**Project Proposal:** “Avoided Deforestation through the Payment for Environmental Services Program in Humid Forests located in Private Lands in the Conservation Area of the Central Volcanic Mountain Range (ACCVC) of Costa Rica”

September, 2006.
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### A. General Information

<table>
<thead>
<tr>
<th>Project Name</th>
<th>“Avoided Deforestation through the Payment for Environmental Services in Humid Forests located in Private Lands in the Conservation Area of the Central Volcanic Mountain Range (ACCVC) of Costa Rica”</th>
</tr>
</thead>
</table>
| Name of the Organizations proposing the project | National Institute for Biodiversity (INBio)  
Fondo Nacional de Financiamiento Forestal (FONAFIFO)  
Foundation for the Development of Costa Rican Volcanic Mountain Range (FUNDECOR) |
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www.fonafifo.com  
www.fundecor.org |
| Required Funding | US$ 9,675,370 (Nine million six hundred seventy-five thousand three hundred seventy) |
| Funding from other sources | - |
| Project Total Cost | US$ 9,675,370 |
| CO₂ Compensation (project life) | 1,935.074 toneladas métricas de CO₂ (527,268 toneladas de carbono). |
| Type: | Gold Offset Carbon |
| Price per compensated CO₂ ton | 5 US$ |
| Date for project construction | 2006 |
| Project Start Date | 2007 |
| Project Life Span (in years) | 10 years |
B. **Project Description**

The project proposal proposes the avoided deforestation in 3680 hectares of forest located in private property through the Payment for Environmental Services Program (PES). It would represent approximately 1,935,073 metric tons of carbon dioxide (CO₂) not-emitted to the atmosphere as a result of a change in the land use in these areas.

The Project will protect 12,000 hectares of private land with forest located in the Central Volcanic Mountain Range in Costa Rica, during a 10 year period, under the PES mechanism. During its first five years, the implementation of this Project will have 24% of the area’s total under the PES system and the next five years, 40% of the total area.

The project promotes the reduction of deforestation, protection of biodiversity, protection of the water resource and protection of the areas neighboring the National Parks necessary to maintain the biological integrity; all of this under the Payment for Environmental Services Program (PES) existing in the country and in combination with the private efforts to protect forest areas. It proposes the establishment of mechanisms that make it possible to ensure the existence of these forests during a 10 year period. In order to fulfill these objectives, the project requires an investment of US$ 9,675,370 (nine million six hundred seventy-five thousand three hundred and seventy dollars).

The project will be implemented by the **Fondo Nacional de Financiamiento Forestal** (FONAFIFO), Foundation for the Development of Costa Rican Volcanic Mountain Range (FUNDECOR) and the **National Institute of Biodiversity** (INBio). FONAFIFO is a fund created within Costa Rica’s Forestry Law Nº 7575 to implement forest conservation programs, natural regeneration, creation of forestry plantations and agroforestry systems, forestry nurseries, forestry industry and credits, including the PES Program as well. This fund will be responsible to pay the producers or land owners who enter the program for their environmental services.

The National Institute of Biodiversity of Costa Rica (INBio [www.inbio.ac.cr](http://www.inbio.ac.cr)), is a private research and biodiversity management center created in 1989 to support the efforts being made to learn about the country’s biodiversity and promote its sustainable use. The organization works under the premise that the best way to save biodiversity in the long term is to take advantage of the opportunities it offers to improve the quality of life of the Costa Rican society within the frame of institutional sustainability and the uses it is given. INBio will monitor the biodiversity in the project area.

The Foundation for the Development of Costa Rican Volcanic Mountain Range (FUNDECOR) is a non-governmental organization founded in 1989 to protect and develop the forests in Costa Rica’s Central Volcanic Mountain Range. The forest cover of this territory is one of the largest in the country and encompasses many of the National Parks in the country. This NGO will be responsible for promoting the project and conducting the required technical studies so the producers can enter the PES Program as stated in the procedures manual annually developed by FONAFIFO for the Program’s execution and implementation.
C. Description of the project area

The following map shows the proposed area for the project’s development. The Guacimo and Pococi aquifers are located within the project area as well as part of the Forestry Reserve of the Central Volcanic Mountain Range and borders with Braulio Carrillo, Irazú Volcano and Turrialba Volcano National Parks. Annex 2 contains a more detailed description of the biophysical characteristics of the zone where the project is located.

Map 1. Location of the proposed project area in the Central Volcanic Mountain Range.

A potential of 24,438 hectares was estimated within the project’s limit for the development of the proposal, which are distributed in 6 Life Zones according to Holdridge’s classification. Table Nº 1 presents the number of hectares located in each one of these ecosystems which excludes protected areas.
Table 1. Number of hectares according to life zones present in the Project

<table>
<thead>
<tr>
<th>Type of Ecosystem</th>
<th>Hectares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Humid Tropical Forest</td>
<td>7651</td>
</tr>
<tr>
<td>Very Humid Premontane Forest</td>
<td>-</td>
</tr>
<tr>
<td>Premontane Pluvial Forest</td>
<td>9.297</td>
</tr>
<tr>
<td>Low Montane Pluvial Forest</td>
<td>6.362</td>
</tr>
<tr>
<td>Montane Pluvial Forest</td>
<td>1.127</td>
</tr>
</tbody>
</table>

Source: FUNDECOR 2006.

The area selected for the project is an important site to maintain the determining ecological processes of environmental goods and services which are fundamental for society. The selected area connects three National Parks (Braulio Carrillo, Irazú and Turrialba) and two of the most important aquifers in the Atlantic region (Guácimo and Pococí). This helps to reduce the fragmentation of habitats and degradation of ecosystems and as a result, maintain the biological function of the landscape outside the areas of absolute protection.

D. Quantifying carbon

In order to develop this project, a base line was defined making it possible to have a point of comparison through time of the impact this project needs to have in this area.

D.1. Base Line

The project’s base line is calculated from the cover studies conducted in the country for the years 2000 and 2005 which made it possible to identify the gross and net rate of deforestation in the area of the study as well as the record of PES contracts executed and implemented by FONAFIFO for the 2001-2006 period.

D.2. Definition of forests.

With respect to the forestry sector (Law Nº 7575), national legislation defines forest as “a native or indigenous ecosystem, intervened or not, regenerated through natural succession or other forestry techniques, which occupies an area of two or more hectares, characterized by the presence of mature trees of different ages, species or different sizes, with one or more canopies that cover more than 70% of this surface and where there are more than sixty trees per hectare measuring fifteen or more centimeters in diameter measured from chest height (DAP)’’.

D.3. Deforestation

Traditionally, deforestation is recognized as a condition that represents the loss of land cover where it used to exist and which has a direct influence on human activity.

In the document, “State of the World’s Forests” by FAO, 1995, deforestation is defined as a “variation in forests with a depletion of tree crown cover of at least 10%” (FAO, 1995).
D.4. Calculation of avoided emissions

A forest cover analysis was performed in the proposed area of study for the 2000-2005 period which made it possible to quantify the cover area as well as the deforested area and observe the changes which occurred in the period. Of the total hectares present with cover, protected areas were excluded since they already under some category of protection.

The following Tables 2 and 3, present the distribution of use of land by life zone for the year 2000 and 2005.

**Table 2.** Land Use in the project area per life zone, year 2000.

<table>
<thead>
<tr>
<th>Use</th>
<th>bmh-P (Basal)</th>
<th>bmh-T (Prem)</th>
<th>bp-M</th>
<th>bp-MB</th>
<th>bp-P</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Forest</td>
<td>53</td>
<td>411</td>
<td>5.010</td>
<td>1.015</td>
<td>4.618</td>
<td>7.509</td>
</tr>
<tr>
<td>Secondary Forest</td>
<td>0</td>
<td>49</td>
<td>113</td>
<td>121</td>
<td>28</td>
<td>52</td>
</tr>
<tr>
<td>Crops and pastures</td>
<td>118</td>
<td>742</td>
<td>4.248</td>
<td>698</td>
<td>781</td>
<td>788</td>
</tr>
<tr>
<td>Pasture with Trees</td>
<td>6</td>
<td>60</td>
<td>204</td>
<td>0</td>
<td>257</td>
<td>13</td>
</tr>
<tr>
<td>Scrublands</td>
<td></td>
<td></td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denuded Soil</td>
<td>19</td>
<td>30</td>
<td>1</td>
<td>17</td>
<td>67</td>
<td></td>
</tr>
<tr>
<td>Water bodies</td>
<td>7</td>
<td>96</td>
<td>1</td>
<td></td>
<td>104</td>
<td></td>
</tr>
<tr>
<td>Reforestation/Recovery</td>
<td>8</td>
<td>46</td>
<td>1.214</td>
<td>34</td>
<td>418</td>
<td>1.751</td>
</tr>
<tr>
<td>Clouds /No data</td>
<td>155</td>
<td>858</td>
<td>3.120</td>
<td>2.911</td>
<td>7.044</td>
<td>7.044</td>
</tr>
<tr>
<td>Other uses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>185</strong></td>
<td><strong>1.333</strong></td>
<td><strong>11.071</strong></td>
<td><strong>2.739</strong></td>
<td><strong>8.836</strong></td>
<td><strong>11.708</strong></td>
</tr>
<tr>
<td><strong>% coverage no clouds</strong></td>
<td>0.33</td>
<td>0.38</td>
<td>0.58</td>
<td>0.62</td>
<td>0.82</td>
<td>0.91</td>
</tr>
<tr>
<td><strong>Cover + cloud prop</strong></td>
<td>61</td>
<td>506</td>
<td>6.427</td>
<td>1.704</td>
<td>7.229</td>
<td>10.619</td>
</tr>
</tbody>
</table>

Source: FUNDECOR 2006.
Table 3. Land Use in the project area per life zone, year 2005.

<table>
<thead>
<tr>
<th>Use</th>
<th>bmh-P (Basal)</th>
<th>bmh-T</th>
<th>bmh-T (Prem)</th>
<th>bp-M</th>
<th>bp-MB</th>
<th>bp-P</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Forest</td>
<td>552</td>
<td>6.026</td>
<td>413</td>
<td>5.937</td>
<td>8.854</td>
<td></td>
<td>21.781</td>
</tr>
<tr>
<td>Secondary Forest</td>
<td>72</td>
<td>726</td>
<td>175</td>
<td>284</td>
<td>314</td>
<td></td>
<td>1.571</td>
</tr>
<tr>
<td>Crops and pastures</td>
<td>487</td>
<td>2.852</td>
<td>32</td>
<td>76</td>
<td>373</td>
<td></td>
<td>3.821</td>
</tr>
<tr>
<td>Pasture with Trees</td>
<td>1</td>
<td>20</td>
<td>99</td>
<td>89</td>
<td>164</td>
<td></td>
<td>372</td>
</tr>
<tr>
<td>Scrublands</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denuded Soil</td>
<td>36</td>
<td>169</td>
<td></td>
<td>4</td>
<td>12</td>
<td></td>
<td>220</td>
</tr>
<tr>
<td>Water bodies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reforestation/Recovery</td>
<td>5</td>
<td>132</td>
<td></td>
<td>2</td>
<td>12</td>
<td></td>
<td>151</td>
</tr>
<tr>
<td>Clouds/No data</td>
<td>185</td>
<td>136</td>
<td>1.059</td>
<td>2.010</td>
<td>2.444</td>
<td>1.980</td>
<td>7.814</td>
</tr>
<tr>
<td>Other uses</td>
<td>44</td>
<td>87</td>
<td>11</td>
<td>0</td>
<td></td>
<td></td>
<td>142</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>185</strong></td>
<td><strong>1.333</strong></td>
<td><strong>11.071</strong></td>
<td><strong>2.739</strong></td>
<td><strong>8.835</strong></td>
<td><strong>11.709</strong></td>
<td><strong>35.872</strong></td>
</tr>
<tr>
<td>% coverage no clouds</td>
<td>0.00</td>
<td>0.53</td>
<td>0.69</td>
<td>0.81</td>
<td>0.97</td>
<td>0.94</td>
<td>0.84</td>
</tr>
<tr>
<td>Cover + cloud prop</td>
<td>-</td>
<td>701</td>
<td>7.612</td>
<td>2.207</td>
<td>8.602</td>
<td>11.048</td>
<td>30.049</td>
</tr>
</tbody>
</table>

Map 2. Land use in the project area at 2005 year.

The study, “Estimate of the amount of carbon stored and captured (air mass) by the forests of Costa Rica”, made it possible to determine the biomass potential present in the life zones according to the soil use. A pondered average was then obtained of biomass per hectare for the estimates of avoided deforestation. The following table shows the data used for the proposal.
Table 4. Type of forests per life zone present in the project area

<table>
<thead>
<tr>
<th>Life Zone</th>
<th>Area (ha)</th>
<th>Biomass (Tm ha⁻¹)</th>
<th>Carbon (Tm ha⁻¹)</th>
<th>Pondered Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Humid Tropical Forest</td>
<td>701</td>
<td>324</td>
<td>162</td>
<td>5</td>
</tr>
<tr>
<td>Premontane Very Humid Forest</td>
<td>-</td>
<td>276</td>
<td>138</td>
<td>-</td>
</tr>
<tr>
<td>Very Humid Tropical Forest Transition to Premontane</td>
<td>6,950</td>
<td>324</td>
<td>162</td>
<td>46</td>
</tr>
<tr>
<td>Premontane Rain Forest</td>
<td>9,297</td>
<td>254</td>
<td>127</td>
<td>48</td>
</tr>
<tr>
<td>Low Montane Pluvial Forest</td>
<td>6,362</td>
<td>295</td>
<td>148</td>
<td>38</td>
</tr>
<tr>
<td>Montane Pluvial Forest</td>
<td>1,127</td>
<td>254</td>
<td>127</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>24,438</strong></td>
<td><strong>254</strong></td>
<td><strong>127</strong></td>
<td><strong>143</strong></td>
</tr>
</tbody>
</table>

Source: FUNDECOR 2006.

For the 1999-2005 period in the project area, a total of 7,193.24 hectares have been placed under the Payment for Environmental Services. The following table shows how the number of areas placed under the Payment for Environmental Services program has decreased possibly because there are less resources available in the national budget which impedes important areas to be covered since the distribution must be balanced for all existing offices nationwide.

For the period defined as the project’s base line (2001-2006), there is a total of 5,163 hectares of private land in the project area submitted under the category of forest protection through the Payment for Environmental Services Program existing to date.

Table 5. Forest hectares submitted under the PES Program for the 2001-2005 period.

<table>
<thead>
<tr>
<th>Year</th>
<th>Hectares</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>620</td>
</tr>
<tr>
<td>2002</td>
<td>648</td>
</tr>
<tr>
<td>2003</td>
<td>2,530</td>
</tr>
<tr>
<td>2004</td>
<td>781</td>
</tr>
<tr>
<td>2005</td>
<td>284</td>
</tr>
<tr>
<td>2006</td>
<td>300</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5,163</strong></td>
</tr>
</tbody>
</table>

Source: FONAFIFO, 2006

In order to estimate the level of threat of deforestation in the project area, the model developed by FUNDECOR was developed which projects the gross deforestation under different PES scenarios in different types of forest according to public and private values.
The methodology’s objective is to isolate the PES effect from other possible variables that could affect deforestation in a region or zone and use the PES, its level and spatial distribution as the country’s political variable for the production of environmental services in private forests.

According to observations, the specified model explains 84% (R² 0.84) of quarterly gross deforestation variability (1996 al 2000) in 19 regions of the Central Volcanic Mountain Range and the estimated parameters are the expected type and significant by 98%. This is strong evidence of PES’ contribution to reduce the country’s deforestation (FUNDECOR, 2006).

The model uses an average critical element which is directly related to the closeness of roads and topography of the areas which also determine the cost of opportunity. The average critical element in the project area was 34% (0.34).

Once all the previously described actions took place, the current scenario and the scenario with the project was developed; the former proposes to avoid deforestation in the existing forests with PES contracts in 40% of the project’s total area by the end of 10 years which is very significant if one compares the current PES levels in the area which currently represent 6%.

Under the current scenario or base line, the PES Program could only maintain 5,163 hectares in 5 years with the resources it currently has, decreasing to 1,800 hectares the remaining five years until the 10 years are completed. This represents a deforestation of 6,160 hectares in 10 years (2,822 hectares the first five years and 3,339 hectares the remaining years).

The implementation of this project proposes the inclusion of 12,000 hectares to the PES Program in the first five years; during the remaining five years, these areas will remain the same until the project’s 10 years are completed. During the first five years, the deforestation in the project area will be 1,813 hectares and then reduced to 669 hectares in the next five years. This is an avoided deforestation of 3,680 hectares and an total of 1,935,074 metric tons of CO₂ not cast to the atmosphere in a 10 year period.

E. Risks

The project area is surrounded by three National Parks: Braulio Carrillo to the East; Turrialba and Irazu Volcano to the South. Part of the buffer zone of these national parks is found in the project area where it is important to develop actions which tend to guarantee forest cover since the push of the agricultural front and population growth are factors that influence deforestation in these areas which could cover basic needs of food, housing, etc.

The risk associated to the project entity-wise is minimal since FONAFIFO developed the PES program 10 years ago during which time the application of resources has been successful; the country’s forest cover has increased 50% by 2005, in part, due to the Program. It has a monitoring and internal evaluation system which has guaranteed the execution of resources. This system would also apply to the proposed activity besides what would be achieved with the sale of certificates.
F. Additional Data

Currently, Costa Rica implements the Payment for Environmental Services (PES) which has been financed with resources destined by the State (3.5%) as a result of the fuel tax, specially, besides the loans and donations from international organizations. Through the implementation of the PES Program, FONAFIFO has developed its technical and administrative capacity to promote conservation and reforestation activities.

However, the resources are not enough to cover the offer of farms nationwide which could be included in the PES Program. The land owners with forest in the land located in these rural areas slowly deforest these lands since the conditions are not sufficiently favorable for a family to live on and satisfy their basic needs, degrading areas with important specimens and with water potential for the surrounding communities.

FONAFIF could pay the land owners with cover for the environmental services generated by the conservation of these areas through the sale of certificates for avoided deforestation (non-emitted CO$_2$); furthermore, the generation of additional environmental services derived from forest ecosystems.

G. Owners

The project develops in private property lands; therefore, FONAFIFO will not acquire lands. The project participants will be land owners who have property titles and cadastral plans or who can prove their possession of the land and are willing to sign a contract with the State through FONAFIFO.

The proprietors or land owners will sign a PES contract with FONAFIFO which establishes that owners will yield their non-emitted carbon rights by the ecosystems to FONAFIFO and in exchange, the farmers will receive an annual payment from the Fund for the environmental services produced by them including the environmental service for carbon avoided deforestation.

Once FONAFIFO signs the contracts with the land owners, it conducts an afectacion of the farm so that the persons who submit their lands to the program are identified with contracts with the State in the Real Estate Record Office. Each year, before disbursement, the land owner farms are visited to verify that the planned activities are being carried out and that vegetable cover exists.

H. Project Costs

The following costs must be considered:

5 Payment for Environmental Services (non-issued CO$_2$)

The project covers the payment to land owners with forest in conformity with the amount established in the procedures manual established annually by FONAFIFO for the PES. The amount to the date of the project creation is US$64 per hectare submitted to the PES category for forest protection. The contracts will be for 10 years.
s Administrative Costs
In order to comply with the project’s objectives, FONAFIFO will retain 10% of the total amount in order to cover its administrative costs to implement the PES program (signing contracts with beneficiaries, farm inspection, administrative management of the areas, etc.) as well as the administration of resources and the project’s operational costs.

s Promotion of Areas
The Foundation for the Development of Costa Rican Volcanic Mountain Range will be in charge of promoting the Project to identify and incorporate PES Program owners in the area.

FUNDECOR has established an amount of 15US$ for each hectare submitted to the PES Program located in the project’s established limit.

s Monitoring Biodiversity
The National Institute of Biodiversity will be responsible for carrying out a plan to monitor the existing biodiversity in the Project Area. Four monitorings will take place during the project’s life span. The years defined for these monitorings are: one at the beginning which will establish the base line and the remaining three which will take place during years 4, 7 and 10. Three indicators will be monitored: diversity of plants related to wealth (number of species) and abundance (number of individuals per species); diversity of key bird species which will make it possible to detect changes in the bird’s biodiversity through composition (wealth of species) and structure (relative abundance of species) of the comunidad diurna of birds in time for each evaluated farm; and diversity of dung beetles, these are groups of organisms whose diversity measurements reflect diversity measurements of other groups in a habitat or determined ecosystem (McGeoch 1998). INBio developed a biodiversity monitoring protocol for FONAFIFO which will be executed in this project.

Cost: US$ 27.500 for each monitoring.

Within the proposed monitoring plan, INBio considers it very important to publish the monitoring report with the study’s more relevant aspects. Each publication has a cost of US$5000. These reports will be elaborated after each monitoring.

s Project Verification
The project verification will be performed by FUNDECOR during the same years the monitorings will take place.
I. Budget

<table>
<thead>
<tr>
<th>Activity</th>
<th>Amount (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishment and implementation of PES</td>
<td>7,680,000.00</td>
</tr>
<tr>
<td>Project Administration</td>
<td>967,537.00</td>
</tr>
<tr>
<td>Project Promotion</td>
<td>180,000.00</td>
</tr>
<tr>
<td>Project Monitoring</td>
<td>130,000.00</td>
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<tr>
<td>Project Verification</td>
<td>137,000.00</td>
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<tr>
<td>Contingency expenses 6%</td>
<td>580,800.00</td>
</tr>
<tr>
<td>Total</td>
<td>US$ 9,675,370</td>
</tr>
</tbody>
</table>

J. Project administration mechanism

FONAFIFO will be the institution responsible for managing the proposed project. The resources will be disbursed directly to FONAFIFO who, in turn, will present the reports to the donor, with the previous support of the participating institutions, according to the responsibilities established in the letter of agreement signed by each of the parties (INBio, FUNDECOR), which will establish the commitments and responsibilities under which the project will be executed. Furthermore, it will be responsible for distributing the financial resources to the institutions which are part of the proposal, according to the conditions established in the letter of agreement.
FUNDECOR and INBio submit reports to FONAFIFO of the project monitorings and verification.

FONAFIFO present reports every three years to the donor for disbursement.

PES Program execution and implementation

FUNDECOR and INBio submit reports to FONAFIFO of the project monitorings and verification.
K. **Timetable**

<table>
<thead>
<tr>
<th>Activities</th>
<th>Responsible</th>
<th>Years</th>
</tr>
</thead>
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<tr>
<td>Payment for Environmental Services to Forests</td>
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<td>1</td>
</tr>
<tr>
<td>Program’s Promotion</td>
<td>FUNDECOR</td>
<td></td>
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<tr>
<td>Monitoring Biodiversity</td>
<td>INBio</td>
<td></td>
</tr>
<tr>
<td>Verification</td>
<td>FUNDECOR</td>
<td></td>
</tr>
</tbody>
</table>

L. **Co-beneficiaries**

The main environmental benefit of the project is its permanence and guarantee of forest cover in 12,000 hectares of land which are currently in private hands with limitations to its change of use but exposed to deforestation to cover basic needs. These new forests will provide fresh material for neighboring areas stripped of vegetation, promote the reduction of illegal deforestation in the area and damage to the remaining natural forest. From a biological point of view, it will maintain the integrity of habitats, ecosystems and biological function of the landscape outside of the absolute protection areas and contribute to maintain the sustainable flow of goods and services to benefit society.

There will also be a generation of additional environmental services derived from the forest ecosystems, such as biodiversity, water resources and scenic beauty and mitigation of natural disasters. The local benefits for the community are better income for families as the local rural economy is improved, generation of employment and protection of water resources.

M. **Bibliography**

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Estimate of the amount of carbon stored and captured (air mass) by Costa Rica’s Forests. PROARCAS – CAPAS. Julio 1998.


[www.una.ac.cr/ambi/telesig/](http://www.una.ac.cr/ambi/telesig/)


Annex 1.

**Description of submitting organizations**

**Fondo Nacional de Financiamiento Forestal (FONAFIFO)**

FONAFIFO was created in Article 46 of Forestry Law Nº 7575, published on April 16, 1996. It is classified as a decentralized organ within the organizational structure of the State’s Forestry Administration under the Ministry of Environment and Energy (MINAE), as long as the aforementioned law provides relative autonomy, but giving it instrumental corporate status.

It is authorized to conduct any type of non-speculative legal business required for the due administration of its net worth resources; it is even allowed to create trust funds. Furthermore, in compliance of Forestry Law Nº 7575, FONAFIFO has a Board of Directors to fulfill its functions, formed by three members of the public sector and two from the private sector in accordance to what stipulated in article 48 of the aforementioned Law.

The Fund’s main objective is to “finance the management of forests, intervened or not, reforestation processes, forestation, forestry nurseries, agroforestry systems, recovery of denuded areas and technological changes for the use and industrialization of forestry resources, for the benefit of small and medium producers.

It can also attract funding for the Payment of Environmental Services offered by the forests, forestry plantations and other necessary activities to strengthen the development of the natural forestry sector.”

The Fund is divided into four areas: Administrative, Environmental Services, Resource Management and Credit (a total of 47 staff members to May 2006). FONAFIFO is responsible for implementing the PES program nationwide, with an annual budget of US$15 million.

FONAFIFO has plenty of experience in planning and implementation and development of projects in the forestry sectors, such as:

**Ecomarkets Project:** The objective of this project was to increase forest conservation in Costa Rica supporting the development of markets and the offer of environmental services to the private sector related to carbon sequestration and the reduction of carbon emissions, biodiversity conservation, scenic beauty and water services. The budget for this project was US$32.6 million from the Interamerican Development Bank (IDB [loan]); Global Environmental Facility, US$8 million (donation); counterpart of the Costa Rican government, US$8.6 million.
**KfW project:** It includes the financial cooperation of the German Bank, KREDISTANSTALT für WIEDERAUFBAU COOPERACION. The project’s objectives are to improve the net balance of CO2 emissions in Costa Rica and generate other positive externalidades ranging from forestry lands including the management of natura forests and forestry plantations. The budget for this project includes US$11.8 million from the German government and close to US$3.1 million for the Costa Rican government.

On the other hand, FONAFIFO is developing a project to reactivate reforestation nationwide (Reforesta project) financed through a donation of US$302,000 from PHRD.

**National Institute of Biodiversity (INBio)**

The National Institute of Biodiversity of Costa Rica (INBio, www.inbio.ac.cr), is a private research and biodiversity management center created in 1989 to support the efforts being made to learn about the country’s biodiversity and promote its sustainable use. The organization works under the premise that the best way to save biodiversity in the long term is to take advantage of the opportunities it offers to improve the quality of life of the Costa Rican society within the frame of institutional sustainability and the uses it is given.

It is a non-governmental, non-profit civil organization with a public interest purpose. It works closely different governmental entities, universities, business sector and other public and private entities in and out of the country.

During the last five years, they have managed an annual budget close to US$6 million with approximately 200 people on staff. Close to 50% of the budget is generated through the sale of goods and services.

INBio’s mission is to “promote a greater awareness of the value of biodiversity to ensure its conservation and improve the quality of life of human beings”.

The institution’s main focus consists of gathering, processing, presenting and transferring information and knowledge to society on the country’s biodiversity. This focus is implemented through the interrelation of the following actions:

**Bioliteracy:** Shares information and knowledge on biodiversity with different sectors (decision makers, public in general, tourists, teachers, students, etc.) seeking to increase awareness on the value of biodiversity and in turn, influence changes in behavior that benefit conservation.

**Inventory and Monitoring:** Generates and captures information on the diversity of the country’s species and ecosystems. It applies different aspects of scientific methodologies such as systematic, ecology, biogeography, bioinformation and geographic information systems. It also establishes the base line and develops monitoring programs for the different biodiversity elements.
Bioinformation: Develops and applies information tools to support the capture, generation, administration, analysis and dissemination of biodiversity. As a result of the use of these tools, a greater efficiency in processes is expected, greater quality in products and strengthening of the institution’s innovative profile worldwide.

Conservation: Integrates information generated and managed by INBio, decision-making processes for the protection and sustainable use of biodiversity from both the public and private sector. It implies the establishment and administration of communication networks with the conservation and productive sector as well as information processing, adding the required value to promote responsible decision-making.

Bioprospecting: Uses scientific and modern technological focus in the search for sustainable uses and commercial application of genetic and biochemical resources of Costa Rican biodiversity, of interest for the chemical, pharmaceutical, agricultural and biotechnological industry.

Economic Value: Determines biodiversity’s contribution to the country’s economic and social development through the goods and services it offers. It involves establishing a network of contributors for the development of research in the area of ecological economy as well as the design of quantifying mechanisms and payment and charging for environmental services.

Foundation for the Development of Costa Rican Volcanic Mountain Range (FUNDECOR)

The Foundation for the Development of Costa Rican Volcanic Mountain Range is a non-governmental organization founded in 1989 to protect and develop the forests in Costa Rica’s Central Volcanic Mountain Range. The forest cover of this territory is one of the largest in the country and encompasses many of the National Parks in the country.

FUNDECOR’s mission is to protect the natural resources of the Costa Rican central mountains and its surrounding areas through the application of sustainable strategies based on the market as well as scientific knowledge and state of the art technologies of the country’s public policies in the conservation field.

The conceptual base of this mission is that conservation and productive development must co-exist in harmony. With this mission in mind, FUNDECOR designed a strategy to create profitable market alternatives for forest owners, and at the same time, respecting and strengthening the existing property structure of small farms. In this process, FUNDECOR has created the conditions so that small forest owners can take advantage of these new environmental markets and increase their income.

This incorporation of informal economic activities of Costa Rican small forest owners into formal economic sectors, local and global, was possible through the links created by FUNDECOR between forest owners and local and global economic communities; first, with the international community through projects of joint implementation; second, with the local economic sector through the participation in the production of hydroelectric energy; and third, with global corporations through the production of sustainable wood to supply forestry industries and through the access to global standards for forest sustainable management such as the environmental certification (Green Seal) of the Forest Stewardship Council.
Particularly, FUNDECOR created the basis for the creation of carbon drain world market. The CARFIX project which gave rise to this global market is recognized worldwide as the first joint implementation project for the international negotiation of the reduction of gases resulting from the greenhouse effect. Likewise, FUNDECOR designed and organized the Costa Rican Office of Joint Implementation, through which the Costa Rican government sold $2,000,000.00 in carbon reduction to the Norwegian government; this event showed the world that the global market for environmental services was feasible.

It is important to highlight the following activities implemented by FUNDECOR with the forest owners:

- Elaboration of sustainable forest management plans, transfer of technology and technical support to guarantee the sustainable supply of wood.
- Gives forest owners a cash flow for their wood production through a system designed by FUNDECOR denominated Payment in Advance for Wood.
- Sales the produced wood in auctions designed to guarantee forest owners the highest market prices for their production.
- Cooperates with investors in hydroelectric production projects protecting watersheds where the projects are located, compensating owners of forestry properties for the service of protecting their forests in the areas surrounding the hydroelectric plants.
- Executes environmental education programs with elementary and high school students in the country’s public and private educational centers.
- Creates market mechanisms to add more value to forest sustainably managed.
- Supports MINAE in the control of illegal logging with the use of state of the art technology such as georeference with GPS (Global Positioning Systems)
- Supports forest and forestry plantations owners in the marketing of their wood.
- Activities to transfer technology at an international level.

FUNDECOR has signed more than 500 agreements with small forest owners to provide them with the needed technical assistance to manage their forests with the highest standards of environmental sustainability. The total extension of lands under agreement with FUNDECOR is approximately 50,000 hectares. The direct beneficiaries of FUNDECOR’s projects are close to 2,600 people considering the the average families of forest owners consists of approximately 5.2 members. The indirect beneficiaries of FUNDECOR’s activities include close to 40,000 national and international tourists who annually visit the National Parks of the Central Volcanic Mountain Range.

Other indirect beneficiaries are the Costa Rican sustainable forestry industry and 50% of the population that lives in the Central Valley and who benefits from the water and energy projects designed by FUNDECOR and implemented by the region’s private companies.
Annex 2

Information of the area where the proposed project is located

The area proposed for the project is located in the Conservation Area of the Central Volcanic Mountain Range (ACCVC, acronym in Spanish), specifically in the Forestry Reserve of the Central Volcanic Mountain Range (RFCVC, acronym in Spanish), located in the provinces of San Jose and Limon. The RFCVC has an extension of 60,797 hectares. This area is very important because of its hydrological and ecological potential; the Guacimo and Pococi aquifers.

These aquifers supply water to the cantons of Guacimo and Pococi which have a population of 38,466 and 114,017, respectively (INEC, 2006). According to the deforestation rate reported for the area, the forests present in this area would have been felled, threatening the supply of this vital liquid to the inhabitants of the region; because these waters are superficial, they are more fragile.

The creation of protected wildlife areas as a means of protecting aquifers makes it possible to permanently develop the area and protect some wildlife species while having the forest play an important role as a carbon dioxide filter (SINAC, 2006).

According to the study “Evaluation of the vulnerability to the contamination of underground water in Costa Rica: An approximation using the DRASTIC model and Geographic Information Systems“, conducted by the Universidad Nacional’s GIS department, one of the areas with the highest vulnerability is located in the north west sector of the Central Volcanic Mountain Range and in the Guaplies-Guacimo and Siquirres aquifers.

According to the study elaborated by Fallas for FONAFIFO, 2006, the area where the project is located is one of the areas with highest infiltration potential and with an annual average production capacity which ranges between 2195-2796 mm.

The ACCVC has a very rich ecosystem due to the climate and topographical variations. According to Holdridge’s Life Zones classification, the Conservation Area has nine out of the 12 life zones described for the country and seven of the eight existing transitional zones. Map 2 shows the life zones present in the project’s area.
Map 3. Holdridge’s Life Zones present in the proposed project’s area.
Twenty-five percent of the territory corresponding to the ACCVC total is under some type of management category. These protected wildlife areas have the greatest biological diversity of the Conservation Areas.

The National Biodiversity Study (1999) indicates that the ACCVC, given its topographical characteristics, temperature, rain pattern and location in the national territory, is one of the most important regions in the country with respect to endemism, mainly in the group of land vertebrates whose endemism represents 80.7% of the endemic species in the country, particularly in the highest areas of the Mountain Ranges. It also points out a rich herpetofauna (28 species) mainly salamanders. The same study indicates that the ACCVC is one of the regions in country with the highest number of water fowl (INBio, 2006).

Some endemic species described are: the hummingbird (*Elvira cupreiceps*), the toad (*Bufo holdrige*); oak (*Quercus tonduzii*), located in the upper sector of the Poas and Barva volcanoes; and the species of the gymnosperm group, *Prumnopitys standleyii*; furthermore, the pine fern (*Podocarpus macrostachyus*) and a species of butterfly (*Automeris kopturae*). The following map presents endemic centers identified in the country where it is possible to observe that the area colored dark green is the area corresponding to the Central Volcanic Mountain Range.

**Map 4. Endemic Centers identified in Costa Rica**
There are some areas within the Conservation Area which reflect a high biodiversity. For example, the Braulio Carrillo National Park (47.582.56 hectares) have registered 6,000 plant species, 50% of the species expected for the whole country; and 515 species of resident and migratory birds, 60.5% of the total of birds recorded in Costa Rica.

In the Northern sector (La Selva Protective Zone), there have been reports of 2,000 species of plants, of which 400 are trees; 400 species of birds, 116 species of mammals, 123 species of amphibians and reptiles; 43 species of sweet water fish and 1,600 species of insects.

According to the National Institute of Biodiversity (INBio, 1998), more than 50 species of plants are endemic in the ACCVC. Some of the species of flora and fauna have been identified in the ACCVC.

**Flora:**

The cloud forest shows species such as oak (*Quercus costarricensis*), azahar de monte (*Clusia odorata*), pine fern (*Podocarpus oleifolius*), helecho lengua (*Elaphoglossum lingua*), type of bush (*Vaccinium sp.*), canopy tree (*Didymopanax pittieri*), ciprecillo (*Escallonia mylloides*), wild apple (*Ardisia sp.*), magnolia (*Magnolia poasana*) and white oak (*Quercus sp.*), epiphytes and other plants.

The vegetation in the highest parts (Irazu Volcano) is characteristic of the subalpine pluvial highlands, with species such as bushes (*Vaccinium sp.*) and oak (*Quercus oleoides*). There are patches of primary vegetation of montane rain forest with species of black oak (*Quercus sp.*), jaúl (*Alnus acuminata*), salvia (*Buddleia nitida*), matagente (*Oreopanax xalapensis*), lorito (*Weinmannia pinnata*), escalonia (*Escalonia poasana*), magnolia (*Magnolia poasana*), lengua de vaca (*Miconia sp.*) and poor man’s parasol (*Gunnera insignis*).

In the very humid tropical forest the species such as manú (*Caryocar costarricensis*), mahagony (*Swietenia macrophylla*), oak (*Quercus costaricensis*), caobilla (*Guarea rhopalacarpa*) and gavilán (type of forest tree) (*Pentaclethra macroloba*) are relatively abundant. There is also botarrama (*Vochysia ferruginea*), ceiba (*Ceiba pentandra*), yos (*Sapium pittieri*), lorito (*Weinmannia pinnata*) and ojoche (*Brosimum costaricanum*). Other species, however, are in danger of extinction such as pittier (*Peltogyne purpurea*), jícaro (*Crescentia alata*), sweet palm (*Iriartea deltoidea*) and geonoma (*Geonoma binervia*).
**Map 5.** Wildlife Protected Areas identified in Costa Rica with the greatest number of globally threatened flora species.

**Fauna:**

In the ACCVC, fauna is represented by approximately 150,000 species of insects, 550 species of birds, close to 150 species of mammals and more than 100 species of amphibians and reptiles. Among the most characteristic bird species found are the following: *mirlo montañero* (*Turdus plebeius*), *quetzal* (*Pharomachrus mocinno*), *reiinta garganta de fuego* (*Pacula gutturalis*), black guan (*Chamaepetes unicolor*), Emerald toucanet (*Aulacorynchus prasinus*) and several species of hummingbirds (*Trochilidae*); king vulture (*Sarcoramphus papa*), three-wattled bellbird (*Procnias tricolorculata*), balck faced solitaire (*Myadestes melanops*), sparrow (*Junco vulcani*), woodpecker (*Melanerpes formicivorus*), robin (*Turdus grayii*), toucans (*Ramphastos sulfuratus and swainsonii*), oropendolas (*Psarocolius montezuma*), blue crowned motmot (*Trogon sp.*), woodpeckers (*Melanerpes sp.*), squirrel cuckoo (*Piaya cayana*), ornate hawk eagle (*Spizaetus ornatus*) and green macaw (*Ara ambigu*), among others.
Among the species of mammals that one can cite are: white faced monkey (*Cebus capuchinus*), mono colorado (*Ateles geoffroyi*) and howler monkey (*Alouatta palliata*); tapir (*Tapirus bairdii*), puma (*Puma concolor*), jaguar (*Panthera onca*), white-lipped pecary (*Tayassu pecari*), anteater (*Tamandua mexicana*), hill goat (*Mazama americana*), rabbits (*Silvilagus brasiliensis*), coyote (*Canis latrans*), armadillo (*Dasypus novemcinctus*), porcupine (*Coendou mexicanus*), weasel (*Mustela frenata*), leopard (*Leo pardus*), red squirrel (*Sciurus granatensis*), sloth (*Choloepus hoffmanni and Bradypus griseus*), tayra (*Eira barbara*), kinkajous (*Potos flavus*), squirrels (*Sciurus sp.*), white-nosed coati (*Nasua narica*), tepezcuintle (*agouti paca*) and others.

**Mapa 6.** Wildlife Protected Areas identified in Costa Rica with the greatest number of globally threatened mammal species.