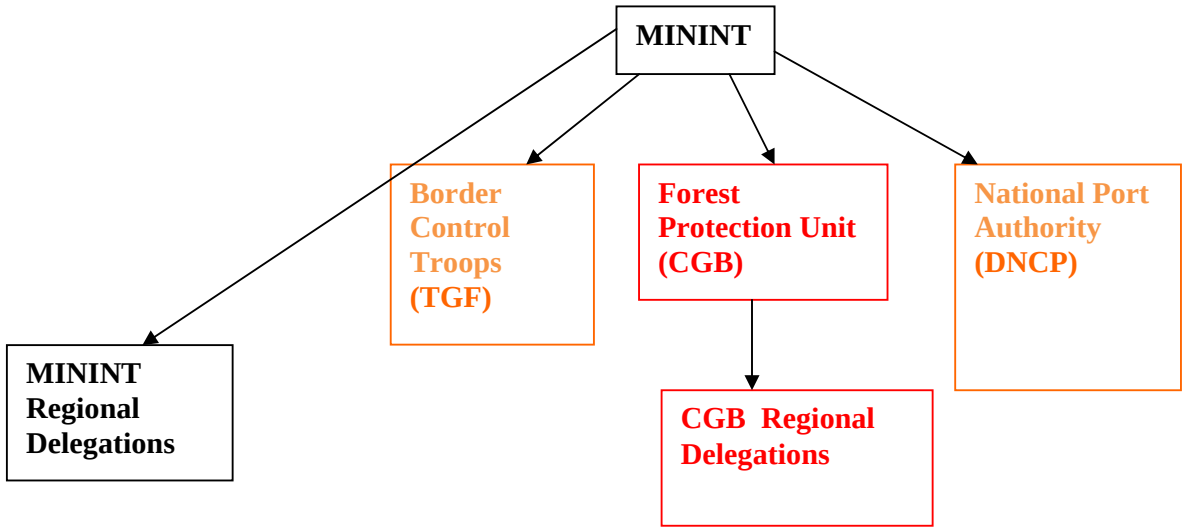
7. Ministry of the Food Industry (MINAL).



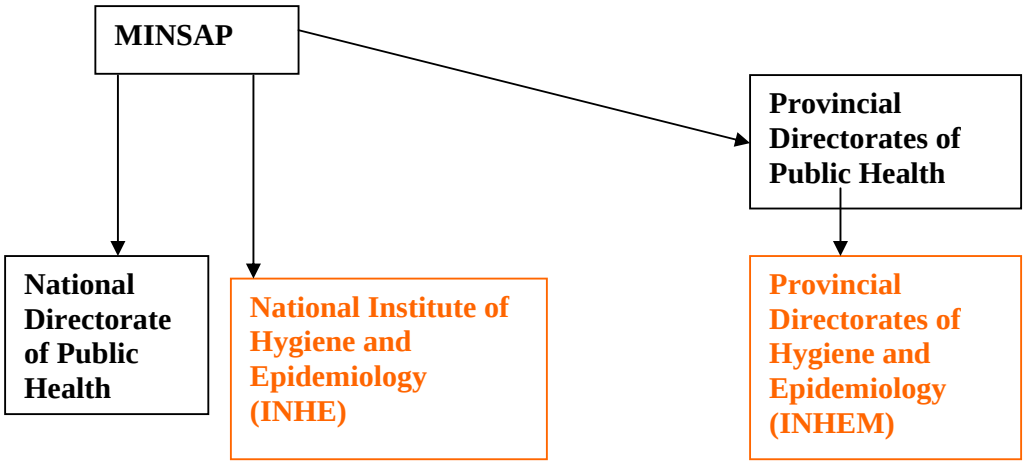
8. Ministry of the Revolutionary Armed Forces (MINFAR).



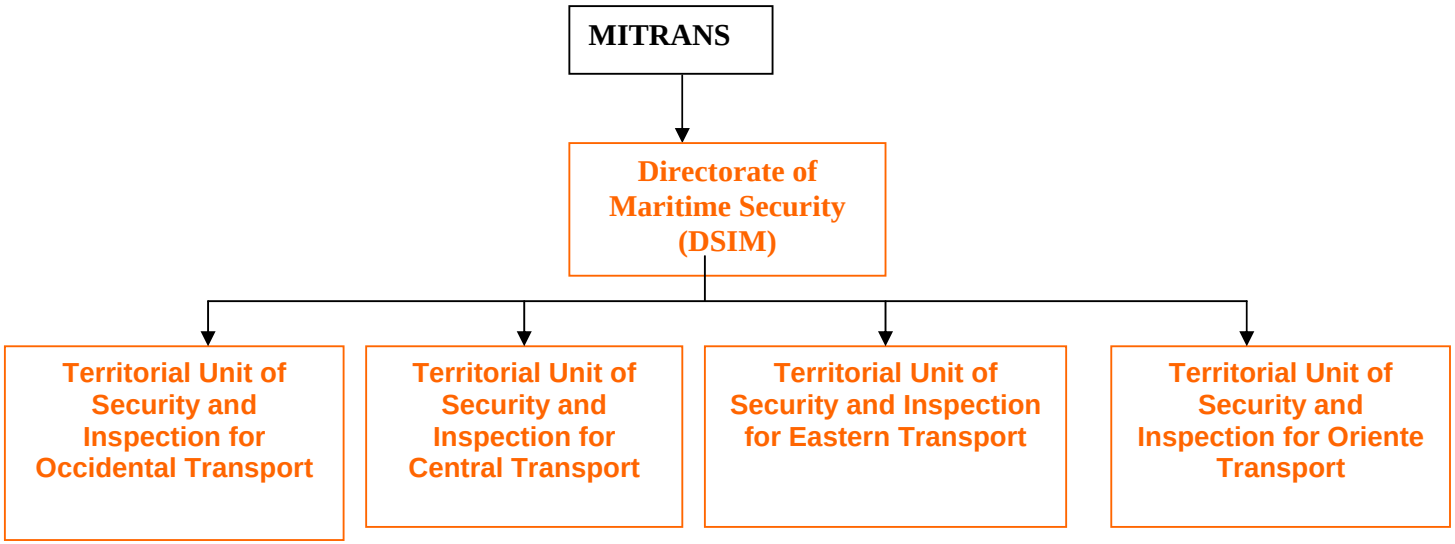
9. MINISTRY OF THE INTERIOR (MININT).



10. MINISTRY OF PUBLIC HEALTH (MINSAP).



11. MINISTRY OF TRANSPORT (MITRANS).



SIGNATURE PAGE

Country: Cuba

UNDAF Outcome(s)/Indicator(s):	3.3 Promoted a greater incorporation of strategies for conservation and the sustainable use of biodiversity in national development plans, in order to reverse the loss of biodiversity / Indicators: Actions implemented for the conservation of biodiversity in productive sectors (agriculture, forestry, fisheries and tourism)
CPD Expected Outcome(s):	3. Promoted strategies for conservation and the sustainable use of biodiversity
CPD Expected Output(s):	3.2 Implemented projects for the biodiversity conservation in productive sectors (agriculture, forestry, fisheries and tourism)
Government:	Ministry of Foreign Trade and Investment (MINCEX)
National Executing institution/ Implementing partner:	Ministry of Science, Technology and Environment (CITMA) / Centre for Environmental Information, Management and Education (CIGEA)

Programme Period: 2008 - 2012
Programme Component: Goal 3: Environment and sustainable development
Project Title: PIMS 3990. Enhancing the Prevention, Control and Management of Invasive Alien Species in Vulnerable Ecosystems in Cuba
ATLAS Project ID: 00078464
PIMS 3990
Project Duration: 5 years
Management Arrangement: NIM

Total Budget:	**$ 15,018,182**
Allocated resources:	
• GEF:	$ 5,018,182
• Government:	$ 9,950,000
In kind contributions	
• UNDP:	$ 50,000

	Name	Title	Signature	Date
Agreed by Government: MINCEX	Alex Nuñez Mordoche	Directora		10/6/2011
Agreed by Implementing partner: CITMA	Mario Abó Balanza	Director		9-6-2011
Agreed by UNDP:	BARBARA PESCE KK			14-06-11