Forest Carbon Partnership Facility (FCPF)

Carbon Fund

Emission Reductions Program Idea Note (ER-PIN)

Country: Costa Rica: Revised February 15, 2013

FONAFIFO Disclaimer

This is a work in progress. FONAFIFO reserves the right to adjust this ER-PIN (for example, with regard to cost estimates, level of reference, monitoring events, or timeline of activities) as the implementation plan for the ER Program moves forward. A World Bank mission will be arriving shortly and will cooperate in the general revision of this document. In addition, consultations will be undertaken during this mission on the ER-PIN proposal. Meanwhile, FONAFIFO is developing the ER-PIN Financial Strategy, which will be discussed at a technical workshop on September 28, 2012, and it is currently revising and updating the REDD+ (R-PP) strategy. These new elements may be included in the ER-PIN presentation to the Carbon Fund on October 16 and 17.

World Bank Disclaimer

The World Bank does not guarantee the accuracy of the data included in the Emission Reductions Program Idea Note (ER-PIN) submitted by a REDD Country Participant and accepts no responsibility whatsoever for any consequence of their use. The boundaries, colors, denominations, and other information shown on any map in the ER-PIN do not imply on the part of the World Bank any judgment on the legal status of any territory or the endorsement or acceptance of such boundaries.

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Guidelines:

1. The FCPF Carbon Fund will deliver Emission Reductions (ERs) from activities that reduce emissions from deforestation and forest degradation, conserve forests, promote the sustainable management of forests, and enhance forest carbon stocks in developing countries (REDD+) to the Carbon Fund Participants.
2. A REDD Country Participant interested in proposing an ER Program to the Carbon Fund should refer to the selection criteria included in the Carbon Fund Issues Note available on the FCPF website (www.forestcarbonpartnership.org) and to further guidance that may be communicated by the FCPF Facility Management Team (FMT) over time.
3. ER Programs shall come from FCPF REDD Country Participants that have signed their Readiness Preparation Grant Agreement, using this ER Program Idea Note ('ER-PIN') template.
4. The completed ER-PIN should ideally not exceed 40 pages in length (including maps, data tables, etc.). If additional information is required, the FCPF FMT will request it.
5. Please submit the completed ER-PIN to: 1) the World Bank Country Director for your country; and 2) the FCPF FMT (fcpfsecretariat@worldbank.org).
6. As per Resolution CFM/4/2012/1 the Carbon Fund Participants' decision whether to include the ER-PIN in the pipeline will be based on the following criteria:
    i. **Progress towards Readiness:** The Emission Reductions Program (ER Program) must be located in a REDD Country Participant that has signed a Readiness Preparation grant agreement (or the equivalent) with a Delivery Partner under the Readiness Fund, and that has prepared a reasonable and credible timeline to submit a Readiness Package to the Participants Committee;
    ii. **Political commitment:** The REDD Country Participant demonstrates a high-level and cross-sectoral political commitment to the ER Program, and to implementing REDD+;
    iii. **Methodological Framework:** The ER Program must be consistent with the emerging Methodological Framework, including the PC's guiding principles on the methodological framework;
    iv. **Scale:** The ER Program will be implemented either at the national level or at a significant sub-national scale, and generate a large volume of Emission Reductions;
    v. **Technical soundness:** All the sections of the ER-PIN template are adequately addressed;
    vi. **Non-carbon benefits:** The ER Program will generate substantial non-carbon benefits; and
    vii. **Diversity and learning value:** The ER Program contains innovative features, such that its inclusion in the portfolio would add diversity and generate learning value for the Carbon Fund.

1. Entity responsible for the management of the proposed ER Program

Please provide the contact information for the institution and individual responsible for proposing and coordinating the proposed ER Program.

Name of managing entity	National Forestry Financing Fund (FONAFIFO)
Type and description of organization	**FONAFIFO is the coordinating organization of the ER Program and the REDD+ strategy** in Costa Rica. FONAFIFO is a governmental institution established by Forestry Act 7575 to finance the forestry sector and execute the payment and sale of environmental services (PES and CES). The Act stipulates the Fund's responsibilities and powers in the area of environmental services for the implementation of deforestation avoidance projects and initiatives to reduce emissions, mainly in terms of land use. FONAFIFO is in charge of creating links between markets of environmental services, forest owners, the forestry sector, PES implementers, governmental agencies, financial bodies, indigenous territories, national and international non-governmental organizations and national and international donors.
Main contact person	Jorge Mario Rodriguez Zuñiga
Title	Director General
Address	AV 7 C3 y 5 San José, Costa Rica
Telephone	(506) 22358475
Email	jrodriguez@fonafifo.go.cr
Website	www.fonafifo.go.cr

2. National REDD+ focal point contact information

Please provide the contact information for the institution and individual who serve as the national REDD+ Focal Point and endorses the proposed ER Program, or with whom discussions are underway

Name of entity	National Forestry Financing Fund
Main contact person	Alexandra Saenz Faerron
Title	Director, REDD Strategy
Address	AV 7 C3 y 5 San José, Costa Rica
Telephone	(506) 22358475
Email	asaenz@fonafifo.go.cr
Website	www.fonafifo.go.cr

2.1. Endorsement of the proposed ER Program by the national government

Please provide the written approval for the proposed ER Program by the REDD Country Participant's authorized representative (to be attached to this ER-PIN). Please explain if the national procedures for the endorsement of the Program by the national government REDD+ focal point and/or other relevant government agencies have been finalized or are still likely to change, and how this might affect the status of the attached written approval. ER Program) must be located in a REDD Country Participant that has signed a Readiness Preparation grant agreement (or the equivalent) with a Delivery Partner under the Readiness Fund, and that has prepared a reasonable and credible timeline to submit a Readiness Package to the Participants Committee

The Emission Reductions Program Idea Note (ER-PIN) in Costa Rica is managed by the office of the REDD+ Focal Point, and has been approved by the Office of the Minister of the Environment, Energy and Telecommunications, and by the Executive Office of FONAFIFO, which will oversee the REDD Executive Secretariat, responsible for managing and coordinating the REDD strategy and executing the Readiness Package (R-Plan).

It is important to note that the Governing Board of REDD+, the REDD Secretariat of FONAFIFO, the Executive Secretariat and the Interinstitutional Commission are in the process of being constituted. These bodies are included in the Costa Rican REDD R-Plan as being in charge of managing national "readiness," and will therefore be responsible for implementing this ER Program.

2.2. Political commitment

Please describe the political commitment to the ER Program, including the level of support within the government and whether a cross-sectoral commitment exists to the ER Program and to REDD+ in general

Attached is a note duly signed by the Minister of the Environment, Energy and Telecommunications (MINEAT) and attesting to the support of his office. For now, there are no formal agreements of support from other sectors; however, the REDD Strategy, and therefore this ER-PIN, are duly aligned with the various public environmental initiatives and policies concerning forestry resources, renewable energy, and sustainable agriculture.

3. Partners and other entities involved in the proposed ER Program

3.1. List of existing partner agencies and organizations involved in the proposed ER Program

Please list existing partner agencies and organizations involved in the development of the proposed ER Program or that have executive functions in financing, implementing, coordinating and controlling activities that are part of the proposed ER Program. Add rows as necessary

Name of partner	Contact name, telephone and email	Core capacity and role in the proposed ER Program
Governmental agencies		
Ministry of the Environment, Energy and Telecommunications		Institution in charge of the country's environmental policies
National System of Conservation Areas (SINAC)		Institution responsible for promotion of sustainable forestry management, cutting permits, and control of illegal logging on private land.
College of Agricultural Engineers - CIAgro		Institution supervising the professional work of forestry engineers in charge of implementing the activities of the ER Program such as PESP for forestry conservation, establishment and sustainable forestry management of forest plantations and natural forests, and advance marketing of wood
Implementers of REDD activities		
Forestry engineers and organizations (FUNDECOR, ASIREA, CODEFORSA)		Natural or legal persons devoted to identifying and recruiting forest owners interested in participating in PES. Their main functions are to provide technical and administrative support and supervision to landowners so that they may qualify for the PESP or Sustainable Forestry Management Projects for wood production. Examples are: FUNDECOR, the Association for the Sustainable Development of the Atlantic Region (ASIREA), Forest Development Commission of San Carlos (CODEFORSA), and independent forest regents.
Wood producers and environmental services providers		
Indigenous peoples		Owners of land for the development of REDD+ activities in indigenous territories, such as conservation of natural forests and natural regeneration, which will produce carbon rights, water and biological diversity by avoiding deforestation.
Landowners		Owners of land in privately owned areas for the development of activities aimed at conservation and sustainable management of natural primary and secondary forests and plantations that will produce wood and carbon rights, water and biological diversity by avoiding deforestation.
National Forestry Office (ONF)		Organization responsible for designing policies, legislation, and activities to improve

		the business environment for the implementation of sustainable forestry management.
Chamber of Forestry		Organizes reforesters and industrial forestry producers, to enhance their political impact and improve the business environment in the forestry sector.
Financial entities		
World Forest Foundation, Pension Funds		Investments in sustainable wood production as a profit-making business.
Ministry of the Interior and Ministry of Planning		Governmental entities in charge of maintaining coordination and financing of national development programs, including PESP.
Buyers of wood and environmental services		
Distributors of electricity, water and sewage services, public and private hydroelectric power companies		Purchasers of environmental services, such as water produced by avoided deforestation, as a measure to protect the quality and flow of water necessary for their operations, either for human consumption or energy production.
FCPF Carbon Fund		Provides incentives for emission reductions while protecting forests, conserving biodiversity, and strengthening the means of subsistence of local communities and forest-dependent indigenous peoples.
Carbon neutral enterprises		Purchasers of forestry emission reductions to offset their greenhouse gas stocks.
Private environmentally sound activities, including in homes, tourist industries, cargo transport, and agricultural firms		Emissions reduction purchases, to mitigate the carbon footprint of their production activities.
Local businesses involved in construction		Increase use of wood as a strategy to reduce their carbon footprint by substituting other materials.

3.2. Capacity of the agencies and organizations involved in implementing the proposed ER Program

Please discuss how the partner agencies and organizations identified in section 3.1 have the capacity (both technical and financial) to implement the proposed ER Program

The partners and entities involved in the proposed ER Program are identified in accordance with two implementation scenarios, established on the basis of the type of REDD+ activities to be carried out:

Avoided deforestation activities: This implementation scenario is based on the production of environmental services (ES) (water, biodiversity, carbon, and scenic beauty) in natural old growth forests and secondary growth forests, through the Payment for Environmental Services Program (PESP). In this scenario, FONAFIFO will serve as an intermediary between producers and buyers of local and global ES. In addition, FONAFIFO will manage the financing and administration of the PESP (control, implementation, and registration), with the support of private entities (individual forestry engineers and corporations) and the relevant government agencies. The avoided deforestation options under this scenario are the following: A. Additional PES area for avoided

deforestation in old growth forest; and B. Additional PES area in secondary growth forest (see Figure **1**).

Activities to enhance carbon stocks: This implementation scenario would cover both the production of ES and sustainable wood production through sustainable management of natural forests, establishment of forest plantations, and induction of secondary growth on degraded land. It would therefore include the partners and entities involved in the production of ES as well as international forestry investors, businesses involved in construction, and owners of unforested land. In this implementation scenario, the role of FONAFIFO is extended to the management and administration of financial mechanisms for the sustainable production of wood. The carbon stock enhancement options are: D. Additional PES area for carbon sequestration through the establishment of forest plantations; E. Additional PES area for carbon sequestration through induction of early regeneration; and F. Sequestration of carbon in wood products by increasing the use of wood (see Figure **2**).

Figure **1** and Figure **2** shows the partners and entities involved in the implementation of REDD activities under the ER Program. The following groups of entities are worth mentioning:

Government agencies: Specifically relevant are the organizations in charge of administration, protection, and illegal logging control in private and public forests. The agencies directly related to the ER Program are the National System of Conservation Areas (SINAC), the Ministry of the Environment, Energy and Telecommunications (MINAET), and the College of Agricultural Engineers (CIAgro). The Government has partially delegated control and protection of forestry management plans to CIAgro, which oversees the professional conduct of PES implementers.

Providers of timber and environmental services: This group includes natural or legal persons that own natural forests, planted forests, or unforested land, as well as organizations providing advisory assistance in the design and execution of avoided deforestation projects. Some examples are indigenous peoples, owners of degraded forests and land, and the Network of Private Reserves.

Implementers of the PESP and sustainable forestry management: Forestry engineers or enterprises responsible for identifying, contracting, and supervising providers of timber and environmental services that participate voluntarily in REDD actions under the ER Program.

Buyers of timber and environmental services: An effort will be made to increase participation by *users of wood* as a strategy to reduce their carbon footprint by the substitution of materials, especially in local businesses involved in construction. In addition, the Program will foster the involvement of *buyers of local environmental services*, as part of their corporate social responsibility programs, and *buyers of global environmental services,* as a result of multilateral and bilateral initiatives or private transactions.

Financial entities: The Ministry of Finance and the Ministry of Planning are the government entities in charge of ensuring the coordination and financing of national development programs, including the PESP. It is anticipated that the financing required for implementing the ER Program

would mainly come from international business investors in timber production and private funding from the sale of carbon rights in the local market.

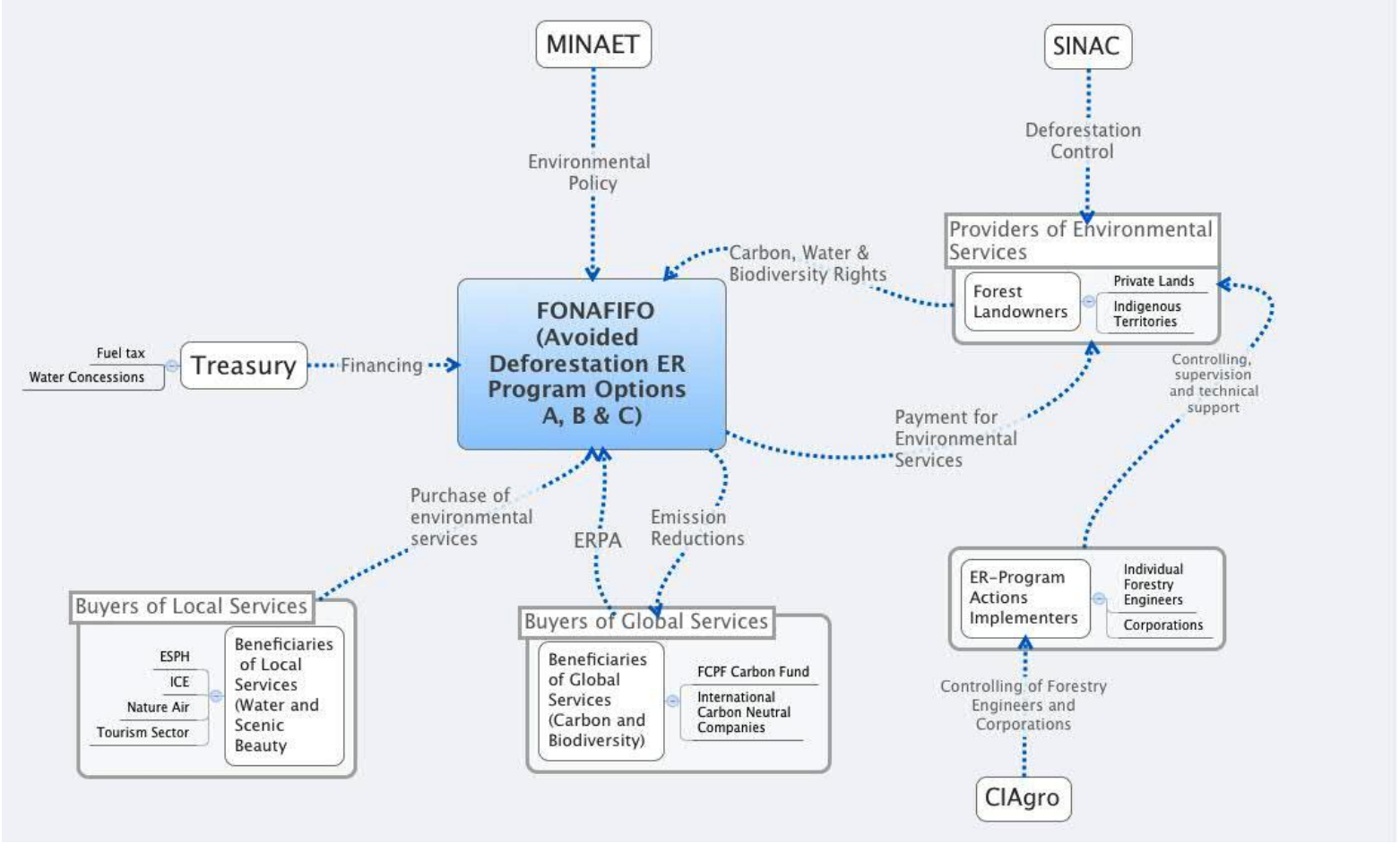

Figure 1: Agencies and organizations involved in the ER Program, for the avoided deforestation options: A. Additional PES area for avoided deforestation in old growth forest; and B. Additional PES area in secondary regeneration forest.

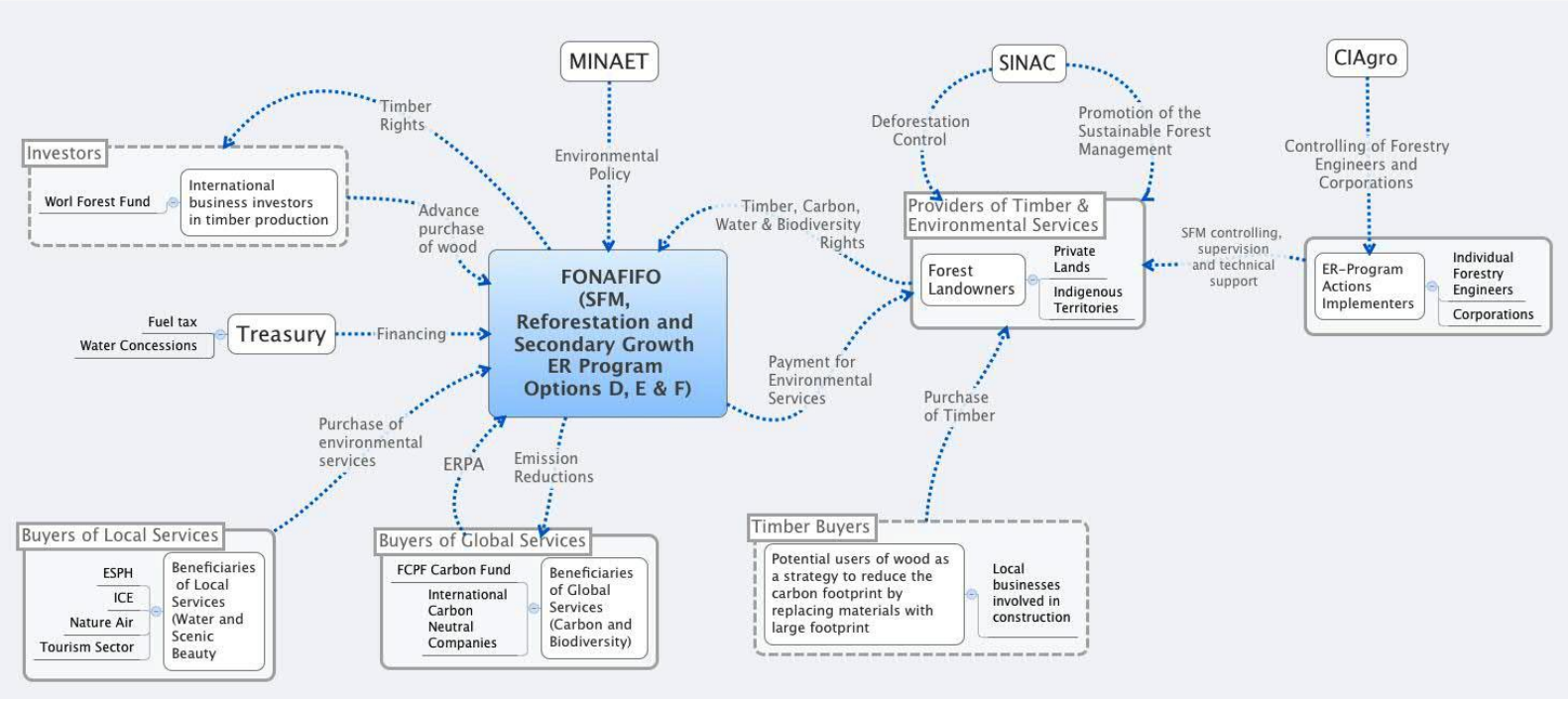

Figure 2. Agencies and organizations involved in the ER Program for the carbon stock enhancement options: D. Additional PES area for carbon sequestration through establishment of forest plantations; E. Additional PES area for carbon sequestration through induction of early regeneration; and F. Carbon sequestration in wood products through increased use of wood.

4. ER Program location and lifetime

4.1. Scale and location of the proposed ER Program

Please present a description and map of the proposed ER Program location and surrounding areas, and its physiographic significance in relation to the country. Indicate location and boundaries of the proposed ER Program area, e.g., administrative jurisdiction(s)

The ER Program is part of the Readiness Preparation Proposal approved for Costa Rica (R-PP). The REDD activities to be implemented are those called for in the REDD strategies for avoided deforestation and carbon stock enhancement. For the ER Program, only credits produced by REDD activities under the R-PP that represent an increase in the country's effort thus far will be taken into account.

There is a possibility that the reduction in emissions resulting from the implementation of the REDD activities under the ER Program will exceed the buying capacity of the Carbon Fund. Nonetheless, it is more attractive for the country to work on the entire package of new R-PP REDD activities for three reasons: i. to reduce the transaction costs; ii. to take advantage of favorable publicity from the signing of an Emissions Reduction Purchase Agreement (ERPA) with the Carbon Fund of the Forest Carbon Partnership Facility (FCPF); and iii. to anticipate the participation of other carbon buyers, both local and international, under the same package.

Scale: The REDD activities will be implemented in an area of approximately 342,000 ha of mixed-use private land (old growth and secondary forests, overused pastureland, and land used for perennial crops). This area would include the expansion of the FONAFIFO Payment for Environmental Services Program for avoided deforestation in an additional 127,000 ha of private old growth forest (107,600 ha) and secondary growth forest (19,191 ha). Also anticipated are the following: carbon stock enhancement through the induction of secondary growth in 142,000 ha of degraded farmland (124,282 ha of private land and 18,742 ha in indigenous territories), and the establishment of 72,132 ha of forest plantations and agroforestry systems.

Location: The REDD activities of the ER Program will not be implemented in a single territory or large expanse of land, but rather in a set of parcels of varying sizes -- mostly less than 50 ha (see Figure **3**) -- located on private land or in indigenous territories zoned for mixed use (old growth and secondary forests, overused pastureland, and land used for perennial crops) and distributed throughout the national territory.

The ER Program will be implemented at the national level under the same modality as the current Payment for Environmental Services Program (PESP), in which owners of private land (3.3 million ha) are recruited, with clear property rights, mainly consisting of individually owned properties, but to a lesser extent communally held land (indigenous territories), zoned for forestry and agricultural use, other than national parks or biological reserves (see Figure **4**).

In order to maximize environmental co-benefits such as soil recovery, erosion control, and improved water filtration, priority will be given to induction of secondary growth and the establishment of forest plantations and agroforestry systems on overused land. As can be seen in Figure **5**, these areas are concentrated in the lowlands of the northern Caribbean slope and the

central and southern Pacific slopes of the country. To maximize environmental co-benefits such as protection of the quality and availability of water and biodiversity, priority will be given to avoided deforestation in basins with water concessions for human consumption, irrigation, and hydroelectric power production; priority will also be given to underrepresented habitats in the system of national parks and biological reserves considered as biodiversity hotspots (see Figure **6**).

To give an idea of the potential structure of the client base for the ER Program, Figure **3** shows the number of contracts signed according to the size of individual properties (fincas), up to August 2012, in the FONAFIFO Payment for Environmental Services Program. Currently, the program has more than 4,500 contracts, of which 64% are under the Forest Protection modality, 33% under the Reforestation modality, and the remaining 3% under the modalities of Management and Regeneration. These contracts represent slightly more than 326,000 ha, 16% of which correspond to fincas of less than 50 ha, 33% to fincas between 50 and 150 ha, and 51% to fincas of over 150 ha.

4.2. Expected lifetime of the proposed ER Program

Please describe over how many months/years the proposed ER Program will be:

a) prepared; and

b) implemented (including expected start date of the proposed ER Program)

The implementation of the ER Program is planned for the period 2010-2020, which means an expected lifetime of 132 months, or 11 years (see Table 1). The early start date of the activities called for in the ER Program depends on i) the availability of public funds to finance the initial implementation of REDD activities in the ER Program and ii) the opportunity for the sale of emission reduction rights through the Carbon Fund. The project is scheduled to end in December 2020, just before the country begins the period of carbon neutral development. The project will not go beyond that date, because the outlook for selling emission reduction rights may change significantly, given the country's need to offset its greenhouse gas emissions with REDD reductions generated in its own territory.

The ER Program began in 2010 with the implementation of three of the eight activities included in the REDD Strategy: i) incorporation of an additional PES area for old growth forest; ii) new forest plantations; and iii) new secondary growth forests. From 1997 to 2009, the average coverage of PES for avoided deforestation in old growth forests was 218,000 ha; as of December 2011, 86,000 of the 107,600 ha of new contracts, established as a target in the REDD Strategy approved in 2010, had been incorporated. In addition, as of December 2011, 14,000 ha of new plantations and agroforestry systems, of the 72,000 set as a target in the REDD Strategy, had been established. Lastly, as of December 2011, about 7,000 ha of new contracts, out of the 123,000 targeted by the REDD Strategy, had been incorporated.

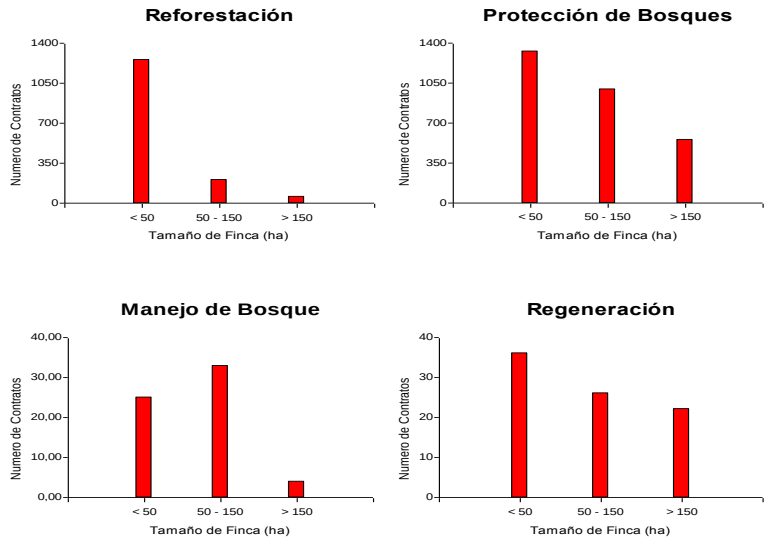

Figure 3: Size of individual properties (fincas), as of August 2012, under the FONAFIFO Payment for Environmental Services Program, for avoided deforestation under the modalities of Forest Protection for biodiversity conservation and water resources and Natural Forest Management for the sustainable production of wood, together with carbon stock enhancement through the induction of secondary growth (Regeneration) and the establishment of monocultures and mixed plantations, with native and exotic species (Reforestation).

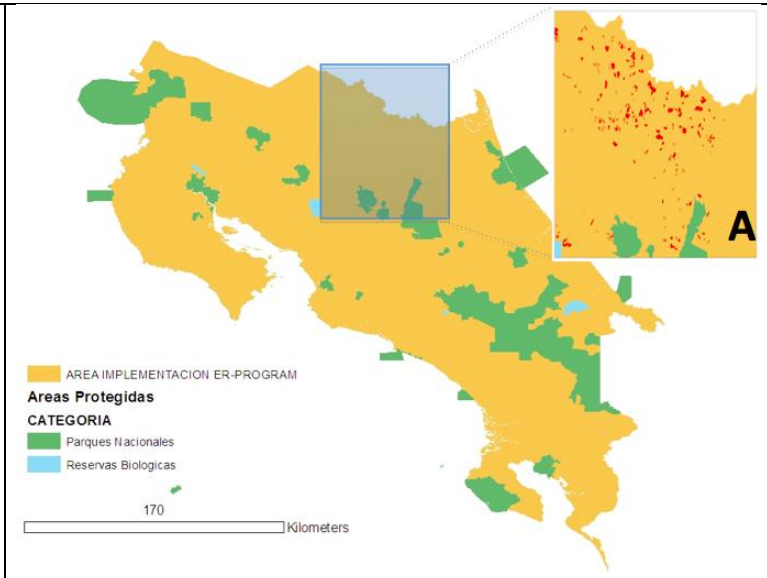

Figure 4: ER Program implementation area. REDD activities will be implemented at the national level on privately owned land, with clear property rights, mainly consisting of individual properties and to a lesser extent communal property (indigenous territories), zoned for forestry and agricultural use, other than national parks or biological reserves. Box A illustrates, in red, an example of private land distribution in the implementation area.

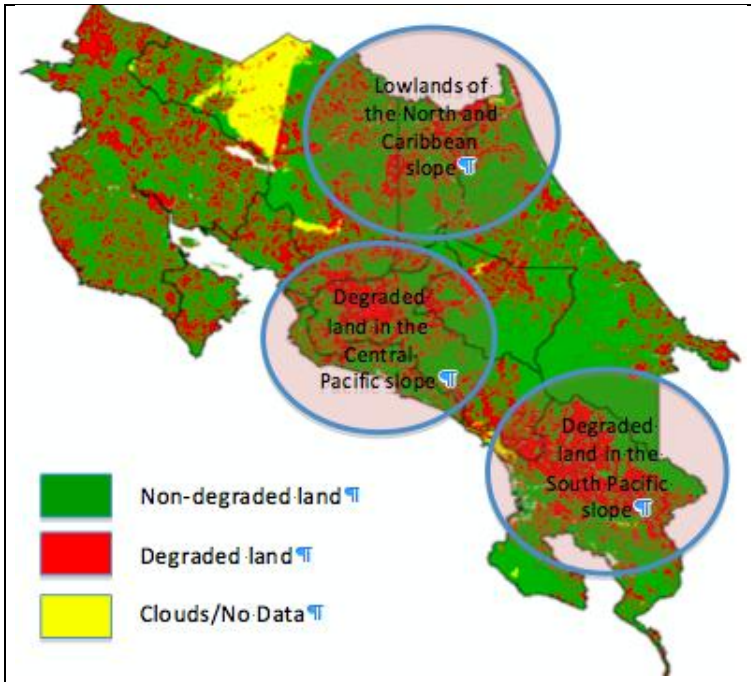

Figure 5: Location of REDD activities under ER Program aimed at enhancing carbon stocks through reforestation and secondary growth on degraded land (lowlands of the northern Caribbean slope and central and southern Pacific slopes).

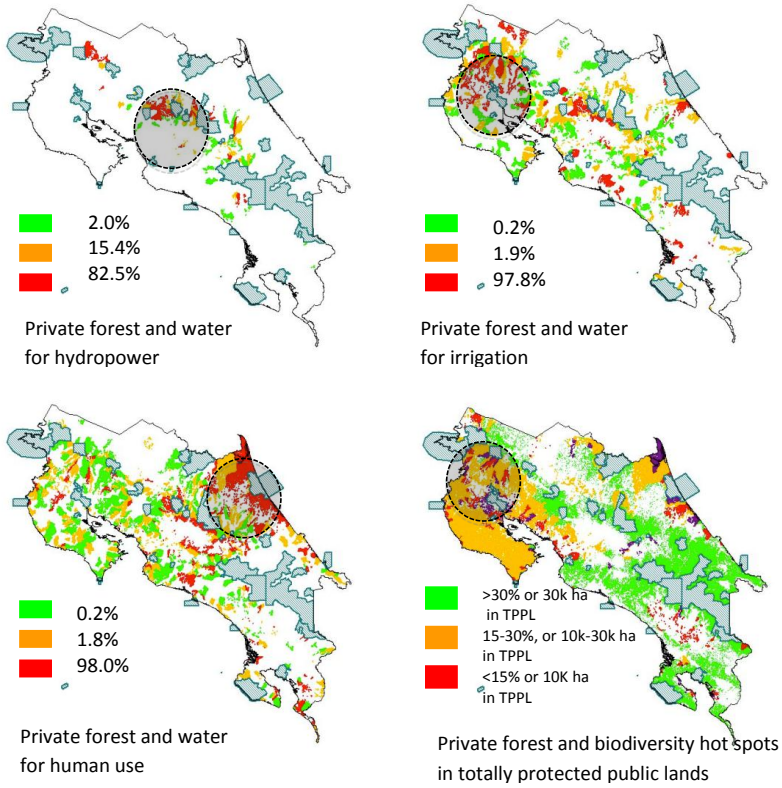

Figure 6: Private forest in basins with water concessions for human use, irrigation, and hydropower, and their contribution to conservation of biodiversity hot spots. The circled areas show the concentration of high-value forests in terms of water or biodiversity.

Listeded below are the main events during the lifetime of the ER Program:

Table 1: Main events during the lifetime of the ER Program

July 2008	Date of selection of country for FCPF.
June 2010	R-PP assessed by FCPF PC at PC6. Strategic actions were reviewed and the country promoted a group of eight strategic actions, including the six actions included in the ER Program.
June 2010	Public funds (from fuel tax, water fee, and Ecomarkets II project) were made available and were used to begin the implementation of three of the six actions considered in the ER Program. As of December 2011, 86,000 new PES contracts were incorporated in old growth forests; 14,000 ha of new forest plantations were established, and about 7,000 new secondary growth contracts were incorporated.
May 2011	SESA process was initiated with a national workshop; risks and concerns in relation to strategic options in R-PP, including REDD activities of the ER Program, were identified, and will be addressed, after due consideration, in the ESFM.
March 2012	Costa Rica presented initial ideas for an ER-PIN to the FCPF Carbon Fund at the meeting held in Paraguay.
September 2012	Costa Rica submitted ER-PIN for consideration of FCPF/FMT Secretariat.
March 2013	Establishment of reference level for REDD Strategy, including ER Program.
December 2013	Signing of Emission Reductions Purchase Agreement (ERPA) with FCPF Carbon Fund
January 2014	Subject to additional funds, new PES contracts will begin to be incorporated for avoided deforestation in secondary growth forests through secondary regeneration and the sequestration of carbon in wood products.
December 2017	First monitoring event for ER Program
December 2020	Second monitoring event for ER Program

5. Description of activities planned under the proposed ER Program

5.1. Analysis of drivers and underlying causes of deforestation and forest degradation, and conservation or enhancement trends

Please present an analysis of the drivers, underlying causes and agents of deforestation and forest degradation. Also describe any policies and trends that could contribute to conservation and enhancement of carbon stocks. Please distinguish between both the drivers and trends within the boundaries of the proposed ER Program, and any drivers or trends that occur outside the boundaries but are affecting land use, land cover and carbon stocks within the proposed ER Program area. Draw on the analysis produced for your country's Readiness Preparation Proposal (R-PP) and/or Readiness Package (R-Package)

In Costa Rica, *deforestation* is the result of economic policies centered on agriculture and livestock, with the expansion of the latter being more significant. These policies have a direct impact on income derived from land, affecting either positively or negatively the dynamics of change in the use of land in Costa Rica. A more detailed description of the causes of deforestation in Costa Rica is given in the R-PP document, especially in section 2a. Listed below are the primary drivers of change in the use of each type of landholding in Costa Rica:

i. **Protected wilderness areas:** restricted access to PES for owners of forests with problems related to the formalization of property rights.
ii. **Privately owned forests:** prohibition of land use conversion; overregulation and administrative ban on the sustainable management of natural primary and secondary forest; restricted access to PES for owners and holders of natural forests under forestry management; lack of competitiveness of forest use versus alternative use; State's failure to enforce mechanisms for the control of illegal logging.
iii. **Indigenous reserves:** little income from forest resources for inhabitants of indigenous territories; State's failure to prevent invaders from gaining illegal title to land in indigenous territories.
iv. **National parks and biological reserves**: State's failure to protect the natural heritage against the threat of squatters, illegal loggers, hunters, and miners.

Moreover, with regard to *degradation* in Costa Rica, it is important to clarify that, for lack of information on the subject, the scope of the land use assessment made during the preparation of the R-PP did not include an analysis of forest degradation. Up to now, no studies have been conducted to evaluate the extent of anthropogenic degradation of biomass in Costa Rican forests. The lack of studies on degradation in the country may be a result of the perception that its effect on the loss of biomass is not significant, given the low consumption of wood in Costa Rica.

Nonetheless, the implementation of the Monitoring, Reporting, and Verification system of the REDD Strategy will help estimate the forest degradation rate in the country. This input will enable the appropriate adjustments to be made, if necessary, to the REDD Strategy and therefore to the actions included in the ER Program (see section 12.1).

5.2. Assessment of the major barriers to REDD+

Please describe the major barriers that are currently preventing the drivers from being addressed, and/or preventing conservation and carbon stock enhancement from occurring

Privately owned forests in Costa Rica went through a process of intervention during the 1970s and 1980s, followed by a reform of the forestry sector in the 1990s. Those who supported market-based solutions to control deforestation were opposed by reformists who advocated greater governmental intervention in the sector. This process influenced the current Forestry Act 7575,[1] which provided for payments to forest owners for environmental services (Art. 22-27) and established the National Forestry Financing Fund (FONAFIFO) to provide financial support for the forestry activities of small and medium-sized producers (Art. 46-51) (Brockett and Gottfried 2002). The results of this law, however, have been counterproductive. The major barriers preventing the implementation of the ER Program resulting from the sectoral reform are as follows (see Table 2):

i. **Overregulation of forestry**: In the initial stages of implementation of the Payment for Environmental Services Program (1997-2003), one type of deforestation identified in the country was that associated with the use of sawn timber (Contraloría General de la República 2008). This situation exists, paradoxically and collaterally, as a result of overregulation of natural forest management promoted in the new forestry law; the implementation of an unwritten policy by the Ministry of the Environment, Energy and Telecommunications (MINAET, formerly MINAE), which ordered an administrative ban on natural forest management; and the elimination of PES for forests subject to natural forest management. These measures were based on the views of the conservationist sector of the country, which unjustifiably accused this activity of being responsible for deforestation and forest degradation.

ii. **Lack of competitiveness of forest use versus alternative uses:** Situations such as high income from privately owned land, the State's inability to enforce environmental legislation, and policies that make forestry industries less competitive have led to a preference for farming over forestry, even when it is not an appropriate use of the land. The capacity of PES in this area is limited, and it cannot compete with the use of land for such highly profitable crops as pineapple or bananas. To finance land recovery initiatives, a series of changes will be needed in the policies that restrict forest use; in

[1] This new law establishes participatory mechanisms for third parties interested in designing forestry policies and in creating and distributing subsidies for the preservation of forest cover. The law prohibits any conversion of land use on privately owned land (Art. 2), even if the purpose of such conversion is to establish a forest plantation (Art. 19). In order to encourage sustainable forest management, the law simplifies requirements for forest management projects, including general and operational plans, and eliminates seasonal restrictions on the implementation of the development plan (Art. 20 and 21). On the other hand, this law allows for the harvesting, transport, industrialization, and exportation of wood from forest plantations (Art. 28). The law also created the National Forestry Office, composed of representatives of forestry producers, industrial wood producers, the trade sector, and environmental organizations. This Office provides advisory assistance to MINAET on policy (Art. 7-11).

addition, mechanisms need to be set up to prevent the illegal elimination of secondary cover, and thereby take advantage of the co-benefits of this type of market.

iii. **Non-sustainability of sources of wood**: Until the mid-1990s, natural forests were the main source of supply for industries; however, the restrictive policy applied to natural forest management (both primary and secondary forests) resulted in a rapid increase in the harvesting of trees on farmland, along with the degradation of forests and deforestation. Beginning in 2002, MINAE formalized the strategy for control of illegal logging and tightened the requirements for obtaining cutting permits on agricultural land; consequently, the exploitation of forest plantations increased exponentially, becoming the major source of raw material for the forestry industry. As a result of this series of events, the structure of wood sources changed radically: more than 70% of processed wood now comes from forest plantations and the rest from forests and farmland (see Figure 7). Unfortunately, this resource has not been adequately replenished, and this has led to shortages (De Camino 2007) and the premature clearcutting of forest plantations, which could have severe environmental and economic consequences (Office of the Comptroller General of the Republic 2008) (see Figure 8).

iv. **Legal uncertainty**: Legal uncertainty in Costa Rica affects investment and undermines the permanence of private forestry resources. Draft law 17472 is one example of an incoherent crosscutting policy; it creates an environment of legal uncertainty in the forestry industry, because it affects article 28 of the Forestry Act, which allows the harvesting, transport, industrialization, and exportation of wood from forest plantations, agroforestry systems, and individually planted trees without a permit. This is in response to Constitutional Chamber resolution 2007-003923. Consequently, the Legislative Assembly, through draft law 17472, is attempting to limit the right to harvest trees in cases where there is no approved management plan. The restriction means that proof must be given that the necessary steps have been taken to avoid or contain any damage to the environment or human health.

v. **Reduced consumption of wood as a result of environmental education based on the misuse of scientific concepts:** In Costa Rica, it is commonly accepted that in order to preserve forests, trees must be planted, and that it is better to replace wood with other products, such as cement, aluminum, and steel in buildings, furniture and implements so that trees do not have to be cut down. This has caused Costa Ricans to lose interest in using wood for construction purposes. The building of houses made of wood in Costa Rica fell from 30% in 1984 to 10% in 2000, and continues to drop. Policies have limited the development of an architectural culture that uses wood; moreover, some environmentalist groups have demonized the consumption of wood as a cause of deforestation and environmental degradation. These cultural, legal, technological, and educational barriers currently discourage the extensive use of wood, provide a disincentive to wood harvesting on private land, devalue natural and secondary forests and forest plantations, and make the exploitation of forests less competitive, thereby

hindering the coherent development of the forestry sector, the promotion of sustainable production of wood, and the provision of environmental services.

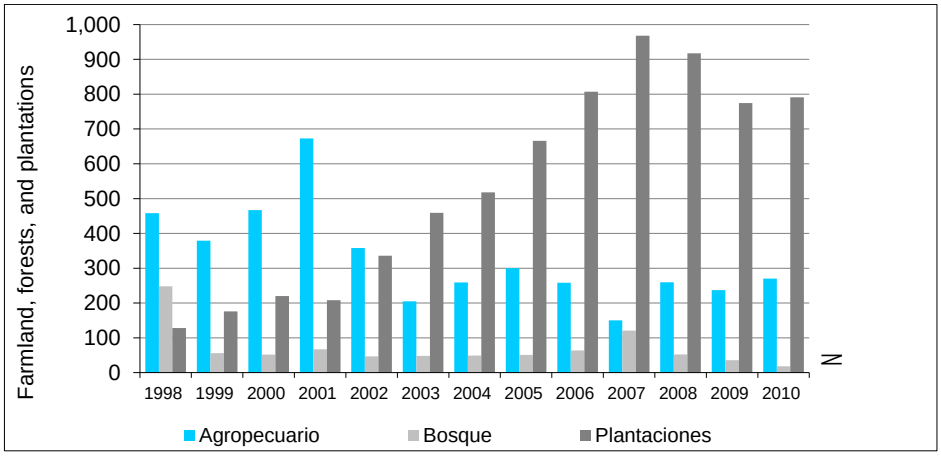

Figure 7. Dynamics of wood supply by source in Costa Rica.
Source: Barrantes, Salazar and Salas (2009) and (2010).

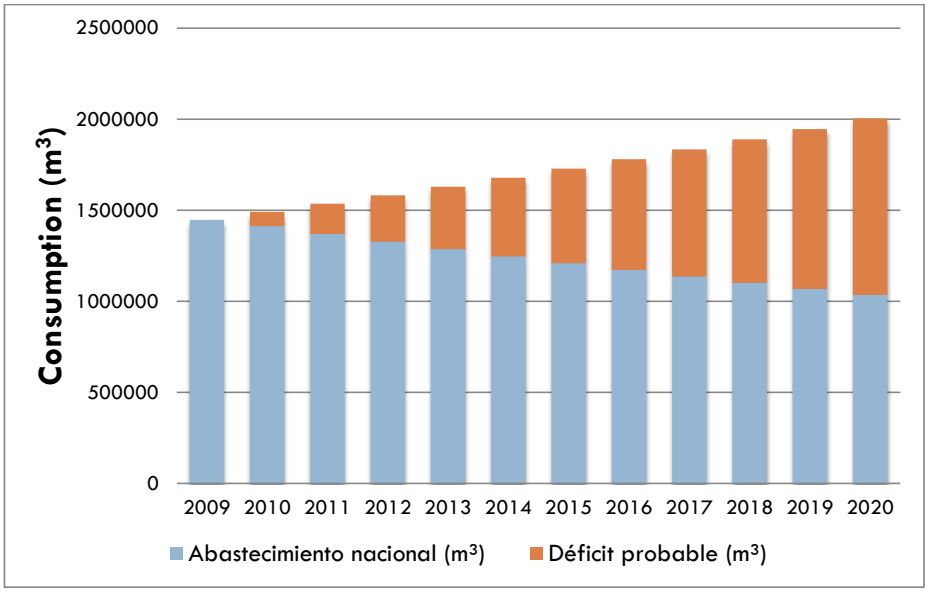

Figure 8. Projection of probable deficit in national wood consumption in Costa Rica resulting from premature clearcutting of forest plantations, an insufficient rate of reforestation, and disincentives to primary and secondary natural forest management and the production of wood.

Table 2. Major barriers to the implementation of REDD+ activities under the ER Program in Costa Rica.

Option	Type of Land Ownership	Emission Reduction Option	Major Barriers to Implementation
A	Private forests and indigenous reserves	Additional PES area for avoided deforestation in old growth forest	• Lack of competitiveness of forestry use versus alternative use. • State's failure to prevent invaders from gaining illegal title to land in indigenous territories.
B	Private forests	Additional PES area for avoided deforestation in secondary regeneration	• Overregulation and administrative ban on sustainable management of natural forest (primary and secondary).
C	Private forests	Additional PES area for carbon sequestration through induction of early regeneration	• Lack of competitiveness of forestry use versus alternative use. • Imbalance between protection and production in forestry sector.
D	Private forests	Additional PES area for carbon sequestration through establishment of forest plantations	• Policies that reduce the competitiveness of forestry use versus alternative uses. • Overregulation and administrative ban on sustainable management of natural forest (primary and secondary).
E	Indigenous reserves	Additional PES area for carbon sequestration through induction of early regeneration	• Early clearcutting and inadequate replenishment of forest plantations.
F	Not applicable	Sequestration of carbon in wood products through increased use of wood	• Reduced wood consumption as a result of environmental education based on misuse of scientific concepts.

5.3. Description and justification of planned and ongoing activities under the proposed ER Program

Please describe the proposed activities and policy interventions under the proposed ER Program, including those related to governance, and justify how these activities will address the drivers and underlying causes of deforestation and forest degradation and/or support carbon stock enhancement trends, to help overcome the barriers identified above (i.e., how will the ER Program contribute to reversing current less sustainable resource use and/or policy patterns?)

Since 1997, Costa Rica has had a Payment for Environmental Services Program (PESP), which comprehensively addresses four services: protection of water resources, scenic beauty, biodiversity, and mitigation of greenhouse gases. The National Forestry Financing Fund (FONAFIFO) has implemented this program. The program has brought significant benefits, including poverty reduction, projection of water quality, carbon fixation, conservation of biodiversity, public health, and improvements in infrastructure (Hartshorn *et al.* 2005). The PES program has also allowed for the development of a local market for environmental services produced from avoided deforestation and carbon stock enhancement. The PESP therefore forms the basis of the REDD+ Strategy in Costa Rica, which in turn represents the third generation of deforestation control activities in Costa Rica.

Figure **9** shows that, from 2000 to 2008, the PES program administered by FONAFIFO resulted in carbon stock enhancement, preliminarily estimated at 55 million tons of CO2. The same program, following the Bali Action Plan (2008) and with the ending of the Ecomarkets loan in 2013, will produce an estimated overall increase in carbon stocks of 30 million tons of CO_2. With the implementation of the REDD+ Strategy, it is estimated that carbon stock enhancement over a period of 11 years (2010-2020) will amount to 52,000,000 tons of CO_2, of which 22 million represent the maintenance of the current PES program when the Ecomarkets II project ends, and the remaining 30 million will be new REDD activities being carried out within this ER Program.

The ER Program covers only REDD R-PP activities that represent an increase in the country's efforts until now. The ER Program corresponds to the following lines of action in Costa Rica's REDD+ strategy: i. Expanding PES coverage to reduce even further the deforestation rate in regenerated and old or ancient growth forest; providing PES for regeneration and reforestation; and iii. Promoting the sustainable production and consumption of wood from natural primary and secondary forests and regeneration.

i. **Expanding PES coverage to reduce even further the deforestation rate in regenerated and old or ancient growth forest (options A and B in** Table 3**)**: if the rate of deforestation in the period 2000-2005 in old growth and secondary forests can be cut in half, and, in addition, the natural regeneration of private forests outside Guanacaste is doubled and natural regeneration in indigenous reserves is tripled, the country could capture 139,125 Gg CO2 in the period 2010-2030 (estimates used in the preparation of the R-PP).

According to preliminary estimates based on the econometric model cited in section 2a of the R-PP, FONAFIFO will be required to increase PES coverage for old growth forests by 107,600 ha. The Program is focused on areas with a high-income index, such as natural wood-producing forests that are subject to sustainable forestry management (multi-cyclical) and/or natural regeneration forests; its aim is to increase the PES supply and promote natural forest management for the production of wood. Costa Rica has nearly 220,000 ha of 15-year-old secondary forests located on private land. Most of these forests are in the hands of smallholders, who generally live in rural areas. According to preliminary estimates using the above-mentioned econometric model, FONAFIFO will provide to landowners in regenerated areas approximately 19,000 ha of new PES contracts. In addition, SINAC will define and formalize clear guidelines for the sustainable management of secondary forests.

ii. **PES for regeneration and reforestation (options C, D, and E in** Table 3**):** the potential is thought to exist for the regeneration or reforestation of 724,000 ha of the 937,000 ha whose use is being disputed. Moreover, it is estimated that there are more than 650,000 ha of private land now being farmed that could be used for forestry. The plan is to induce regeneration and promote reforestation by providing positive incentives such as the PES Program. For owners of land that could be used for forestry but is now unforested, FONAFIFO will provide positive incentives to induce the regeneration of approximately 124,000 ha and the establishment of 72,000 ha of forest plantations. Both the regeneration and its maintenance will be centered on land where, because of its opportunity cost, PES is more cost effective, for example on land being used for anything other than forestry, indigenous reserves, and privately owned protected wilderness areas. In addition, agroforestry systems have a significant capacity to enhance carbon stocks, since agriculture is the second highest producer of greenhouse gases in the country. An assessment will be made, however, of the suitability of including these systems in the REDD+ Strategy, because it is more complex and costly to monitor carbon stock enhancement in agroforestry systems. Before including them in the ER Program, the financial and environmental profitability of agroforestry systems will be determined.

Environmental and social sustainability in the management of forestry plantations is gauarantee by the Procedures Manual and its modifications of the PES Program, and the 36935 MINAET PPES Decree [2]. The most relevant criteria for both cases are outlined in Table 4 and Table 5.

~~ii~~iii. **Promoting the sustainable production and consumption of wood from natural primary and secondary forests, regeneration and forestry plantations (Option F in** Table 3**)**: In order to promote the production of wood, the administrative, technical, and legal barriers that restrict income from the management of natural forests and forest plantations must be eliminated. It is also necessary to promote commercial reforestation and sustainable management of primary and secondary natural forests, mainly among organizations of smallholders, and the community management of forests in indigenous territories. Access to

[2] Available at: http://www.fonafifo.go.cr/paginas_espanol/servicios_ambientales/sa_decreManua.htm

green markets must be improved in order to augment the income of landowners and producers of wood from natural forests and plantations. Moreover, programs must be promoted for enhancing the productivity of forestry plantations through genetic improvement. If the sustainable production of wood is to be increased, there must be a readiness for consumers to buy it on local markets. The consumption of wood will therefore have to be encouraged, which would result in co-benefits for the country. On the one hand, the storage of carbon in buildings and other storage facilities would increase and, on the other, the consumption of materials with a large carbon footprint, such as cement, steel, and aluminum, would decrease.

The use of carbon sequestration in wood products can be justified by REDD+ activity (e) of the decision 1/CP.16 provided by the UNFCCC under the Cancun Agreements (Enhancement of forest carbon stocks). This REDD+ activity can envelope the proposed action of the wood substitution component by the Government of Costa Rica in its REDD+ National Strategy, in the sense that Costa Rica`s national REDD+ actions includes the increase of carbon stocks through the use wood from forest plantations (approx. with the establishment of 72132 ha).

Moreover, wood substitution component is based on the work developed by the Subsidiary Body for Scientific and Technological Advice (SBSTA), since 2004, through its Working Sessions, which describes relevant aspects from the Harvested Wood Products (HWP) (Table 6).

Additionally, in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Volume 4 Agriculture, Forestry and Other Land Use), Chapter 12 were presented, which describes different approaches for reporting the storage of carbon in wood products and its subsequent release as CO2, concentrating on some of the variables needed for particular approaches and showing how they can be estimated from default data or more detailed country-specific data.

Later, in the IPCC Expert Meeting on HWP, Wetlands and Soil N2O held in Geneva in 2010[3], participants agreed that the methodological guidance in the 2006 IPCC Guidelines is correct, but noted that the entire chapter needs to be considered to ensure there are no inconsistencies with other parts of the guidelines. The participants also noted that the guidance is complex and proposed the development of FAQ (frequently asked questions) that would guide users to the correct, full implementation of the guidelines.

Finally the participants noted that to produce estimates for HWP according to the approaches currently being discussed in the UNFCCC AWG-KP negotiations (FCCC/KP/AWG/2010/CRP.3) might require some modification to the existing guidelines (particularly equation 12.3).

[3] Available at http://www.ipcc-nggip.iges.or.jp/meeting/pdfiles/1010_CoChairsSummary_Geneva.pdf

Environmental and social sustainability in the management of natural forests is gauarantee by the Sustainability Standards (Principles, Criteria and Indicators; Code of Practices; and Procedures Manual) from the 344559 MINAE Decree[4]. The most relevant criteria for both cases are outlined in Table 7 and Table 8.

Table 3 lists the various options for emission reduction by avoided deforestation and a preliminary estimate of emission reductions to be included in Costa Rica's ER Program. The reduction of emissions resulting from the implementation of these REDD activities clearly exceeds the buying capacity of the Carbon Fund. Nonetheless, in order to reduce transaction costs and take advantage of favorable publicity from the signing of an ERPA with the FCPF Carbon Fund, it is more attractive for the country to work on the entire package of new REDD activities, making room for other carbon buyers, both local and international, to participate in the same package.

The implementation of these emission reduction options offers the following opportunities:

i. **Significant unmet demand for PES:** The FONAFIFO PES Program shows an average annual unmet demand of 72,000 ha under the Forest Conservation modality and 7,000 ha in that of Reforestation (see Figure **10**). This offers the country the opportunity to expand the avoided deforestation and reforestation programs.

ii. **High potential for mitigation in forestry and agricultural sectors**: Costa Rica's National Economic, Environment and Development Study for Climate Change (NEEDS) Project estimates the potential costs of the use of alternative production technologies and practices at the national and sectoral level and assesses their impact on the country's capacity to mitigate greenhouse gas emissions. This analysis focused especially on the potential to achieve carbon neutrality (CN) by 2021, one of the main objectives of the country's National Strategy for Climate Change (ENCC). Among other things, the studio noted that the forestry and agricultural sectors offer competitive options, with a high abatement potential. As can be seen in Figure **11**, by maintaining the current PES Program and incorporating new REDD activities such as those contained in this ER Program, the forestry and agricultural sectors would be able to abate the business-as-usual (BAU) emissions scenario for Costa Rica by 79% by 2021, and projected emissions for the period 2021-2030 by 49%.

iii. **High ~~migration~~ mitigation potential in privately owned secondary growth forest:** In Costa Rica, there is a deforestation gradient related to the income index of various types of ownership, with the lower incomes being those with the least deforestation (national parks and biological reserves), followed by protected wilderness areas, indigenous reserves and, lastly, privately owned forests. Deforestation is also correlated with the age of the forest. The highest rate of deforestation is seen in early regeneration forests, followed by secondary regeneration forests and old growth or late regeneration forests (Figure **12**). This suggests,

[4] Available at: http://www.sirefor.go.cr/Documentos/Normativa/PCI_MFS_2009.pdf

among other things, that the greater mitigation potential, for both avoided deforestation and secondary growth, can be found in early regeneration forests located on private lands.

iv. **High potential for co-benefits:** Costa Rica has 8,191 km^2 unforested land involved in land use conflicts, specifically because of overuse, on privately owned property and indigenous territories. This land, generally speaking, has problems with erosion, surface runoff, and filtration that adversely affect the supply of high-quality water for human consumption, irrigation, and hydroelectric power generation. These lands are of special interest to the ER Program, since carbon stock enhancement can be combined with the generation of environmental co-benefits such as soil recovery, erosion control, and improved filtration of water, especially if it is found in basins with water concessions. Similarly, forests in Costa Rica have been identified as being associated with the basins having the most water concessions for different uses, as well as conservation hotspots (see Figure **6**); thus, the REDD activities of the ER Program, besides avoiding deforestation, could produce environmental co-benefits by prioritizing avoided deforestation in those basins with a high volume of water concessions for human consumption, irrigation, and hydroelectric power generation, as well as habitats that are underrepresented in the system of national parks and biological reserves that are considered biodiversity hotspots.

v. **High potential for production and consumption of sustainable wood from primary and secondary natural forests and reforestation**: As a result of environmental education based on the misuse of scientific concepts, the construction sector in Costa Rica uses less than 10% wood, preferring materials with a large carbon footprint such as cement, steel, or aluminum. These building materials consume 40% of the natural resources of the planet extracted by mining, 17% of the world's freshwater supply, 40% of global energy, and 50% of fossil fuels, and generate up to 20% of solid waste products; Moreover, they contribute 20% of CO_2 on the planet by using fossil fuels (Roodman and Lensen 1996, Dimson 1996, Locken 1994). These facts offer the country the opportunity to increase the storage of carbon in buildings and other storage facilities and to reduce emissions by replacing materials that have a large carbon footprint. This would promote the consumption of wood, and consequently the establishment of new forest plantations and the incorporation of new primary and secondary natural productive forests in order to increase the supply of sustainable wood in local markets; it would therefore provide environmental and social co-benefits to the country.

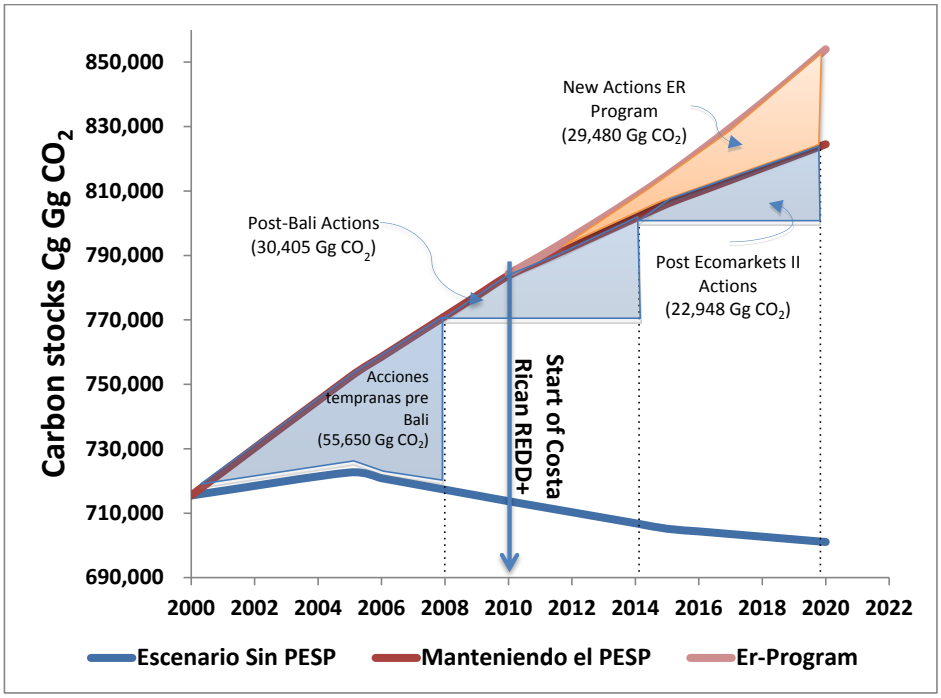

Figure 9. Preliminary estimate of accumulated growth of carbon stocks through implementation of proposed and current activities under Costa Rica's REDD+ Strategy.

Table 3. ~~Migration~~ Mitigation potential and implementation area of various options for emission reduction through avoided deforestation and carbon sequestration proposed in Costa Rica's ER Program.

Option	Type of Land Ownership	Emission Reduction Option	PES Area (ha)	Tons CO_2
A	Private forests and indigenous reserves	Additional PES area for avoided deforestation in old growth forest	107,600	8,540,929
B	Private forests	Additional PES area for avoided deforestation in secondary regeneration	19,191	628,952
C	Private forests	Additional PES area for carbon sequestration through induction of early regeneration	124,282	6,505,287
D	Private forests	Additional PES area for carbon sequestration through establishment of forest plantations	72,132	8,019,422
E	Indigenous reserves	Additional PES area for carbon sequestration through induction of early regeneration	18,742	785,370
F	Not applicable	Carbon sequestration in wood products through increased use of wood	-	5,000,000
		Total	341,946	29,479,960

Table 4. Enforcement of environmental sustainability by criteria under forestry plantations management practices.

Environmental sustainability practices for forest plantations management
1. PPES pre-applications are subject to prioritization criteria considered in the Procedures Manual and its modifications of the Payment for Environmental Services Program
1.1 Sites with high potential for the production of wood based on land use capacity will have priority
1.2. Sites with reforestation programs that consider the use of endangered species, and the reforestation in protected areas defined by the Forestry Law Nº7575 will have priority
1.3. Projects using improved genetic material will have priority
1.4. Reforestation projects with integrated forest industry
2. PPES beneficiaries are required to prevent and control forest fires

Table 5. Enforcement of social sustainability by criteria under forestry plantations management practices.

Social sustainability practices for forest plantations management
1. PPES under reforestation systems gives a maximum amount of $980/ha/5 years. If reforestation projects are made with native species, this amount raises to $1470/ha/5 years
2. PPES area limits range from 1 ha (of a single block) to 300 ha, per year, per farm or farms (adjacent to each other or close within five kilometers), by natural or legal persons and by Conservation Area
3. Organizations acting, as beneficiaries of the PPES, must posses a legal figure, and represent small to medium owners, helping them with the project implementation and monitoring. Also they must supply clear information to their associates, of the fees they will receive for the services they will provide
4. Reforestation PES programs choosing payments in advance, must be made by organizations or by small-owners with less than 50 ha
5. Indigenous Territories are excluded for the need of certifying the reforestation PPES area by a Forest Regent, which can be made by the Regional Manager of the respective Conservation Area, at no cost
6. Properties subject to entering PPES must be properly registered in the National Register, and shall not possess judgment liens (refer lo Legal Requirements item of the PPES Procedures Manual for exceptions)
7. For monitoring processes inside FONAFIFO, an external entity can be contracted for this purpose, thereby expanding the distribution of benefits
8. The project evaluations made by FONAFIFO, allows the engagement of institutions like CIAgro and SINAC
9. PPES beneficiaries are required to allow SINAC official`s to develop environmental education programs
10. PPES programs subscribed by Indigenous Territories, should be signed by the president of the respective Development Indigenous Association, in agreement with the assembly associates

Table 6. SBSTA Working Progress on the Harvested Wood Products (HWP) discussions.

Session		Description
SBSTA 20	FCCC/SBSTA/2004/6, paragraphs 20-22	Parties agreed on specific topics for the workshop on HWP (Norway, 30-8 to 1-9). In example definitions, scope and methods of estimation, reporting and accounting of HWP.
SBSTA 21	FCCC/SBSTA/2004/13, paragraphs 29-33	SBSTA noted the need to further analyze the socio-economic and environmental implications, impacts on forest carbon stocks and emissions, impacts on sustainable forest management, and impacts on trade, of reporting GHG emissions resulting from the production, use and disposal of HWP.
SBSTA 23	FCCC/SBSTA/2005/10, paragraphs 31-36	Data and information on changes in carbon stocks and emissions of GHG from HWP and experiences with the use of relevant guidelines and good practice guidance of the IPCC to generate such data and information were submitted by Parties
SBSTA 24	FCCC/SBSTA/2006/5, paragraphs 65-70	Planned consultations for the agenda item on HWP was merged with the consultations for the agenda item on the Intergovernmental Panel on Climate Change (IPCC) guidelines for national greenhouse gas inventories
SBSTA 26	FCCC/SBSTA/2007/4, paragraphs 59–61	SBSTA recalled that, at its twenty-fourth session, it had invited Parties in a position to do so to voluntarily report on HWP in their national inventories in a manner consistent with current UNFCCC reporting guidelines. SBSTA also decided to discuss reporting of HWP in the context of its consideration of the 2006 IPCC Guidelines
SBSTA 32	FCCC/SBSTA/2010/6, paragraph 69	The SBSTA invited the IPCC to organize an expert meeting to explore the need and ways to clarify methodological issues related to reporting on harvested wood products, included in the 2006 IPCC Guidelines.
SBSTA 33	FCCC/SBSTA/2010/13, paragraphs 70-72	The SBSTA noted with appreciation the IPCC expert meeting convened on harvested wood products, in response to the invitation of the SBSTA at its thirty-second session

Table 7. Enforcement of environmental sustainability by criteria under natural forest management practices.

Environmental sustainability practices for natural forests management
1. A digital registry for forests under management practices keeps track over time to control land use change and guarantee forest permanence
1.1. Cadastral plans are georeferenced
1.2. Land use maps illustrates the location and size of each strata identified as well as each Forest Management Units (FMU)
2. Historical and future activities are tracked to enable monitoring and ensures long-term forest management
2.1. Forest Management Units (FMU) are registered to the State Forestry Administration
2.2. Management plan must include polycyclic schedule activities for a cutting cycle
3. Managed forests are located and characterized based on their surrounding landscape, allowing its evaluation when management practices occurs
4. Forests management practices maintain forests structure and composition
4.1. A forest inventory is developed, in order to characterize variables like species composition, basal area and abundance. Temporary plots include all trees ≥30cm DBH and a sample of trees ≥10cm DBH. Basal area sampling error must be ≤20% with a 95% probability
4.2. Forests whose condition does not support a new intervention without altering their structure, are not managed (based on a comparison between current and reference values)
4.3. Managed forests are located above a minimum reference level of its basal area, for both commercial and non-commercial trees >30cm DBH
4.4. Managed forests are located below a maximum reference level (<15% of total trees >10cm DBH) for the species guilds short-lived pioneer and intermediate
4.5. Minimum Cutting Diameter (MCD) is 60cm DBH (except those species with a different threshold defined by the State Forest Administration)
4.6. Logging intensity is based on the forest growth
4.7. Cutting cycle is determined for each FMU based on its own dynamics. When such data is not available, cycle shall not be less than 15 years
4.8. Harvested trees shall not belong to species with abundance thresholds lower than 0.3 trees/ha. They must be inside the FMU and accessible to the planned cutting roads. Its selection must avoid high concentrations
4.8. Management plan should take into account remnant trees, with similar characteristics to the harvested ones, avoiding high concentrations
5. FMU includes replicas of natural dynamics (tree fall gaps)
5.1. A wall to wall census is developed under the forest effective area for all trees with a DBH greater than the MCD
5.2. Logging seeks to harvest trees causing the least environmental impact (controlled directional felling, log-loading operations, lopping management, minor and major transport)
5.3. Impacted areas do not exceed defined thresholds of the total forest productive area (12% for tree fall gaps, 1% for log dumps, 1% for primary roads, 5% for secondary roads). Impacted area should not exceed 15% of the total forest productive area
6. Forest management protects water and soil quality
6.1. Forest management plan identifies water sources
6.2. Water and soil mitigation activities should be focused on impacted areas, specially those that become permanent (i.e. log dumps and primary roads) because of the erosion and sedimentation that may occur
6.3. In areas with slopes greater than 60% no timber harvesting is performed using crawler tractor
6.4. After completion of harvesting activities, no liquid or solid inorganic waste is left at the site

Table 8. Enforcement of social sustainability by criteria under natural forest management practices.

Social sustainability practices for natural forests management
1. It is verified that forest tenure and rights are clearly defined according to legal documents provided by the owner
1.1. Management plan must include cadastral plans without land tenure problems, and with clearly defined limits
2. Forest management plan must include the amount and type of direct employment generated by forestry activities and its impact on surrounding communities

Table 9. Distribution of area in conflict over use, in km2 (agricultural use in forestry category) by stratum of land use dynamics in Costa Rica.

Region	Stratum	Area in conflict over use (Agricultural use in forestry category)	Total area of non-forestry use	% of area in conflict over use
Country	Indigenous reserves	676	862	78%
Rest	National parks and biological reserves	95	98	97%
of country	Protected wilderness areas	606	863	70%
	Private property	5,992	14,487	41%
Guanacaste	National parks and biological reserves	360	366	98%
	Protected wilderness areas	118	184	64%
	Private property	1,523	4,365	35%
	Total	**9,369**	**21,226**	**44%**

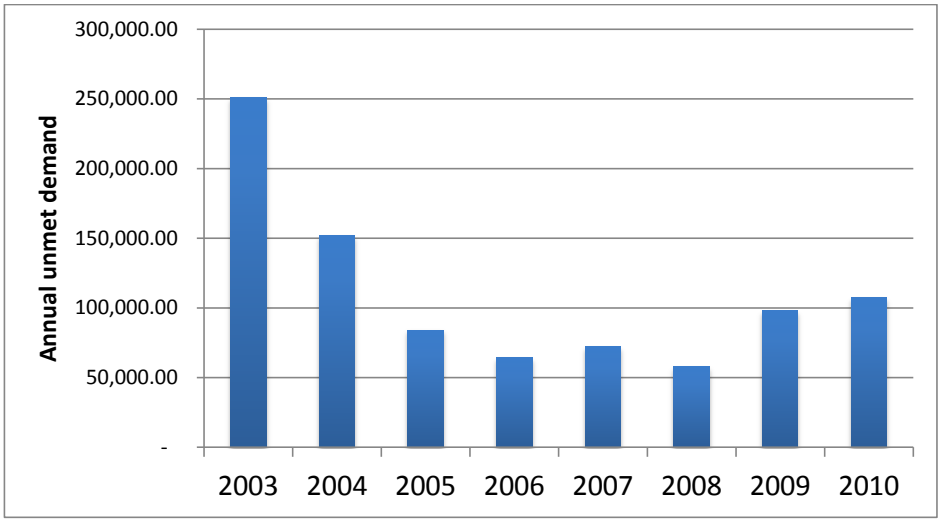

Figure 10. Annual unmet demand in the FONAFIFO Payment for Environmental Services Program for the Forest Conservation and Reforestation modalities. Since 2005, the eligible period for receipt of applications has been restricted to 30 working days a year.

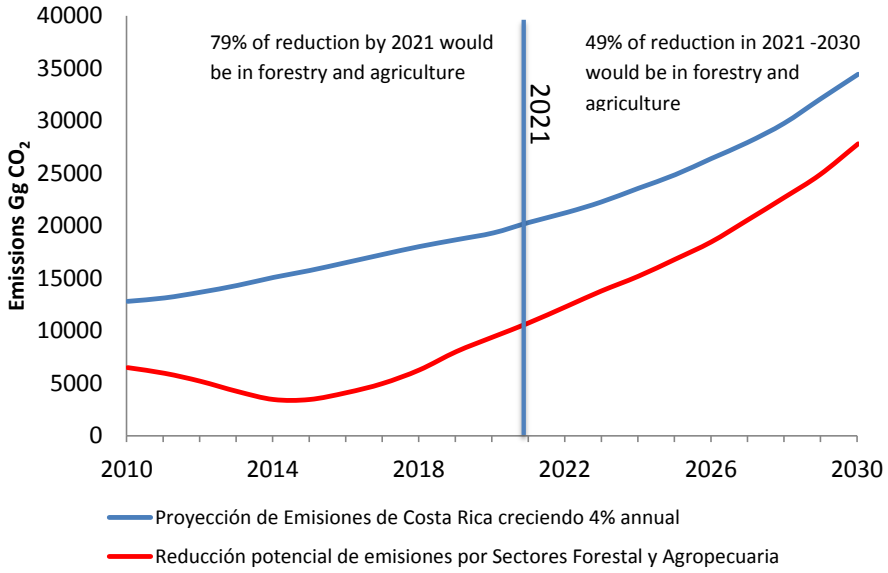

Figure 11. Potential for reduction in forestry and agriculture sectors. Business as usual (BAU) scenario for emissions in Costa Rica, assuming a 4% annual growth of the economy, without implementing mitigation activities in transport, renewable energy, energy efficiency, waste treatment, and agroforestry mitigation. Mitigation potential assuming maintenance of current PES Program and incorporation of new REDD activities in the ER Program (Source: NEEDS Project-Costa Rica).

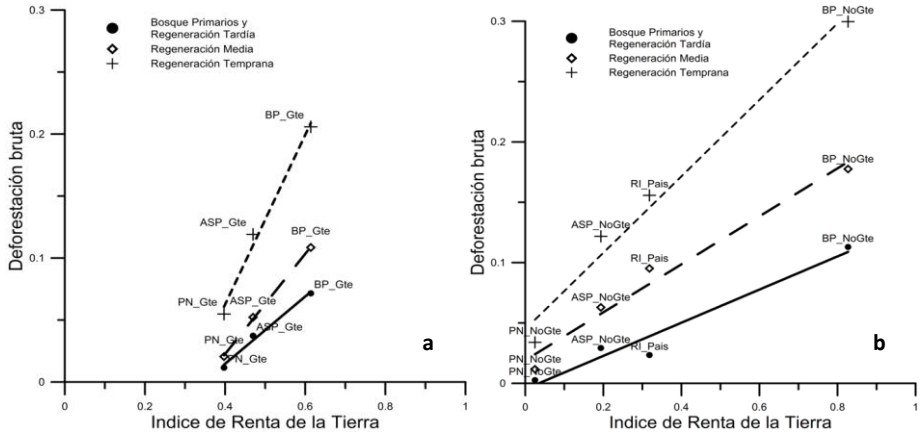

Figure 12. Gross deforestation for different regeneration cohorts, by income index of land in uniform stratum of land use dynamics outside Guanacaste (a) and within Guanacaste (b). PN: national parks; ASP: protected wilderness areas; RI: indigenous reserves; BP: private forests.

5.4. Activities to address risks of reversal of greenhouse gas benefits

Please describe major risks of anthropogenic and non-anthropogenic reversals of greenhouse gas benefits (from e.g., fire, agriculture expansion into forest, changes in commodity prices). Also describe any activities or design features in the proposed ER Program that are incorporated to minimize and/or mitigate the anthropogenic risks or reversals, and how these activities are consistent with the design features of the (emerging) national REDD+ strategy to address risks of reversal

With regard to the risks of reversal of benefits, note that the Program is scheduled to end in December 2020, just before the country begins the period of carbon neutral development. In 2021, the country will require a given balance in its greenhouse gas emissions, for which it will use the REDD reductions generated in its own territory, and hence the country should continue investing in REDD activities. Accordingly, reforestation and induction of secondary growth, as promoted in the ER Program, will continue to enhance carbon stocks until 2055, at which time the last recruited areas would be in full use and would no longer fix carbon.

The greatest risk of reversal of benefits is found in forests located in higher income land (with greater accessibility). Old growth and/or secondary growth forests that are difficult to reach and located on steep hillsides would normally have a low risk of deforestation. The production and consumption of wood promoted by the ER Program would encourage the sustainable management of these natural old and secondary growth forests and forest plantations, which would maintain/renew carbon stocks beyond 2020, provided that wood continues to be a profitable business.

In the long term, it is a matter of concern that, once the carbon stock enhancement program ends in Costa Rica and gross deforestation is minimal, the maintenance of carbon stocks will

require alternative funds to support carbon stock conservation, in order to keep the lack of motivation for maintaining coverage from becoming a perverse incentive.

The R-PP identified as risks of reversal of greenhouse gas benefits potential problems of inefficiency of the programs to control illegal logging and forest fires, and problems relating to lack of clarity about emission reduction rights under the REDD Strategy, owing to difficulties in terms of land ownership or fraudulent activities.

Costa Rica's REDD Strategy (R-PP) calls for the following actions to mitigate the identified risks:

i. **Promotion of the production and consumption of sustainable wood from primary and secondary natural forests and reforestation:** see section 5.3 iii.

ii. **Improved management of SINAC and CIAgro**: Through the REDD Strategy, it is hoped to tighten control over activities that degrade and eliminate forest cover. To that end, it is proposed to improve the management of SINAC in controlling illegal logging and forest fires, as well as the oversight role of the College of Agricultural Engineers.

iii. **Establishment of a National Registry for Environmental Service Rights:** (see section 6.4).

iv. **Establishment of a Fraud Control Unit**: The purpose of this Unit is to prevent fraudulent transactions of environmental service rights and regulate transactions of environmental service rights in the local environmental services market. It has not yet been decided which institution or entity will be responsible for this Unit.

5.5. Description of the potential risks of both domestic and international displacement of emissions (leakage)

Please describe the potential risks of both domestic and international displacement of emissions from the proposed ER Program activities. Then also describe how the proposed ER Program activities will minimize the risk of domestic displacement and international displacement (if applicable), via the design of the proposed ER Program and the ER Program activities and the selection of locations. For sub-national programs, pay special attention to identifying domestic risks of displacement of emissions, the proposed ER Program activities to mitigate these risks, which otherwise would contribute to fewer net emission reductions generated by the proposed ER Program, and how these activities are consistent with the design features of the (emerging) national REDD+ strategy to address risks of displacement

Arranging mitigation activities per leakage type

Six ER-Program activities can be rearranged in 4 groups based on mitigation and leakage possibilities:

1. Activities: A & B: Pure Mitigation of Avoided Deforestation and Degradation.
2. Activities C, D, & E: Regeneration, Afforestation/Reforestation.
3. Activity D: Agroforestry Systems.
4. Activity F: Promote wood consumption.

Costa Rica´s MRV in the ER-Program has been design at a National Scale, thus, existing internalization of leakage occurs. In this sense, the R-PP includes control activities to avoid potential for leakage, for all different options. The order of magnitude and even the direction of leakage (negative versus positive), however, are unknown, and could be included as a component in the MRV.

Leakage potential on ER-Mitigation activities and control activities to avoid potential for leakage

The ER-Program includes control activities to avoid potential for leakage, in the sense that it depends on its own good management and design, and on the success of the investments on enhancing forest governance as suggested by the R-PP. Nevertheless, despite of internalization occurring between each activity, some of them may be needed to avoid leakage.

A study carried out by FUNDECOR for the 1996-2001 period, showed the deforestation results for forests in the Atlantic slope of Costa Rica, which may serve as an approximation to estimate the leakage likely to be in the revised ER-PIN. The study revealed that failure to control forest management practices by the Forestry Law and the Sustainability Standards from that date caused the deforestation of nearly 21,500 ha, where 8,000 ha corresponded to logging permits under areas deforested after land use change was prohibited. This 8,000 ha corresponded to nearly 36% of the total deforestation, meaning that for every 3 ha deforested there were 1 ha of leakage displacement.

Table 10 shows the leakage potential and control activities for each of the six mitigation activities under de ER-Program.

It is also worth noting the proposed strengthening of the role of National System of Conservation Areas – SINAC, in the control of illegal logging, as another control activity. In this respect, SINAC should develop a digital system that allows a fast verification in the field for control of illegal logging, carry out procedures in the custody chain, and prepare task reports (refer to strategic option under the R-PP).

Also strengthening the supervising task of the CIAgro is a major control activity. A sustainable financial scheme should be established that guarantees an adequate supervision of the forest activity by the CIAgros and the CIAgro must immediately respond to delays in its supervision obligations, which could be affecting the control of the illegal activity (refer to strategic option under the R-PP).

Finally, the main reasons explaining why it is expected that there will be no significant risk of domestic displacement of emissions from the proposed ER Program activities are the following:

i. The activities will be national in coverage;

ii. Land purchases are not included;

iii. Landowners are recruited on a volunteer basis;

iv. A landowner participating voluntarily in the REDD activities of the proposed ER Program, who might be motivated by the demand for agricultural products to migrate and deforest another piece of land, would have to find a property without an owner, in order to convert it to agricultural use. This situation would not be very feasible, given that in Costa Rica nearly all the forests outside of national parks and indigenous reserves have already been reclaimed or have owners. Moreover, Costa Rica is now implementing a program for regularization of the official land register; its main objective is to improve legal certainty about real property rights. The program is geared to identifying, preventing, and resolving conflicts relating to land ownership and use, especially in indigenous territories. This component is operating in 15 Costa Rican indigenous territories, collecting information on the ownership and use of land in these territories.

v. Lastly, the REDD activities of the ER Program are expected to discourage illegal logging by promoting the production and consumption of sustainable wood from natural primary and secondary forests and reforestation.

For the case of international leakage, if the supply of wood from forest plantations and agroforestry systems increases significantly as a result of the ER Program, the current trend of meeting local demand for wood through imports could be reversed, thus avoiding the leakage of emissions from deforestation and degradation to other countries.

Table 10. Leakage Potential and Mechanisms for Avoiding and Controlling Leakage for 6 Mitigation Activities of the ER-Program of Costa Rica

Option	Land use tenure	Emission Reduction Activity 2010-2020	LEAKAGE POTENTIAL	MECHANISM FOR AVOIDING LEAKAGE
A	Private forestland and Indigenous Reserves	Expand the coverage of PES in old growth forest	Failure to design a good PES program compatible with forestry livelihoods and SFM in the investment/design phase: • Promote activity shifting • Avoid PES money will be invested in forestry and other sustainable livelihoods and be invested in activities that will promote leakage. • Avoid the generation of forestry co-benefits	PES compatible and promoting SFM in forest that has high opportunity cost. To orient PES in forest that will maximize co-benefits. Promotion of SFM, through deregulation and lower transaction costs. Create incentives for helping with management-planning cost for SFM. Distribution of cost of control and monitoring in other actors different from forest owners. Capacity building Improve contracts responsibilities, and ethical behavior of beneficiaries to avoid leakage behavior. Target of beneficiaries with low probability of leakage behavior Develop SFM procedures and codes of practice for secondary forests, agroforestry systems and plantation forestry Improve forest governance and investment security on AFS and plantation forestry
B	Private Forestland	Additional PES Area for Avoided deforestation in secondary growth forest		
C, D	Private forestland and Indigenous Reserves	Additional PES Area for carbon fixation by promoting Secondary growth in degraded lands.	Activity shifting by moving agricultural activities into other areas, or use of PES as an investment capital for such leakage activities (see decision tree in Figure 2). A/R can create deforestation, and therefore leakage, if it is implemented in areas in which early secondary growth was happening. In AFS promotion, lack of acceptable technologies on the agricultural component AFS promoting forest degradation: establishment of AFS in secondary forest.	Target of beneficiaries with low probability of leakage behavior Promote sustainable livelihoods and SFM Leakage by promoting A/R and AFS in early regenerated areas and secondary forest can be avoided if there is a detail baseline map, and a proper procedure for checking of previous condition of the land. Define safeguard for AFS agricultural component for a low carbon and environmental friendly technologies Decrease transaction cost of AFS Improve forest governance and investment security on AFS and plantation forestry
D	Private forestland	Additional PES Area for carbon fixation by promoting reforestation and agroforestry systems in degraded lands		
F	Not apply	Promotion of the production	Low governance, high transaction cost of legal	Improve forest governance in terms of forest investment security, deregulation,

		and consumption of sustainable wood	users will not allow for forest permanence and forest investments in the context of promotion of wood consumption and increase demand for forest products. It may allow for increase illegal logging and trade, forest liquidation.	decreasing transaction cost to SFM and access to forest use, There is potential that FLEG, and FLEGT actions will improve forest governance, and also tackle sources of leakage for the ER-Program in term of international trade of timber.

6. Consistency with national REDD+ strategy and governance arrangements

6.1. Institutional arrangements

Please describe the governance arrangements anticipated or in place to manage the proposed ER Program (committee, task force), and the institutional arrangements among ER Program stakeholders (i.e., who participates in this ER Program, and how, including the roles of civil society organizations and forest dependent communities)

Figure **13** and Table 11 summarize the institutional, hierarchical, and functional arrangements put in place to implement the REDD Strategy and consequently this ER Program. It is also important to note that an *environmental services market* is being developed in Costa Rica (for water, biodiversity, scenic beauty, and carbon), in which FONAFIFO serves as an intermediary between producers and buyers of local and international environmental services, together with managing and financing the PESP (control, implementation, registration) with the support of private entities (individual forestry engineers and corporations) and the relevant government agencies (see Figure **1**).

The carbon stock enhancement activities in the ER Program would broaden the context to include the sustainable production of wood, by including the participation of partners and entities, both within and outside the Costa Rican forestry sector, such as international forestry investors, businesses involved in construction, and owners of unforested land. In this implementation scenario, the role of FONAFIFO would expand to include the management and administration of financial mechanisms for the sustainable production of wood (see Figure **2**).

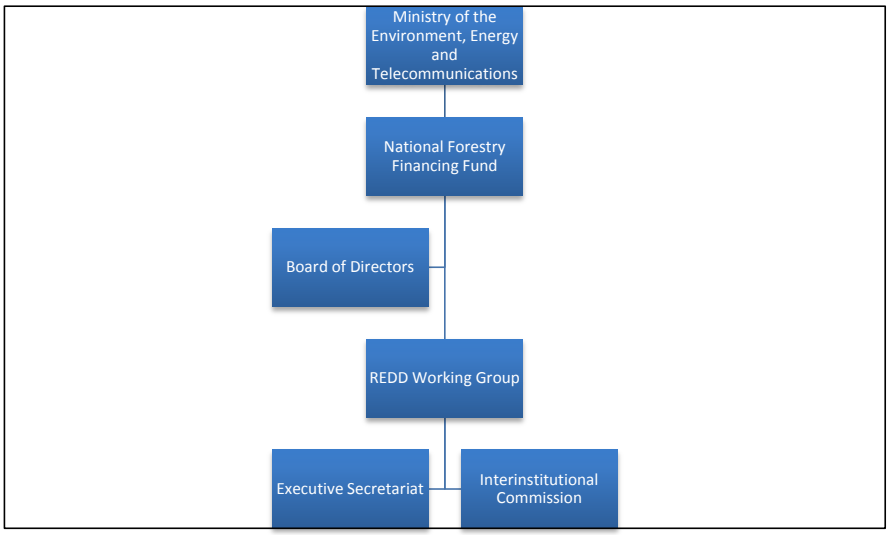

Figure 13. Organization chart for the management of the REDD Strategy

Table 11. Institutions, bodies, functions, and members necessary for the management of the REDD Strategy in Costa Rica

Functions	Institution - Body	Members
In context of REDD+ strategy: • Issue of policies • Decision-making • Conflict resolution	REDD+ Board of Directors (JD)	• Two representatives of National Forestry Office (ONF) • One representative of ADIIs • One representative of Ministry of Agriculture and Livestock • One representative of MINAET • One representative of National Banking System • One representative to be chosen among owners of degraded lands (large and small), environmentalist NGOs, and civil society organizations
• Management and coordination of REDD+ Strategy • Execution of ER Program	FONAFIFO-REDD Secretariat	• FONAFIFO Executive Director
• Interinstitutional coordination • Implementation of REDD+ JD agreements • Execution of Communication Strategy	Executive Secretariat	• Secretary • Two professional assistants
• Interinstitutional execution of REDD+ Strategy	Interinstitutional Commission	Composed of liaison officials from: • Academia • SINAC • National Meteorological Institute (IMN) • College of Agricultural Engineers (CIAgro) • National Forestry Office (ONF) • Associations of Comprehensive Indigenous Development (ADII) • Ministry of Agriculture and Livestock

6.2. Linking institutional arrangements to national REDD+ implementation framework

Please describe how the institutional arrangements for the proposed ER Program fit within the national REDD+ implementation framework

The ER Program calls for the implementation of six of the eight strategic options of the Readiness Preparation Proposal (R-PP) approved for Costa Rica. Accordingly, the ER Program is operating under the same implementation framework as the REDD Strategy: institutional arrangements (see section 6.1); SESA (see section 7.2); consultation process (see section 8.1). In addition, the strategy is being duly adjusted to meet the requirements of the Carbon Fund in relation to the MRV system (see sections 11 and 12).

6.3. Consistency with national REDD+ strategy and other relevant policies

Please describe:

a) *How the planned and ongoing activities in the proposed ER Program relate to the variety of proposed interventions in the (emerging) national REDD+ strategy*
b) *How the proposed ER Program is strategically relevant for the development and/or implementation of the (emerging) national REDD+ strategy (including policies, national management framework and legislation)*
c) *How the activities in the proposed ER Program are consistent with national laws and development priorities*

The ER Program is part of the Readiness Preparation Proposal approved for Costa Rica (R-PP). The ER Program covers only REDD R-PP activities that represent an increase in the country's effort up to now. The ER Program corresponds to the following lines of action in Costa Rica's REDD+ strategy: a. Reducing even further the deforestation rate in regenerated and old growth forests; b. Expanding PES coverage; and c. increasing carbon sequestration through the induction of regeneration, establishment of forest plantations, and promotion of wood consumption. Table 3 details the various options for emission reduction by avoided deforestation and carbon sequestration proposed in the Costa Rican ER Program.

6.4. National registry

Please include a short description of the relationship of the proposed ER Program to national REDD+ activity management arrangements, and if the proposed ER Program will be part of any system to track REDD+ or other emissions reduction activities (e.g., a REDD+ registry)

In Costa Rica, landowners own the environmental services; thus, any problem relating to overlapping property titles affects the unity of emission reduction rights under the REDD+ Strategy. Private initiatives are also being implemented to reduce emissions through avoided deforestation and carbon stock enhancement in parallel to those taken by FONAFIFO, including, among others, the PES Solidarity Program of the Foundation for the Development of the Central Volcanic Mountains (FUNDECOR), the Carbon Neutral Program of EARTH University, and the "Reforest the Tropics" Program. The National Registry for Environmental Service Rights would allow for the orderly operation of the various concurrent activities in the country, ensuring the unity and spatial and temporal integrity of forestry emission reductions in a way that is simple and understandable to the general public, as well as being auditable by third parties and subject to public consultation. Moreover, this registry would provide information on which of the increases in carbon stock determined by the Monitoring, Reporting and Verification (MRV) system might be claimed by the initiatives taken under the ER Program. Figure **14** shows a simple example of the registering of REDD emission reduction rights, developed by FUNDECOR (a non-profit NGO) for a private PES program in the central volcanic mountain range. The same example is developed further in Google Fusion Tables, a low-cost open source platform.

Figure 14. Example of registration of emission reduction rights developed by FUNDECOR for the Solidarity Payment for Environmental Services Program, an initiative to raise private funds to finance positive incentives to avoid deforestation in the central volcanic mountain range conservation area of Costa Rica (for more details refer to http://www.fundecor.org/public_html/PSA_Solidario.html).

7. Preliminary assessment of the proposed ER Program in the context of the national Strategic Environmental and Social Assessment (SESA) and the Environmental and Social Management Framework (ESMF)5

7.1. Progress on SESA/ESMF

Please describe the country's progress in the implementation of SESA and the development of the ESMF, and their contribution or relationship to the proposed ER Program

FONAFIFO has completed the following steps necessary for the development of the SESA Work Plan:

i. *Identification of Participants*: The identification of the relevant stakeholders took place during the R-PP process; improvements have been made in the form of the preparation of a directory of stakeholders and a better definition of roles.

ii. *Identification of World Bank Safeguards:* The specific environmental and social safeguard policies were identified for the preparation phase and the preparation of the ESMF (Environmental and Social Management Framework) as part of the R-PP. The following World Bank Operational Policies were identified as the reference framework for the SESA in the R-PP: Environmental Assessment (OP/BP 4.01), Indigenous Peoples (OP/BP 4.10), Forests (OP/BP 4.36) and Involuntary Resettlement (OP/BP 4.12).

iii. *Identification of the Cancún Safeguards*: A proposal was made to UN-REDD to design the safeguards information system for Costa Rica.

iv. *SESA National Workshop:* FONAFIFO organized the first SESA National Workshop (May 4-5, 2011) to begin the SESA process with the relevant stakeholders. The relevant sectors of society were represented, including the indigenous peoples, other persons dependent on the forests, owners of rural lands, and others. During this workshop, the relevant stakeholders were informed about Costa Rica's revised proposal for the design of a national REDD strategy and were offered a platform to raise their issues and concerns regarding the proposal. As well, the risks and benefits of each of the REDD strategy options were identified for consideration in the design of the national REDD strategy. The proceedings of the national workshop were distributed to the stakeholders and included responses to the risks and concerns identified during the workshop.

v. *SESA Work Plan*: Based on input from the stakeholders, FONAFIFO is preparing a SESA work plan, which will be distributed to the indigenous peoples in 2012. A World Bank mission in support of the preparation of the work plan is scheduled for late September of this year (September 20-30).

[5] The ESMF is the assessment process to be used in FCPF REDD+ countries during R-PP implementation and REDD+ readiness preparation. The ESMF is an output of SESA that provides a framework to examine the issues and impacts associated with projects, activities, and/or policies/regulations that may occur in the future in connection with the implementation of the national REDD+ strategy but that are not known at the present time.

7.2. Incorporation of SESA outputs and/or outcomes into the proposed ER Program
Based on the progress outlined in 7.1, please describe how the proposed ER Program is expected to make use of the outputs and/or outcomes of the SESA process. Provide an analysis of the ways in which activities planned under the proposed ER Program will rely on the measures and procedures included or to be included in the ESMF. Are there likely to be any gaps or issues regarding the compliance of the proposed ER Program activities with applicable safeguard standards, including the UNFCCC safeguards?

Using a participatory approach, FONAFIFO will conduct analytical and diagnostic studies of the social and environmental aspects, legal and political impacts, and risks and benefits of the options proposed in the REDD strategy, of which the ER Program REDD activities are an integral part. Studies of the following risks identified during the SESA Workshop will be carried out:

a. Land Tenure and Overlaps
b. Management of the Natural Forest
c. Payment for Differentiated Environmental Services: Indigenous Peoples and Farmers
d. Restrictions on economic activities and access to natural resources in communities

The data and results of these analytical and diagnostic studies will be summarized in a separate SESA report, which will include the following key information: (i) the consultation process for the analytical and diagnostic studies; (ii) the risks and benefits of the options proposed in the national REDD strategy, including the ER Program actions in particular; and (iii) the contextual challenges that could weaken and/or improve the long-term sustainability of the national REDD strategy

Based on the SESA report, an Environmental and Social Management Framework (ESMF) will be prepared to manage future impacts once the national REDD strategy (including the ER Program actions) is being implemented. The ESMF strategic options will take account of deficiencies so as to manage risks and potential impacts in accordance with the corresponding World Bank safeguard policies. The ESMF will provide a framework for managing and mitigating the possible environmental and social impacts of the specific projects and activities (for example, investments and carbon finance transactions in the context of REDD implementation).

8. Stakeholder Information Sharing, Consultation, and Participation

8.1. Stakeholder engagement to date on the proposed ER Program

Please describe how key stakeholder groups have been involved in designing the proposed ER Program, and summarize issues raised by stakeholders, how these issues have been addressed in the ER Program to date, and potential next steps to address them

FONAFIFO has held numerous information-sharing sessions since 2008 on Costa Rica's proposal for the design of a national REDD strategy, in particular during the preparation of the R-PP. Some 80 civil society organizations, NGOs and government entities participated in the preparation of the R-PP (2009), which sets out the strategic options, including the REDD actions in the ER Program. A working session was organized to discuss the REDD with civil society and academic institutions such as the University of Costa Rica, the National University of Costa Rica, the Costa Rican Institute of Technology, the T*ropical* Agricultural *Research* and Higher Education Center (CATIE), the National Biodiversity Institute (INBio), and FUNDECOR. Information packages, including the R-PP, were distributed to a wide range of government entities, civil society organizations, indigenous peoples and rural organizations such as the ONF, the Junta Nacional Forestal Campesina, the Central American Indigenous and Farmers' Coordinating Association for Community Agroforesty (ACICAFOC), FECON, ARADIKES, the Mesa Nacional Indígena, the Coordinadora ADII-Caribe, and the Network of Private Reserves

For its discussions with the indigenous peoples, FONAFIFO has been holding bilateral dialogues with the Integral Indigenous Development Associations (ADIIs) and indigenous peoples' organizations, in which information has been provided, as well as early planning meetings to identify their problems and concerns. Visits and meetings were held in 2009 with the ADIIs in Talamanca and other organizations of indigenous peoples such as the RIBCA in the Atlantic region. FONAFIFO also supported a series of planning workshops organized by the indigenous peoples themselves in the Atlantic region specifically to discuss the R-PP.

In the national SESA workshop (May 4-5, 2011), the relevant sectors of society (indigenous peoples, other people who depend on the forests, owners of rural lands, etc.) were informed of Costa Rica's revised proposal for the design of a national REDD strategy and a platform was provided for the relevant stakeholders to raise their problems and concerns regarding the REDD strategy and its options, including the REDD actions in the ER Program. In this SESA workshop, the risks and benefits of each of the REDD strategic options were identified for consideration in the design of the national REDD strategy.

8.2. Planned outreach and consultation process

Please describe how relevant stakeholder groups will participate in further design and implementation of the proposed ER Program and how free, prior and informed consultation leading to broad community support for the ER Program and key associated features, including the benefit-sharing arrangement, will be ensured. Please describe how this process will respect the knowledge and rights of Indigenous Peoples and local communities, by taking into account relevant international obligations, national circumstances and laws

FONAFIFO has carried out a series of early information dissemination workshops and has engaged in an initial dialogue on the REDD with a variety of stakeholder groups, including the indigenous peoples in the Atlantic and Pacific areas. A new series of communications actions will be undertaken to ensure the dissemination of culturally appropriate information to the relevant stakeholders. FONAFIFO will establish institutional agreements for the communications work, mobilize the necessary human and financial resources, and develop and implement a comprehensive communications strategy based on a baseline communications survey. The communications strategy will also support the SESA consultation and processes.

In developing the REDD strategy, FONAFIFO is planning to carry out relevant and culturally appropriate consultations with the relevant stakeholders. Special attention has been paid to the active participation of indigenous communities and their representative organizations, as well as farmers' organizations, to ensure an open, transparent and credible consultation process. The intention of the process is to help strengthen local and regional organizations to make them better able to identify and articulate the issues that affect them. Account will be taken in this consultation strategy of the indigenous peoples' traditional and nontraditional structures, their own decision-making process, and socio-cultural channels of communications and decision-making. As well, FONAFIFO will support a self-selection process for the identification of representatives of the indigenous peoples on the FONAFIFO Board.

FONAFIFO also plans to analyze the socio-economic profile of farmers dependent on the forests and, based on an adequate consultation process, will propose measures to tackle their problems. Farmers dependent on forests are a demographically significant group in Costa Rica and in general are the poorest.

FONAFIFO will continue providing information to the members of indigenous communities that are not members of the ADII structure and to local organizations, associations and cooperatives that represent other non-indigenous communities. At the same time, FONAFIFO plans to cooperate with the institutional structure to ensure the participation of representative indigenous and farmers' organizations at various levels, including decision-making on implementation, monitoring and assessment.

Finally, it should be added that the ER-PIN will be ready by the time of the consultations with the relevant stakeholders, and its discussion will be combined with that of all the other REDD strategy options. This communications strategy will support the dissemination of information on the risks and benefits of the strategic options, including the REDD actions in the ER Program,

to strengthen the participatory platforms and process and raise awareness about the overall national REDD strategy.

8.3. Feedback and grievance redress mechanisms

Please describe the mechanism(s) that are or will be put in place to resolve any disputes regarding the proposed ER Program

The grievance mechanism will be managed by FONAFIFO's Audit Office (*Contraloría de Servicio*), which has been established by law and is responsible for receiving and processing complaints on behalf of each specific governmental agency. In the case of grievances and complaints relating specifically to the REDD, the REDD Executive Secretariat (within FONAFIFO) will receive and communicate the grievance and/or complaint to the Audit Office, which will coordinate with the relevant FONAFIFO department to prepare the appropriate institutional response. The REDD Working Group will not communicate the institutional response to the complainant or provide further advice on responding to questions regarding the implementation of the R-PP and the design of the national REDD strategy. The grievance mechanism will include specific procedures for receiving, documenting, following up, investigating and reporting that will be managed by the Audit Office with assistance from the REDD Executive Secretariat in coordination with the REDD Working Group.

9. Additional Benefits

9.1. Expected social and environmental benefits

Please describe the environmental and social benefits, other than emission reductions, that the proposed ER Program is planning to achieve; and any other ways in which the ER Program would contribute to broader sustainable development

Table 12 describes the environmental and social benefits, other than emission reductions, that the ER Program could help achieve.

Table 12. Environmental and Social Benefits, Other than Emission Reductions, of the Costa Rica ER Program.

ER-PIN Mitigation Option	Co-Benefits	Size of the Co-Benefit [6]
A. Additional PES area for Avoided Deforestation/Old Growth Forest B. Additional PES area for Avoided Deforestation/ Middle Regeneration Forest	i. Biodiversity conservation ii. Water quality conservation (erosion control) iii. Water flow regulation.	i. Potential conservation of ***35,000 ha*** of high biodiversity value forests not included in the existing system of protected areas and improvement of connectivity in biological corridors ii. Potential water quality conservation of ***25 million m^3*year $^{-1}$*** for human consumption iii. Potential water quality conservation of ***333 million m^3*year^{-1}*** for hydroelectric power production.
C. Additional PES area for Carbon Capture by inducing Early Regeneration D. Additional PES area for Carbon Capture by establishing Forest Plantations E. Additional PES area for Carbon Capture by inducing Early Regeneration	i. Wood production ii. Water quality conservation (erosion control)	i. Potential income of ***US$400*ha^{-1}*year^{-1}*** for owners of unforested lands that establish forest plantations for wood production ii. Potential income of ***US$50*ha^{-1}*year^{-1}*** for owners of land who manage secondary growth forests for the sustainable production of wood.
F. Carbon capture in wood products by means of increased use of wood	i. Creation of demand for wood	i. Promotion of forest activity ii. Job creation in depressed regions of the country

9.2. Diversity and learning value

Please describe the innovative features of the proposed ER Program and what learning value the Program would bring to the FCPF Carbon Fund

As this proposal is the first ER program draft presented by a country to the FCPF Carbon Fund, it has an inherent learning value. The preparation of the ER-PIN has forced both Costa Rica and the FCPF technical support team to undertake a technical and financial exercise that has brought Costa Rica closer to implementation of the REDD actions contained in the R-PP and has provided the FCPF with an opportunity to adjust and design its proposal preparation and assessment mechanism. Nevertheless, it should be made clear that it is hoped that Costa Rica's

[6] The size of the environmental co-benefits is estimated on the basis of the work by Tattenbach *et. al* (2007). Generation of Environmental Services. Chapter 13 in Costa Rica's Experience with Payments for Environmental Services. Publishers: Platais and Pagiola.

work on this ER-PIN will contribute to the R-PP preparation process without undermining its own preparatory work. Civil society is concerned that if Costa Rica concentrates on the implementation of this ER-PIN it will not complete the work required for the preparation of the general REDD strategy.

As well, the following innovative features were identified during the preparation of this proposal:

i. Promotion of wood production: The lack of additional public funds to finance the implementation of the REDD actions has made it necessary to include alternative sources of financing. Private investment in forestry businesses for the production of wood is proposed. This would require the creation of financial mechanisms and institutions to attract investment to a depressed and overregulated forestry sector.

ii. Promotion of wood consumption: The success of the previous initiative depends on the promotion of wood consumption in Costa Rica. This will require R&D in biomaterials and the re-education of architects and engineers in the use of wood, expansion of the supply of sustainable wood products, and readjustment of the housing insurance policy to reverse the trend toward the use of materials with a large carbon footprint.

iii. Measuring, Reporting and Verification for the Emissions Reductions Payment Agreement (ERPA): This is an important aspect for the negotiation of the ERPA; this proposal will provide experience in tackling areas of uncertainty and deductions and in assessing cost-effective monitoring technologies. In general, the REDD proposal MRV strategies have lacked this focus in their design.

10. Benefit Sharing

10.1. Rights to territories and land, and mitigation benefits

Please describe the land use and land tenure context of the proposed ER Program, and if and how rights to territories and land and mitigation benefits from REDD+ are reflected in traditional practices and codified in legal and/or regulatory frameworks

In Costa Rica, the ownership of environmental services generated by forests or plantations is considered an "asset" or "good" that belongs to the owner of the property providing the service. Although such goods are not easily classifiable using traditional definitions (Article 253 and ff. of the Civil Code), their nature as an "asset" that could potentially receive a payment from the State through mechanisms such as the PES is generally accepted. Logically therefore, in Costa Rica a forest or plantation can become an asset that is an economic factor that gives value to a specific environmental service provided (mitigation, water production, protection of biodiversity, protection of ecosystems), which is a real right derived from the ownership of the forest and thus transferable.[7] Therefore, the owner of the land is also the owner of the carbon. On public lands, the carbon rights belong to the State; in indigenous areas, the rights belong to the indigenous community; and on private lands, the rights belong to the individual owner. Thus, the owner can sell his carbon rights to a third party in exchange for compensation. Carbon rights purchased by FONAFIFO belong to the State since they were purchased with public funds;, FONAFIFO can therefore market these rights if it so wishes.

It is important to note that the government payment is compensation for conservation or for the dedication of land to the ends pursued by Law 7575. Said compensation is not paid for a specific environmental service, since such services are not considered individually for such payments. In the event that the State (through FONAFIFO) has actually paid for the environmental mitigation service, selling would no longer be an option.

10.2. Description of envisioned benefit-sharing arrangement for the proposed ER Program

Please describe the benefit-sharing arrangements that are envisioned to be used for this proposed ER Program

The benefit-sharing arrangement applicable to the various types of forest ownership throughout the country that was developed and implemented in the PES Program will be used for the ER Program. This mechanism has been used at the highest administrative and political levels by means of the Valuation Matrix for Forest Protection Projects established by FONAFIFO Decree No. 36935-MINAET. This matrix prioritizes the inclusion of the following types of forests in the program:

1. ***Private forests:*** Priority is given to the inclusion in the PES of properties located in districts with a low degree of social development (IDS MIDEPLAN 2007) that measure less than 50 ha.

[7] See the doctrine set out in Resolution 546-90 of the Constitutional Chamber of the Supreme Court of Justice (2:30 p.m., May 22, 1990) regarding the rights derived from forest ownership.

2. ***Indigenous Reserves:*** Priority is given to the inclusion in the PES of forests located in indigenous territories throughout the country.

3. ***Protected Forest Areas:*** Priority is given to the inclusion in the PES of forests and farms located within Protected Forest Areas that have not yet been purchased or expropriated by the State.

10.3. Link between the envisioned benefit-sharing arrangement and the activities in the proposed ER Program

Please explain how these benefit-sharing arrangements would support the activities identified in section 5.3 to address the drivers of deforestation and forest degradation. Identify, if possible at this stage, potential issues or constraints that may emerge in development of the ER Program that could need additional progress in order to effectively implement the benefit-sharing mechanisms

The benefit-sharing arrangement would build on the systems created for the PES program, with adjustments and complementary approaches where needed. The ER Program could include new PES variants in order to involve a large number and diversity of landowners and further strengthen the principles of equity and transparency. A specific variant of the PES could be designed to meet the particular conditions of the indigenous communities. The R-PP discusses how the strategic options will be further improved by analytical studies and consultations. For example, the R-PP foresees systematic analysis of opportunity costs for all strategic options, including analysis of the potential costs of compensation in the case of loss of income or restricted access to natural resources by communities.

10.4. Progress on benefit-sharing arrangements

Describe the progress made thus far in the discussion and preparation of the benefit-sharing arrangements, and who has been participating in this process

In the National SESA workshop held in May 2011, the following key aspects that are directly linked with benefit-sharing arrangements under the ER Program were identified:

i. The lack of a differentiated PES for farm communities, based on their unique characteristics, situation and needs, that would favor the farm community as it favors the indigenous communities.

ii. Design a new indigenous PES model that responds to and meets the expectations of the indigenous peoples.

Based on these and other inputs provided by the participants in the National SESA Workshop, FONAFIFO is preparing a SESA work plan that contains operational directives on the next steps and activities to carry out the necessary studies with those who are working on the adjustments to the national REDD strategy, including the ER Program actions, and the steps to be taken in the ESMF to mitigate the impact of the risks identified.

11. Reference Level and Expected Emission Reductions

11.1. Approach for establishing the Reference Emission Level (REL) and/or Forest Reference Level (FRL)

Please briefly describe how the REL/FRL for the proposed ER Program has been or will be established. Describe how the approach for establishing the REL/FRL is consistent with UNFCCC guidance available to date and with the emerging Methodological Framework of the FCPF Carbon Fund, and with the (emerging) national REL/FRL (or with the national approach for establishing the REL/FRL)

Implementation of the ER Program is planned for 2010-2020, so that the proposed reference level for the ER Program will be Costa Rica's carbon stock on December 31, 2009 (see Figure 9).

~~. The early initiation of the ER Program actions responds to: (i) the availability of public funds to finance early implementation of the REDD actions included in the ER Program; and (ii) the opportunity provided by the Carbon Fund to sell emission reduction rights. The project is to end in December 2020, just before Costa Rica begins the carbon neutral development period. The project will not continue past this date, which means that the outlook for the sale of emission reduction rights could change substantially, which is why Costa Rica must balance its greenhouse gas emissions with REDD reductions generated on its own territory.~~

11.2. Expected REL/FRL for the ER Program

Please provide an estimate of the REL/FRL for the proposed ER Program area. Even a very preliminary estimate would be helpful

~~The ER Program began in 2010 with the implementation of REDD actions in addition to the activities already under way. A preliminary estimate shows that the level of Costa Rica's carbon stocks as of December 31, 2009 could be above 777,000 Gg CO_2 (see Figure 9).~~

1. Determining the historical reference period for setting the reference level of the ER-PIN:

The reference baseline of Costa Rica`s ER-Pin is preliminary. It is based in the earliest estimation of the deforestation and regeneration of the historical reference period comprised between 2000 and 2005. This estimate was performed using a set of Landsat forest cover maps developed by different institutions (National Meteorological Institute – IMN for 1980 and 1990; and FONAFIFO for 2000 and 2005), and based on different methodologies. The existence of methodological differences between the forest cover maps used, call for the revision of data reported in the ER-Pin by repeating this analysis using standardized methodologies.

1.1. Forest definition

There is no guarantee that the definition of forest used in the different classifications of this historical analysis is consistent with the definition adopted by Costa Rica, this being one of the elements for which the current analysis is considered preliminary.

The determination of the reference level will be adjusted considering the forest definition adopted by Costa Rica.

For design purposes of the National Forest Inventory, and the MRV for REDD+, it was adopted the forest definition reported by Costa Rica in CDM projects, namely: "Forest is an area of land with a minimum size of 1.0 ha, with a canopy cover over 30%, and presenting trees with the potential to reach a minimum height of 5 meters at maturity *in situ*. A forest may consist of tight formations where trees of various strata and undergrowth cover a high proportion of the ground, or open formations with canopy cover over 30%. Young natural stands and all plantations that have not yet reached a canopy cover of 30%, or a height of 5 meters are considered forest (Ortiz, 2011)".

Comment [VM1]: Stavros comment #2

1.2. Land cover classification at different successional stages

Deforestation was assessed separately for three different forest successional stages: a. Old Growth Forest, b. Mid regeneration, c. Early regeneration. These successional stages were determined through an historical analysis of forest permanence and regeneration for two ten-year periods (1980-1990, 1990-2000), and one five-year period (2000-2005).

Since land use maps were provided in vector format, it was necessary their transformation to raster format, in order to conduct the analysis. The maps final resolution was 100x100 meters.

The historical analysis for all the years studied, was made in cloud-free areas, where all the spatial scenes contained land use data.

For this analysis, land uses were grouped in three basic categories: forest, secondary forest, and other use. It was necessary the standardization of land use categories for the four years. Initially, maps were reclassified in 16 categories as follows: 1. primary forest; 2. disturbed/logged forest; 3. forested pastures; 4. crops and pastures; 5. early regeneration; 6. bare land; 7. water; 8. reforestation; 9. clouds, shadows and no data; 10. urban; 11. paramo; 12. wetlands; 13. mangroves; 14. not classified; 15. mixed use; 16. deforestation. Subsequently, these categories were reclassified in 1. forest cover (1,12,13); 2. secondary forest (2); 3. other use (3, 4, 5, 6, 8, 10, 15, 16); 4. clouds, shadows and no data (9, 14); 5. water (7); 6. paramo (11).

Based of the reclassified maps, land use change dynamics since 1980 were studied, for the purpose of establishing the mean age of regeneration retained in the period 2000-2005 (Figure **15**). In order to be conservative in the estimates of deforestation and regeneration, it was defined ten-year periods for capturing the land cover net changes, avoiding temporal regeneration and deforestation.

1.3. Approximation of the mean land revenue for each Uniform Strata

Deforestation was estimated separately for four land tenure strata denominated "Uniform Strata". These strata were a. National Parks and Biological Reserves (public domain); b. Protected Wilderness Areas (private domain); c. Indigenous Territories; and d. Private Forests (Figure **16** and Figure **17**).

Strata were analyzed separately in the province of Guanacaste (Figure **16**), as the socio-economic reality there is different from the rest of the country[8]. Consequently, Guanacaste presents its own forest dynamic recovery.

For each of the strata, the land revenue (R_a) was estimated using von Thünen empirical model (developed from the relationship between the opportunity cost of land and its distance to the markets) (Leclerc & Rodríguez 1998). Using this model, an index was determined based on road density. This index assumed that the land revenue decreases exponentially as the distance to the nearest road increases, leading to an opportunity cost close to zero at a distance equal to or greater than one kilometer.

Each Uniform Strata was divided in 100x100 meters pixels. It was established a 1km buffer zone around the roads (paved and unpaved), and the land revenue index i was calculated for each pixel using the following equation, were d is the distance to the nearest road:

Equation 1.: $i = e^{d/100}$

With the calculated land revenue for each pixel, it was estimated a mean land revenue for each Uniform Strata (R_a):

Equation 2.: $\boldsymbol{R_a} \frac{\sum \boldsymbol{revenue\ index}}{\boldsymbol{total\ pixels}}$

1.4. Historical reference period

Preliminarily, it was estimated the deforestation and regeneration for the 2000-2005 historical reference period, which was immediately prior to the Montreal Climate Change Conference, where RED discussions began by the Subsidiary Body for Scientific and Technological Advice (SBSTA) (VCS, 2012).

Considering this, Costa Rica adopted 2005 as the year to set the reference level of the REDD + Strategy. This will allow claiming of carbon credits produced from that year by the PPES of FONAFIFO. In order to access different carbon markets (regulated and voluntary), credits from the 2005-2010 period will be claimed using the Jurisdictional and Nested REDD+ (JNR) methodological framework from the Verified Carbon Standard (VCS). From 2010, the credits produced by the additional effort of the current PPES of FONAFIFO will be claimed by ER-Program using as the crediting baseline the 2000-2005 historical reference period (Figure **9**).

[8] Tourism impact, prime real estate and the decrease in livestock (once very typical of the area), might be the causes of this situation.

Moreover even if five years as historical reference period for the projection of deforestation over the next 10 years (2010-2020) could be considered a short time, that period is used because is when PPES of FONAFIFO stabilizes (Figure **18**), and therefore its effect on deforestation. To be conservative, the analysis excludes the period 1996-2000, since in these years the PPES began, and its effect on deforestation was biased.

Comment [VM2]: Stavros comment #3

The preliminary determination of the historical reference period was expressed as an accumulated line of carbon stocks versus time (Figure **9**). Considering the UNFCC base equation (Equation **4**) to determine the emission reductions (Activity Data by Emission Factor), data presented in this report will be recalculated based on information provided by the National Forestry Inventory, in order to achieve decision 12/CP17[9] from Durban Climate Change Conference.

Comment [VM3]: Stavros comment #8

1.5. Carbon stock estimation

Preliminarily, it was estimated the carbon stock per Uniform Strata. Estimation was made in Gigagrams of CO_2 for each period. It was assumed that: a. secondary forest carbon storage approached primary forest levels after 35 years (Figure **19**); b. the mean biomass for old growth forests in Guanacaste is 220 $MgCO_2*ha^{-1}$ (Tropical Dry Forest); and c. the mean biomass for old growth forests in the rest of the country is 367 $MgCO_2*ha^{-1}$ (Tropical Rain Forest).

Although there are differences in the carbon storage capacity between life zones, for this preliminary study it was used a weighted average per life zone for 2005, based on observations made in six of the twelve life zones existing in Costa Rica (Table 13). These six life zones represented 77% of the forest remaining in 2005. The weighted average was 106 $MgC*ha^{-1}$, however to facilitate operations, it was rounded to 100 $MgC*ha^{-1}$ corresponding to 367 $MgCO_2*ha^{-1}$.

For each regeneration cohort, the carbon stock reserve was estimated by multiplying the proportion given by the mean age over the total time to reach old growth forest characteristics (35 years), by the carbon in old growth forest for the Region. It was considered an age of 22 years for early regeneration (138 $MgCO_2*ha^{-1}$ in Guanacaste and 230 $MgCO_2*ha^{-1}$ for the rest of the country), and an age of 27 years for mid regeneration (170 $MgCO_2*ha^{-1}$ in Guanacaste and 283 $MgCO_2*ha^{-1}$ for the rest of the country). Late regeneration was considered as old growth forest, with more than 35 years (220 $MgCO_2*ha^{-1}$ in Guanacaste y 367 $MgCO_2*ha^{-1}$ for the rest of the country).

[9] "The definition of forest used in the construction of forest reference emission levels and/or forest reference levels and, if appropriate, in case there is a difference with the definition of forest used in the national greenhouse gas inventory or in reporting to other international organizations, an explanation of why and how the definition used in the construction of forest reference emission levels and/or forest reference levels was chosen."

Finally, data obtained for each stratum was generalized to the national territory, since forest successional stage areas obtained from the historical land use cover study correspond to 71% of the country (remaining 29% corresponded to areas cover by clouds, shadows, or with no data).

1.6. Reference scenario projection

Forest cover change based on preliminary land use change matrix for the period 2000-2005 was calculated for each Uniform Strata, using a Markov chain. It was estimated the proportion t_{ij} of the cohort j, that pass to the cohort i, in the 2000-2005 reference period. This transition matrix was named T = (t_{ij}). Multiplying consecutively transition matrix T by the resultant land use vector, is how land use was preliminarily projected every five years between 2005 and 2030.

$$[1{,}424{,}898 \quad 163{,}147 \quad 200{,}097 \quad 625{,}209].X..\begin{bmatrix} & OU & R22 & R27 & B100 \\ OU & 0.921 & 0.729 & 0 & 0 \\ R22 & 0.265 & 0 & 0.735 & 0 \\ R27 & 0.141 & 0 & 0 & 0.869 \\ B100 & 0.060 & 0 & 0 & 0.940 \end{bmatrix}$$

2. Results from the preliminarily determination of the ER-Pin reference period

Historical analysis for the land use classification and successional stages was assessed in 3,626,195 ha of the national territory (71% of its total extent) that remains cloud free and with land use data throughout the study period (1980-2005). Forest cover distribution at the end of the studied period (2005) showed 288,886 ha under Early Regeneration; 329,599 ha under Mid Regeneration; 1,845,922 ha remained as Old Growth Forest/Late Regeneration and 2,646,169 ha as Other Use (Figure **20**).

From the deforestation analysis, it is concluded that in Costa Rica, despite the fact that the forest cover has been recovered (net deforestation is negative[10]), forests continues to be lost (there is gross deforestation[11]). 2000-2005 period presented the loss of 144,398 ha and the regeneration of 207,983 ha, implying a positive balance in the forest cover of 63,585 ha. 42% of the deforested areas corresponded to Early Regeneration forests, 32% to Mid Regeneration forests, and 27% to Old Growth forests.

Further, within identified strata there remains a deforestation gradient statistically significantly and positively related to land revenue. Said deforestation gradient is presented from highest to lowest as follows: National Parks and Biological Reserves; Protected Wilderness Areas; Indigenous Territories; and Private Forests (Figure **12**).

[10] Net Deforestation: assume loss of forest cover for one period, after considering its regeneration, which in addition is added to the forest area, remained until the end of the period.
[11] Gross Deforestation: assume loss of forest cover for one period without considering its regeneration.

This is consistent with (Walker, 2004), who indicates that in National Parks and Protected Wilderness Areas, deforestation tends to be lower because its land revenue is lower than the one in Private Forests.

It was also observed a deforestation gradient linked to the forest age. In this regard, the highest deforestation rate was found in early regeneration forests, followed by mid regeneration forests and at the end by old growth forests (Figure **12**).

2.1. Uniform Strata land use dynamics in 2005

Land use dynamics in National Parks and Biological Reserves: in 2005, this stratum possessed 22% of the national forest cover. It presented low land revenue, and thus a low deforestation rate. Absence of people living in these areas suggests that deforestation is more likely attributable to natural deforestation as a product to natural phenomena such as landslides, earthquakes and forest fires (Table 14 and Table 15).

Land use dynamics in private Protected Wilderness Areas: in 2005, this strata possessed 19% of the national forest cover. As in National Parks, this strata presented low land revenue, especially outside Guanacaste province, reason why deforestation is also low. Forest cover in this stratum tended to be stable (in 2000-2005 period, less than 4% of the stratum was deforested and more than 7% was regenerated). Outside National Parks, regeneration is more likely to be permanent, thus secondary growth forests remains longer (Table 16 and Table 17).

Land use dynamics in Private Forests: in 2005, this stratum possessed 50% of the national forest cover. Unlike National Parks and Protected Wilderness Areas, this stratum possessed higher land revenues and hence higher deforestation rates (in both regenerated stages and old growth forests). Although private forests are the only strata that presented a negative net deforestation, they were responsible for the 55% of the carbon storage in the 2000-2005 period (attributable to the fact that secondary forest growth exceeded the decrease in carbon stocks from deforestation) (Table 18 and Table 19).

Land use dynamics in Indigenous Territories: in 2005, 10% of the national forest cover was under this stratum. Land revenue under these areas was not as low as in National Parks and Protected Wilderness Areas, and deforestation rates in all regeneration cohorts were intermediate. Its carbon storage contribution was 4% (Table 20).

2.2. Reference scenario projection

Figure 21 and Figure **22** summarize land use projection (in sq km) for Guanacaste region and the rest of the country, which at the same time is disaggregated by Uniform Strata. Figure **23** shows the preliminary reference level projection based on the proposed ER-Pin of the Costa Rican Government to the FCPF.

Table 13. Carbon storage in aboveground biomass by life zones present in Costa Rica`s forests.

Life zone	Carbon (Mg*ha-1)	Forest (ha)		Weighted carbon by life zone (Mg*ha-1)
		Weighted area	Non weighted area	
Tropical wet forest	88	632,094		31
Premontane rain forest	73	323,083		13
Tropical moist forest			315,616	
Lower montane rain forest	84	300,548		14
Premontane moist forest	117	383,614		25
Premontane wet forest			127,408	
Montane rain forest	289[12]	106,357		17
Tropical dry forest			58,939	
Lower montane wet forest	204	53,052		6
Premontane wet forest, rain forest transition			45,350	
Lower montane moist forest			3,783	
Lakes			946	
Montane wet forest			847	
SubAlpine rain paramo			136	
Total		1,798,748	553,026	106

Source: Costa Rican Ministry of Environment and Energy, 1997

Comment [VM4]: Stavros comment #5

[12] Data is provided in Annex 1 of the document titled "National Proposal for the Territorial and Financial Consolidation of Costa Rican National Parks and Biological Reserves" from the Costa Rican Ministry of Environment and Energy. Calculation of biomass and carbon content is based don the data provided in forestry inventories.

Table 14. Land use dynamics in National Parks and Biological Reserves for the 2000-2005 period outside of Guanacaste.

	Other use		Early Regeneration		Mid Regeneration		Old Growth Forests and Late Regeneration		Total 2000
	Area (ha)	Coefficient (%)	Area (ha)	Coefficient (%)	Area (ha)	Coefficient (%)	Area (ha)	Coefficient (%)	
Other use	6608	60,83	4.256	39,17					10.865
Early Regeneration	500	3,39			14.247	96,61			14.747
Mid Regeneration	582	1,17					49.267	98,83	49.849
Old Growth Forests and Late Regeneration	1001	0,27					374.271	99,73	375.272
Total 2005	8691	1,93	4.256	0,94	14.247	3,16	423.538	93,97	450.732

Table 15. Land use dynamics in National Parks and Biological Reserves for the 2000-2005 period in Guanacaste.

	Other use		Early Regeneration		Mid Regeneration		Old Growth Forests and Late Regeneration		Total 2000
	Area (ha)	Coefficient (%)	Area (ha)	Coefficient (%)	Area (ha)	Coefficient (%)	Area (ha)	Coefficient (%)	
Other use	36.432	65,72	19.006	34,28					55.438
Early Regeneration	1.384	5,48			23.862	94,52			25.246
Mid Regeneration	520	2,06					24.783	97,94	25.303
Old Growth Forests and Late Regeneration	342	1,15					29.357	98,85	29.699
Total 2005	38.678	28,51	19.006	14,01	23.862	17,59	54.140	39,90	135.687

Table 16. Land use dynamics in Protected Wilderness Areas for the 2000-2005 period outside of Guanacaste.

	Other use		Early Regeneration		Mid Regeneration		Old Growth Forests and Late Regeneration		Total 2000
	Area (ha)	Coefficient (%)	Area (ha)	Coefficient (%)	Area (ha)	Coefficient (%)	Area (ha)	Coefficient (%)	
Other use	73.825	75,62	23.795	24,38					97.620
Early Regeneration	4.652	12,18			33.540	87,82			38.192
Mid Regeneration	3.960	6,30					58.926	93,70	62.887
Old Growth Forests and Late Regeneration	8.872	2,93					293.911	97,07	302.783
Total 2005	91.309	18,21	23.795	4,75	33.540	6,69	352.838	70,36	501.482

Table 17. Land use dynamics in Protected Wilderness Areas for the 2000-2005 period in Guanacaste.

	Other use		Early Regeneration		Mid Regeneration		Old Growth Forests and Late Regeneration		Total 2000
	Area (ha)	Coefficient (%)	Area (ha)	Coefficient (%)	Area (ha)	Coefficient (%)	Area (ha)	Coefficient (%)	
Other use	16.964	72,26	6.511	27,74					23.476
Early Regeneration	777	11,91			5.745	88,09			6.521
Mid Regeneration	1.557	5,22					28.288	94,78	29.846
Old Growth Forests and Late Regeneration	300	3,73					7.749	96,27	8.049
Total 2005	19.598	28,87	6.511	9,59	5.745	8,46	36.037	53,08	67.891

Table 18.Land use dynamics in Private Forests for the 2000-2005 period outside of Guanacaste.

	Other use		Early Regeneration		Mid Regeneration		Old Growth Forests and Late Regeneration		Total 2000
	Area (ha)	Coefficient (%)	Area (ha)	Coefficient (%)	Area (ha)	Coefficient (%)	Area (ha)	Coefficient (%)	
Other use	1.679.313	93,08	124.773	6,92					1.804.085
Early Regeneration	54.838	29,97			128.127	70,03			182.965
Mid Regeneration	33.149	17,76					153.484	82,24	186.633
Old Growth Forests and Late Regeneration	39.803	11,30					312.447	88,70	352.250
Total 2005	1.807.103	71,54	124.773	4,94	128.127	5,07	465.931	18,45	2.525.933

Table 19. Land use dynamics in Private Forests for the 2000-2005 period in Guanacaste.

	Other use		Early Regeneration		Mid Regeneration		Old Growth Forests and Late Regeneration		Total 2000
	Area (ha)	Coefficient (%)	Area (ha)	Coefficient (%)	Area (ha)	Coefficient (%)	Area (ha)	Coefficient (%)	
Other use	512.276	83,74	99.490	16,26					611.766
Early Regeneration	30.190	20,59			116.462	79,41			146.651
Mid Regeneration	28.405	10,85					233.354	89,15	261.760
Old Growth Forests and Late Regeneration	4.603	7,15					59.739	92,85	64.342
Total 2005	575.474	53,06	99.490	9,17	116.462	10,74	293.094	27,03	1.084.520

Table 20. Land use dynamics in Indigenous Territories for the 2000-2005 period.

	Other use		Early Regeneration		Mid Regeneration		Old Growth Forests and Late Regeneration		Total 2000
	Area (ha)	Coefficient (%)	Area (ha)	Coefficient (%)	Area (ha)	Coefficient (%)	Area (ha)	Coefficient (%)	
Other use	96.345	89,71	11.054	10,29					107.398
Early Regeneration	1.405	15,57			7.618	84,43			9.023
Mid Regeneration	2.944	9,53					27.964	90,47	30.908
Old Growth Forests and Late Regeneration	4.621	2,35					192.380	97,65	197.002
Total 2005	105.315	30,59	11.054	3,21	7.618	2,21	220.345	63,99	344.331

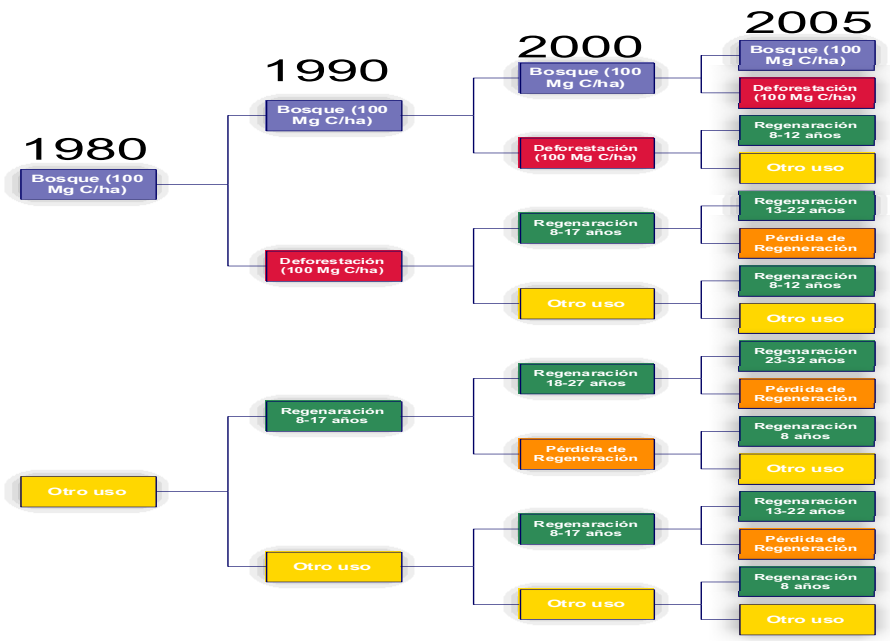

Figure 15. Determination of the different forest successional stages through an historical analysis of forest permanence and regeneration for two ten-year periods (1980-1990, 1990-2000), and one five-year period (2000-2005).

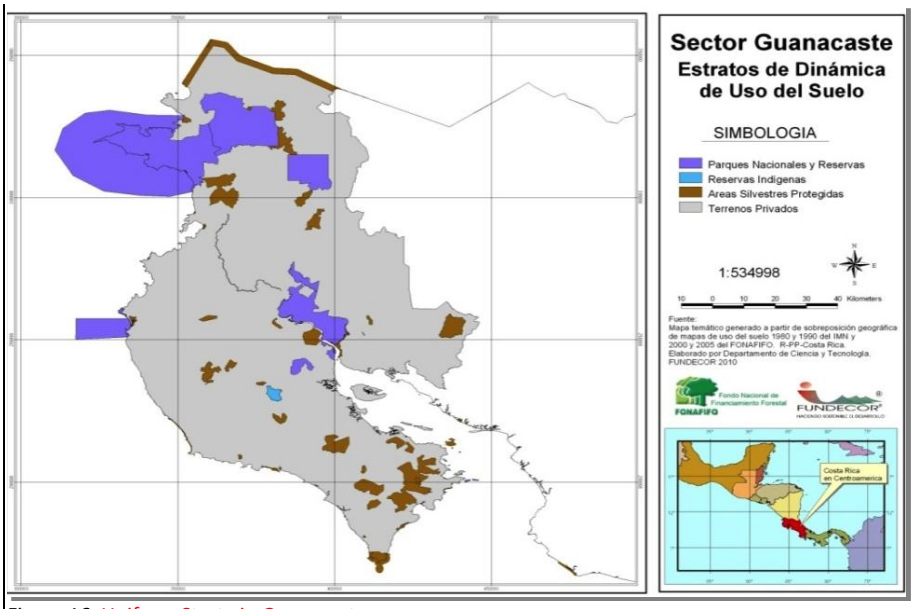

Figure 16. Uniform Strata in Guanacaste

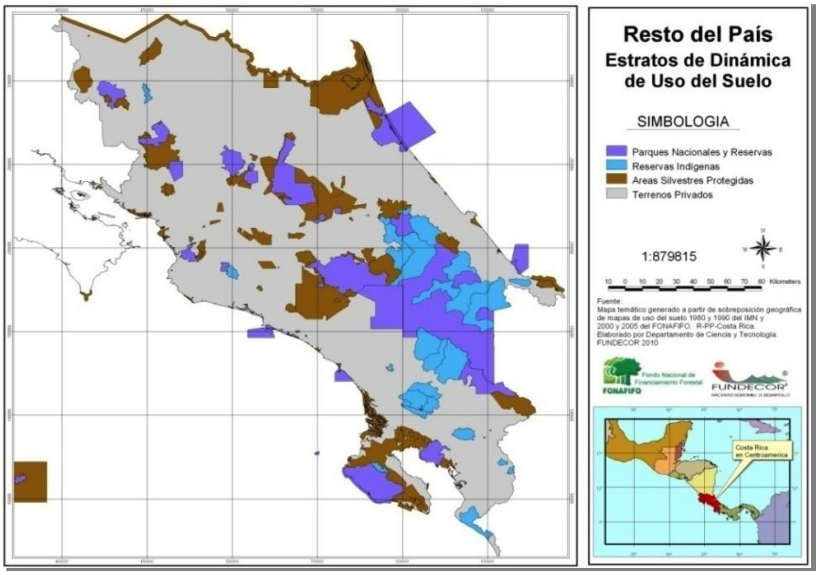

Figure 17. Uniform Strata in the rest of the country

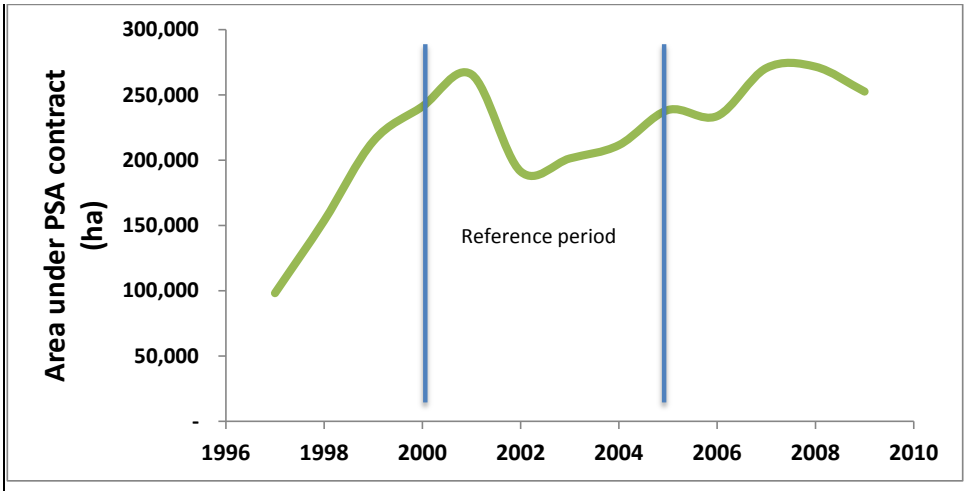

Figure 18. Implementation level of the PSA program in Costa Rica for old growth forests en in the reference period (2000-2005).

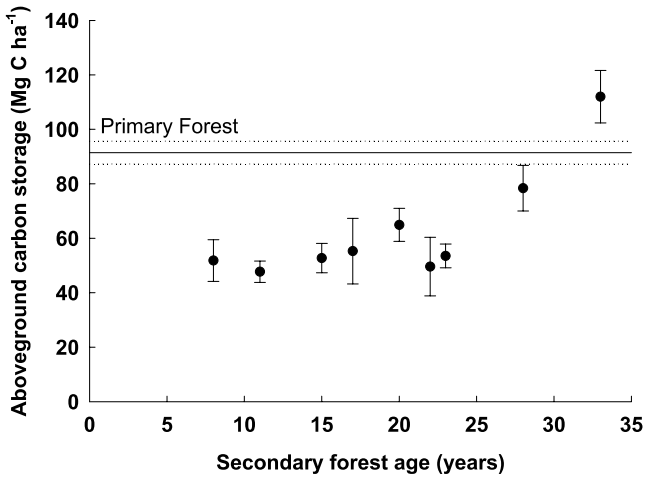

Figure 19. Mean aboveground carbon storage ± one standard error for each secondary forest site. The solid and dotted horizontal lines represent mean aboveground carbon storage and one standard error, respectively, as measured in undisturbed primary forests at the La Selva Biological Station. Values were calculated as one half of aboveground biomass estimates for all stems ≥10 cm dbh in plots ≥4 ha.
Source: Sesnie, 2006

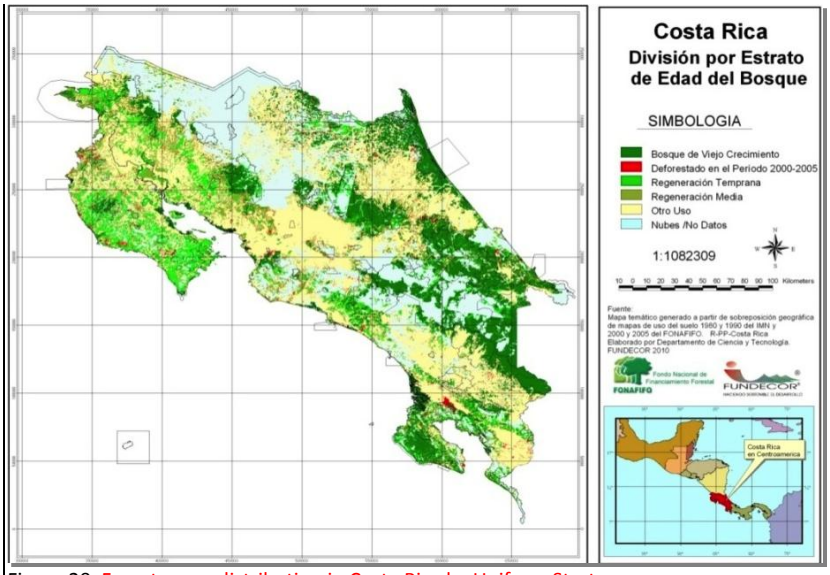

Figure 20. Forest cover distribution in Costa Rica by Uniform Strata.

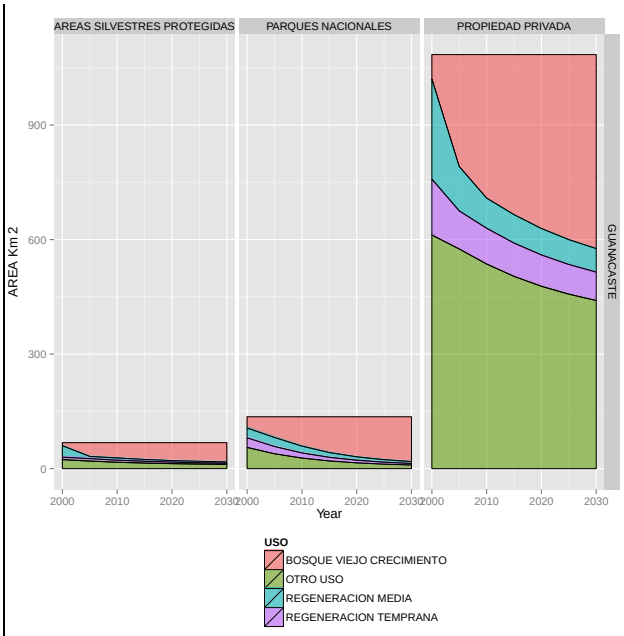

Figure 21. Land use projection (in sq km) for Guanacaste region disaggregated by Uniform Strata

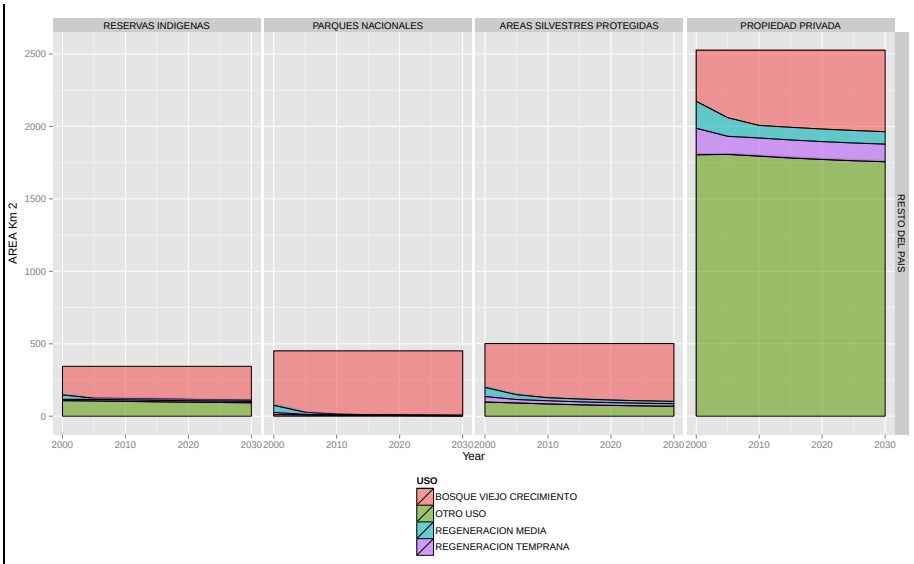

Figure 22. Land use projection (in sq km) for the rest of the country disaggregated by Uniform Strata

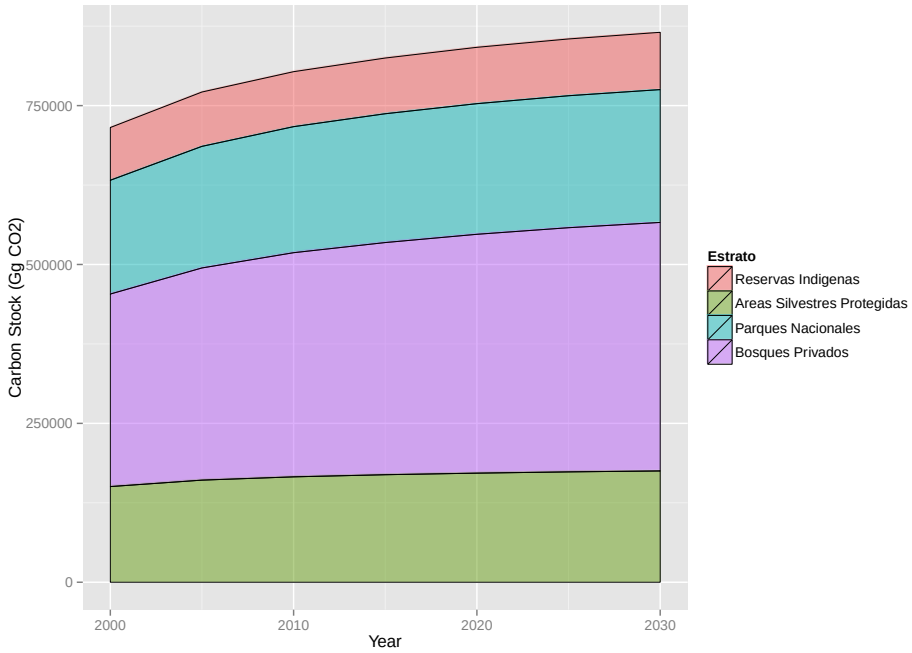

Figure 23. Preliminary reference level projection based on the proposed ER-Pin of the Costa Rican Government to the FCPF. Vertical axis shows the projected carbon stock for the national level, disaggregated by Uniform Strata. Reference level for each five-year period is estimated based on carbon fractions assumed and the projected area for each successional stage (Early regeneration - 230 MgCO2*ha-1; Mid regeneration - 283 MgCO2*ha-1; and Old Growth Forest -367 MgCO2*ha-1).

11.3. Expected Emission Reductions (ERs)

Please provide an estimate of the expected impact of the proposed ER Program on the REL/FRL (as percentage of emissions to be reduced). Based on this percentage, also estimate the volume of ERs, as expressed in tonnes of CO_2e, that would be generated by the ER Program:

a) Up to December 31, 2020 (currently the end date of the FCPF)
b) For a period of 10 years; and
c) The lifetime of the proposed ER Program, if it is proposed to continue longer than 10 years

REDD+ activities included in the R-PP are considered in the ER-Program as the only ones were an increased effort by the country has been held to date. ER-Program responds to the following action lines of Costa Rica`s REDD+ Strategy: 1. Increase PES Program to continue diminishing deforestation rates in old growth and regenerated forests; 2. Sustain regeneration and reforestation PES contracts; 3. Promote the production and consumption of sustainable wood from natural forests and plantation forests.

ER-Program execution comprises the 2010-2020 period, by implementing three of the six REDD+ considered options (Table **21** and Figure **25**)[13]: A. Incorporation of additional PES area in old growth forests; C. Incorporation of additional PES area for carbon capturing in new private regenerated forests; and D. Incorporation of additional PES area for carbon capturing in new plantation forests.

Field Code Changed

Field Code Changed

1. Increase PES Program to continue diminishing deforestation rates in old growth and regenerated forests:

A proposed action aimed at the REDD+ Strategy is halving deforestation rates observed during the 2000-2005 period in old growth and secondary forests.

1.1. Option A: Incorporation of additional PES area for avoided deforestation in old growth forests

1.1.1. Historical deforestation rate during the reference period:

Reference rate for Option A is the gross deforestation observed during the 2000-2005 historical reference period, for the Uniform Strata Private Forests (old growth forests) located outside of Guanacaste. Said rate was estimated as 11.3%[14] for the five-year period (2.37% annual rate).

[13] This is achievable because in 2010 Costa Rica had already a REDD+ Strategy, availability of public funds, and the opportunity to sell emissions reductions rights to the World Bank`s FCPF.
[14] Refer to section 1.5 and Table 7 from the key issue named "Historical reference period for setting the reference level, and reference level key assumptions"

1.1.2. Additional PES area estimation to diminish deforestation in old growth forests:

Based on preliminary estimations made in the econometric model aforementioned in the R-PP component 2a (Equation 3), for halving gross deforestation rates observed on the 2000-2005 period in private old growth forests, FONAFIFO requires increasing historic PES area by 107,600 ha.

Equation 3. $$d_r = 0.4R_{ar} - 1.55h_{cr}$$

Above model (Equation 3) was developed by Tattenbach *et al.* (2007) derived from Walker (2004). Besides land revenue (R_{ar}), it considers the insertion of PES Program (h_{cr}) as an independent variable. This model was adjusted for the whole country, managing to explain 92% of the observed deforestation variability in all the Uniform Strata and forests cohorts (except National Parks inside and outside of Guanacaste, and Protected Wilderness Areas outside of Guanacaste). Land revenue (R_{ar}) and insertion of PES Program (h_{cr}) coefficients were significant (0.40 p-value: 0.0001 and -1.55 p-value: 0.0089, respectively).

1.1.3. Geographic space to focus the incorporation of additional PES area:

The Program emphasizes on old growth forests with higher deforestation threat (higher land revenue), located on private lands outside of Guanacaste, and that comprises wood production capacity (thus forests that can be sustainable managed by polycyclic systems).

Preliminarily estimations indicate that in 2010, old growth private forests outside of Guanacaste consisted of 519,000 ha approximately.

Considering that PES Program, between 1997 and 2009, maintained an average area of 218,768 ha of old growth forests, and assuming that all of the contracts were located on this stratum and outside of Guanacaste, available area for the ER-Program will be no less than 300,000 ha.

1.1.4. Recruitment of additional PES area:

Recruitment of the additional 107,600 ha of PES area, for old growth forests, was fulfilled between 2010 and 2012 (Figure **24**). In 2010, historic PES area was incremented from 218,768 ha to 258,985 ha (40,217 additional hectares). It is assumed that the remaining 20,909 ha are incorporated in 2012 to completing the additional 107,600 ha and reaching an overall REDD+ strategy coverage of 326,768 ha of PES contracts.

Historic PES coverage is determined by considering PES area with existing contracts. Since contracts last for five years, PES coverage corresponds to the average total area of all five-year periods from 1997 to 2009. According to this, it was estimated that the average PES insertion was 218,768 ha (Table **22**).

1.1.5. Emissions reductions estimations:

Potential emission reductions estimated in Option A, was conducted by subtracting carbon reservoirs in the scenario With Project and the scenario Without Project. Without Project scenario, was built by projecting the coverage and applying the historical annual deforestation rate of 2.37% observed in the stratum (see section 1.1.1). With Project scenario, was built with the same reference rate applied only to the remnant coverage without PES at each year.

For the preliminary estimation of ER`s in this option, it was assumed an effective PPES implementation of 100%, nevertheless, in order to be conservatives, data will be recalculated using the historical PPES registry from FONAFIFO.

Comment [VM5]: Stavros comment #9

For the carbon reservoirs estimation in each scenario, it was assumed an average carbon density of 106 $Mg*Ha^{-1}$ (387 $Mg\ CO_2*Ha^{-1}$) (Table **23**). This can be explained considering that the average carbon density per hectare for avoided deforestation is 100 ton $Mg\ CO_2*Ha^{-1}$, and that the stock within replacement vegetation (mostly degraded pastures without trees) is 6 $Mg\ CO_2*Ha^{-1}$.

Emission reductions under this option shall be adjusted with carbon density data collected in degraded pastures during the National Forest Inventory development. Once these data is available, forest classes will be updated.

Comment [VM6]: Stavros comment #6

1.2. Option B: Incorporation of additional PES area for avoided deforestation in mid-regenerated forests

1.2.1. Historical deforestation rate during the reference period:

Reference rate for Option B is the gross deforestation observed during the 2000-2005 historical reference period, for the Uniform Strata Mid Regenerated forests located outside of Guanacaste. Said rate was estimated as 17.76%[15] for the five-year period (3.84% annual rate).

[15] Refer to section 1.5 and Table 7 from the key issue named "Historical reference period for setting the reference level, and reference level key assumptions"

1.2.2. Additional PES area estimation to diminish deforestation in mid-regenerated forests:

Based on preliminary estimations made in the econometric model aforementioned in the R-PP component 2a (Equation 3), for halving gross deforestation rates observed in the 2000-2005 period in the mid regeneration forests, FONAFIFO requires increasing historic PES area by 19,191 ha.

1.2.3. Geographic space to focus the incorporation of additional PES area:

The Program emphasizes on mid regeneration forests with higher deforestation threat (higher land revenue), located on private lands outside of Guanacaste, and that comprises wood production capacity (thus forests that can be sustainable managed by polycyclic systems).

Preliminarily estimations indicate that in 2010, mid regeneration forests outside of Guanacaste consisted of 88,000 ha approximately.

Considering that PES Program, between 1997 and 2009, maintained an average area of 10,610 ha of mid regenerated forests, and assuming that all of the contracts were located on this stratum and outside of Guanacaste, available area for the ER-Program will be no less than 77,000 ha.

1.2.4. Recruitment of additional PES area:

Recruitment of the additional 19,191 ha of PES area, for mid regenerated forests, is expected to be fulfilling between 2014 and 2020, assuming an annual increase of 2,714 ha for achieving an average coverage by 2020 of 30,000 ha under PES contracts.

1.2.5. Emissions reductions estimations:

Potential emission reductions estimated in Option B, was conducted by subtracting carbon reservoirs in the scenario With Project and the scenario Without Project. Without Project scenario, was built by projecting the coverage and applying the historical annual deforestation rate of 3.84% observed in the stratum (see section 1.2.1). With Project scenario, was built with the same reference rate applied only to the remnant coverage without PES at each year.

For the preliminary estimation of ER`s in this option, it was assumed an effective PPES implementation of 100%, nevertheless, in order to be conservatives, data will be recalculated using the historical PPES registry from FONAFIFO.

Comment [VM7]: Stavros comment #9

For the carbon reservoirs estimation in each scenario, it was assumed an average carbon density of 69 Mg*Ha^{-1} (253 Mg CO_2*Ha^{-1}) (Table **24**). This can be explained considering that the average carbon density per hectare for avoided deforestation is 63 ton Mg CO_2*Ha^{-1}, and that the stock within replacement vegetation (mostly degraded pastures without trees) is 6 Mg CO_2*Ha^{-1}.

Emission reductions under this option shall be adjusted with carbon density data collected in degraded pastures during the National Forest Inventory development. Once these data is available, forest classes will be updated.

Comment [VM8]: Stavros comment #6

2. Sustain regeneration and reforestation PES contracts:

A proposed action aimed at the REDD+ Strategy is incrementing carbon stocks through duplicating natural forest regeneration on private lands outside of Guanacaste and tripling natural forest regeneration in Indigenous Territories.

2.1. Option C: Incorporation of additional PES area for carbon capturing in new private regenerated forests

2.1.1. Historical deforestation rate during the reference period:

Reference rate for Option C is the regeneration observed during the 2000-2005 historical reference period, in private lands outside of Guanacaste. Said rate was estimated as 6.92%[16] for the five-year period.

2.1.2. Additional PES area estimation to diminish deforestation in new regenerated forests:

Using the same procedure of the land use change projection in the reference level, it was estimated the effect of duplicating the regeneration rates of the 2000-2005 period, in private forests. It is estimated that 2010-2020 period would produced 196,413 ha of new forests, of which 124,282 ha corresponds to early regeneration and 72,132 ha to plantation forests.

2.1.3. Geographic space to focus the incorporation of additional PES area:

Option C focuses in non-forested areas located on private lands outside of Guanacaste, with topographic conditions that allow the production of wood, and therefore that may be subjected to sustainable forest management by monocyclic systems (for secondary forests).

[16] Refer to section 1.5 and Table 7 from the key issue named "Historical reference period for setting the reference level, and reference level key assumptions"

2.1.4. Recruitment of additional PES area:

The recruitment of additional 124,282 ha of PES contracts for inducing early regeneration is realized in the 2010-2020 period. In 2010, PES area for inducing early regeneration was incremented by 4,838 ha (from 618 ha to 5,469 ha). In 2011, this increment was by 2,031 ha (up to 7,500 ha). Between 2012 and 2014 it is expected to reach 37,831 ha (incorporating 30,331 ha more, at a rate of 10,110 ha annually). Between 2015 and 2020 it is expected to reach 124,912 ha (incorporating the rest of the 87,082 ha, at a rate of 14,514 ha annually).

2.1.5. Emissions reductions estimations:

Potential carbon storage produced by Option C, was estimated assuming that secondary forest carbon storage approached primary forest levels after 35 years (Sesnie, 2006), and that the average biomass in old growth forests outside of Guanacaste is 367 $MgCO_2*ha^{-1}$, that corresponds to an average growth of 10.5 $MgCO_2*ha^{-1}$. Carbon storage for Option C was obtained by multiplying induced regenerated PES area by the average growth rate (Table **25**).

2.2. Option D: Incorporation of additional PES area for carbon capturing in new plantation forests

2.2.1. Historical reforestation rate during the reference period:

Reference rate for Option D is the total reforested area in plantation forests and agroforestry lands in the PES Program from 1997 to 2009. Data from FONAFIFO accounts for 59,715 ha for that period.

2.2.2. Additional PES area estimation to establishing new plantation forests:

Using the same procedure of the land use change projection in the reference level, it was estimated the effect of duplicating the regeneration rates of the 2000-2005 period, in private forests. It is estimated that 2010-2020 period would produced 196,413 ha of new forests, of which 124,282 ha corresponds to early regeneration and 72,132 ha to plantation forests.

2.2.3. Geographic space to focus the incorporation of additional PES area:

Option D focuses in non-forested areas located on private lands outside of Guanacaste, with topographic conditions that allow the production of wood, and therefore that may be subjected to sustainable forest management by monocyclic systems (for secondary forests).

2.2.4. Recruitment of additional PES area:

The recruitment of additional 72,132 ha of PES contracts for establishing new plantation forests is realized in the 2010-2020 period. In 2010,

6,870 ha were established in addition to the existing 59,715 ha. In 2011 rises to 7,109 ha, and between 2012 and 2020 it is expected to reach 131,846 ha (incorporating 6,461 ha annually).

2.2.5. Emissions reductions estimations:

Potential carbon storage produced by Option D, was estimated assuming that all types of forests plantations (monospecific, mixed, agroforestry) approached its maximum carbon storage levels after 20 years, and that average biomass in maximum capacity of plantation forests outside of Guanacaste is 367 $MgCO_2*ha^{-1}$, that corresponds to an average growth of 18.3 $MgCO_2*ha^{-1}$.

Carbon storage for Option D was obtained by multiplying accumulated reforested PES area by the average growth rate (Table 26).

This data is similar to that observed by Redondo (2008), which indicate that reforestation with native species in small and medium-sized plantations in the Northern lowlands of Costa Rica, ranging an age between 9 and 14 years (half of its logging cycle), presented an annual CO2 increment between 10.8 and 17.1 MgCO2*ha-1. Nevertheless, this data will be recalculated with information from the National Forest Inventory.

Comment [VM9]: Stavros comment #10

2.3. Option E: Incorporation of additional PES area for carbon capturing in new regenerated forests in Indigenous Territories

2.3.1. Historical reforestation rate during the reference period:

Reference rate for Option E is the total regenerated area for the Uniform Strata Indigenous Territories on the 2000-2005 period. Said area was preliminarily estimated as 10.3%[17] for the five-year period.

2.3.2. Additional PES area estimation to inducing early regenerated forests:

Using the same procedure of the land use change projection in the reference level, it was estimated the effect of tripling the regeneration rates of the 2000-2005 period, in Indigenous Territories. It is estimated that 2010-2020 period would produced 18,742 ha of new early regenerated forests.

2.3.3. Geographic space to focus the incorporation of additional PES area:

Option E focuses in non-forested areas located in Indigenous Territories, with topographic conditions that allow the production of wood, and

[17] Refer to section 1.5 and Table 9 from the key issue named "Historical reference period for setting the reference level, and reference level key assumptions"

therefore that may be subjected to sustainable forest management by monocyclic systems (for secondary forests).

2.3.4. Recruitment of additional PES area:

The recruitment of the additional 18,742 ha of PES contracts to inducing early regenerated forests in Indigenous Territories is realized in the 2014-2020 period, incorporating 2,667 ha annually.

2.3.5. Emissions reductions estimations:

Potential carbon storage produced by Option E, was estimated assuming that carbon storage in secondary forests at all the different life zones approached primary forests levels after 35 years (Sesnie, 2006), and that average biomass in old growth forests outside of Guanacaste is 367 $MgCO_2*ha^{-1}$, that corresponds to an average growth of 10.5 $MgCO_2*ha^{-1}$. Carbon storage for Option E was obtained by multiplying induced regenerated PES area by the average growth rate (Table 27).

3. Promote the production and consumption of sustainable wood from natural forests and plantation forests

A decreasing trend in wooden homes in Costa Rica continues, standing at 30% in 1984, 10% in 2000 and less today. Some environmental groups have falsely demonized the use of timber as a cause of deforestation or degradation of the environment, claiming that deforestation in Costa Rica results from agricultural policies that convert wooded areas to agricultural uses. Increasing the consumption of sustainable wood is critical. For this, the REDD+ Strategy must finance a program led by the ONF to eliminate cultural, legal, technological, and information barriers that discourage the generalized use of timber (Gobierno de Costa Rica, 2010).

3.1. Option F: Carbon storage in harvested wood products (HWP) by increasing wood consumption

Through this option it is expected to increase carbon storage in buildings and furniture, as well as reducing emissions by replacing wide carbon footprint materials.

3.1.1. Reference wood consumption intensity:

Based on wood consumption statistics, Costa Rica stored 288,207 m^3 (Table 28) of timber volume in HWP with a lifetime of more than 10 years (Espinoza, 2009a), on 8,465,111 m^2 of construction (Colegio Federado de Ingenieros y Arquitectos, 2007). Assuming a timber storage capacity of 1 Mg $CO_2*(m^3)^{-1}$, provided by the National Forestry Office (ONF), the estimated wood consumption intensity under this option is 0,034 Mg Mg $CO_2*(m^2)^{-1}$.

3.1.2. Carbon storage estimation in HWP:

Carbon storage estimation in HWP under Option F, was conducted by subtracting carbon reservoirs in the scenario With Project and the scenario Without Project.

Without Project scenario, was built by projecting construction activities and applying the annual increment observed in the 2004-2010 period (386,683 m^2*$año^{-1}$).

With Project scenario was built through the multiplication of the constructed area by the estimated wood consumption intensity (0.034 Mg Mg CO_2*$(m^2)^{-1}$). It was applied a target wood consumption intensity of 0.131 Mg CO_2*$(m^2)^{-1}$, which is four times greater than the reference one. It is expected to reach this level of intensity from 2016, and maintain it until 2020 (Table 29).

The methodological approach used to determine the gain of carbon stocks in the HWP, both at the reference level and in the MRV, will be studied through a gap analysis of the Jurisdictional and Nested REDD+ (JNR) framework from the Verified Carbon Standard (VCS), by hiring a Winrock Int collaborator.

Comment [VM10]: Stavros comment #11

Table 21. Potential carbon and area mitigation through six different REDD+ options considered in the Costa Rica ER-Program.

Option	Land Tenure	Emission reduction option	PES Area (ha)	CO_2 Ton
A	Private Forests an Indigenous Territories	Incorporation of additional PES area for avoided deforestation in old growth forests	107,600	8,540,929
B	Private Forests	Incorporation of additional PES area for avoided deforestation in mid-regenerated forests	19,191	628,952
C	Private Forests	Incorporation of additional PES area for carbon capturing in new private regenerated forests	124,282	6,505,287
D	Private Forests	Incorporation of additional PES area for carbon capturing in new plantation forests	72,132	8,019,422
E	Indigenous Territories	Incorporation of additional PES area for carbon capturing in new regenerated forests in Indigenous Territories	18,742	785,370
F	Doesn´t apply	Carbon storage in harvested wood products (HWP) by increasing wood consumption	-	5,000,000
		Total	341,946	29,479,960

Source: Costa Rica ER-PIN, September 16 2012.

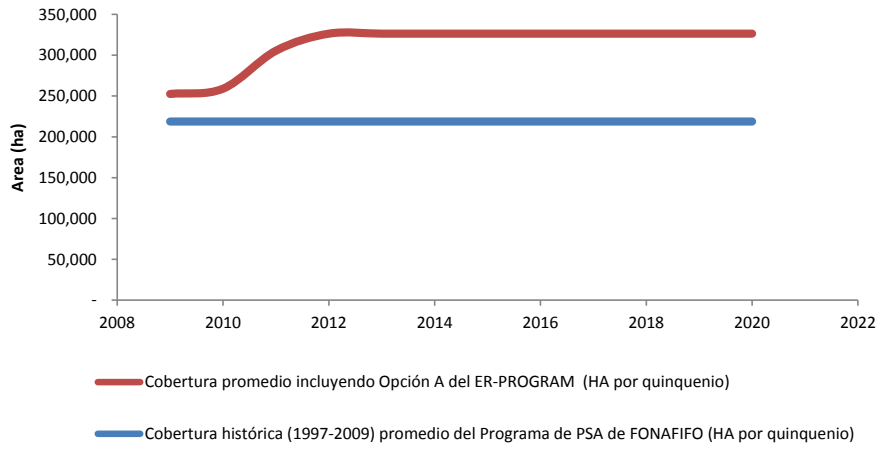

Figure 24. Recruitment of the additional 107,000 ha (Option A) to increase historic FONAFIFO`s PES Program coverage observed between 1998 and 2009, and to halving reference deforestation rates during the 2000-2005 period in old growth forests outside of Guanacaste.

Table 22. Costa Rica`s PES area under FONAFIFO`s program, ER-Program and REDD+ Strategy.

	FONAFIFO`s PES Program		ER-Program	REDD+ Strategy
Year	Forest Conservation area (ha)	Sustainable Forest Management area (ha)	Additional action (ha)	PES area with existing contracts in five-year periods (ha)
1997	88,830	9,325		98,155
1998	47,804	7,620		153,579
1999	55,776	5,125		214,480
2000	26,583			241,063
2001	20,629	3,997		265,689
2002	21,819	1,999		191,352
2003	65,405			201,333
2004	71,081			211,513
2005	53,493			238,423
2006	19,972			233,769
2007	60,568			270,519
2008	66,474			271,588
2009	52,018			252,524
2010	59,645	310	40,217	258,985
2011	65,967	479	46,474	305,459
2012			20,909	326,368
2013				326,368
2014				326,368
2015				326,368
2016				326,368
2017				326,368
2018				326,368
2019				326,368
2020				326,368

Total Area	107,600 ha	Historic average 97-09	218,768 ha

Source: FONAFIFO

Table 23. Option A. Incorporation of additional PES area for avoided deforestation in old growth forests outside of Guanacaste, by incorporating 107,600 ha of additional PES area.

Year	Recruited Area (ha)		Non-recruited Area (ha)	Without Project Coverage (ha)	With Project Coverage (ha)	Avoided Deforestation (ha)	Carbon Reservoirs		Accumulated carbon (Mg C)	Accumulated CO_2 (Mg)
	Annual recruited PES area (ha)	Accumulated area (ha)					Without project (Mg C)	With project (Mg C)		
2009	-	-	299,884	299,884	299,884		29,988,353.97	29,988,353.97	-	-
2010	40,217	40,217	253,513	292,778	293,731	953	29,277,752.95	29,373,051.29	95,298	349,427
2011	46,474	86,691	202,133	285,840	288,825	2,985	28,583,990.26	28,882,452.86	298,463	1,094,363
2012	20,909	107,600	176,930	279,067	284,530	5,464	27,906,666.90	28,453,025.45	546,359	2,003,315
2013	-	107,600	172,738	272,454	280,338	7,884	27,245,393.33	28,033,773.72	788,380	2,890,728
2014	-	107,600	168,644	265,998	276,245	10,247	26,599,789.23	27,624,456.53	1,024,667	3,757,113
2015	-	107,600	164,648	259,695	272,248	12,554	25,969,483.30	27,224,838.48	1,255,355	4,602,969
2016	-	107,600	160,747	253,541	268,347	14,806	25,354,113.04	26,834,689.74	1,480,577	5,428,781
2017	-	107,600	156,938	247,533	264,538	17,005	24,753,324.53	26,453,785.92	1,700,461	6,235,025
2018	-	107,600	153,219	241,668	260,819	19,151	24,166,772.24	26,081,907.97	1,915,136	7,022,164
2019	-	107,600	149,588	235,941	257,188	21,247	23,594,118.84	25,718,841.99	2,124,723	7,790,652
2020	-	107,600	146,044	230,350	253,644	23,293	23,035,034.97	25,364,379.19	2,329,344	8,540,929

Table 24. Option B. Incorporation of additional PES area for avoided deforestation in mid-regenerated forests outside of Guanacaste, by incorporating 19,191 ha of additional PES area.

Year	Recruited Area (ha)		Non-recruited Area (ha)	Without Project Coverage (ha)	With Project Coverage (ha)	Avoided Deforestation (ha)	Carbon Reservoirs		Accumulated carbon (Mg C)	Accumulated CO_2 (Mg)
	Annual recruited PES area (ha)	Accumulated area (ha)					Without project (Mg C)	With project (Mg C)		
2009	-	-	76,766	76,766	76,766		4,825,272	4,825,272	-	-
2010	-	-	73,821	73,821	73,821	-	4,640,198	4,640,198	-	-
2011	-	-	70,990	70,990	70,990	-	4,462,223	4,462,223	-	-
2012	-	-	68,267	68,267	68,267	-	4,291,075	4,291,075	-	-
2013		-	65,649	65,649	65,649	-	4,126,490	4,126,490	-	-
2014	2,741.56	2,742	60,494	63,131	63,236	105	3,968,219	3,974,828	6,610	24,235
2015	2,741.56	5,483	55,538	60,709	61,021	311	3,816,018	3,835,593	19,575	71,776
2016	2,741.56	8,225	50,771	58,381	58,996	615	3,669,654	3,708,308	38,653	141,729
2017	2,741.56	10,966	46,187	56,142	57,154	1,012	3,528,905	3,592,514	63,609	233,233
2018	2,741.56	13,708	41,779	53,988	55,487	1,499	3,393,553	3,487,771	94,217	345,464
2019	2,741.56	16,449	37,541	51,918	53,990	2,072	3,263,394	3,393,655	130,261	477,625
2020	2,741.56	19,191	33,464	49,926	52,655	2,729	3,138,226	3,309,758	171,532	628,952

Table 25. Option C. Incorporation of additional PES area for carbon capturing in new private regenerated forests outside of Guanacaste, by incorporating additional PES area.

Year	Annual recruited PES area (ha)	Accumulated area (ha)	Accumulated carbon (Mg C)
2010	4,838	4,838	50,686
2011	2,031	6,869	71,958
2012	10,110	16,979	177,875
2013	10,110	27,089	283,793
2014	10,110	37,200	389,710
2015	14,514	51,713	541,758
2016	14,514	66,227	693,806
2017	14,514	80,741	845,853
2018	14,514	95,254	997,901
2019	14,514	109,768	1,149,949
2020	14,514	124,282	1,301,997
Totals	124,282		6,505,287

Table 26. Option D. Incorporation of additional PES area for carbon capturing in new plantation forests outside of Guanacaste, by incorporating additional PES area.

Year	Annual recruited PES area (ha)	Accumulated area (ha)	Accumulated carbon (Mg C)
2010	6,870	6,870	125,943
2011	7,109	13,979	256,282
2012	6,461	20,440	374,741
2013	6,461	26,902	493,200
2014	6,461	33,363	611,659
2015	6,461	39,825	730,118
2016	6,461	46,286	848,578
2017	6,461	52,747	967,037
2018	6,461	59,209	1,085,496
2019	6,461	65,670	1,203,955
2020	6,461	72,132	1,322,414
Totals	72,132	437,423	6,697,008

Table 27. Option E. Incorporation of additional PES area for carbon capturing in new regenerated forests in Indigenous Territories, by incorporating additional PES area.

Year	Annual recruited PES area (ha)	Accumulated area (ha)	Accumulated carbon (Mg C)
2010		-	-
2011		-	-
2012		-	-
2013		-	-
2014	2,677	2,677	28,049
2015	2,677	5,355	56,098
2016	2,677	8,032	84,147
2017	2,677	10,710	112,196
2018	2,677	13,387	140,245
2019	2,677	16,064	168,294
2020	2,677	18,742	196,343
Totals	18,742		589,028

Table 28. Option F. Timber lifetime in Harvested Wood Products (HWP) in Costa Rica.

Uses	Products	Industrialized volume (m^3)	Percentage	Lifetime (years)
Pallets	Pallets, boxes	311,380	100%	1
Construction	Formwork and other temporal constructions	49,242	20%	1
	Scaffolds, moldings	98,482	40%	>10
	Floors, beams	73,862	30%	>10
	Other uses	24,620	10%	<10
Furniture	General furniture	115,862	100%	10
Other uses	Pencils, sticks	50,690	100%	1

Source: Barrantes & Salazar 2008; Espinoza (2009b)

Table 29. Constructed area (registered and projected) and historic storage estimation of Harvested Wood Products (HWP) for Option F of Costa Rican ER-Program.

Year	Constructed area (m^2)	Projected constructed area (m^2)	Without Project scenario Historic storage estimation of HWP[18] ($Mg\ CO_2$)	With Project Scenario Storage increment of HWP by the ER-Program[19] ($Mg\ CO_2$)	HWP total storage ($Mg\ CO_2$)
2004	4,157,293		141,541		
2005	5,030,874		171,283		
2006	7,941,701		270,386		
2007	8,465,111		288,207		
2008	8,747,562		297,823		
2009	5,416,297		184,405		
2010	7,240,767		246,522		
2011		7,627,450	259,687		
2012		8,014,133	272,852		
2013		8,400,816	286,018		
2014		8,787,499	299,183		
2015		9,174,182	312,348		
2016		9,560,865	325,513	925,165	1,250,678
2017		9,947,548	338,678	962,582	1,301,260
2018		10,334,231	351,843	1,000,000	1,351,843
2019		10,720,914	365,008	1,037,418	1,402,426
2020		11,107,597	378,174	1,074,835	1,453,009
Total	46,999,605	93,675,235	4,789,471	5,000,000	6,759,217

Source: Colegio Federado de Ingenieros y Arquitectos, 2007; Colegio Federado de Ingenieros y Arquitectos, 2009

[18] Used HWP for construction in 2007: 0.034 Mg CO_2*$(m^2)^{-1}$

[19] Production goal of HWP in construction from 2016: 0.13 Mg CO_2*$(m^2)^{-1}$

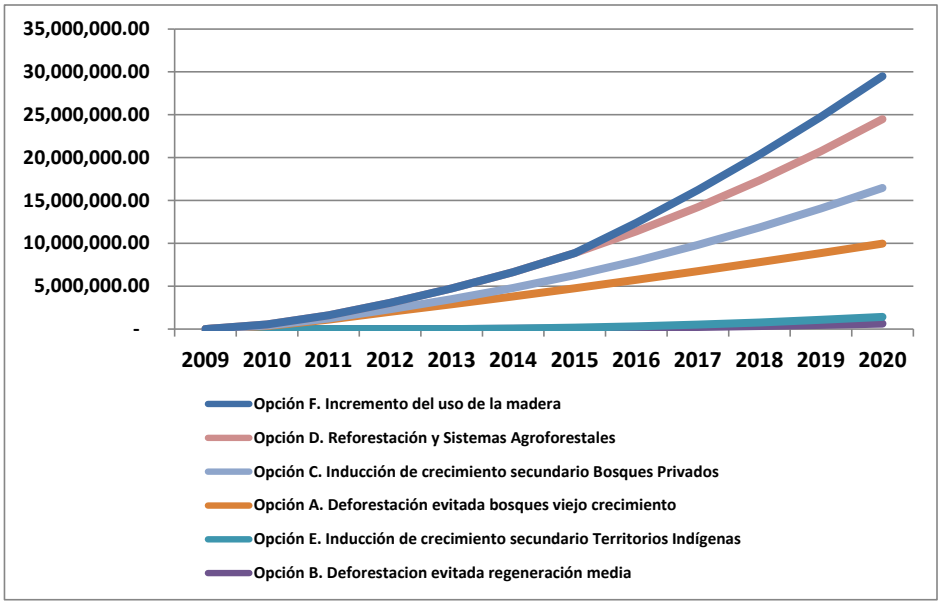

Figure 25. Preliminary estimate of the anticipated impact of the ER Program proposed by Costa Rica.

11.4. Volume proposed for the FCPF Carbon Fund

Please explain the portion of the expected ERs that would be offered to the Carbon Fund, and if other carbon finance providers or buyers have been identified to date, the portions of the expected ERs that would be offered to them

Considering that implementation of the ER Program costs US$238 million, that Costa Rica should be able to count on public funds in the amount of US$73 million (fuel tax and water royalty) for initial implementation and that, based on preliminary analyses, Costa Rica should be able to raise US$43 million from private investments in forestry businesses, the program would need to offer the Carbon Fund an emission reduction volume with a value of at least US$62 million.

This amount could be raised based on a hypothetical price of US$5 per ton of CO_2 and an emission reduction volume of around 12,482 Gg CO_2 as of December 31, 2020. This volume of reductions represents 50 percent implementation of the REDD actions in the ER Program, excluding the 5,000 Gg CO_2 from the program to increase wood consumption.

Thus, the Carbon Fund is offered 50 percent of the emission reduction produced as of December 31, 2020 (excluding the 5,000 Gg CO_2 from the program to increase wood consumption). Nevertheless, it is clearly important to have the option of selling a part of the REDD action program to increase wood consumption and replace large carbon footprint materials in construction to the Carbon Fund. Additional purchasers identified included international investors interested in wood production as well as developers in the construction sector interested in reducing emissions by means of increased use of wood.

12. Forest Monitoring System

12.1. Description of approach and capacity for measurement and reporting on ERs

Please describe the proposed approach for monitoring and reporting the emission reductions attributable to the proposed ER Program, including the capacity of the proposed ER Program entities to implement this approach

The monitoring of emission reductions attributable to the ER program will be part of the REDD+ Strategy MRV. The main challenges in adjusting the REDD strategy MRV to the requirements of ER Program monitoring are: inclusion of the status of forest resources and biodiversity in monitoring, minimization of the deductions for uncertainty, estimation of degradation, and monitoring of the consumption of collected wood products. The current scope and the adjustments needed to respond to the requirements of an eventual agreement with the FCPF Carbon Fund for the purchase of emission reductions are detailed below:

i. **Scope:** Deforestation, Reforestation/Secondary Growth, Degradation.
Adjustments for the ER Program: The design of the REDD Strategy MRV is limited in terms of the estimation of the emissions resulting from degradation, specifically by means of the proposed inventory method. It is hoped that this problem will be solved by combining the traditional inventory approach with the use of Light Detection and Ranging (LIDAR).

ii. **Carbon Reserves**: Above-ground and below-ground carbon biomass are considered. *Adjustments for the ER Program*: Monitoring of the carbon gains based on collected wood products (CWP) is also required. Exclusion of the rest of the carbon pools (litter, dead wood and soil carbon) is due to its high costs and the high uncertainties associated with their estimations. The appropriateness of monitoring additional reservoirs such as organic carbon in the soil and forest litter, especially in areas of secondary growth, will be assessed.

Comment [VM11]: Stavros comment #4

~~ii.~~iii. **Reference Level Option**: Carbon stock in the reference year (between 2000 and 2008). The historic rate of deforestation/degradation is not used.
Adjustments for the ER Program: For purposes of carrying out carbon transactions, three periods of greenhouse gas emissions reduction based on forest carbon[20] are identified, for each of which a reference level will need to be established (see Figure 9):

- Post-Bali Carbon: From January 2008 (just after the Bali COP) until 2013;
- ER Program: Reduction of emissions resulting from the increased level in the PES program actions from 2010 to 2020;
- Post Ecomarkets II Carbon: Reduction of emissions resulting from the current PES program. This period would run from 2014, when the Ecomarkets II ends, until 2020.

~~iii.~~iv. **Calculation Methodology**: Change in carbon stocks (IPCC, 2006)

[20] Draft Memorandum of Understanding between the Verified Carbon Standard Association and FONAFIFO.

Adjustments for the ER Program: The capacity of the National MRV to measure emission reductions under the ER Program is limited. Given that the potential reduction under the ER program is less than 4 percent of Costa Rica's total carbon stock, the risk is run that inventory errors will be higher than the anticipated change (IPCC, 2006). For ER Program monitoring purposes, it is important to assess the good practice default method (reductions and removals).

~~iv.~~v. **Assessment of Uncertainty**: Measuring component to address propagated error in CO2 emissions and reductions, comprisses activity data and emission factors~~The proposed MRV does not consider the issue of uncertainty.~~

To monitor CO2 emissions and absorptions, biomass estimates per unit of activity data are required. Accuracy and error propagated in these estimates has been thoroughly assessed and it is recognized that error is introduced in various steps of the estimation (Chave et al. 2005, IPCC 2006). Still, few studies show propagated uncertainties using different technologies that would enable countries in earlier phases of MRV development to choose optimal tools and systems for their own circumstances. Nonetheless, study cases are available for different scales and forest types and these provide guidelines for countries assessing methodological alternatives for their MRVs.

Costa Rica proposes to use a highly sophisticated combination of remote sensing, airborne LiDAR and on-the-ground forest inventory to measure above-ground biomass carbon stock changes due to deforestation, degradation and enhancement of forest biomass carbon stocks. The end goal of this approach is to reduce overall uncertainty (Table **30**). Propagated uncertainty is targeted to be less than 20% for CO2 emission and absorption estimates. The system proposed by Costa Rica is state-of-the-art and aims to reduce uncertainty as much as practicable as recommended by IPCC (2006) and as expected within a REDD+ mechanism.

~~*Adjustments for the ER Program*: It is proposed that uncertainty be calculated on the basis of the IPCC's good practice for LULUCF (Land Use, Land-Use Change and Forestry). Uncertainty regarding the change in the carbon stock on forest lands is calculated on the basis of the change in stocks taking into account the uncertainty associated with the area involved, the uncertainty associated with the change in biomass, and the uncertainty associated with the estimation of the IFC carbon factor. The overall estimate will be the sum of the combination of these uncertainties in forest lands that remain forest lands and lands converted into forest lands.~~

~~v.~~vi. **Sampling Methodology**: The continuous forest inventory will be used to monitor emission reductions with the required monitoring frequency.

Adjustments for the ER Program: Even though the issue of deductions from emission reductions for monitoring uncertainty has not been clarified, it is clear that it should preferably be as small as possible. Although the MRV proposal for Costa Rica does not contemplate the use of LIDAR, this airborne mapping method will be combined with the information from the forest inventory to reduce costs, improve accuracy, and reduce the uncertainty of the estimate of the change in the carbon stocks (see Figure **26** and Table **31**).

~~vi.~~vii. **Entities involved in the MRV**: Among the entities involved in the MRV of the REDD Strategy are the National System of Conservation Areas (SINAC), which is responsible for the national forest inventory, the mapping of forest cover for sustainable management, monitoring and reporting on the biodiversity status, and, together with FONAFIFO, monitoring and assessment of the PES program; FONAFIFO, which is responsible for designing and implementing the REDD strategy; and the public universities, to which the Government of Costa Rica has traditionally delegated auditing.
Adjustments for the ER Program: FONAFIFO and SINAC have signed a memorandum of understanding to coordinate MRV actions for the REDD strategy and the ER Program.

~~vii.~~viii. **Monitoring and Reporting Capacities**: Academia, FONAFIFO and SINAC have experience with the preparation of cover maps (1997, 2000 and 2005) and knowledge and experience in the establishment of traditional forest inventory parcels, biomass estimation, and the preparation of allometric equations. As well, Costa Rica has institutions of higher education that have the capacity and appropriate experience for the establishment and measurements of sampling parcels. With their cooperation, the Network of Permanent Forest Parcels has been created, although the data have not yet been processed or released to the public.
Adjustments for the ER Program: Training of Costa Rican personnel in the use of the images from new remote sensors and in the use of LIDAR-type airborne mapping methods is required. As well, coverage of the Network of Permanent Monitoring Parcels is required, especially in early and middle secondary forests, using a standard parcel to generate information for detail levels 2 and 3.

~~viii.~~ix. **Consistency between the Reference Level and the MRV:** It is planned to maintain consistency between the reference level and MRV during the ER-Program implementation. Any change in the definition of forest, Minimum Mapping Unit used in remote sensing analysis, or in the allometric equations, autamitacally involve the recalculation of reference level, and therefore the ER`s (this to avoid under-or overestimation of ER `s generated through the ER-PIN).

Comment [VM12]: Stavros comment #7

Current progress in the Forest Monitoring System:

The current progress on the MRV system is based on the development of National Forest Inventory, outlined on Novemeber 2012, with the objective to "Determine the reserves, characteristics and conditions of the country's forest resources as a basis to orient the management of forested lands in the decision making process for their management and administration".

The National Forest Inventory proposal began with a stratification scheme, including two levels of stratification. The first identifies bio-geographical zones (ecoregions), while the second level identifies forest types within these ecoregions.

Bio-geographical zones were based on strata defined by elevation data and number of dry months (both criteria available on digital cartography). Four altitudinal floors were selected to conform such strata: 0-1000 m.a.s.l; 1000-1700 m.a.s.l; 1700-3100 m.a.s.l; 3100-3840 m.a.s.l.

Consecuently, four sets of dry months were picked within the strata definition: 0; 1 to 2; 3 to 4; 5 to 6.

Forests types within each ecoregion were identified based on the forest definition adopted by Costa Rica for its REDD+ Strategy (refer to section 11.2), as long as they meet the segment size, canopy cover and total height criteria; and whenever possible to identify with available satellite imagery and/or existing auxiliary information. These types were: old growth forest, secondary forest, mangroves, palm forest, and forestry plantations.

Subsequently a validation of the stratification proposal was carried out, based on the variability in basal area (m2/ha) and the visual verification of the limits of the strata in the false-color mosaic from RapidEye images. Results showed that coefficient of variation (CV%) for the basal area was maintained in a range between 19% and 36% for all the regions included in the inventory.

Once the stratification proposal was validated, a classification metohodology for the 2012 Rapid Eye images was formulated wich includes the clasifications steps and the external quality control approach (refer to Ortiz 2012).

Table 30.Components adding to overall uncertainty in the carbon stock change estimates.

Measuring component	Source of uncertainty	National data employed	Expected uncertainty	References
Activity data	Land cover maps	Yes	7-11%[21]	Sánchez-Azofeifa et al. 2002
Activity data	Airborne LIDAR[22] with remote sensing imagery	Yes	8-35%[23] or 15 to 23 Mg C ha^{-1}	Asner et al. 2009, Asner et al. 2010, Asner et al. 2011, Asner et al. 2012a, Asner et al. 2012b, Asner et al. 2012c Castillo et al. 2012 Gautam et al. 2010 (ArboLiDAR by Arbonaut) Mascaro et al. 2011 Saatchi et al. 2011
Emission factors	Carbon fractions	Yes	<15%[24]	West 2009
Emission factors	Biomass allometric models	Yes	0%[25] for biomass change	Brown and Lugo 1992, Harmon et al. 2007, Mitchard et al. 2012
Emission factors	Biomass estimates from National Forest Inventory data	Yes	12-40%[26]	Brown and Lugo 1984, Chave et al. 2004, Asner et al. 2012a, Lu et al. 2012[27]
Propagated error for CO_2 emissions and absorptions			10-30%	

[21] Uncertainty estimates based on correspondance matrices using 200 and 800 validation sites for tropical dry and humid forests in Costa Rica.

[22] Independently of the sources of forest degradation (legal vs. illegal), LiDAR will be employed to aid in the post-stratification of biomass within strata defined by climactic criteria (Holdridge Life Zones). This would increase sample size and, in combination with the national forest inventory, provide accurate measures of forest structure.

[23] Root mean square error in %

[24] Specific carbon fractions by biomass stratum will be obtained from the forest inventory. According to IPCC (2006), these are required for Tier 3 reporting for above-ground biomass. Carbon fractions usually range in the order of 0.36-0.61 for tropical tree species. Adopting IPCC's (2006) 0.5 default value would add 10-15% of uncertainty for estimates at the tree-level, but may be absorbed in forest-level applications if no systematic errors occur.

[25] Random errors from tree-level biomass estimation are cancelled out when the same set of biomass allometric models are employed for times *1, 2…n* within the stock change difference method, as described by IPCC (2006).

[26] National Forest Inventories that are post-stratified by LiDAR can yield very precise estimates of forest structure. Resulting sub-strata would likely be low variance and thus be associated to lower estimate uncertainties.

[27] Data from Brazilian Amazon by Lu et al. 2012

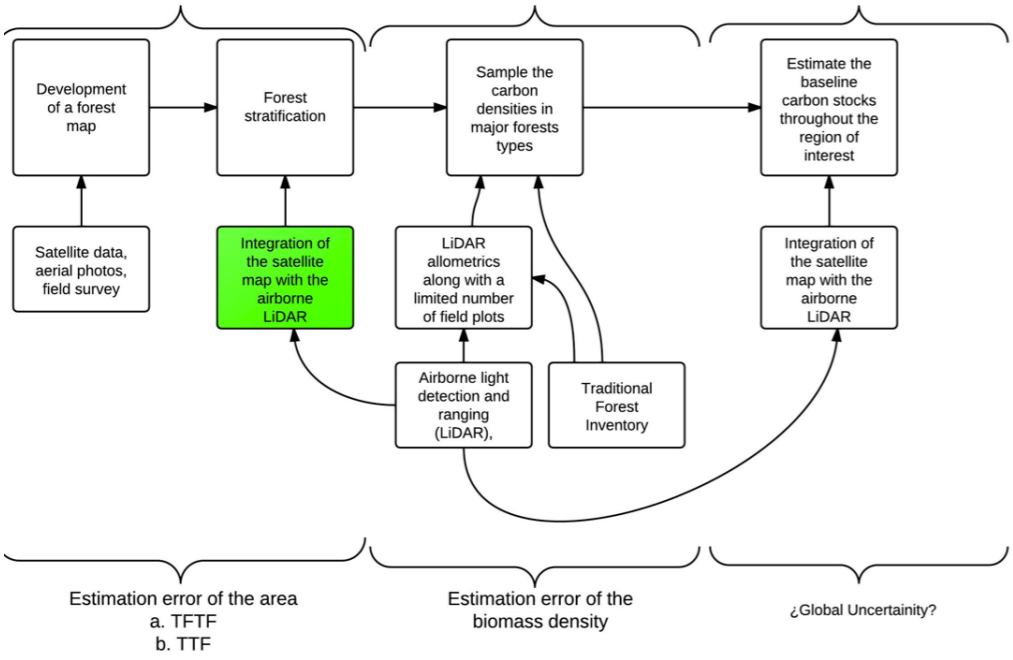

Figure 26. Integration of the Continuous Forest Inventory with LIDAR-type Airborne Mapping Methods to Reduce Costs, Improve Accuracy and Reduce Uncertainty in the Measurement of Changes in the Carbon Stock

Table 31. Calculation of the Change in Tropical Forests: Integration of Satellite and Airborne Mapping[28].

Satellite Images + Forest Parcels Inventory	Satellite Images + Parcels Inventory + LIDAR
No satellite technology can directly measure carbon density	Airborne mapping methods can help in the development of estimates of carbon stored in tropical forests
Satellites offer the opportunity to observe changes in forest carbon caused by deforestation and degradation, but only if carbon densities have been measured	The most recent airborne approaches, particularly LIDAR, can be used to estimate large-scale above-ground carbon stocks
Carbon densities have been measured using inventory parcels, which are valuable but also are costly, take time, and are limited in their usefulness by their geographic representation	LIDAR mapping combined with field calibration information (parcels) can produce maps of above-ground carbon covering thousands of hectares per day of flight.

Source: Asner, 2009

[28] Given the limited work attempting to integrate airborne technologies into the carbon mapping process for REDD, there are no operational or even any clearly proposed methods for using these technologies (Asner, 2009).

12.2. Describe how the proposed ER Program monitoring system is consistent with the (emerging) national REDD+ monitoring system

Monitoring of the reduction of emissions under the ER Program will be part of the REDD+ Strategy MRV. As indicated in 12.1, a series of adjustments to the R-PP proposal are required. The largest adjustments relate to the integration of the use of LIDAR, the assessment of uncertainties, and the calculation methodology (see 12.1).

12.3. Describe how the proposed ER Program monitoring system is consistent with UNFCCC guidance available to date and with the emerging Methodological Framework of the FCPF Carbon Fund

Guidance on MRV systems is generally provided by UNFCCC in its decisions (www.unfccc.int) (Table **32**). IPCC provides a detail guidelines for countries to measure, report and verify emission factors and activity data which are the key components linking MRV systems to IPCC guidelines for producing national (or sub-national, if appropriate) estimates of CO2 emissions by sources and absorptions by sinks (Figure **27**).

National reference emission levels and reference levels are defined by UNFCCC (Table **33**) and IPCC does not provide guidelines on reference levels as it mostly concerns about monitoring rather than emission reduction verification.

Costa Rica fully complies with MRV and national reference emission level requirements under UNFCCC and according to IPCC guidelines in a gradually improving manner. National circumstances are considered and existing institutions, financial mechanisms and data are employed and improved to fulfill reporting requirements under FCPF and for the REDD+ National Strategy that is included in the National Greenhouse Gas Inventory.

Conversely to UNFCCC general guidelines for MRV systems, IPCC offers a measurement, reporting and verification platform for estimating CO2 emissions and reductions which is summarized by the Equation **4** (IPCC, Vol1, Ch1, p1.6):

Equation 4: CO2 Emissions or Absorptions = Emission factor x Activity Data

All throughout IPCC guidelines, these MRV components are thoroughly explained and methodologies suggested for different reporting tiers. Figure **27** explains the relationship between the MRV system for REDD+ and IPCC guidelines.

Costa Rica fully complies with the structure suggested by IPCC as emission factors and activity data are estimated for knowing CO2 emissions and absorptions and thus agrees with international guidelines for establishing national forest monitoring systems designed to measure, report and verify mitigation actions such as emission reductions from degradation and deforestation within a REDD+ mechanism.

Table 32. Measurement, reporting and verification requirements under the UNFCCC.

UNFCCC Decision Document	Decision	Implication for Costa Rica's ER-PIN program	Compliance
4/CP.15	Non-Annex I Parties to the Convention will implement mitigation actions, including those to be submitted to the secretariat by non-Annex I Parties in the format given in Appendix II by 31 January 2010, for compilation in an INF document, consistent with Article 4.1 and Article 4.7 and in the context of sustainable development. Least developed countries and small island developing States may undertake actions voluntarily and on the basis of support. Mitigation actions subsequently taken and envisaged by Non-Annex I Parties, including national inventory reports, shall be communicated through national communications consistent with Article 12.1(b) every two years on the basis of guidelines to be adopted by the Conference of the Parties. Those mitigation actions in national communications or otherwise communicated to the Secretariat will be added to the list in appendix II. **Mitigation actions taken by Non-Annex I Parties will be subject to their domestic measurement, reporting and verification the result of which will be reported through their national communications every two years.** Non-Annex I Parties will communicate information on the implementation of their actions through National Communications, with provisions for international consultations and analysis under clearly defined guidelines that will ensure that national sovereignty is respected. **Nationally appropriate mitigation actions seeking international support will be recorded in a registry along with relevant technology, finance and capacity building support.** Those actions supported will be added to the list in appendix II. **These supported nationally appropriate mitigation actions will be subject to international measurement, reporting and verification in accordance with guidelines adopted by the Conference of the Parties.**	"**Nationally appropriate mitigation actions seeking international support**" such as the ER-PIN program are subject to domestic and international measurement, reporting and verification according to UNFCCC guidelines approved by Parties. In order to be measurable, comparable methodologies (IPCC, 2006) should be adopted accordig to UNFCCC. Reporting requirements are completeness, accuracy and transparency. Documentation of all activities and mehtodologies is essential for transparent reporting All emission factor and activity data estimates produced by Costa Rica are comparable, consistent, complete, transparent and as far as possible accurate..	*Total*
4/CP.15	*Requests* developing country Parties, on the basis of work conducted on the methodological issues set out in decision 2/CP.13, paragraphs 7 and 11, to take the following guidance into account for activities relating to decision 2/CP.13, and	(a) Drivers of deforestation and degradation are being identified and current information exists on their dynamics (p16). (b) Through programs for	*Total*

	without prejudging any further relevant decisions of the Conference of the Parties, in particular those relating to measurement and reporting: (a) To identify drivers of deforestation and forest degradation resulting in emissions and also the means to address these; (b) To identify activities within the country that result in reduced emissions and increased removals, and stabilization of forest carbon stocks; (c) To use the most recent Intergovernmental Panel on Climate Change guidance and guidelines, as adopted or encouraged by the Conference of the Parties, as appropriate, as a basis for estimating anthropogenic forest-related greenhouse gas emissions by sources and removals by sinks, forest carbon stocks and forest area changes; (d) To establish, according to national circumstances and capabilities, robust and transparent national forest monitoring systems and, if appropriate, sub-national systems as part of national monitoring systems that: (i) Use a combination of remote sensing and ground-based forest carbon inventory approaches for estimating, as appropriate, anthropogenic forest-related greenhouse gas emissions by sources and removals by sinks, forest carbon stocks and forest area changes; (ii) Provide estimates that are transparent, consistent, as far as possible accurate, and that reduce uncertainties, taking into account national capabilities and capacities; (iii) Are transparent and their results are available and suitable for review as agreed by the Conference of the Parties;	environmental services payments, Costa Rica proposes to avoid deforestation and enhance forest carbon stocks in degraded forests (p7). (c) Costa Rica employs IPCC Good Practice Guidance (2003) for estimating emission and removal within a gradually improving system for measuring, reporting and veryfing mitigation actions under the UNFCC (i) Costa Rica proposes to employ remote sensing imagery, LiDAR information and field data from the National Forest Inventory to estimate "anthropogenic forest-related greenhouse gas emissions by sources and removals by sinks, forest carbon stocks and forest area changes" (ii) Costa Rica will employ state-of-the-art remote sensing imagery (i.e. RapidEye), supplementary information for forest stratification and measurement of forest structure (airborne LiDAR) and a statistically robust National Forest Inventory in order to decrease the uncertainty in the reduction of emissions estimates. (iii) All estimates are for the ER-PIN are part of Costa Rica's REDD+ National Strategy and thus of the national accountability of CO2 emissions by sources and removals by sinks for the forest (LULUCF) sector within the National Greenhouse Gas Inventories under the UNFCCC.	
1/CP.1629	61. *Also decides* that internationally supported mitigation actions will be measured, reported and verified domestically and will be subject to international measurement, reporting and verification in accordance with guidelines to be developed under the Convention; 62. *Further decides* that domestically supported mitigation actions will be	61 & 62. As of Decision 4/CP.15, all emission factor and activity data estimates produced by Costa Rica are comparable, consistent, complete, transparent and as far as possible accurate. Further, they are based on IPCC guidelines and encompassed in a gradually improving system for measuring, reporting and verifying reduction	*Total*

[29] Cancun agreement

	measured, reported and verified domestically in accordance with general guidelines to be developed under the Convention; 64. *Also decides* that information considered should include the national greenhouse gas inventory report, information on mitigation actions, including a description, analysis of the impacts and associated methodologies and assumptions, progress in implementation and information on domestic measurement, reporting and verification, and support received; discussion about the appropriateness of such domestic policies and measures is not part of the process; discussions should be intended to provide transparency of information related to unsupported actions; 66. *Agrees* on a work programme for the development of modalities and guidelines for: facilitation of support to nationally appropriate mitigation actions through a registry; measurement, reporting and verification of supported actions and corresponding support; biennial reports as part of national communications from Parties not included in Annex I to the Convention; domestic verification of mitigation actions undertaken with domestic resources; and international consultations and analysis; 73. *Decides* that the activities undertaken by Parties referred to in paragraph 70 above should be implemented in phases, beginning with the development of national strategies or action plans, policies and measures, and capacity-building, followed by the implementation of national policies and measures and national strategies or action plans that could involve further capacity-building, technology development and transfer and results-based demonstration activities, and evolving into results-based actions that should be fully measured, reported and verified;	emission estimates. These are thus measurable, reportable and verifiable domestically or internationally. 64. An in depth discussion on naitonal circunstances and the mitigation measures adopted, especially in relation to existing mechanisms to reduce emission reductions from degradation and deforestation (e.g. Payments for Environmental Services Program, PESP) is carried out in a transparent way. Additionally, it is describe how modifications to the current system will impact current trends in deforestation. A more detailed discussion on the policy making to expand current PESP has been provided by FONAFIFO. 66. FONAFIFO will serve as emission reduction registry and in collaboration with SINAC produce integrated National Communications. 70. Costa Rica proposes an advanced national strategy or action plan (including policies, measures and capacity building). The implementation of national policies is underway with the inclusion of new modalities for PESP to account for increased emission reductions from deforestation and degradation. With the FCPF program and the ER-PIN proposed, Costa Rica seeks a results-based mitigation actions that are fully fully measured, reported and verified by national institutions and external third parties (FCPF).	
2/CP.17	13. Parties should provide information on the description of domestic measurement, reporting and verification arrangements.	13. Costa Rica provides a detail account of the measurement, reporting and verification arrangements (p 9, 10)	*Total*

Note: Pages referred to in parenthesis are for Costa Rica's ER-PIN earlier proposal document.

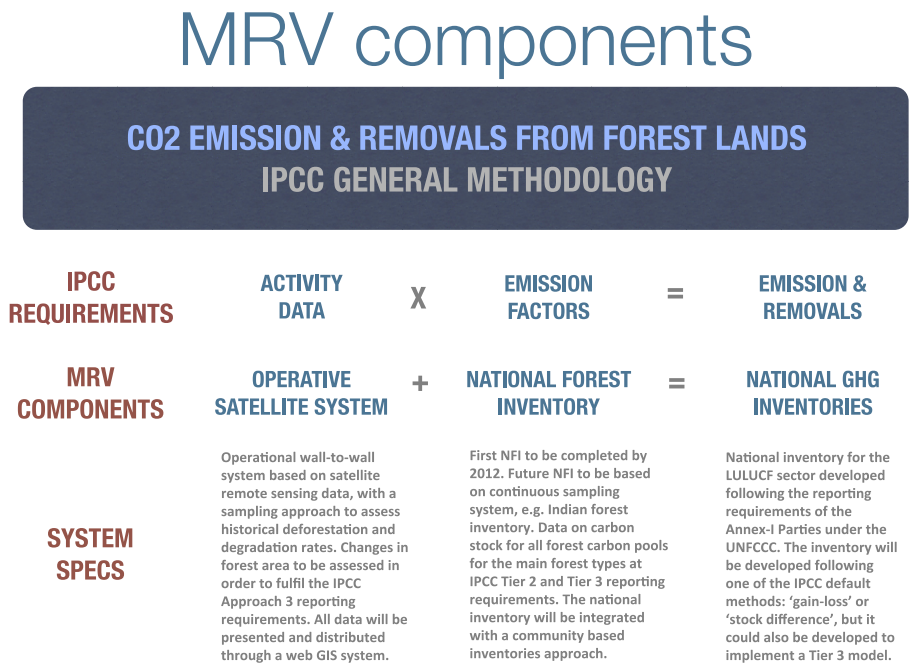

Figure 27. MRV components and their links to IPCC guidelines. Modified from Girardin (2010).

Table 33. UNFCCC Decisions related to reference emission levels and reference levels.

UNFCCC Decision Document	Description	General implication	Implication for Costa Rica's REDD+ strategy	Compliance
2/CP.13	Parties are invited to reduce emissions from deforestation and degradation	A reference emission level is required to verify emission reductions.	A reference emission level has been proposed for deforestation and degradation using a combination of remote-sensing imagery and field data collection from the National Forest Inventory.	*Total*
4/CP.15	Parties are encouraged to identify activities that result in emissions	Reference emission levels need to be defined for these activites in order to estimate emissions and potential reductions	Costa Rica has identified drivers of deforestation and activities that result in emissions. PESPs currently target this activites by means of forest preservation, management and enhancement of forest carbon stocks	*Total*
4/CP.15	Parties are suggested to use historical information to define reference emission levels	Reference emission levels include previous information on land use changes and changes in forest carbon stocks	Reference emission levels include historical information on activity data (land cover maps dating from 1992) but also from emission factors (*e.g.* data from permanent sampling plots in the country)	*Total*
12/CP.17	Reference emission	Refernce emission	Trend in emission is estimated	*Total*

	levels are defined in tons of equivalent CO2 per year	levels are expressed as rates and not as static baselines (e.g. year of reference)	from repeated land cover maps (every five years) and associated to nationally-derived emission factors, and in consequence, are expressed in tons of CO2-equivalent per year.	
12/CP.17	Reference emission levels should be integrated in National GHG Inventories	REDD+ reference emission levels are consistent with the national forest monitoring system and national reports	REDD+ reference emission levels will be incorporated into national strategies for reducing uncertainty of National GHG Inventory estimates	*Total*
12/CP.12	Reference levels may be gradually improved with better data, methods and additional carbon pools	Parties are encourage to use current information to set reference emission levels that can be improved in time	A refence level will be defined for for above-ground biomass and other C pools will eventually be incorporated with information collected from the national forest inventory.	*Total*

~~For purposes of the ER Program monitoring, the IPCC good practice method of estimating default gains (reductions and removals) will be assessed. As well, the uncertainty of the change in the carbon stock on forest lands will be calculated on the basis of the change in stocks, taking into account the uncertainty associated with the area involved, the uncertainty associated with the change in biomass, and the uncertainty associated with the estimation of the carbon factor. The overall estimation will be the sum of the uncertainties for forest lands that remain forest lands and lands converted into forest lands.~~

12.4. Describe any potential role of Indigenous Peoples or local communities in the design or implementation of the proposed ER Program monitoring system.

The design of the forest inventory that will provide LIDAR calibration information, which will be the responsibility of SINAC and will be financed by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), has not yet been completed. A SINAC-FONAFIFO interinstitutional committee, created by means of a letter of understanding, will revise the scope of said design to ensure full and effective participation of the stakeholders (indigenous peoples and local communities).

12.5. Describe if and how the proposed ER Program monitoring system would include information on multiple benefits like biodiversity conservation or enhanced rural livelihoods, governance indicators, etc.

The design of the forest inventory that will provide LIDAR calibration information, which will be the responsibility of SINAC and will be financed by GIZ, has not yet been completed. A SINAC-FONAFIFO interinstitutional committee, created by means of a letter of understanding, will revise the scope of said design to ensure that information is provided for monitoring the compatibility of the REDD measures with forest conservation and biodiversity.

13. Summary of Progress on REDD+ Readiness

13.1. Brief summary of major achievements of readiness activities in country thus far
Please briefly provide any additional updates on REDD+ readiness activities not described above, using the component categories of the R-PP as a guide. If public information is available on this progress, please refer to this information and provide a link

The following advances in the REDD strategy should also be mentioned:

1. Strategic Environmental and Social Assessment (SESA) Workshop: The national SESA workshop was held; it consisted of a participatory process to create an interactive platform that would contribute to the design of the national REDD strategy. This workshop was used to prioritize the environmental, social and, political/legal issues from the viewpoint of the stakeholder groups. It consisted of a process that involved representatives of the 24 indigenous territories in a discussion of the common priorities, after many years of nonparticipation. As well, a farmers' group was established at the petition of the farmers.

2. Process of definition of the reference level for the REDD and the measuring, reporting and verification (MRV) system.
    a. First National Workshop of Experts: Analyze and suggest the methodology for the Baseline and the Measuring, Reporting and Verification System for Costa Rica's National REDD+ Strategy. September 2011.
    b. Second National Workshop of Experts: Propose general guidelines for the design of the National Forest Inventory. November 2011.
    c. Exchange of knowledge and experience on the MRV methodologies: Contributions for the development of a pilot project in Costa Rica to access the Carbon Fund within the framework of the REDD+ Strategy project. June 2012.

3. In the last week of September 2012, FONAFIFO will receive a World Bank mission, which will provide support for the preparation of the SESA Work Plan and will revise the current proposed ER-PIN.

4. FONAFIFO is in the process of updating its R-PP, integrating the agreements reached in the Information and Consultation Process, design of the MRV and SESA.

5. During the coming 18 months, FONAFIFO will be working on the implementation of the reference level of the ER Program and the REDD Strategy, preparing the respective terms of reference for contracting and execution of the necessary consultancies and services.

13.2. Current status of the Readiness Package and estimated date of submission to the FCPF Participants Committee (including the REL/FRL, REDD+ Strategy, national REDD+ monitoring system and ESMF)

The details are being finalized for Costa Rica to receive a grant of US$3.6 million. These funds should be available in the coming weeks. The purchasing plan is being approved to allow FONAFIFO to begin contracting support staff and thus continues aggressive implementation of

the strategy starting in October. Although the date for submission of the Readiness Package has not been finalized, it is estimated that this could take place in June 2013. As well, the reference level should be ready by March 2013 as part of its formal preparation for the beginning of negotiations on an ERPA agreement with the World Bank and FCPF.

13.3. Next steps to finalize the proposed ER Program implementation design (REL/FRL, ER Program monitoring system, financing, governance, etc.). Provide a rough timeline for these steps

Activities described under Table **34** cover the seven actions funded by the World Bank`s FCPF (REDD Management Arrangements, PIR Consultation Process, Land Use Evaluation, Strategic Options, Implementation Framework, Monitoring, Report and Verification, Social and Environmental Impacts).

Those activities, whose delivery date corresponds to the first semester in 2013, are the ones that currently embrace a progress level, and therefore will be included in the mid-term report by June 2013. It is expected that remaining activities be completed at the end of 2013 in the final R-Package document.

It should be noted that Costa Rica needs financial support and technical assistance from the FCPF to complete these tasks in a timely fashion. In this respect, efforts will be made to complete this working process, taken into account that execution of the proposed agenda in the R-PP (2010) was implemented until 2012, when the delivery of funds by the World Bank were available.

Table 34. Seven actions funded by the World Bank`s FCPF for Costa Rica's REDD+ Strategy.

Activities	Verifiable Products	Products Delivery
REDD Management Arrangements		
Definition of Indigenous Peoples Representative	Definition of the Indigenous People Representative	I Semester 2013
Determination of second chair in the REDD+ Executive Committee	Definition of the Civil Stakeholders Representative	I Semester 2013
REDD+ Executive Committee establishment	Record from the first REDD+ Executive Committee session	I Semester 2013
Secretariat recruitment	Contracted establishment plan	I Semester 2013
Establishment of the Inter-institutional Commission	REDD+ Executive Committee agreement on electing participant institutions	II Semester 2013
REDD+ webpage and newsletter design	Operational REDD+ webpage and first newsletter delivered	II Semester 2013
REDD+ positioning at the highest level	Workshops with senior officials	I Semester 2013
PIR Consultation Process		
Consultation Process Design	TOR's of the consultation process	I Semester 2013
PIR Consultation on REDD+ Strategy	Execution of the Action Plan	II Semester 2013

Indigenous Action Plan Execution	Execution of the Indigenous Action Plan integrated to the General Action Plan	II Semester 2013
Land Use Evaluation		
Standardization and methodological improvements for the determination of the deforestation	Deforestation and degradation official definitions manual	II Semester 2013
	TOR's of the standardized methodology for determining deforestation	II Semester 2013
PPES evaluation as a mechanism to control deforestation	Technical Report for the identification of efficient schemes Deforestation and Degradation PPES	Without funding
	Technical Report for the evaluation of the land opportunity cost at the national level	II Semester 2013
	Technical Report for the dynamics and causes of degradation	II Semester 2013
Strategic Options		
Actualization, Recertification and sale of PAP	Draft Document updated and certified Protected Areas	II Semester 2013
Digital system development or forest information for SINAC	Digital Forest Information System for SINAC running.	II Semester 2013
Design the legal architecture necessary to provide access to forest owners to positive incentives	Document that formalizes the legal architecture for implementation of forest owners incentives	II Semester 2013
Implementation of Sustainable Forest Management in ASP and Indigenous Territories	Official Practices Code for the Implementation of Sustainable Forest Management in the ASP and Indigenous Territories	II Semester 2013
Implementation of Sustainable Forest Management in Secondary Forest.	Official Practices Code for the Forest Management Implementation in Secondary Forest.	II Semester 2013
PESP Design for induction and retention of regeneration	Agreement for design approval by the Executive Board of FONAFIFO. Its implementation is subject to the availability of financing for the induction of PES for the retention of regeneration.	II Semester 2013

PESP Design for natural forest management (Primary and Secondary Forest)	Agreement for design approval by the Executive Board of FONAFIFO. Its implementation is subject to the availability of financing for the natural forest management (primary and secondary)	II Semester 2013
PESP Design for Indigenous Territories.	Agreement for design approval by the Executive Board of FONAFIFO. Its implementation is subject to the availability of financing for PES for the Indigenous Territories.	II Semester 2013
Creation of fresh funds, predictable and long term to finance REDD Strategy	Financing Strategy Document	II Semester 2013
Control Strategy for Illegal Logging.	ECTI Revision and a document with the improvement proposal.	II Semester 2013
Campaign to promote the production and sustainable consumption of wood from primary and secondary natural forest and reforestation	Execution Campaign.	I Semester 2013
	Academic Programs of genetic improvement in forest plantations strengthened.	Deleted
	Plan to eliminate barriers to the use of wood in execution.	I Semester 2013
Implementation Framework		
Fraud Control Unit in carbon rights trading	Fraud Control Unit in carbon rights trading implemented en the C-Neutrality Framework.	II Semester 2013
Establishment of the National Register of Environmental Services Rights.	Technology platform for the National Register of Environmental Services rights implemented in the framework of the C-Neutrality	II Semester 2013
Monitoring, Report and Verification		
Definition of the panel responsible for the MRV, and preparation of logical framework	REDD + Executive Board agreement formalizing the body responsible for the MRV.	I Semester 2013
	Logical Framework Matrix of MRV	I Semester 2013

Evaluation of options of monitoring and final inventory design.	REDD + Executive Board agreement formalizing the monitoring option and forest inventory design.	I Semester 2013
Complete data and biomass equation construction.	Technical Document formalizing the allometric equations and the reference data.	I Semester 2013
Preparation of Forest Cover Maps.	Cover maps prepared.	I Semester 2013
Definition and Validation of the baseline.	A Document formalizing the country baseline	II Semester 2014
Social and Environmental Impacts		
Social and Environmental Evaluation System (SESA)	SESA Design and Implementation	I Semester 2013
Reference review of the environmental and social impacts.	REDD + Executive Board agreement formalizing the baseline of environmental and social impacts.	I Semester 2013
Design of Socio-Environmental Management Plan	Socio-Environmental Management Plan being implemented	I Semester 2014

14. Financing plan (in US$ million)

Please describe the financial arrangements of the proposed ER program including potential sources of funding. This should include both near-term start-up cost and long-term financing. If the proposed ER program builds on existing projects or programs that are financed through donors or multilateral development banks, provide details of these projects or programs, including their financing timeframe.

Table 35 provides a financing scenario based on a set of assumptions. According to the parameters set out in Table 36, the cost of the ER Program would be US$238 million. It is important to emphasize that implementation of the ER program will require additional financing. Existing public funds cover maintenance of the current level of penetration of the PES program administered by FONAFIFO and will be able to finance only US$73.4 million out of the US$238 million required for implementation of the ER Program activities

Owing to the inability of the government to allocate additional public resources, the remaining financing of the ER Program will depend primarily on the sale of emission reduction rights produced early, such as the Post Bali/Post Ecomarkets II Carbon[30] (US$22.3 million), and those produced by the ER Program (US$62 million). The funds raised through carbon transactions represent the sale of 50 percent of the potential emission reductions under the ER Program and 5 percent of early reductions. Transactions are planned only for carbon produced prior to 2021, avoiding potential inconsistencies with the Carbon Neutrality declaration (see Table 37).

It should be noted that this is a very preliminary version of the Financing Plan. Additional scenarios that can better handle the surpluses and reduce the deficits must be developed, and aspects such as the impact of low farmer recruitment levels at the beginning of the project or an increase in the price of the PES, among many other variables to be taken into consideration, must be analyzed.

[30] The aim of the ECOMARKET Project was to preserve forests in Costa Rica, support the development of private markets and suppliers of environmental services offered by private forests, incorporate protection of biodiversity, mitigate the gases produced by the greenhouse effect and promote hydrologic services.

Table 35. Summary of the financing plan

Expected ER Program costs	Description / Specification	Breakdown per year										Total
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Operational and implementation costs	*Pago por servicios ambientales para deforestacion evitada en 107600 ha de boques de viejo crecimiento*	**3,217,378**	**6,935,290**	**8,608,014**	**8,608,014**	**8,608,014**	**8,608,014**	**8,608,014**	**8,608,014**	**8,608,014**	**8,608,014**	**8,608,014**	**79,016,781**
	Pago por servicios ambientales para deforestación evitada en19000 ha de Regeneración media					**219,325**	**438,650**	**657,975**	**877,300**	**1,096,625**	**1,315,951**	**1,535,276**	**6,141,103**
	PSA para 19,000 ha de crecimiento secundario en Territorios indígenas					**187,418**	**374,836**	**562,254**	**749,672**	**937,090**	**1,124,507**	**1,311,925**	**5,247,701**
	PSA para 123,000 ha de crecimiento secundario en terrenos privados	**338,676**	**480,811**	**1,188,531**	**1,896,252**	**2,603,973**	**3,619,928**	**4,635,884**	**5,651,839**	**6,667,794**	**7,683,750**	**8,699,705**	**43,467,142**
	PSA para 72,000 ha de plantaciones forestales o sistemas agroforestales en terrenos privados	**8,243,514**	**8,531,298**	**7,753,689**	**7,753,689**	**7,753,689**	**7,753,689**	**7,753,689**	**7,753,689**	**7,753,689**	**7,753,689**	**7,753,689**	**86,558,011**
	Captura de carbono en productos de madera mediante el Incremento Uso de Madera					**1,000,000**	**1,000,000**	**1,000,000**	**1,000,000**	**1,000,000**			**5,000,000**
Financing costs (e.g interest payments on loans)	*(please explain)*												-
Costs related to developing the ER Program (i.e monitoring costs)	*Establecimiento nivel de referencia y eventos de monitoreo del ER-Program*				**1,500,000**				**1,000,000**			**1,000,000**	**2,500,000**
Other costs	*Iniciativa JNR-VCS, empaquetamiento Carbono Post Bali y Post Ecomercados II*	**500,000**											**500,000**
	Total costs	**12,299,568**	**15,947,399**	**17,550,234**	**19,757,955**	**20,372,418**	**21,795,117**	**23,217,815**	**25,640,514**	**26,063,212**	**26,485,911**	**28,908,609**	**238,038,752**
Expected income	**Description**												
Revenue from REDD+ activities (e.g sale of agricultural products)	*(please name sources)*												-
													-
Other sources of income (e.g grants)	*R Package, apoyo al MRV*				**1,500,000**								**1,500,000**
	Grant aumento consumo de madera					**1,000,000**	**1,000,000**	**1,000,000**	**1,000,000**	**1,000,000**			**5,000,000**
	Fondos Públicos	**5,191,268**	**3,752,619**	**6,547,415**	**6,798,212**	**6,874,286**	**6,970,211**	**7,151,411**	**7,306,292**	**7,458,337**	**7,621,773**	**7,797,452**	**73,469,277**
	Ecomercados II	**8,049,545**	**11,600,000**	**5,631,084**									**25,280,629**
Loans	*Credito Forestal FONAFIFO*	**500,000**	**500,000**	**500,000**	**500,000**	**500,000**							**2,500,000**
	Inversionistas Forestales						**7,650,000**	**7,650,000**	**7,650,000**	**7,650,000**	**7,650,000**	**7,650,000**	**45,900,000**
Revenue from sale of Emission Reductions (contracted)	ERPA Fondo de Carbono FCPF ER-Program					**16,613,112**			**21,317,618**			**24,479,960**	**62,410,690**
Revenue from sale of additional Emission Reductions (not yet contracted)	Mercado Local de carbono				**1,929,884**	**2,143,803**	**2,372,789**	**2,617,069**	**2,876,880**	**3,152,367**	**3,443,675**	**3,750,951**	**22,287,418**
	Mercado Voluntario Internacional (Carbono Post Ecomercados II)												-
	Mercado Voluntario (Carbono Post BALI)												-
	Mercado Regulado Saldo Carbono ER-Program												-
	Total income (before taxes)	13,740,813	15,852,619	12,678,499	10,728,096	27,131,201	17,993,000	18,418,480	40,150,790	19,260,704	18,715,448	43,678,363	238,348,013
													-
	Net revenue before taxes (=total income – total costs)	1,441,245	(94,780)	(4,871,735)	(9,029,859)	6,758,783	(3,802,117)	(4,799,335)	14,510,276	(6,802,508)	(7,770,463)	14,769,754	309,261

Table 36. Parameters Considered in the Development of the ER Program Financing Plan.

PPES Type	Option	Actual amount MINAET Decree 36935 ($ US*ha^{-1})		Estimated amount ($ US*ha^{-1})		Increment (%)
		Total	Annual	Total	Annual	
Old growth forest	A	640	64	800	80	25%
Mid-regenerated forests Indigenous Territories	B	-	-	400	80	
Secondary growth	C & E	410	41	700	70	70%
Reforestation	D	980	196	1200	240	20%

Table 37. Amount of Carbon to be Traded, in Tons of CO2 produced in the Different Periods, to Finance Implementation of the ER Program

Year	ER Program	Post Bali/Post Ecomarkets Carbon	Annual Total
2010	-	-	-
2011	-	-	-
2012	-	-	-
2013	-	385,977	385,977
2014	3,322,622	428,761	3,751,383
2015	-	474,558	474,558
2016	-	523,414	523,414
2017	4,263,524	575,376	4,838,900
2018	-	630,473	630,473
2019	-	688,735	688,735
2020	4,895,992	-	4,895,992
Total	12,482,138	3,707,293	16,189,431

15. List of acronyms used in the ER-PIN

Please include an explanation of any institutional or other acronyms used. Add rows as necessary

Acronym	Meaning
ACICAFOC	Indigenous and Farmers' Coordinating Association for Community Agroforestry
CIAgro	College of Agricultural Engineers
COP	Conference of the Parties
DCC	Climate Change Directorate
ERPA	Emission Reductions Payment Agreement
ER-Program	Emission Reduction Program
ESMF	Environmental and Social Management Framework
ESPH	Heredia Public Utility Corporation
FCPF	Forest Carbon Partnership Facility
FONAFIFO	National Forest Financing Fund
FUNDECOR	Foundation for the Development of the Central Volcanic Range
Gg	Gigagrams
GHG	Greenhouse Gases
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
ICE	Costa Rica Electricity Company
IPCC	Intergovernmental Panel on Climate Change
LIDAR	Light Detection And Ranging
LULUCF	Land Use, Land-Use Change and Forestry
MINAET	Ministry of the Environment, Energy and Telecommunications
MRV	Measuring, Reporting and Verification
NEEDS	National Economic, Environment and Development Study for Climate Change
NGO	Nongovernmental Organization
ONF	National Forest Office
PC	Participants Committee
PES	Payment for Environmental Services
PIR	Relevant Stakeholder
REDD	Reducing Emissions from Deforestation and Forest Degradation
SESA	Strategic Environmental and Social Assessment
SINAC	National System of Conservation Areas
TFTF	Forest lands that remain forest lands
TTF	Lands converted into forest lands

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