Emission Reductions Program

to the FCPF Carbon Fund

Costa Rica

December 5, 2015

Government of Costa Rica
Ministry of Environment and Energy

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Note on the English translation

The reader should note that the official version of Costa Rica's Emission Reduction Program Document is in Spanish, this version is available at www.reddcr.go.cr. The current translation to English may have errors. However, this version is presented to the FMT due to time constraints. Nonetheless, Costa Rica is not resposible for any errors found in this document. Costa Rica's REDD+ Secretariat was able to review sections 1, 2, 3, 4.3., 5, 6, 7, parts of section 8, and 9. The remaining sections remain solely the responsability of the translator.

Measurement units

For all numbers, commas "," represents the decimal point, for example 5,4. A point is used for thousands, as in 5.400,20. Emissions and removals (absorptions) are expressed in tons of carbon dioxide equivalent per year (t CO_2-e yr^{-1}). Removals are expressed as negative numbers. Gigagrams (Gg) are not used. For areas, hectares (ha) are used, unless otherwise specified (e.g. km^2 may be used in certain sections of the document).

1. Entities responsible for the management and implementation of the proposed ER Program

1.1. ER Program Entity that is expected to sign the Emission Reduction Payment Agreement (ERPA) with the FCPF Carbon Fund

Name of entity	Ministry of the Environment and Energy (MINAE)
Type and description of organization	MINAE is the government entity in charge of the Costa Rican environmental policy per the Organic Law of Environment, and amongst its responsibilities, it must ensure the comprehensive application of the existing forestry legislation, both in public and in private areas. MINAE has its own legal identity.
Main contact person	Dr. Édgar Gutiérrez-Espeleta
Title	Minister of the Environment and Energy
Address	Edificio Vista Palace, Calle 25. Avenida 8 y 10, San José, Costa Rica
Telephone	+(506) 2233-4533
Email	ministrominae@minaet.go.cr
Website	www.minae.go.cr

1.2. Organization(s) responsible for managing the proposed ER Program

Same entity as ER Program Entity identified in 1.1 above?	Yes; because the MINAE is the governmental institution that concentrates the environmental competences, but for the purposes of the program management, it will delegate in the State Forestry Administration, which is part of the National System of Conservation Areas (SINAC) and to the National Fund for Forest Financing (FONAFIFO), who will take over their competences according to the provisions in the current legislation. A Secretariat for the coordination between both institutions as well as for the coordination and supervision of actions shall be established by means of an executive decree. **National Fund for Forest Financing (FONAFIFO)**: was created by the Forestry Law, with the purpose of promoting forest management and reforestation, and to improve the use and industrialization of Costa Rica's forest resource. FONAFIFO is also in charge of obtain financing and manage the program of Payment for Environmental Services. It is governed by a Board of Directors that represent different stakeholders of the Forestry sector.

	Information of contact person Jorge Mario Rodríguez Executive Director (506) 2545-3501 jrodriguez@fonafifo.go.cr **National System of Conservation Areas (SINAC)**: was created by the Law of Biodiversity, as a decentralized office of the Ministry of the Environment and Energy. It has the responsability to issue forest policies for the sustainable management of natural resources. The System incorporates to the General Wildlife Office, the State Forestry Administration and the National Parks Service. Jointly, these execute their functions and competencies as a single instance, through the administrative structure of the System, without prejudice of the objectives for which they were established. Information of the contact person Julio Jurado Director (506) 2522-6500 julio.jurado@sinac.go.cr

1.3. Partner agencies and organizations involved in the ER Program

Name of partner	Contact name, telephone and email	Core capacity and role in the ER Program
National Center of Geo-environmental information (CENIGA)	Álvaro Aguilar Director (506)2522-6500 Alvaro.aguilar@recope.go.cr	• Responsible for the coordination of the Forest Cover Dynamics and Land Use Change National Monitoring System according to the Ministerial Guideline DM-417-2015. • Responsible for the REDD+ Safeguards Information System, in coordination with other institutions involved, such as FONAFIFO and SINAC.
High-level committee	Dr. Édgar Gutierrez-Espeleta Minister (506) 2233-4533 ministrominae@minaet.go.cr	• Composed by the directors of the FONAFIFO and the SINAC, plus two high-level representatives from each of both institutions. • Its main role is to guarantee the active and responsible participation of both institutions for the due implementation of the program measures and policy actions. • Responds to the political direction of the Minister of the Environment and Energy. • This committee will be created as part of the decree being drafted to regulate the implementation of the Emissions Reduction Program and the National REDD+ Strategy.
Office of the Minister of the Environment and Energy	Dr. Édgar Gutierrez-Espeleta Minister (506) 2233-4533 ministrominae@minaet.go.cr	• Highest political level of decision making in relation to the Program • Guarantees consistency with the national development goals • It is implemented through guidelines and regulations to define institutional arrangements, as required.

National Meteorological Institute, of the Ministry of the Environment and Energy (IMN)	Juan Carlos Fallas Director (506) 2222-5616 jcfallas@im.ac.cr	• Responsible for the Biennial Update Reports, National Communications and National GHG Inventories before the United Nations Framework Convention on Climate Change (UNFCCC). Serves as focal point before the Intergovernmental Panel on Climate Change (IPCC).

2. Strategic context and rationale for the ER-program

2.1. Current status of the Readiness Package and summary of additional achievements of readiness activities in the country

As part of the REDD+ Readiness Package (R-Package), Costa Rica performed its self-assessment considering all relevant stakeholders. This assessment was executed by an external partner to the REDD+ preparation process: the project "Widening Informed Stakeholder Engagement on REDD+" (WISE-REDD+) implemented by Conservation International in Costa Rica. This project organized, pomoted and facilitated the country's self-assessment in July-September, 2015.

The self-assessment began with the Social and Environmental Strategic Assessment (SESA).. The SESA began in 2011 and is still ongoing, which provides a broad dialogue basis to the Government of Costa Rica with the relevant stakeholders.

In 2015, the R-Package self-assessment was developed in collaboration with each of the five sectors identified as a relevant stakeholders. This allowed for the identification of legal, institutional and capacity gaps, especially in relation to managing REDD+ priorities, improvement needs, achievements and recommendations during REDD+'s readiness phase. Some of the challenges and weaknesses identified were: i) low effectiveness in sharing information with relevant stakeholders, ii) limitations in institutional planning, iii) lack of clarity in the roles of the relevant stakeholders in the REDD+ and iv) the formalization of processes by the REDD+ Secretariat to facilitate decision making at the sector level. However, this must be understood in light of the expectations that stakeholders may have, which also have changed with the progress made on international negotiations on REDD+.

During the self-assessment, there was clear evidence of the difference in opinions showed by the indigenous sector and the rest of the stakeholders. This may be attributed to the more intensive REDD+ readiness process conducted with the indigenous peoples. To ensure success in the next stage of the National REDD+ Strategy, the results of the self-assessment suggest that more information need to be provided to non-indigenous stakeholders and to increase, as feasible, the overall participation of all relevant stakeholders.

2.2. Ambition and strategic rationale for the ER Program

Strategic Role of the Emissions Reduction Program

Historically, Costa Rica has been a strong proponent of green, sustainable development, particularly in regards to the protection of natural resources, forests and their environmental services. In its Political Constitution, Costa Rica has provided for the fundamental right of a "healthy and ecologically balanced environment, and the responsibility of the State to guarantee it". In the Costa Rican mindset, environmental protection occupies a privileged position and enjoys popular support, although some areas are recognized to have more progress than others, where significant efforts are still needed.

It is with this spirit that Costa Rica presents its Emissions Reduction Program (ER-P) to the FCPC Carbon Fund, as an additional opportunity to achieve a low carbon economy in a resilient environment. The ER-P is

part of the Forests and Rural Development Program[1] (**Figure 2.2.1.**). The latter is an ambitious platform promoted by the Costa Rica to streamline the implementation of the National Forestry Development Plan. Further, the ER-P is key to make progress towards Carbon Neutrality and constitutes a central axis of Costa Rica's Nationally Determined Intentional Contribution (INDC).

The ER-P is focused on increasing the impact of public policies that have proven successful in the last 20 years of implementation of the current Forestry Law. The ER-P heavily relies on the prohibition to convert forests to other land uses, but also seeks to strengthen the Protected Areas System to guarantee the conservation of critical biodiversity and the Payment for Environmental Services (PSA) program as a policy instrument to guarantee forest conservation and carbon (C) stock enhancement through reforestation, tree plantations, agroforestry and silvopastoral systems.

A goal of the ER-P's is to increase participation of all stakeholders, both public and private, including indigenous territories whose property regime is communal. Along this line, the ER-P seeks to generate new alternatives to enable the participation of people with unclear land-tenure rights. Stakeholders may implement all five REDD+ activities across the country, with the purpose of achieving the highest possible emissions reduction offer.at the national level.

There is an undeniable political will in the country to reduce emissions, conserve forest carbon stocks, and increase the ambition of mitigation actions, while actively seeking to eradicate poverty, which constitutes the core of the National Development Plan. A goal of the ER-P's is to contribute to both, as well as to promote entrepreneurship among micro, small and medium forestry-related producers and land-owners.

[11] The Forests and Rural Development Program is an initiative of current government administration. Its objective is to assist the implementation of key elements of the National Forestry Development Plan. Besides the National REDD+ Strategy, the Forests and Rural Development Program includes the following initiatives: 1. Green and inclusive development program in rural productive territories, 2. Economic reactivation for the production, transformation and commercialization of sustainable forestry products and generation of income for the rural sector, 3. Policy for the Protected Wildlife Areas of the National System of Conservation Areas and 4.Strengthening of the State's Natural Heritage.

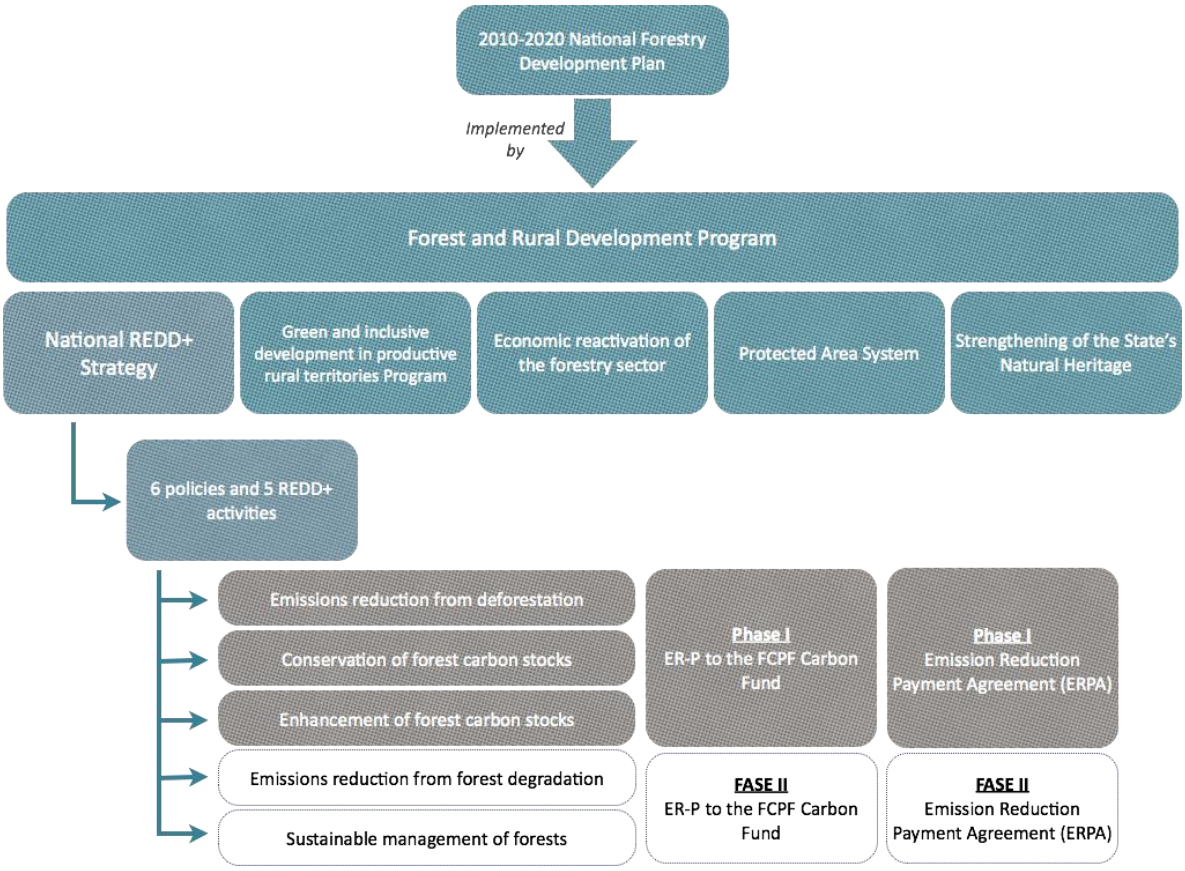


Figure 2.2.1. Relation of the Forests and Rural Development Program with National REDD+ Strategy and Costa Rica's ER-P to the FCPC Carbon Fund. The ER-P includes all the REDD+ activities per decision 1/CP.16, p.70, but they are implemented in phases. The ER-P starts with the activities in gray (Phase I), and gradually incorporates the remaining activities in its Phase II, which requires improvements in accounting data and methods. Although the emission reductions of the ER-P are initially offered to the Carbon Fund for the first three activities, the Benefit-Sharing Mechanism considers the financing of all REDD+ activities (see **Section 15**).

Progress since the ER-PIN

The concept of the ER-P has significantly evolved since the Carbon Fund endorsed Costa Rica's ER-PIN. The current ER-P includes new financing opportunities identified by stakeholders during SESA, as well as during the information and pre-consultation process of the National REDD+ Strategy.

In terms of C accounting, Costa Rica initially presented a programmatic approach mainly focused on the expansion of the PSA. However, the current ER-P includes more policy measures. For example, SINAC's policy framework for reducing illegal logging and the impact of forest fires. The current ER-P proposes national-level accounting, with multiple policies and measures.

Additionally, the current ER-P addresses essential issues related to governance (e.g. help in solving land-tenure conflicts and development of new financing options for areas under special land-tenure regimes). Therefore, the ER-P still includes the ambition initially proposed in the ER-PIN, and in addition to that, seeks to improve and expand existing financing mechanisms. An important novelty in the current ER-P is

the proposal of additional, more flexible PSA modalities for indigenous territories and small forestry and agroforestry producers.

Ambition of current and future programs

The ER-P is based on forestry policies and programs implemented in the last three decades, besides additional measures to increase their effectiveness, improve governance efficiency, and address key drivers of deforestation and forest degradation (**Section 4.3.**). Mainly, it is through SINAC's policy framework and FONAFIFO's PSA program, as well as other policy instruments and mechanisms included in the current Forestry Law, that Costa Rica has been able to demonstrate an early REDD+ implementation (Figure 2.2.2.) . Thanks to these policies and programs, Costa Rica has protected a significant portion of its territory in Protected Conservation Areas since 1970 (today they cover 26% of the country's continental territory). Ecotourism, a national GDP driver, positively affects rural economies, especially, in coastal zones and highly depends on these Protected Conservation Areas.

FONAFIFO's PSA program was also instrumental in achieving early REDD+ results. The PSA was expanded thanks to two loans from World Bank known as Ecomercados I y II. Ecomercados' global goal was to secure the conservation of critical biodiversity and to guarantee its long-term sustainability by implementing market-based mechanisms. Ecomercados II ended in 2014, its results are available in the project's final reports, including information on the measures taken to comply with the World Bank's operational policies. This also sets an applicable management framework to follow-up REDD+ safeguards under the UNFCCC. FONAFIFO's PSA program is based on the principle that "whoever contaminates pays". The PSA is mainly financed by 3,5% of the national fuel tax and from a fee for water use. As of 2013, the PSA compensated environmental services of over 1 million hectares of forest (120.000 hectares in indigenous territories), with an investment of more than $400 million in the most economically depressed rural areas. The ER-P intends to obtain additional financial resources to strengthen the PSA.

In 2010, a more ambitious phase of REDD+ began, which mainly reflected an increase in ambition of FONAFIFO's PSA. Simultaneaously, SINAC continued giving payment for expropriated forest lands in Protected Conservation Areas. SINAC also intensified its fire control and illegal logging operations, e.g. by enforcing the use of Forest Transport Permits.

Moreover, In addition to the policies and programs described above, the ER-P sets forth six new forestry policies, particularly addressed to support some of the stakeholders' special interests. Similarly, many of the policy actions explained in the ER-P are designed with the aim to solve deficiencies of current programs. For instance, through a new PSA modalities for indigenous territories, Costa Rica may enable a more appropriate cultural management of forests, according to the cultural customs and principles of the indigenous territories. Another example is the design of more flexible financing mechanisms that may operate in areas under special land-tenure regimes or where land-tenure is unclear. An important proposal of the ER-P is the strenghening of managerial capacities in the private forestry sector in order to increase production of timber and non-timber forest products.. Since Costa Rica pursues the implementation of all REDD+ activites, the ER-P seeks to generate the enabling and complementary measures to current programs.

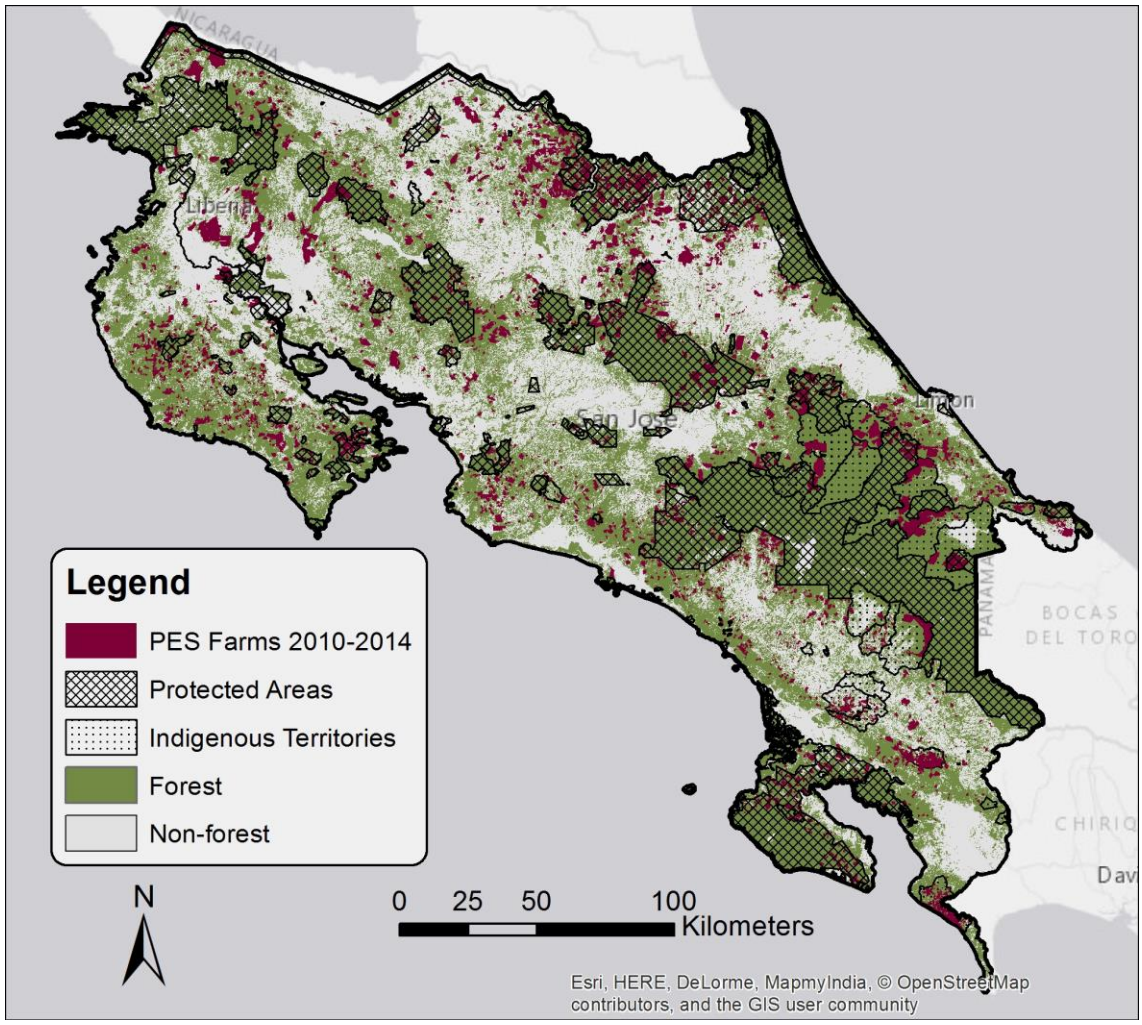


Figure 2.2.2. Forest program cover for the conservation of forests in Costa Rica. PES Farms are properties registered in FONAFIFO's PSA.

Early REDD+ actions and forest conservation

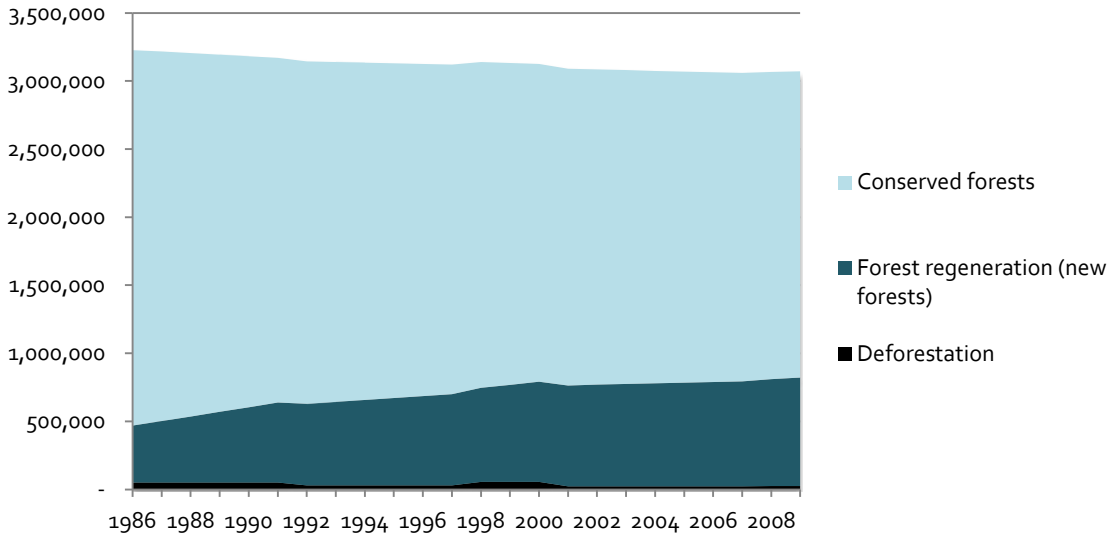
In 2013 (latest year with land cover information), Costa Rica had 2.215.543 hectares (ha) of primary forests[2] (44% of the national territory). Including secondary forests and other forest lands, Costa Rica had a total 3.134.026 ha of forest cover in 2013 (61% of the territory[3]). Maintaining more than half of the county's forest cover has been a significant achievement, which results from multiple laws, policies and programs, which in turn have required important investments. Besides the financial implications of maintaning standing forests, Costa Rica has imposed strong measures against deforestation by making forest conversion illegal, which greatly affects forest- owners. Today, these forests fulfill an invaluable environmental function, by providing numerous social and environmental benefits and by protecting a significant portion of the planet's biodiversity.

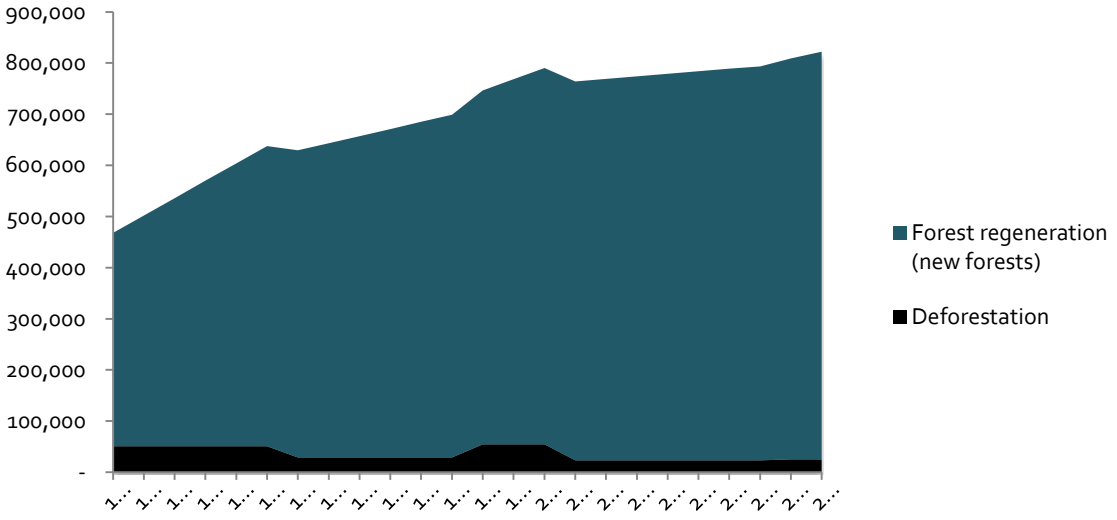
[2] *Primary forests* are defined as those forests that were present in 1986 and are still standing.

[3] Includes tree plantations, mangroves, "yolillales" and palm forests, as well as primary and secondary forests.

Considering the period 1986-2013, annual gross anthropogenic deforestation[4] has decreased in time. In the 1980s deforestation was close to 50,000 ha/yr, in 1990s it was 38,000 ha/yr, and after 2000 deforestation diminished to 27,000 ha/yr. At the same time, forest regeneration (new forests) has substantially increased. In 1986, new, growing forests covered 417,000 ha, while in 2013, the area increased to 918,000 ha. (**Figure 2.2.2.**).

In this context, Costa Rica can show evidence that i) it has been able to maintain a large proportion of its primary forests, ii) it has been able to reduce deforestation, and iii) it has promoted the regeneration of new forests. Much of this happened prior to the Conference of the Parties (COP) in Bali and Cancun..





[4] Includes harvesting of tree plantations, defined as forest or forest lands.

Figure 2.2.2. Area of forest conservation, deforestation and forest regeneration for 1986-2009. The graphic below does not include forest conservation to provide more detail on forest regeneration and deforestation for the same period.

Implementation stages of REDD+ under the Convention and the role of the Emissions Reduction Program

The ER-P is Costa Rica's next step to scale up REDD+ implementation.. As shown in Figure 2.2.1., the first phase of the ER-P is based on the implementation of three REDD+ activities; namely, emissions reduction from deforestation, conservation and enhancement of forest C stocks. Future phases of the ER-P (and the National REDD+ Strategy) will include CO_2 absorptions from tree plantations, emissions reductions from forest degradation and sustainable management of forests.

The ER-P is how Costa Rica plans to implement its National REDD+ Strategy, so it may produce more emission reductions that could be purchased by the FCPF Carbon Fund. These additional emission reductions may be sold to other buyers, reported to the UNFCCC for results-based payments or used internally for different purposes. The current ambition of the ER-P may be increased as predictable funding is identified in a timely manner. According to the 2012 national GHG inventory, Costa Rica's LULUCF sector is a net sink, but opportunities for forest enhancement and emissions reduction still exist and have been identified elswhere in this document.

Consistency with national policies and development priorities

The six policies presented here are meant to complement the National Forestry Development Plan. Moreover, some of the Plan's policies and measures are implemented through the ER-P. At the same time, the ER-P is part of the Forests and Rural Development Plan, a political initiative to further assist in the implementation of the National Forestry Development Plan (Figure 2.2.1). The Forests and Rural Development Program could include other strategies, actions and activities in the future, as determined by the Ministry of the Environment and Energy.

In terms of national strategic planning, the ER-P was defined as a specific goal of the National Development Plan[5], enjoying a privileged position in the highest level of strategic planning. The ER-P will also support other strategic goals included in the National Strategy on Climate Change, both in mitigation and in adaptation, especially in relation to Carbon Neutrality and in increasing ecosystem and human population resilience to climate change. Further, the ER-P has a strong social component and seeks to increase the participation of stakeholders in order to reduce poverty, especially in rural areas.

Payment expectation for emissions reduction

According to Costa Rica's R-PP and ER-PIN[6], the National REDD+ Strategy and, therefore, the ER-P started in 2010. For this reason, Costa Rica has the expectation that the FCPF Carbon Fund will recognize the emissions reduction from 2010 .

Costa Rica is not expecting the FCPF Carbon Fund to pay for tons of carbon dioxide equivalent (t CO_2-e) from the conservation of forest C stocks, as explained in **Section 7**.

Measured emission reductions in 2010-2013

Since the beginning of the ER-P (2010), deforestation of primary forests decreased from 14,657.49 ha per yr^{-1} (1996-2009) to 8,148.20 ha yr^{-1} (2010-2013), which produced an emissions reduction of -7,539,269 t CO_2-

[5]Program 2.4.of National Development Plan 2015-2018.

[6] Technical basis for the letter of intention signed by the Government of Costa Rica with the World Bank for the payment of $63.000.000 or 12.000.000 t CO_2e, per resolution Nº CFM/5/2012/1 of the Carbon Fund during its fifth meeting in Paris (16-17 October, 2012).

e (-1,884,817 t CO_2-e yr^{-1}). At the same time, deforestation of secondary forests (or "new forests") increased from 16,304.07 ha yr^{-1} (1996-2009) to 21,277.40 ha yr^{-1} (2010-2013), resulting in an increase of emissions of 1,619,463 t CO_2-e (404,866 t CO_2-e yr^{-1}). Overall, emissions reduction from deforestation resulted in -5,882,845 t CO_2-e (-1,470,711 t CO_2-e $year^{-1}$) for 2010-2013, when compared to the average for 1996-2009. In terms of C stock enhancement, the area of new forests increased from 738,454.74 ha $year^{-1}$ (1996-2009) to 856,135.30 ha $year^{-1}$ (2010-2013), which resulted in the removal of -20,694,952 t CO_2-e (-5,173,731 t CO_2-e $year^{-1}$).Globally for 2010-2013, the ER-P produced net emissions of of -8,889,739 t CO_2-e (-2,222,435 t CO_2-e yr^{-1}) (**Figure 2.2.3.**).

Table 2.2.2. Emission reductions for 2010-2013.

Historical reference period: 1996-2009				
REDD+Activity	ha	ha^{-1}	t CO_2-e	t CO_2-e yr^{-1}
DF.an.to	433,461.87	30,961.56	101,050,331	7,217,881
DF.an.bp	205,204.89	14,657.49	74,102,791	5,293,057
DF.an.bn	228,256.98	16,304.07	26,947,539	1,924,824
AE.bn		738,454.74	-61,908,107	-4,422,008
Total			**39,142,223**	**2,795,873**

Gross and net emissions and removals in 2010-2013				
REDD+Activity	ha	ha^{-1}	t CO_2-e	t CO_2-e yr^{-1}
DF.an.to	117,702.36	29,425.59	22,988,678	5,747,170
DF.an.bp	32,592.78	8,148.20	13,632,957	3,408,239
DF.an.bn	85,109.58	21,277.40	9,355,721	2,338,930
AE.bn		856,135.30	-20,694,952	-5,173,731
Total			**2,293,726**	**573,432**

Net emission reductions for 2010-2013				
REDD+Activity	ha	ha^{-1}	t CO_2-e	t CO_2-e yr^{-1}
DF.an.to	-6,143.85	-1,535.96	-5,882,845	-1,470,711
DF.an.bp	-26,037.17	-6,509.29	-7,539,269	-1,884,817
DF.an.bn	19,893.32	4,973.33	1,656,424	414,106
AE.bn	470,722.24	117,680.56	-3,006,894	-751,724
Total			**-8,889,739**	**-2,222,435**

Note:DF.an.to = Total anthropogenic deforestation; **DF.an.bp** = Anthropogenic deforestation of primary forests; **DF.an.bn** = Anthropogenic deforestation of new forests; **AE.bn** = increase of forest C stocks in new forests.

2.3. Political commitment

The political commitment to implement the ER-P is straightforward, as the ER-P is part of the National Development Plan for 2015-2018. More broadly, Costa Rica's political commitment to reducing emissions and forest conservation of forests has been very clear in its environmental legislation, sectoral and cross-sectoral goals. For example, forest conversion was prohibited by law since 1996. Also, multiple forest-related environmental services were defined by law and a fund was established to pay for them.

Additionally, the Biodiversity Law created SINAC to manage programs to reduce illegal logging and the impact of forest fires at the national level. Costa Rica also created a robust and extensive system of

Protected Conservation Areas with several management categories. Most national parks and biological reserves are strategically located to create biological corridors, protect high-conservation value forests and avoid the loss of key forest species.

Other examples of political commitment are:

- The ER-P was validated by the Minister of MINAE,
- The President confirmed the intention of achieving Carbon Neutrality during the New York Climate Summit in 2014, and included forests as an important part of this strategy,
- The Minister of MINAE spoke of the country's intention to develop a Forests and Rural Development Program at COP 20. This program aims to move towards an integrated approach to manage rural landscapes, while reducing poverty,
- In an official mandate, the Minister of MINAE issued guidelines to facilitate the implementation of the National Forestry Development Plan for 2014-2018, mainly focused on the economic reactivation of timber production, as well as the transformation and marketing of forest products in order to increase revenue in the rural sector,
- Costa Rica initiated dialogues with multiple sectors to prepare the INDC submitted to the UNFCCC in October 2015; the INDC includes the forestry sector and the National REDD+ Strategy,
- Currently, an executive decree is under preparation to define responsibilities and roles of the public sector (and public institutions) for the implementation of the ER-P and the National REDD+ Strategy. This decree will also help clarify the organizational structure and implementation framework of the ER-P.

3. ER-Program Location

3.1. Accounting Area of the Emission Reduction Program

Location

Costa Rica is located at 9°56'0" N, 84°5'0" W, in the American continent. The ER-P is implemented at the national scale, but excludes Coco Island[7].The ER-P's six policies described in **Section 4.3.** are implemented across the entire territory..

The accounting area of the ER-P is slightly smaller than the continental territory of Costa Rica. Out of the total continental territory (5.113.939 ha not counting Coco Island), 6.105 ha have been excluded (0,12% of the total) in active volcanoes areas, 13,873 hectares (0,27% of the total) of natural water bodies and 115.364 hectares (2,6% of the total) of clouds and cloud shadows. In total, the accounting area is 4.978.596.42 hectares (97,35% of the continental territory) (**Figure 3.1.1.**). Land cover changes in areas impacted by active volcanoes or natural water bodies are considered non-anthropogenic and thus remain excluded of the accounting area. As explained in Section 8, anthropogenic emissions are not part of the reference level or the estimation of emission reductions.

However, the accounting area is not static and will have to be reviewed in every measurement period, considering that new areas may have been affected by natural disturbances and/or new cloud-covered may appear[8]. Therefore, if found necessary, future measurement reports may include an updated map of the accounting area showing excluded areas. Conversely, areas may be included again in the accounting area if activity data (AD) is recalculated during the ERPA term, or if areas previously excluded due to natural disturbances have recovered to their original condition.

More details and explanations on the accounting area can be found in section 3.1 of CDI (2015.c)[9].

[7]Coco Island is a remote location (5°31'08" N and 87°04'18" W) is located 542 kilometers from the Costa Rican pacific coast, with no significant human population. Few park rangers live there, but they do not perform production activities. The island has suffered biological degradation with the introduction of exotic species. There is no displacement of emissions to Coco Island product of REDD+ implementation.

[8] As explained in a separate report (Agresta *et al.,* 2015.a), global databases are available to fill no-information or cloud-coverted areas without introducing a greater bias in the activity data, for instance, due to differences in the definition for "forest". In fact, Agresta *et al.* (2015.a) filled between 0.49% and 1.83% of the seven land-cover maps, which served as the base for compiling the activity data time series. Gap filling was done for years following 2000 with the *Global Forest Change* project (Hansen, *et al.*, 2013).

[9] CDI, 2015.b. Reference level of emissions and forest removal in Costa Rica and methodology used to build it. Report of consultancy prepared for the Government of Costa Rica under the Carbon Fund of the Cooperative Fund for Forest Carbon (FCPF). 223 p.

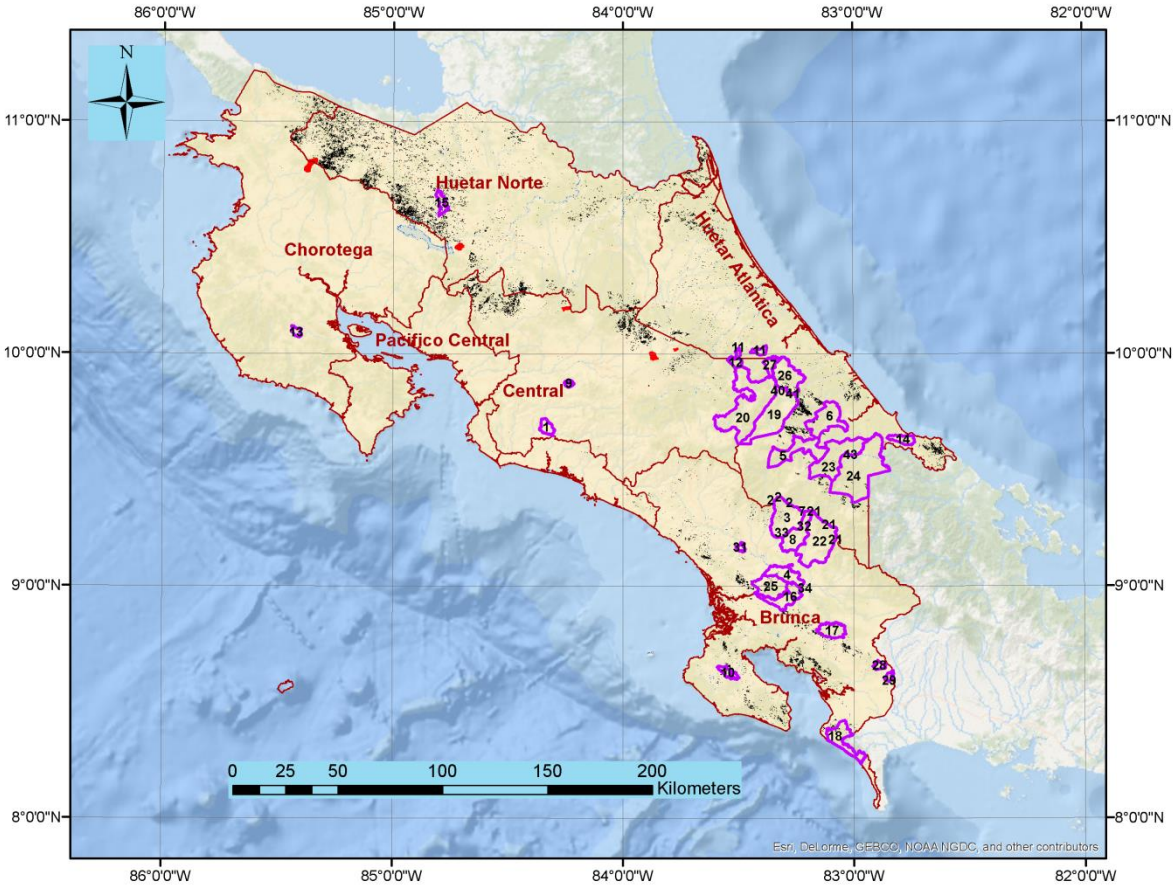


Figure 3.1.1. Accounting area of the ER-P. Areas excluded in active volcanoes (6.105 ha) are shown in red, natural water bodies (13.873 ha) in blue, clouds and cloud shadows (115.364 ha) in black, and the accounting area (4.978.596 ha) in yellow. The accounting area represents 97,35% of the country's continental territory. Additionally, the maps shows the Ministry of national Planning's (MIDEPLAN) regions and the indigenous territories (see legend below), as suggested by the Carbon Fund's Technical Advisory Panel (TAP).

No.	NAME
1	HUETAR DE ZAPATON INDIGENOUS TERRITORY
2	CABECAR DE UJARRAS INDIGENOUS TERRITORY
3	CABECAR DE UJARRAS INDIGENOUS TERRITORY
4	TERRABA INDIGENOUS TERRITORY
5	CABECAR DE TELIRE INDIGENOUS TERRITORY
6	CABECAR DE TAYNI INDIGENOUS TERRITORY
7	BRIBRI DE SALITRE INDIGENOUS TERRITORY
8	BRIBRI DE SALITRE INDIGENOUS TERRITORY
9	HUETAR DE QUITIRRISI INDIGENOUS TERRITORY
10	GUAYMI DE OSA INDIGENOUS TERRITORY
11	CABECAR DE NAIRI-AWARI INDIGENOUS TERRITORY
12	CABECAR DE NAIRI-AWARI INDIGENOUS TERRITORY
13	MATAMBU INDIGENOUS TERRITORY
14	BRIBRI DE KEKÖLDI (COCLES) INDIGENOUS TERRITORY

No.	NAME
15	GUATUSO INDIGENOUS TERRITORY
16	BRUNKA DE CURRE (REY CURRE) INDIGENOUS TERRITORY
17	GUAYMI DE COTO BRUS INDIGENOUS TERRITORY
18	GUAYMI DE CONTEBURICA INDIGENOUS TERRITORY
19	CABECAR DE CHIRRIPO (DUCHII) INDIGENOUS TERRITORY
20	CABECAR DE CHIRRIPO (DUCHII) INDIGENOUS TERRITORY
21	BRIBRI DE CABAGRA INDIGENOUS TERRITORY
22	BRIBRI DE CABAGRA INDIGENOUS TERRITORY
23	CABECAR DE TALAMANCA INDIGENOUS TERRITORY
24	BRIBRI DE TALAMANCA INDIGENOUS TERRITORY
25	BRUNKA DE BORUCA INDIGENOUS TERRITORY
26	CABECAR DE BAJO CHIRRIPO INDIGENOUS TERRITORY
27	CABECAR DE BAJO CHIRRIPO INDIGENOUS TERRITORY
28	GUAYMI DE ABROJOS-MONTEZUMA INDIGENOUS TERRITORY
29	GUAYMI DE ALTOS DE SAN ANTONIO INDIGENOUS TERRITORY
30	CHINA KICHA INDIGENOUS TERRITORY
31	CHINA KICHA INDIGENOUS TERRITORY
32	CABECAR DE UJARRAS INDIGENOUS TERRITORY
33	BRIBRI DE SALITRE INDIGENOUS TERRITORY
34	TERRABA INDIGENOUS TERRITORY
35	BRUNKA DE CURRE (REY CURRE) INDIGENOUS TERRITORY
36	CABECAR DE NAIRI-AWARI INDIGENOUS TERRITORY
37	CABECAR DE CHIRRIPO (DUCHII) INDIGENOUS TERRITORY
38	BRUNKA DE CURRE (REY CURRE) INDIGENOUS TERRITORY
39	BRUNKA DE BORUCA INDIGENOUS TERRITORY
40	CABECAR DE CHIRRIPO (DUCHII) INDIGENOUS TERRITORY
41	CABECAR DE BAJO CHIRRIPO INDIGENOUS TERRITORY
42	CABECAR DE TALAMANCA INDIGENOUS TERRITORY
43	BRIBRI DE TALAMANCA INDIGENOUS TERRITORY

3.2. Environmental and social conditions in the Accounting Area of the ER Program

Geography, vegetation and climate

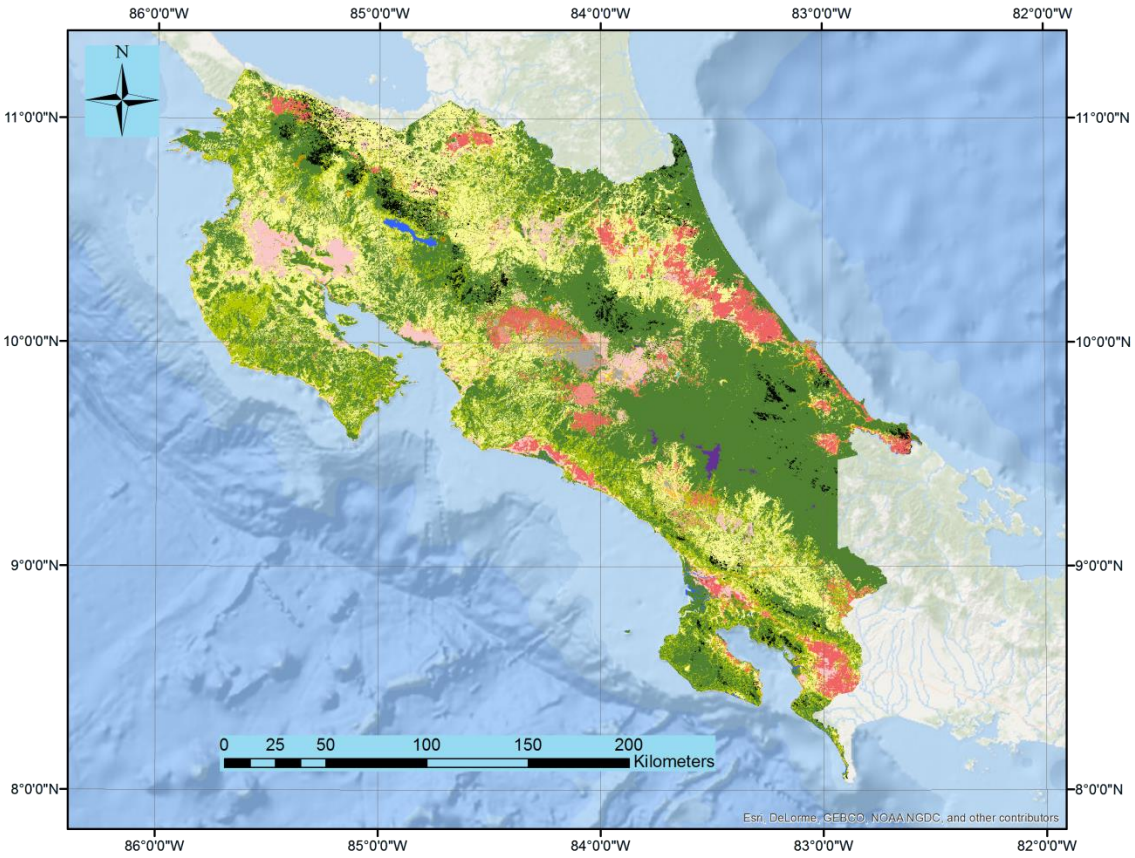
Costa Rica, a Central American country with a population of 4.592.149[10], is located in the tropical region and is characterized for having a wide variety of climates that have resulted in 12 different ecological and forest zones (**Figure 3.2.1.**). Due to geographical, atmospheric and oceanic factors, the country has been divided in seven big climate regions: North Pacific, Central Pacific, South Pacific, Central Zone, North Zone, North Caribbean Region, and South Caribbean Region. With 51.139 km^2 of continental area, the country has 34 hydrological basins, amongst which Tárcoles and Reventazón are two of the main ones. It has a heterogeneous relief, subject to the action of important variable climate and biological conditions; it is a

[10] Data for 2011 of the National Statistics and Census Institute

mainly mountainous country, whose Northwest-Southeast axis shows mountain ranges and chains whose higher peaks are Chirripó with3.879 m above sea level[11]and Kamuk with 3.564 m above sea level.

In general terms, two climate arrangements appear: Pacific and Caribbean, both with dry and rainy seasons. The most frequent meteorological events and that cause extreme events are: tropical depressions, tropical storms, hurricanes, tropical depressions, low-pressure systems, troughs, and cold fronts. Any of these phenomena if intense, may cause flooding.

Moreover, the variability of climate in Costa Rica is more related to the phenomenon "El Niño" South Oscillation. During El Niño, there is a higher probability for the Pacific area and the Central region to experience dry to extreme dry conditions, while in the Caribbean there is a higher probability of extremely rainy scenarios.



Land-cover		Area
Color	Description	Ha
	Forest lands (FL)- Primary forests	2,265,429.96
	Lands converted to FL – New forests	770,395.05
	Cropland - permanent	323,930.52
	Cropland – annual	242,276.76
	Grassland	1,260,219.24
	Settlements	43,086.69

[11]Meters above sea level

	Wetlands - natural	21,875.85
	Wetlands - artificial	294.12
	Other land - moor	10,422.45
	Other land–natural bare lands	1,948.32
	Other land–artificial bare lands	58,696.38
	No information – clouds and shadows	115,364.16
	Total Area	**5,113,939.50**

Figure 3.2.1.Types of forests and non-forest areas for 2007/2008 using classified LANDSAT images, considering the land use categorization of IPCC in its 2006 guides.

According to Holdridge's life zone's classification system and based on environmental factors such as wetness, precipitation and temperature, there are 12 life zones in Costa Rica. The most prominent zones are the very tropical rain forest (29,8% of the country), very wet premontane (15,5%), tropical wet (13,5%), and pluvial lowland montane (13,2%). These ecosystems take place in a high variability of parental material and lands, distributed in a heterogeneous relief and subject to the action of very variable climatic and biological conditions. The most common type of land is inceptisol, covering 38,8% of the territory; however, there is also presence of ultisols (21%), andisols (14,4%), entisols (12,4%) and alfisols (9,6%).Vertisols do not exceed the 2%.

Likewise, the interaction of a diversity of climate and altitudinal variables, a geological history very active in emersions, subsidence and volcanism, have caused that since its origins as part of an isthmus, Costa Rica has been a biological bridge where multiple species of flora and fauna coexist. It is estimated that 4% of the planet's terrestrial species are found in Costa Rica, even though it only has 0.01% of the global extension, which constitutes a heritage and a natural resource of big proportions[12]. Of the 500,000 species calculated for the country, only an approximate of 87,000 (17,4%) have been described. More than 79% of these species described are arthropods. Plants compose the other majority group, of which an approximate 10,979 species have been described. Of the total diversity described for the world, approximately 6% corresponds to Costa Rica.

There is a high degree of endemism in the country. It is estimated that 12% of the Costa Rica plants are endemic (some 1,200 species) and are distributed in different locations. For the group of fresh water fish, it is estimated that there is 14% endemism. This way, factors such as the disappearance of the forest mass, the destruction and alteration of ecosystems, illegal hunting, overexploitation, the introduction of exotic species, the indiscriminate use of pesticides, the illegal trade of species and pollution pose a strong effect and many species are suffering a reduction in their populations, in a way that they can be considered threatened or vulnerable in the country. The World Union's red list of threatened species mentions Costa Rica with 242 endangered species out of which 111 are plants, 62 amphibians, 20 fish and 17 birds.

Economic and political conditions

Costa Rica has an old democratic, pacifist tradition, respectful of human rights. For instance, education was declared free and mandatory in 1869, the army was abolished in 1949, social guaranties of access for all Costa Ricans were enacted back in 1943 and the existence of a rule of law regime and democratic governments have produced a recognized political stability[13].

During the last 20 years, most households improved their life conditions, thanks to the combination of economic growth and a higher social public investment. Revenues were increased in general, within a

[12]Obando, 2002. Citado en la Estrategia Nacional de Control y Manejo del Fuego 2012-2021 del Sistema Nacional de Áreas de Conservación.
[13] Vigésimo Informe Estado de la Nación del 2014.

framework of liberty and rights, and a better protection of them. It is still, as it was twenty years ago, a "middle income" country, and according to UNDP's classification, of "high human development"; however, the country's challenge is to improve the inequality in income, the reduction of poverty, the inequity of labor markets and environmental unsustainability, within the context of a new development model.

Between 2013 and 2014, the economy grew at a moderate pace, with acceleration and slowdown mini cycles, in a low inflation context. This growth was accompanied by a relatively high unemployment level (8,5%), a higher dynamism in the creation of informal jobs. Health, education and access to public services indexes continued to improve, as well as the average income of families. However, poverty remained stagnant in close to 20%. And in the political arena, the country held free and clear democratic elections for its sixteenth time, the longest sequence of this nature in Latin America. The country evolved towards a multiparty system.

Costa Rica has environmental strengths which are part of its image and historic evolution, and that have positioned it in the world as a responsible and innovative country in ecological issues. Conservation continues to be the country's biggest strength, even though the protected continental surface has not suffered significant changes, in four years, the marine area almost tripled. Progress in knowledge has allowed the detection of threats to the integrity of ecosystems. Nevertheless, important fragmentations, few forests with high integrity and strong pressures on land use have also been identified.

Linguistic and socio-cultural diversity

Costa Rica has 24 indigenous territories covering 334.447 hectares, who are the result of two cultural horizons: the Mesoamerican and the Chibchoid. Both are characterized for the cultivation of lands, for basing their diet in corn, cocoa, roots, tubers, wild animals hunting and fishery; but most of all, they maintain a cultural, philosophic and socioeconomic relation with forest resources. 60% of the indigenous population in the country speak their ancestral language, specifically Bribris 55%, Bruncas 6&, Cabécares 88%, Chorotegas 0,4%, Huetares 0,4%, Malekus 68%, Ngöbes 78% andTeribes 10%.

With regards to small and mid- sized agro forestry producers, the 100% speak Spanish. The country has 12 life zones at heights that go from 0 to 3,800 m above sea level, which produced a variety of ecosystems, types of land, microclimates, geography, etc.; it caused that the peasant culture adapted to so diverse conditions producing a particular rural landscape depending on each region (diverse crops, farm sizes, economy and technology adapted to each climate and land conditions).Regarding the socioeconomic indicators, in this sector, the average population has grown old and the youngest abandon the farms in search of better opportunities, the average age of peasants is now 50-54 years, and most of them are males.

Lifestyles and the dependency of local populations on forest resources

According to the National Population Census of 2011, there are 104,143 indigenous people in Costa Rica, of which 48,500 live in their territories. The indigenous homes located in territories add up to 11.853. Of that total, 62,8% performs some sort of productive agricultural activity.13% worked on crops during the last year; 11% own cattle, pigs, poultry, others for self-consumption; therefore 63% have performed at least one agricultural activity. Of the 7.204 indigenous agricultural employees, 88% are male and 12% female, and the position they occupy in this activity corresponds to 2% employers, 69% self-employed workers and 20% employees of private companies. In terms of environmental protection, it is evidenced that the locations where the indigenous peoples exist, match the big remnants of protected areas in the country; their close relationship with nature is also recognized to indigenous peoples, its resources are the fundamental basis of their identity and because of its cosmogonic component, vital for community life.

For the sector of small and medium forestry and agro forestry producers, 30% of the farms in the country are covered by forest, indicating a change of vocation and conscience of many farmers. On the other hand, livestock farming has remained an important activity at the national level. However, the main economic activity is agriculture, which varies according to the country zone. The Central Region represents 92% of

the lands planted reported in the agricultural census and is characterized by the production of vegetables with a high technological degree. The Chorotega Region is the one with the biggest production of meat cattle in the country; besides, in the agricultural field, it can be affirmed that Guanacaste is the main producer of grains because of its diversification (rice, beans, sorghum, as well as non-traditional products such as coffee). In the Brunca Region; its economy is based in the agriculture of basic grains, especially corn and beans, as well as Oil palm and pineapple.80% of the country banana is planted in the Caribbean region, and along with the pineapple farms, offers employment to many growers; in the North Huetar Region there are more farming lands; their economy is based in the agriculture of basic grains, sugarcane, coffee, plantains, banana and non-traditional export products such as citric, cardamom, pineapple, passion fruit, papaya, yucca, ornamental plants and some others.

4. Description of actions and interventions to be implemented under the proposed ER Program.

4.1. Analysis of drivers and underlying causes of deforestation and forest degradation, and existing activities that can lead to conservation or enhancement of forest carbon stockss

Methodology for the analysis of forest cover change factors

The factors that determined the dynamics and distribution of deforestation (and forest regeneration) in Costa Rica were studied for the period 1987-2013 at two scales: a) at the national level, and b) at the regional level[14]. It is assumed that the deforestation agents, individuals or companies, make decisions on transforming the forest areas into agricultural areas or settlements, or on abandoning the agricultural areas to allow, with or without the intention of doing it, the regeneration of natural vegetation based on the benefits perceived. These benefits, in turn, are directly linked to biophysical local factors such as the quality of soil, socio-economic factors such as the availability of labor force, and institutional factors such as regulations on land use, as well as regional, national and global factors such as market access for the local products and their prices.

Indirect factors such as the exchange and interest rates that influence prices and markets, or historical factors such as colonization policies or the investment in education affecting the applicability of certain agricultural technologies or the access to rural employment outside of the agricultural sector, also condition the decisions on land use and the evolution of regional landscapes. The accumulation of decisions relatively similar and contemporary of close agents of change in response to direct and indirect shared factors build landscapes with typical and predictable characteristics.

The statistics on the dynamics of change for land-cover in Costa Rica between 1987 and 2013 were estimated based on the crossed tabulation of the temporary series of maps used as the basis for the construction of the reference level (**Section 8**). This temporary series included some modifications suggested in the regional workshops held during the study. The reference used to estimate the levels of loss of forest cover at the national and regional levels is the potential forestry cover of the different types of forests, including yolillales and mangroves.

Forest areas can only grow once the regeneration is higher than deforestation; it is not sufficient that the deforestation be zero. Therefore, in order to identify the factors that determine the magnitude and distribution of the changes in forest cover in the country, the space-temporary patterns of gross deforestation and the gross regeneration of native forests during the analysis periods were studied. These two components are basically different. The deforestation statistics reflect contemporary conditions and processes to the deforestation observed. The regeneration statistics, on the other hand, reflect conditions and processes that took place 10-20 years before being observed, when the users of deforested areas previously decided to abandon them or to allow the forest to regenerate.

The regional analysis is focused in identifying zones of homogeneous deforestation processes. The zones share distinctive land-cover paths, with complex historical and geographical patterns of the absolute and qualitative forest cover that responds to an integrated logic of land use and to a context of ecological diversity. For the clustering of cantons in the zones, the first stage was to cluster the 81 cantons of the country by using the *Two-Step Cluster* procedure according to 3 indicators: the intensity of deforestation during the period 2001-2011, the cantonal trend of deforestation during the period 1987-2001 and 2001-

[14] CDI, 2015.d. Patterns and factors of change in the natural forest cover of Costa Rica, 1987-2013. Report prepared for the Government of Costa Rica under the Carbon Fund of the Forest Carbon Facility (FCPF). 57 p.

2011, and the final land use (i.e. 2013). In a second stage, these clusters were manually refined with a logical analysis of their characteristics and the expert criteria. Lastly, this regionalization was reviewed by local experts in five consultation workshops. The zones are not perfectly homogeneous due to the fact that the unity of analysis, the canton, frequently includes areas with different ecological, economic and cultural characteristics. The zones attempt to reflect the conditions and process that are dominant in each of them.

Once the zones were structured, global statistics on land use and agricultural productive systems were calculated for each of them, based on the maps mentioned above. The statistics on population dynamics, employment and migration were also estimated for each zone.

Spatial-temporary patterns of the forest cover change: 1987-2013

Costa Rica has achieved progress in the creation of the Protected Wildlife Areas System, the fight against deforestation, the recovery of forest cover, the creation of supporting institutions, the sustainable sustainable management of forest, and the development of financial and market instruments for the conservation and recovery of forest ecosystems. Currently (2013), Costa Rica has 2.215.543 ha of primary forests (43% of the national territory) besides a total 3.134.026 ha of forest cover (61% of the territory).

The natural forest area in Costa Rica shows a clear recovery trend. The country moved from being a net loser to a net winner of native forests between 1997 and 2008.During this period, the net deforested area gradually fell from the beginning of the period and the net regenerated area grew consistently towards the end of the period (2013) (**Figure 4.1.1.**).

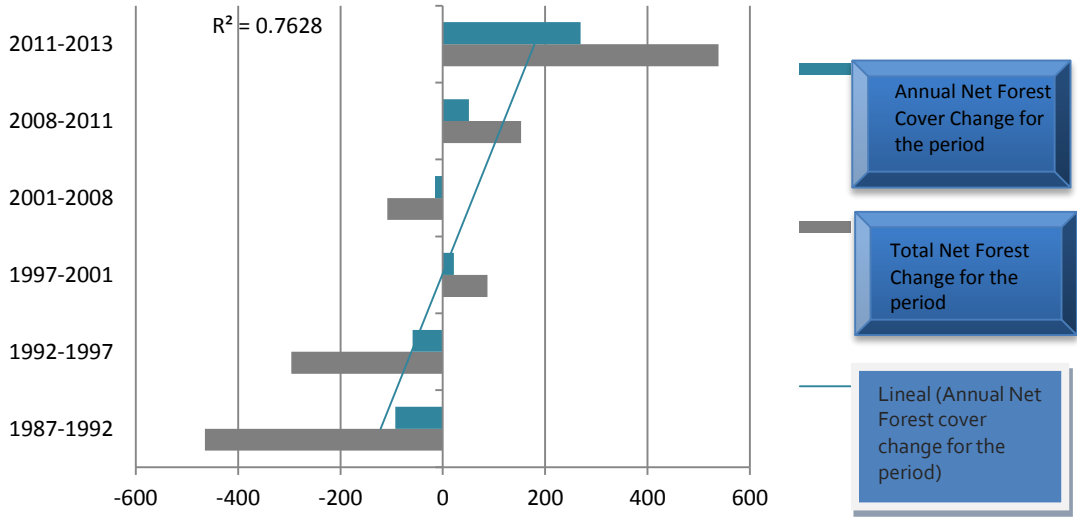


Figure 4.1.1. Change in Costa Rica's forest areas for the period 1987-2013. Units in km².

This trend reflects, at the same time, the trends in both components of change in forest areas. Along the whole period, the gross area deforested annually fell from approximately 550km² per year to 300 km² per year, a reduction of approximately 40% (**Figure 4.1.2.**). During this period, the regeneration of natural forestry areas in Costa Rica showed a general recovery trend, most of all due to the fast growth of the regenerated forestry area from the end of year 2000 on. This regeneration reflects processes that might have started 15 to 20 years earlier, when the decision of abandoning or of letting recover the vegetation was made, but it only measures the fraction available at the time it was accounted as forest. Therefore, it underestimates the initial regeneration volume.

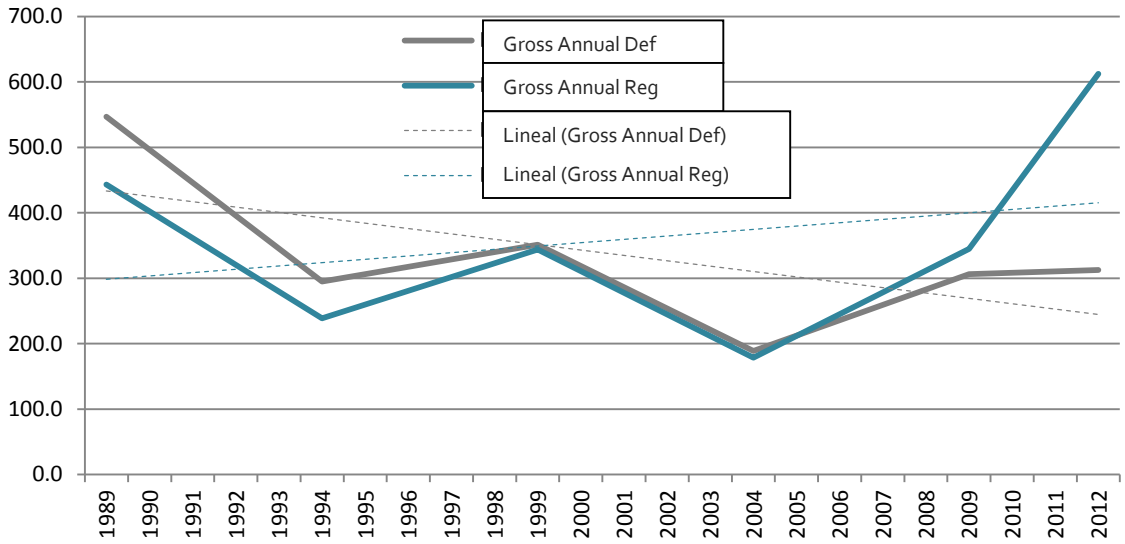


Figure 4.1.2. Variation and simple trends of deforestation and gross regeneration for the 1987-2013 period. The year assigned is the average of each period.

The main use of deforested areas during the whole period was pastures (**Figure 4.1.3.**). An approximate seven out of ten deforested hectares became pastures. All the crops, for the domestic market (i.e. rice, beans, Oil palm) and for export (i.e. pineapple, banana, Oil palm), captured two out of 10 deforested hectares. Abandoned areas or areas in recovery took place more frequently as well in pastures and crops, with approximately two out of ten regenerated hectares, respectively (**Figure 4.1.4.**).

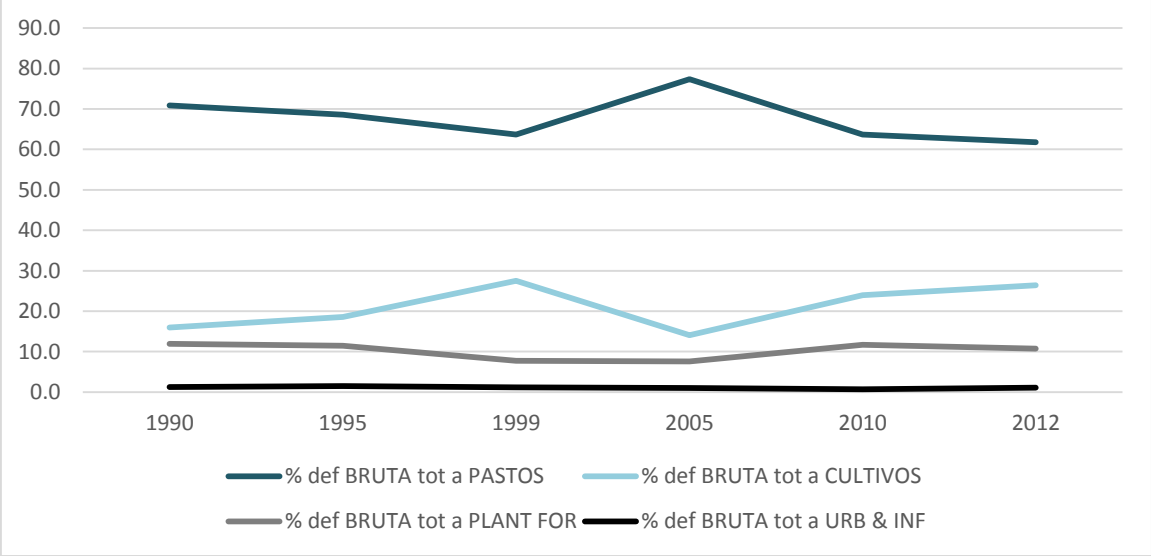


Figure 4.1.3. Use of the deforested gross area in Costa Rica for the 1987-2013 period. The year assigned is the average of each period.

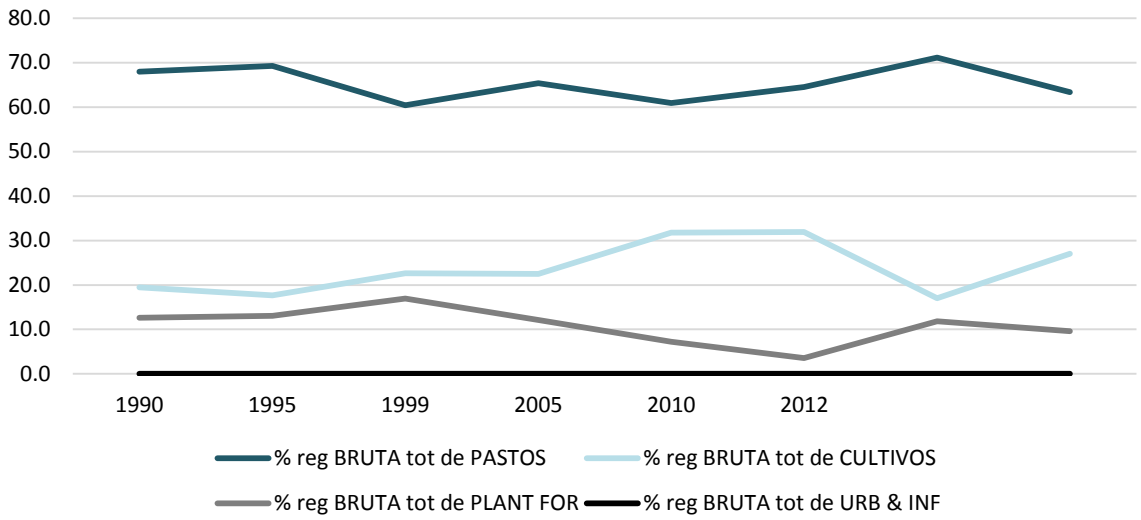


Figure 4.1.4. Use of regenerated gross area in Costa Rica for the 1987-2013 period. The year assigned is the average of each period.

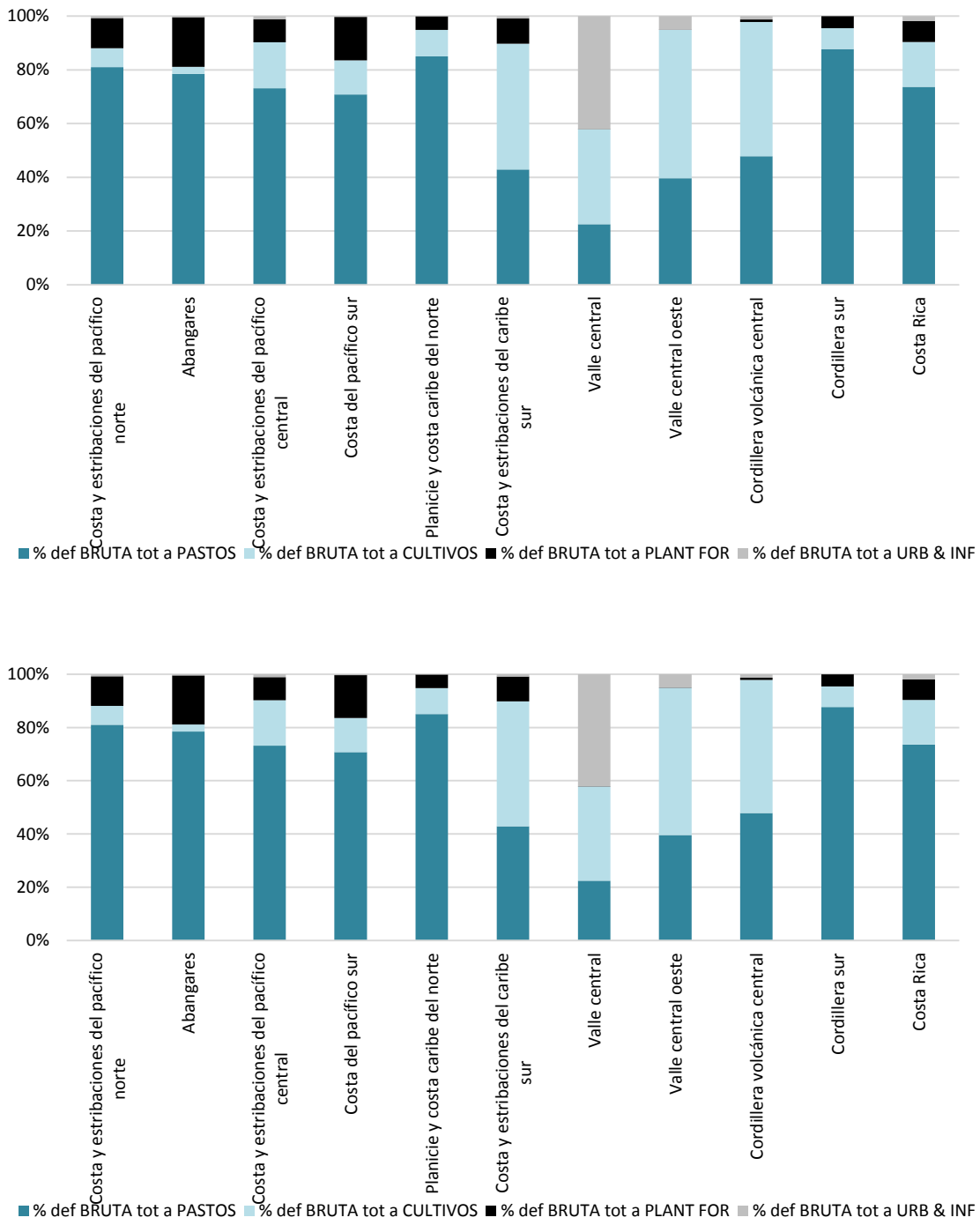


Figure 4.1.5. Use of deforested gross area in Costa Rica for the 1987-2001 (above) and 2001-2011 (below) periods, by zone of homogeneous deforestation process.

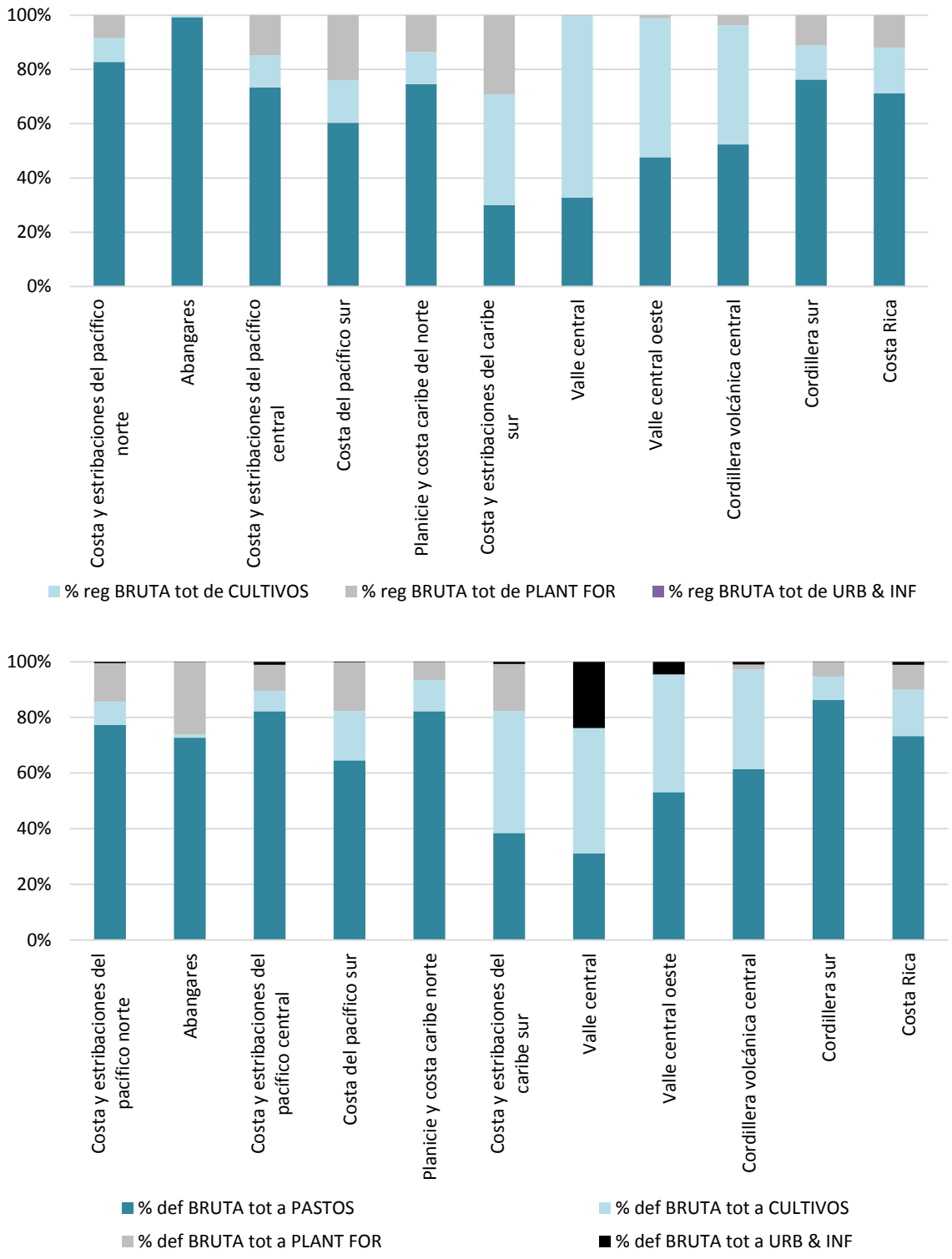


Figure 4.1.6. Use of regenerated gross area in Costa Rica for the 1987-2001 (above) and 2001-2011 (below) periods by zone of homogeneous deforestation process.

In this context, Costa Rica shows evidence that: i) it has been able to maintain much of its primary forests, ii) it has reduced deforestation in its forests, and iii) it has promoted the regeneration of its forests. These are early results, prior to the Conference of the Parties in Bali and Cancun that allow showing the country performance in implementing REDD+ measures and policies.

However, as analyzed below, the deforestation problem and degradation are not eradicated in Costa Rica. Even though the forest cover is growing, there are places where deforestation and land use changes from forests to other uses take place.

Costa Rica does not have sufficient and robust information for the analysis of drivers of forest degradation. However, avoiding degradation is part of the National REDD+ Strategy and will be part of future action plans, as defined, to cover REDD+ activities, while information is produced to set an analysis of the phenomenon and reference levels for the possible claim of emission reductions from forest degradation.

In order to start the technical and political dialogue on degradation, REDD+ Secretariat, by means of USAID's Regional Program on Climate Change, facilitated a national workshop to define the concept of degradation in the framework of climate change and to provide initial elements for its measurement and report, which is useful for an eventual inclusion in the reference level to be submitted before the United Nations Framework Convention on Climate Change.

Subsequent to the discussion of the participants in the workshop (PRCC, 2015), and after agreeing to the work in groups to reach the goal of constructing a consensual definition, it was possible to state the following definition for "forest degradation" that will be used within the context of Costa Rica's National REDD+ Strategy.

"Forest degradation, in the context of Costa Rica's National REDD+ Strategy is a statistically significant reduction in the magnitude of carbon existences in areas defined as mature forest, due to anthropogenic actions (fires, illegal cut, wrong agricultural practices et al), that can be quantified and monitored through remote sensors and field data" (PRCC, 2015).

It is important to clarify that the participants agreed that due to the carbon content per forest cover type existing in the country, it is important to prepare a definition of forest degradation for secondary forests, in which there is carbon recovery or gains as well as losses. Therefore, the preceding definition applies as so to mature forests.

This information basis will be useful to report the action plan(s) including degradation and that will be financed by the additional funds granted by the FCPF to prepare REDD+ in Costa Rica.

Not all the regions in the country show those patterns. For instance, between 1987 and 2001, only two of every ten deforested hectares were transformed into grasslands in the central valley. Here, the most important uses are settlements and infrastructure, with over four out of every 10 hectares. To the West and East of the central valley, in the central volcanic range, the most important use of deforested areas was crops. Between 2001 and 2011, the regional patterns remained stable. The only significant change was an increase in the proportion of the deforested area dedicated to crops in the central valley (at the expense of urban settlements and infrastructure).

Both deforestation and regeneration show a high geographical concentration. Between 2001 and 2011, one of every three deforested hectares was located in the Northern plateau and coast. Another two took place in the North Pacific coast and foothills, and a little over one out 10 occurred in the Southern mountain range (**Chart 4.1.1.**). Deforestation and regeneration follow patterns more or less similar in each period: when more deforestation takes place, there is a trend to observe more regeneration. During the 1987-2001 period, six out of 10 deforested hectares occurred in the North, in the coast and the Pacific foothills, and in the plateau and the North Caribbean areas of Costa Rica.

		North Pacific coast and foothills	Abangares	Central Pacific coast and foothills	South Pacific coast	North Caribbean plateau and coast	South Caribbean coast and foothills	Central Valley	Western central valley	Central volcanic range	Southern range	Costa Rica
1987-2001	Annual Gross DEF proportion per zone	33.9	2.3	3.5	5.6	28.1	5.8	2.9	3.3	8.3	6.3	100.0
	Annual Gross REG proportion per zone	35.1	1.5	8.9	9.4	20.3	4.8	1.9	1.7	8.9	7.6	100.0
2001-2011	Annual Gross DEF proportion per zone	18.5	1.3	7.0	6.7	31.1	8.0	2.4	2.7	8.5	13.8	100.0
	Annual Gross REG proportion per zone	29.0	1.1	6.8	10.7	19.9	4.1	3.0	3.4	16.7	5.4	100.0

Chart 4.1.1. Regional net deforestation and regeneration distribution (%) in Costa Rica for the 1987-2001 and 2001-2011 periods.

Forest cover change national and regional factors for the 1987-2013 period

The trend towards the reduction of the gross deforested area in Costa Rica between 1987 and 2013 is the result of the conjunction of three enabling conditions:

1) Starting at the beginning of the 1980's, the intense migration of rural population to urban centers and in particular to the central valley, reduced the capacity of geographical expansion of an agricultural sector that until then had depended on the availability of rural labor. The most important crops, banana, Oil palm and grasslands for cattle, are highly dependent on a flexible labor force.

2) The population transfer from the rural sector to urban sectors was reinforced by state policies, amongst them education, health, energy, the creation of free trade zones that had a determinant effect on available rural work options outside the agricultural sector, including tourism at their places of origin and destination when they migrated. And,

3) The agricultural sector adapted at a rapid speed to the effects of these transformations, replacing labor with machinery and other factors of productive intensification. The development of new export markets for non-traditional products such as pineapple and oil palm facilitated the evolution of the agricultural sector towards more intensive and capitalized production sectors. A possible important result of this process is the increase in the opportunity cost of land (one pineapple hectare produces $6-8000/year), probably displacing production systems of a lower performance and extensive (such as cattle farming). .

At the regional level, the productive systems adapted in a different way. The direct production system associated to cattle farming, most of all meat that supplies a quickly growing urban population and with a growing consumption capacity, may have pressed for the expansion of grassland areas in zones with a low land cost, including areas with limited access (cattle walk to the market) in general, and in the North Caribbean plateau and coast in particular. The scarcity of local labor in zones where cattle farming is possible was solved by the presence of significant migrant population, mostly coming from Nicaragua. In the central region of the country, the loss of forest areas is associated to its transformation in dense and disperse urban settlements.

The increase in the regeneration of native forests observed can be connected, at least preliminarily, to specific periods during which the demand of new productive areas strongly declined. Specifically, the regeneration upturn observed between 1997 and 2001, could have been started by a generalized abandonment of agricultural lands associated to the coffee, banana and fiscal crisis (due to the increase of oil prices) at the beginning of the 1980's. The forests in these lands were regenerated towards the second half of the decade of the 1990's sufficient enough as to be detected by the satellite images. The second upturn that began more or less a decade ago is probably associated to the 1996 Forestry Law and its impact on forests in a regeneration process. From then on, and in contrast with preceding periods, a significant fraction of regenerated area is, by law, maintained and accumulated, which could explain the acceleration of the regenerated area growth during the last years

Based on the foregoing, it is possible to affirm that the policies and actions proposed as part of the Emissions Reduction Program are considering the attention to deforestation drivers, by applying existing or new mechanisms, to look after the deforestation factors related to land tenure. Thus, in public domain

lands, the actions are oriented to improving institutional management capacity and to consolidate the purchase of lands to integrate them to their conservation roles, strengthening the investments for the purchase of land and their consolidation as State Natural Heritage. The expansion of Payment for Environmental Services program is also included, as well as the improvement of fire control and illegal cuts and the updating of Protected Wildlife Areas management plans.

In indigenous territories, corresponding to an approximate 10% of the country's forest cover, besides strengthening the control actions of illegal logging, there is a plan to improve the clarification of land tenure rights and to expand the scope of the Payment for Environmental Services program. In private property, where the highest levels of intensity and deforestation are observed, mainly because of the dedication of terrains to agricultural activities, in addition to strengthening illegal cut control, the valorization of the terrains and the production of additional revenue for producers by broadening the coverage of Payment for Environmental Services program will be promoted.

Influence of Protected Wildlife Areas System

Costa Rica's Protected Wildlife Areas System produce a clear effect on the probability of forest cover change on any of the analyzed non-forest classes (**Chart 4.1.2.**). An approximate 40% more deforestation than expected takes place outside of these areas due to the distribution of native forests. On the other hand, the recovery probability of forest area within protected areas is proportionally higher.

Chart 4.1.2. Cover change probabilities from and to forest inside and outside of protected areas in Costa Rica, 1987-2013.

Period	Location	Total forest %	Total deforestation %	DEF relation	Total agriculture %	Total regeneration %	REG relation
1987-2001	Outside protected areas	62.9	88.7	1.41	93.2	88.6	0.95
	Within protected areas	37.1	11.3	0.30	6.8	11.4	1.67
	Costa Rica	100.0	100.0	1.00	100.0	100.0	1.00
2001-2013	Outside protected areas	61.8	91.4	1.48	92.9	87.9	0.95
	Within protected areas	38.2	8.6	0.22	7.1	12.1	1.71
	Costa Rica	100.0	100.0	1.00	100.0	100.0	1.00

Deforestation and regeneration analysis per tenure regime

The analysis of the temporary land use change is consistent with the preliminary findings shown in the REDD+ Preparation Plan or R-PP. A deforestation gradient was identified in mature forests inversely related to the management category's restriction level (**Figure 4.1.7.**) and directly proportional to the average opportunity of land cost in the management category [15] (**Figure 4.1.8.**). The deforestation in national parks and biological reserves (probably deforestation with a natural origin), protected wildlife areas, indigenous reserves and private property forests is ordered, from lower to higher (**Figure 4.1.7.**). It is

[15] The opportunity cost was estimated for each management category using maps algebraic analysis based on the shape developed by Vega-Araya (2014).

possible that national parks and protected wildlife areas are less deforested because the rent of their lands is lower than that of private forests[16].

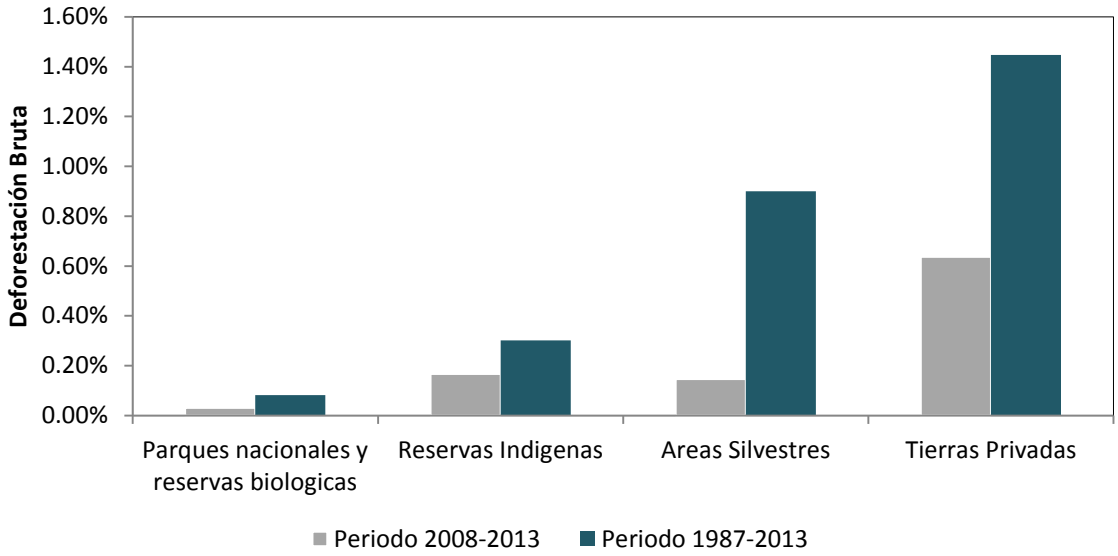


Figure 4.1.7. Gross deforestation variation of mature forest in different types of tenure/management categories: Public (Protected Wildlife Areas, National Parks and Biological Reserves), Communal (Indigenous territories) and Private (Private Lands), for the 1987-2013 and 2008-2013 periods.

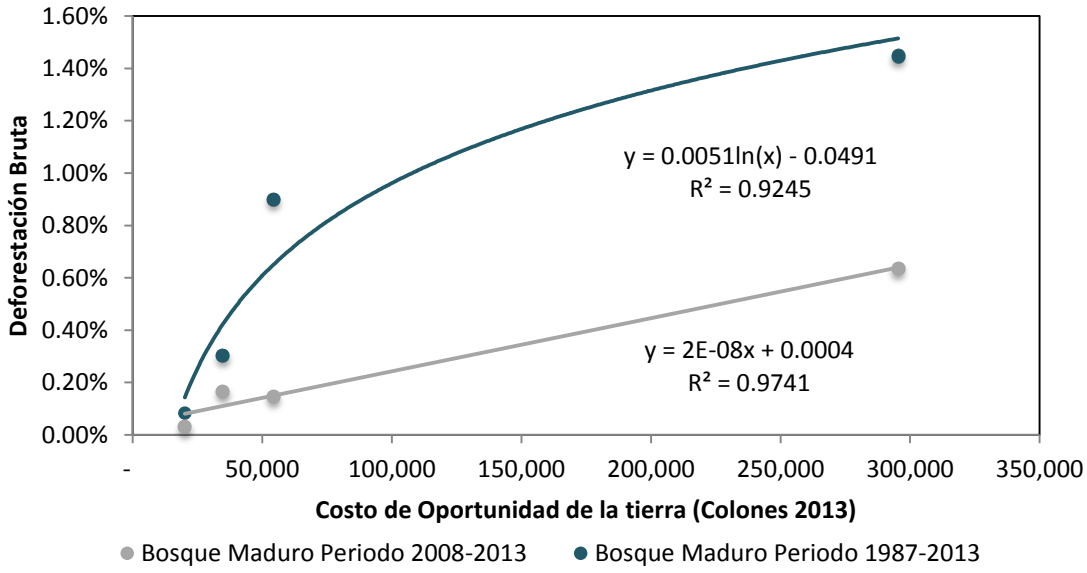


Figure 4.1.8. Gross deforestation variation of mature forest based on the opportunity cost of land in Colones of 2013.

[16] Walker, R. 2004. Theorizing Land-Cover and Land-Use Change: The Case of Tropical Deforestation. International Regional Science Review, 27(3), 247–270. doi:10.1177/0160017604266026.

Moreover, a deforestation gradient linked to forest age was also identified (**Figure 4.1.9.**). The higher deforestation rate is found in Early Regeneration forests (lower than 10 years), followed by Mid-Regeneration forests (between 10 and 20 years), and finally, Late Regeneration forests (over 20 years). The foregoing suggests, amongst other things, that: a) The low deforestation observed in late regeneration and old growth forests, in the different management categories, evinces a preference for its conservation over regenerated forests; b) the agents are subject to legal and economic stimulus that promotes the removal of regenerated cover, in particular early forest cover. It must be noted that the variation of gross deforestation of the different secondary succession cohorts show the same gradient for the different management categories in Costa Rica, as well as an order amongst management categories, similar to the one observed for gross deforestation in mature forests (Fig. 1.A); with the exception of Indigenous Reserves where a deforestation level similar to the one of public lands was evinced.

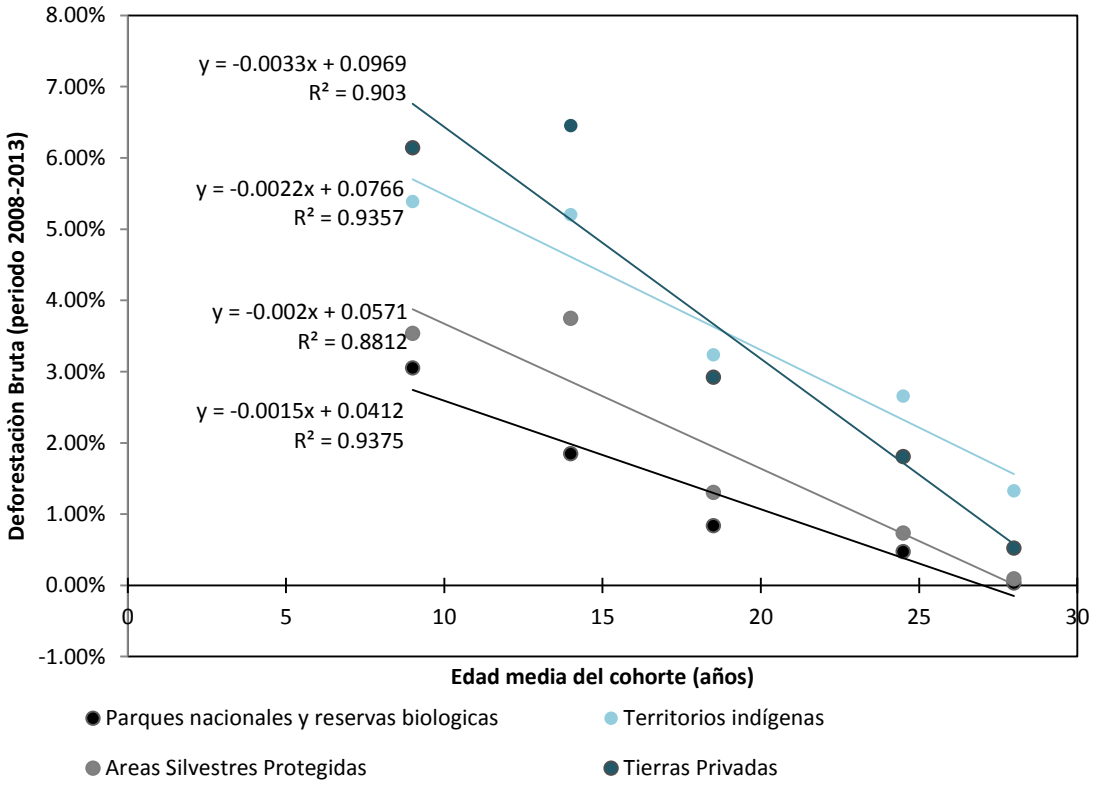


Figure 4.1.9. Gross deforestation variation of the different cohorts (age classes) for the different management categories.

Wildlife Areas Protected by the State

Costa Rica has protected its resources with an ambitious National Parks and Biological Reserves System created in the decade of the 1970's. With over 11% of the country, these are public domain lands and are under the full protection category. However, part of the lands expropriated for this System have not yet been paid to their owners; the System is inappropriately financed, with little security and under the constant threat of squatters, illegal lumber dealers, hunters and miners. The size of the System is not sufficiently big as to guarantee the conservation of some species, including the most valued by the Costa Rican society. Consequently, the biodiversity conservation role of the System depends on the conservation of buffer areas or in the creation of biological corridors that are mainly located in private lands. In contrast,

this national parks system has been the basis for the promotion of ecotourism and has promoted the activity to the point of turning it into one of the most important income generator in the country[17].

Protected Wildlife Areas in Costa Rica are classified by their management category. The most restrictive categories are exclusively destined to full conservation and are comprised by the National Parks and Biological Reserves. In general, it is the regime with the lowest deforestation problem. There's still gross deforestation in Protected Wildlife Areas, including National Parks and Biological Reserves (MINAE, 2011), mainly because of the fact that some of those lands have not been consolidated, meaning that the purchase and/or expropriation process and the corresponding payment have not taken place yet.

The reasons differ in the cases of already consolidated areas (lands duly registered as State property and with appropriate institutional presence and resources) from those not yet consolidated. Regarding the first ones, the deforestation problem is lower; however, the lack of resources to exercise dominion and control by the State is recognized as part of the threats posed by squatters, illegal lumber dealers, hunters and miners. In relation with the latter, the pressure comes from the higher profitability of alternate uses. Private lands in national parks and biological reserves do not have this type of problem because the forest cover is relatively competitive. Notwithstanding this, there are problems on access restrictions to the PSA for forest holders with formalization problems of their property rights to avoid alternate uses of the forest.

With regards to the other protection categories, 14% of the country is regulated under those, especially forest reserves and wildlife refuges. Most of these protected areas are located in private or mixed dominion lands, meaning that they are not fully under State dominion, but that belong to private farmers in different proportions. Land titling is a problem in these areas, due to the length and cost of the process. In forest reserves, the legislation requires that the holder proofs his possession of at least ten years prior to the creation of the reserve, which is a situation that cannot be evinced in many cases.

Protected wildlife areas under private dominion

In addition to the National Parks and Biological reserves, 14% of the country is regulated under different protection categories, especially forest reserves and wildlife refuges. Most of the protected areas are located in private or mixed dominion lands. Land titling is a problem in these areas, due to the length and cost of the process. Notwithstanding this, significant use and resource access restrictions are applied to them, which also propitiate cover recuperation natural processes.

Indigenous territories

10% of the country's forest cover is under communal tenure dominion. In indigenous reserves, the opportunity cost of land is not as low as in national parks and protected wildlife areas, the deforestation rate in all the cohorts is intermediate, and the conflict on land use is low. The reality of this stratum is similar to the Protected Wildlife Areas, although forest tenure is clearer in indigenous territories even though an important proportion is in the hands of non-indigenous people.

[17] Brockett y Gottfried, 2002. State policies and the conservation of forest cover: lessons from contrasting public-policy arrangements in Costa Rica. Latin America Research Review 3(1):7-40

Private lands

Private property forests underwent an intervention process during the seventies and eighties, and a reform process of the forestry sector during the nineties that originated the current Forestry Law. This new law set the participation mechanisms for third parties interested in the creation of forestry policies and in the creation and distribution of incentives for the conservation and improvement of forest cover. The law prohibits changes in forest land use, even in cases where the conversion takes place to set a forest plantation. In order to promote sustainable sustainable management of forest, the requirements for management plans were simplified, including the figure of the general plan and operational plans, and the seasonal restriction to the execution of the use plan was eliminated. This legislation created the National Forestry Office, conformed by representatives of forest producers, wood industry, trade sector and environmental organizations, as the counterparts in the dialogue for the definition of public policies on this subject by the Government. Additionally, the law freed the cutting, transportation, industrialization and export of wood coming from Tree plantations. Finally, it created the system for the Payment for Environmental Services to forest owners and the National Forestry Financing Fund to financially support forestry activities of small and medium producers and to manage the Payment for Environmental Services program.

The deforestation cause in this tenure regime is attributed by some authors to the conversion of forests into agricultural and cattle farming use. In many cases, land users obtain a higher income with agriculture or cattle farming than with forests, conditioned by factors such as road access, policies, legal rules, even market situations that favor these activities. Specifically, recent actions such as the pineapple expansion due to fiscal incentive and the high prices of the product in international markets, the project of an international airport in the southern part of the country, the national bio-fuels' program, the development of new markets such as China and Japan for agricultural products, etc., could, in the short term, stimulate deforestation processes because the balance between profitability and conservation is altered vis a vis other activities competing for the use of land (Joyce,2006 and Joyce, 2013).

Other authors (FUNDECOR, 2005) on the other hand, propose access to wood resources as another cause. The lack of control combined with the existing use regulations (inefficient red tape) of wood are considered other causes. Specifically, the agents face barriers or legal and economic stimuli that promote the removal of regenerated cover, in particular early cover (for instance the prohibition of land use change set forth in Forestry Law 7575 promotes the lack of interest for regenerated lands to become forests). The forest is first illegally cleared and once cleared, a permit is requested to use the remaining wood as forestry inventory (this has increased the proportion of agro-forestry systems permits/managed forest permits) since the law reduced the restrictions to use non-forest areas. Concluded the process, the owner decides whether to keep it as grassland for cattle (which was not his original motivation) or if he allows the regeneration. The difference of use requirements between SAF and Managed Forest, SINAC's deficient control of permits and the slope in the participation of communal control groups such as COVIRENAS) promote this phenomenon.

By discovering the behavior of deforestation per regeneration cohort that indicates that there is more deforestation in forests' early stages than in mature forests, the prohibition of change use in force in the Costa Rican legislation is set as the cause itself, since the owners prevent the new cover to become a forest. It is argued that the legislation and institutional mechanisms (Forestry Law 7575 in its article on the prohibition of use change, and the deficiency in controls) promote the occurrence of more deforestation in early regeneration stages to prevent its conversion into a "forest".

Finally, small forest producers and peasants (Zúñiga, 2014) claim an over-regulation and administrative closure, on sustainable primary and secondary natural sustainable management of forest; access restriction to PES or the standing tree value recognition to natural forest owners and holders; lack of competitiveness of the forest use in front of alternate uses; State weakness in the implementation of control mechanisms, as elements that promote deforestation and degradation. The difficulty to enter the incentive or recognition scheme to obtain financing and the fact that the State does not promote the activity are adduced as barriers to maintain carbon forest reserves. In the case of forest reserves increases, the difficulty for financing and the fact that the State does not promote the activity in addition to the uncertainty caused by the Forestry Law with the article prohibiting use changes are adduced. Regarding the sustainable management of forests, the causes adduced are the difficult and excessive procedures to access sustainable management of forest according to current instruments.

Lands owned by State institutions not managed by SINAC

There is no clear information of the deforestation behavior in these lands. There is no knowledge of the magnitude of hectares in said condition, or of their cover behavior, exploitation and tenure situations. The country already has a legal body for its order and control, however, the irregular cadastral situation, and the lack of registration and recording into the State Natural Heritage, prevents the actual knowledge of the situation.

According to the forestry legislation in force (Law 7575), the State Natural Heritage is constituted by the forests and forestry terrains of national reserves, areas declared inalienable, the properties registered under its name and those belonging to municipalities, autonomous institutions and other organisms of the Public Administration,... (art. 13).

Areas with the highest deforestation risk

The highest deforestation risk between 1987 and 2001 was located in Belen, where 5 times more deforestation occurred than expected given the proportion of forest cover of the canton. Between 2001 and 2011 the canton with the highest risk was San Pablo, where 10 times more forests were deforested than expected given the natural forest cover level. In general, the cantons with the highest deforestation risk are small and have little forest cover. Some big cantons also show high deforestation intensity. During the 2001-2011 period, Buenos Aires and San Carlos were example of that, experiencing over twice the deforestation expected for cantons with their forest cover. Between 2011 and 2013, the cantons of San Pablo, Palmares and Poás had 10 times more deforestation than expected for their forest cover at the beginning of the period. Because of the gross regeneration intensity, cantons such as Alajuelita, Dota and Escazú stood out between 2001-2013, with less than twice the regeneration expected given their size and agricultural cover. Between 2011 and 2013, cantons like Tibás, Alajuelita, Aserrí and Dota experienced at least three times less regeneration than expected given the agricultural area measured at the beginning of the period. .

Finally, the following features were highlighted regarding deforestation, conservation and regeneration:

Generalities: along the complete lapse built (1986-2013) there is a very low fall in primary forest cover, a fall in the gross deforestation rate and an upturn in reforestation and regeneration; consequently, there was a net upturn of forest cover during the comprehensive period.

Deforestation and regeneration direct factors: Regarding gross deforestation, close to 70% of the deforested area becomes pastures, a little over 20% crops and almost 10% plantations. However, it must also be mentioned that out of the full regeneration, before over 65% were pastures, 20% crops and close to 20% plantation.

Tenure regime as a first factor: For the whole series, close to 1.4% of private lands are deforested, close to 0.9% of the ASP (excluding PN and RB) are deforested, close to 0.3% of indigenous territories are deforested and 0.1% of NP and BR are deforested. The biggest problem lies then in private lands. For regeneration, it was also showed that there is more regeneration within ASP (all of the protection categories) than outside ASP.

Forest age: From the R-PP studies (MINAE, 2011), it is known that there is higher deforestation in new forests (secondary) than in mature forests. With the new series generated a deforestation rate of 15 years or less of close to 4.5% is known, while in forests 15-25 years old it reaches 2%, and less than 1% for forests of over 25 years of age.

Deforestation concentration: Deforestation is not the same for all the national territory. The ZPHD with the highest deforestation are: North Pacific coast and foothills (with 34% of the country total deforestation for the 1987-2001 period, and 19% for the 2001-2013 period); North Caribbean plateau and coast (with 28% and 31% deforestation with regards to the whole country for periods 1987-2001 and 2001-2013 respectively); and the South Range (with 6% and 14%). In the case of regeneration these are the most representative regions too. For the same periods, they represent: North Pacific coast and foothills 35% and 29%; North Caribbean plateau and coast 20% and 20% and South Range 8% and 5.

Indirect factors for each deforestation homogeneous zone:Table **4.1.3.** is shown in the summary of factors found in CDI (2015) for each deforestation homogeneous zone once reviewed in field with the performance of 5 validation workshops.

Chart 4.1.3. Importance degree of deforestation indirect factors.

Situational indirect factors	Score[18]
Key cultivation price cycles in the zone	39
Tourism (employment diversification, land value)	15
Urban markets growth and increase of urban demand for derived products	14
Proximity and Access to the central valley (control, land price)	13
Changes in employment structure (to urban and tourism)	12
Productive transformation towards agribusiness systems (productive intensification)	12

[18] For the determination of the scores of situational factors in order of importance, a score of 6 was assigned to the Deforestation Homogeneous Zone (ZPHD) mentioned for the first factor, 5 points for the factor mentioned second, 4 for the one mentioned third, 3 for the one mentioned fourth, 2 for the one mentioned fifth, 1 for the one mentioned sixth and 0 if the factor was not mentioned. The score represents the addition of scores for each factor in each ZHPD.

Demand increase of cattle products	10
Rural-urban migration	9
Foreign labor force, rural labor force availability	7
Appropriate ecological context for cattle	6
Fall of livestock density capacity	5
Fall of livestock density capacity in regions neighboring traditional livestock areas	5
Indigenous productive systems	5
Foreign labor force availability in services sector	4
Land cost increase in neighboring regions	4
Forest moratorium	3
Land cost increase (in other economic activities)	2

The most dominant factors are related to the competitiveness of activities alternate to forest conservation, and have been highlighted in pink and orange, those specific for livestock farming. Those related to labor force, migrations, social support, etc., appear in light blue.

These factors show that deforestation is a mainly economic phenomenon, in which the decisions of changing the land use from forest to other uses are driven by the desire 1) of exploiting woods, or 2) to make an alternate land use. The decisions of conserving forests are made because 3) given the conditions, a higher profitability is NOT obtained from the current one conserving it (that includes values for ecotourism use, or for research, of future options, personal values, etc.), or 4) the impossibility of doing so, for instance, because of a legal mandate.

There are many elements behind these factors and the different authors who have treated the topic have centered in one or several elements that affect one or several of the 4 factors mentioned above. This way, any agricultural promotion policy motivating alternate uses of forests (factor 2) will favor deforestation, so if congruence is sought, it is necessary to review the policy so its effect is not posed on forest lands. In Costa Rica, the agricultural policy points towards the improvement of the sector based on actions to improve technology and market access, and to improve productivity per unit of space used, and that do not promote gaining new areas for cultivation and production.

On the other hand, programs such as PES, in turn, act by increasing the forest's relative profitability (factor 3). These must deal with other market situations, such as the behavior of wood local price (factor 1), or the long term price of any product competing for land use (such as the case of melon some years ago or pineapple these days), that increase the general profitability of all the competitive uses of forests (factor 2). These variations in price may be caused by international situations or even by the improvement of accessibility through infrastructure development.

Different authors have also argued that the legislation or institutions, for instance the Forestry Law prohibiting the land use change from forest to other uses (factor 4). Other factors such as spiritual values

towards the forest, household income, labor availability in the zone, educational level, etc., are considered marginal.

4.2. Assessment of the major barriers to REDD+

Main barriers to attend deforestation barriers

From the R-PP and ER-PIN analysis, the main barrier to attend deforestation drivers is the opportunity cost of land in private forests, and at the same time, the lack of an efficient and successful forestry sector in the production, industrialization and marketing of wood and other products originating in sustainable management of forest. This implies that the profitability of forestry management is lower to the profitability of agricultural production. In this case, it is assumed that the forestry management, not as REDD+ activity but as an emission reduction measure by deforestation and forest conservation, since it is the only productive alternative explicitly made by the current Forestry Law to forest owners.

Currently, another element is the existence of rights on non-registered lands and consequently over the forest resources, which produces a disadvantage for land holders because this condition prevents them from participating in the Payment for Environmental Services program, since they do not comply with the requirements previously set, or because they are located in areas excluded by the program. For these owners, the lack of requirements is a barrier for forest conservation. The problem of land tenure in different areas under the administration of different State institutions is also a condition that acts a barrier, since those holders have no legal security to remain and develop their lives in such lands.

It is also important to recognize that the private owned areas within Protected Wildlife Areas that have not been expropriated or paid produce a feeling of dissatisfaction in the owners and a general mistrust on the State compliance. Although not formally confirmed, it is possible that the owners incur in criminal actions in adjacent areas as well as in the boundaries of Protected Wildlife Areas. In this case, the barrier is the non-expropriation and the payment of the lands owed by the State and considered part of the State Natural Heritage.

In the case of accidental fires in the forest, the forest fire does not change the land use, unless deliberately used as part of the tools for such purpose. In Costa Rica, from 1998-2014, an average 3,300 ha/year of Forest, 9,700 ha/year of Secondary Forest and 16,400 ha/year of grasslands caught fire[19], being theses covers an approximate 90% of the total burnt area. The National Committee on Forest Fires has an ordinary State budget; however, it does not include all fires reported in zones outside of protected wildlife areas (ASP), since its priority is to prevent fires to penetrate the ASP in the first instance, and only then to provide support to private owners outside the ASP. This is a significant barrier and is reflected in the 100% of the burnt area for the 1998-2014 period, the 87% is outside the ASP and only the 13% within the ASP. The records on fire causes are kept since 2007 and of the fires between 2007 and 2014, 24% of the fires were caused by grassland burnings, 21% vandalism, 19% agricultural burnings, and 11% hunting activities. Most of the forest fires are caused for accidents outside the forests.

[19] Data provided by the National Committee on Forest Fires, 1998-2014 period. There are no records on the type of cover changed both in the forest burnt area or in the secondary forest, but the expert criteria is that the percentage is very low. The affectation of forest fires in Costa Rica is for degradation.

Regarding illegal logging, it is estimated that in Costa Rica it is equal to 36%, understood as the percentage of the wood coming from illegal logging[20], some 200.000 m^3 per year. In the consultation to experts made in the aforementioned study, the main causes of illegal logging were identified as procedures with 17%, poor control management 17%, demand of forest products 14% and human needs 11%. Additionally, 50% blamed the State for illegal logging, more than the responsibility attributed to the private sector (22% to consumers and market and 22% to owners). As of this moment, the main barriers for the prevention of illegal logging have been the inefficacy of the existing mechanism and of the monitoring systems to detect forest loss. The functioning of the current control model obeys to the need of covering control and protection actions of immediate response, in a way that their response level in this role is usually reactive before society claims and is not enough to become preventive. There is not an integrated model either, because due to SINAC's organizational structure each conservation area makes an effort to respond to claims and they are all organized independently. This situation hinders management and follow-up of the control policy at the national level, besides the planning and budgeting and the control per strategic results. Currently, SINAC is reviewing the control institutional model on Illegal Logging, in order to improve key features for its functioning, such as scope, structure (organization and components), processes, methodologies, instruments, resources, etc.

In indigenous territories, the main barrier is the poor flexibility of current financial mechanisms to allow the cultural exploitation of forests in indigenous territories. For instance, the Payment for Environmental Services does not permit hunting or the extraction of non-wooden products from areas registered under the modality of conservation, including indigenous territories. This is against the worldview and management ancestral practices. This could cause that they become forest areas outside the Payment for Environmental Services areas to compensate for the need of forest products. Additionally, the presence of non-indigenous population in possession of indigenous territories has been pointed out as an eventual driver of deforestation, given the precarious situation of land tenure rights in those areas, which implies the need to continue moving towards the clarification of rights, in particular in indigenous territories and other areas under special management schemes.

Main barriers for REDD+ and forest conservation

REDD+ in Costa Rica is implemented through forestry and environmental policies that created the National System of Conservation Areas, its illegal logging control programs and forest fires management as well as the Payment for Environmental Services. The private sector has contributed to the reduction of emissions from deforestation through the conservation of forests.

At the governance level, REDD+ faces significant challenges. Its complexity and inter-disciplinary and inter-sectoral scope[21] require of capacities which are new in the country. Attaching the existing governance structures might be limited by the legal competence of ministries and institutions. This applies to the implementation framework as well, since REDD+ must be coherent with the other mitigation actions,

[20] The estimate of Illegal Forest Logging mentioned in this document comes from the Consultancy Report "Strengthening of the Strategy for prevention and control of illegal logging" developed in the framework of the Preparation for REDD+ along with SINAC, through the offer-demand method. There, consultant Muñoz mentions an estimate made by CATIE (35%) for yr 2001 and the currently performed (37%) for 2011, which are close to the ones perceived by several players consulted by the end of 2014 by the consultant, 36%, understood as the percentage of wood volume coming from illegal logging.

[21] Seeking the attention of the deforestation drivers.

consistent with the GHG inventory and must provide environmentally sound emission reductions within a Carbon-Neutrality framework. Achieving consistency in the accounting scheme has been an important challenge to the country. It has also been a challenge for the country to properly adapt to the emerging methodological frameworks. Regarding the transfer of title to emission reductions, being a requirement of the Carbon Fund, there are land tenure problems in the country, particularly in Protected Wildlife Areas, border areas and indigenous territories in which a transfer may not be legally possible. In terms of financing, the country cannot commit to a highest ambition in emission reduction, without knowing and being sure of the availability of international financing resources.

Consistency with the barriers' analysis of ER-PIN and R-Package

The ER-PIN poses barriers to the implementation of REDD+ through the Payment for Environmental Services program. The scope of this Emissions Reduction Program is nation-wide for the reduction of emissions caused by deforestation, and therefore the magnitude is higher and the scope broader than the barriers considered; however, some of the barriers explained in the ER-PIN are applicable. With regards to deforestation, the barriers explained in the ER-PIN match.

Consistency between the proposed policies and the strategic options of R-PP

The policies, actions and activities included in the Emissions Reduction Program were designed building on the risks identified during the consultation process. These risks derive from the analysis of the strategic options originally incorporated into the R-PP. In the R-PP, the strategic options did not entail sufficient details as to construct a program with specific actions and tasks as contemplated in the policies hereby considered. It is because this common base that the consistency between the strategic options and the Program policies and actions can be assured. For instance, concrete actions to strengthen the National System of Conservation Areas were identified (Strategic option 1), in particular with reference to its capacities to guaranty its integrity, by strengthening fire control and illegal logging strategies. Moreover, actions to integrate national parks and biological reserves were also incorporated (Strategic option 2) in addition to the Protected Wildlife Areas and other State Natural Heritage lands to carbon capture. Likewise, actions to support the regularization measure of rights on areas under special arrangements (Strategic option 3) including indigenous territories were included, so that the land offer for the Payment for Environmental Services can be expanded. The Program also includes actions to maintain the coverage of Payment for Environmental Services in the long term and to broaden its scope (Strategic options 4 and 5). Finally, actions to promote the sustainable production and consumption of Wood are included (Strategic option 6), the strengthening of the control actions by the Agronomists Association (Strategic option 7), and the development of a financing strategy (Strategic option 8) for National REDD+ Strategy as identified in **Section 4.3.**

4.3. Description and justification of the planned actions and interventions under the ER Program that will lead to emission reductions and/or absorptions

Costa Rica's forestry policy is formally defined in national forestry development plans. The first Plan was created for 2001-2010 and included a strong participation process with stakeholders. The second Plan currently covers 2011-2020, and this provides continuity to forestry state policies. The Government defined priority areas for implementing the Forest and Rural Development Program, in order to support the implementation of the forest policies defined in the 2nd Plan. However, public financial resources have been insufficient to cover the costs of the 2nd Plan, even though the country has requested loans from the World Bank to fill some of the existing finance gaps.

The 2nd plan adopted measures (by decree) to 1) Expand and consolidate a Protected Areas System, 2) Improve operational capacities to reduce illegal logging and to enforce the prohibition on forest coversion, 3) Strengthen actions to reducing the impact of forest fires, 4) Improve capacities to formally incorporate public forest lands to the State Natural Heritage, and 6) Purchase lands to continue improving the Protected Area System, as well as forest reserves for hydroelectricity.

The ER-P considers the first two National Forestry Development Plans, especially the 2nd Plan, and builds on its forest policy framework by providing six new policies to reduce emissions, increase removals and build capacity to grant sustainability and environmental integrity to these emission reductions.

Context of the proposed measures

According to the phased approached described in Figure 2.2.1., , the ER-P will focus on three REDD+ activities, for which sufficient quality data exist to determine a reference level and to establish emission reduction goals.. Additional information on the remaining REDD+ activities will be collected for allowing their incorporation in 2016. Nonetheless, policy actions are included in the ER-P for all REDD+ activities, as these are part of the benefit sharing mechanism (**Section 15**). Additional policy actions may be included in the future, as more data is collected on the activities not included in the reference level.

Presently, each REDD+ activity is implemented by policies, actions and activities additional, which may or not be additional to what is mandated by law (**Section 4.5.**). Some additional efforts are meant to fill gaps in implementation, for example, in cases where Costa Rica does not have sufficient human, technical and financial resources[22].

Methodology for defining the proposed measures

Costa Rica's strongest proposal to the FCPF Carbon Fund is a set of policy actions that were derived from multi-stakeholder participatory processes. The six policies presented here are a product of ample discussion with government institutions, indigenous peoples, the small- and medium landowner forestry sector, as well as large -scale, industrial forestry sector. These measures are in the form of policies, actions and specific tasks or activities derived from a the SESA and during the information and pre-consultation phases of National REDD+ Strategy.

The participatory processes were designed to identifty risks and opportunities related to the proposed Strategic Options[23] included in Costa Rica's R-PP. Over 100 recurring risks and opportunities were identified and grouped in 27 groups, to address reflect ideas. This sistematization was done by the REDD+ Secretariat and is publicly available here. Subsequently, five strategic axes and six forestry policies were identified for addressing these risks and to foster opportunities. In addition to this, the REDD+ Secretariat included other

[22]For instance, Article 2 of the Forestry Law defines the authority of the State to execute expropriations of private forest lands in Protected Conservation Areas. However, many expropriations have not been appropriately compensated, an actually have been identified as a driver of deforestation (**Section 4.1.**). Often, proper compensation has not been carried out because the State is unable to assign public financial resources for payment. Currently, the State Forest Administration annually assigns funds for payment of these lands, but it is not sufficient to pay for all the pending expropriations.

[23] It must be noted that the REDD+ Secretariat performed a consistency analysis of the original strategic options with the six policies, actions and tasks eventually defined, and found full compatibility.

specific actions, within the framework of the six policies, according to specific political interests by the Minister of MINAE. This set of policies will be subject to formal national consultation. All policies are part of the ER-P to the FCPF Carbon Fund.

Furthermore, opportunities to enhance the current set of REDD+ policies have already been identified. For example, Costa Rica is currently finalizing a proposal to the World Bank for developing a "Green and Inclusive Development Plan in Productive Rural Lands". The purpose of this Plan is to capitalize value chains and the provision of ecosystem services in forests and agricultural lands. This is intended to go beyond current restrictive measures and seeks to rehabilitate productive lands. Particularly for the forestry sector, overly restrictive forest management policies are in place, and these have caused a significant reduction of investment in forestry businesses, as well as the development of value chains for forest products.

In summary, the objetctive of this initiative is to promote green and inclusive development, favoring the application of sustainable productive systems in rural territories with lower development and potentially vulnerable to climate change. Mainly ,the Plan seeks to:

- Rehabilitate rural lands, and reduce degradation processes to generate ecosystem services and improve wealth of small- and medium- scale producers,

- Increase productivity and competitiveness of agricultural production and strenghen value chains to increase monetary value of the territories, based on their environmental goods and services,

- Foster enhanced resilience of rural lands by increasing mitigation and adatpation.

There is some redundancy with the ER_P, which will be solved as the proposal to the World Bank is further advanced.

Proposed measures included in the ER-P

Table 4.3.1.Policies, actions and activities included in the ER-P and the National REDD+ Strategy. (It is important to remember that the ER-P is the operational framework proposed by Costa Rica to implement the National REDD+ Strategy).

Policies	Actions
POLICY 1. Guarantee the integrity of the State Natural Heritage and private forests, as well as the Measurement, Report And Verification capacities, according to REDD+'s requirements	ACTION 1.1: Strengthen the operation and financing of SINAC's Forest Fires Management Strategy inside and outside Protected Conservation Areas ACTION 1.2: Strengthen the operation and financing of SINAC's Illegal Logging Control Strategy ACTION 1.3: Strengthen Costa Rica's system for monitoring land use/cover dynamics ACTION 1.4: Develop a strategy to integrate public lands to the State Natural Heritage ACTION 1.5: Contribute to the consolidation of SINAC's Protected Areas System ACTION 1.6: Device synergies between conservation and resilience of the State's Natural Heritage ACTION 1.7: Execute action plans to address direct and underlying causes of deforestation and forest degradation
POLICY 2: Promote the comprehensive and harmonious participation of stakeholders in REDD+, including lands under special land-tenure regimes	ACTION 2.1: Prepare a Forestry Development Plan with Indigenous Territories ACTION 2.2: Implement mechanisms for solving conflicts in regards to REDD+ ACTION 2.3: Develop mechanisms to promote the participation of agroforestry producers and farmers in REDD+

Policies	Actions
POLICY 3: Improve capacities in the public and private sectors to manage and promote silvicultural practices in forests and tree plantations, in order to increase competitiveness	ACTION 3.1: Contribute to the implementation of forest policies in the National Forestry Development Plan related to improving management capacities in support of REDD+ implementation ACTION 3.2: Strengthen policies to promote and recognize sustainable agricultural and agroforestry practices
POLICY 4: Promote legal security by supporting clarification and regularization procedures of land tenure and emission reduction rights, with an emphasis on indigenous territories,, public lands and areas under special land-tenure regimes	ACTION 4.1: Address land-tenure and emission reductions rights in indigenous territories ACTION 4.2: Address land-tenure and emission reductions rights in areas under special land-tenure regimes ACTION 4.3: Address land-tenure and emission reductions rights in public lands ACTION 4.4: Promote consistency in the delimitarions rules for areas under special land-tenure regimes
POLICY 5: Increase opportunities for all stakeholders to receive benefits from REDD+ activities, as well as those addressing deforestation and forest degradation	ACTION 5.1: Plan land use as a function of the potential contribution of areas to REDD+ objectives ACTION 5.2: Improve competitiveness of forestry and agroforestry financing mechanisms, also in relation to other land uses ACTION 5.3: Broaden financing sources and consolidate a benefit sharing mechanism, which is consistent with the goals of the National REDD+ Strategy. ACTION 5.4: Promote tree planting in urban public zones

Policies	Actions
POLICY 6: Guarantee the operation of participation, follow-up and accountability mechanisms, consistent with technical, methodological and political provisions applicable to REDD+	ACTION 6.1: Design, test and implement a Safeguards Information System (SIS) ACTION 6.2: Implementation and follow-up of the Social and Environmental Management Framework (ESMF) ACTION 6.3: Achieve a sound Measurement, Reporting and Verification (MRV); consider other methodological issues ACTION 6.4: Consider gender , youth and the participation of other relevant groups

Implementation, Monitoring and Evaluation of policies, actions and activities

The ER-P is implemented at the national level. Costa Rica's goal is to reduce emissions in diferent ways and to enable the implementation of multiple activities with different stakeholders. As a whole, these activities are expected to have a global impact on total emissions and removals at the national level, reflected in terms a decrease in t CO_2-*e*/yr according to the national GHG inventory, against a reference level. Determining the individualized impact of each policy, action and activity proposed here is not a goal of the ER-P or of the monitoring system described later in the document (**Section 9**). Hence, emission reductions may be a product of multiple types of interventions. Interventions may not have the same impact across the country, so different combinations of activities may be required to effectively reduce emissions.

In order to assess performance of specific policies, actions and activities, the implementing entities will define the required indicators in their monitoring and evaluation (M&E) frameworks, without implying that these indicators should be measured in terms of t CO_2-*e*/yr.. Those policies, actions and activities implemented by public institutions are required to have M&E provisions, based on MIDEPLAN's guidelines, which are not sector-based (i.e. indigenous territories, farmers and forestry producers). In this way, and with support from CENIGA, these indicators will be compiled to produce reports on the effectiveness of the policies, actions and activities. These reports will be defined in collaboration with CENIGA in 2016.

Despite the fact that specific policies, activities and actions are not monitored in terms of t CO_2-*e*/yr , some of the measures will have a stronger impact on the reduction of emissions. For example, expanding the PSA program, as well as enhancing the Illegal Logging Control and Forest Fires Management strategies by SINAC. How these measures are financed is part of the benefit sharing mechanism (**Section 15**).

MRV, as well as the reference level were defined at the national level. The current C accounting framework covers some of the anthropogenic land use changes affected by REDD+ activities (Section 7). As explained in Section 2, this framework will be broadened to cover all REDD+ activities in 2016. Since MRV will be biennial (**Section 9**), Costa Rica will produce regular information to understand the collective impact of these policies, actions and activities.

Consistency of policies with the attention of drivers of deforestation

The Emissions Reduction Program plans to attend the deforestation and degradation drivers, as identified in the country and during REDD+ implementation. Specifically, on deforestation drivers, there is a description below on how political actions support the attention of identified drivers (**Chart 4.3.2**.).

Chart 4.3.2. Indirect factors and attention of deforestation drivers by political actions proposed in the Emissions Reduction Program.

Indirect factors	Political attention
The tenure regime	National REDD+ Strategy strengthens and consolidates the situation in tenure arrangements with proven lower deforestation: Policy 1 contains actions to develop and consolidate public lands and integrate them to the State Natural Heritage, guaranteeing that they belong to arrangements of proven lower deforestation. It also intends to contribute to the consolidation of the Protected Areas National System, by increasing the financing for land purchases, financing the tenure inventory within Protected Wildlife Areas, etc. Policy 2 is aimed at finding mechanisms to encourage and strengthen the participation of populations of farmers and agro producers in the so-called "areas under special management" (indigenous territories, wildlife refuges and other types of protected areas, refuges and bordering reserves, maritime zone) in which there are conflicting conditions particularly regarding the rights of land tenure. Policy 4 also seeks solutions to the problems of land tenure and therefore carbon rights in areas under special management, as well as improving the delimitation of these zones. .
Forest age	Actions to increase control over the change of use in all ages of the forest and on the other hand to make monetary recognition and incentives for forest regeneration are being promoted, since that has been the driving force in recent years anyway in improving forest cover in the country. Policy 1 has actions that strengthen the supervision and control within PAs, and in some cases outside of PAs (strengthening the National System of Conservation Areas, Agronomists Association and the Regional and Local Committees for Conservation Areas, volunteering, etc.) Policy 5 improves the competitiveness of the financing mechanisms for forest and agro forestry ecosystems in relation to other land uses, motivating forest maintenance from an early age. One of them is the strengthening of the existing modalities of FONAFIFO's Environmental Services, amongst which reforestation is found.

Deforestation concentration	In the context of REDD + the level of carbon has already been identified; the places with the most problems and policy actions both for protection categories of Protected Wildlife Areas and of land in special arrangements and private lands, can be properly oriented. Policy 1 promotes the constant updating of deforestation causes and the review and alignment of policies to address the findings. So existing instruments such as the Payment for Environmental Services or the control of the State Forestry Administration can emphasize problem areas. Policy 6 guarantees that through the mechanisms established for the participation of multiple stakeholders, as well as robust monitoring system that covers the entire national territory, allow follow up actions and the results thereof at the local level.
Low competitiveness with regards to the alternatives	The National Forestry Development Plan is reinforced by strengthening the forestry sector at all stages of the production chain of wood and "profitability" of conservation increases. Policy 5 is fully aimed at strengthening investment opportunities in both traditional (Payment for Environmental Services and the like) and new (Payment for Environmental Services to indigenous peoples/peasants) methods to enable the participation of the widest variety of actors and activity modalities and therefore improve the alternative profitability of forest and tree systems in non-forest lands. Policy 2 provides mechanisms to encourage the participation of agro forestry and peasant producers in REDD+. Policy 3 provides for the promotion and recognition of sustainable agricultural and agro forestry practices, and the generation of business models and participation of the academy in strengthening the sector.

Labor force, migrations, social support	Overall, although the migrations issue is not treated, the strategy as such represents a transfer of resources from other sectors, mostly urban and international, to the Costa Rican rural sector. Policies 2, 3 and 5 related to increasing the competitiveness of forestry activities will implicitly improve salaries and the socio-economic conditions of families dedicated to agro forestry. Policy 6, by promoting the implementation of the Environmental and Social Management Framework (including compliance with safeguards) and expanding the participation of other population segments, contributes that rural areas are represented and enjoy MDB benefits through REDD +.

4.4. Assessment of land and resource tenure in the accounting area

Assessment methodology of land and resource tenure

Costa Rica's REDD+ Secretariat made an analysis on land and resource tenure, in order to inform the potential transfer of titles to emission reductions and the challenges and opportunities of REDD+ implementation. A summary of the main results follows.

Land tenure modalities

In Costa Rica, lands can be classified as: a) Public domain lands, b) Private domain lands held by private parties, and c) Private domain lands owned by Public institutions.

Some other land tenure classifications condition its use, such as:

Private rights over land, referred to property right or possession right and other use rights derived; here we have private owners of registered lands and holders of non-registered lands.

Rights on state lands, of which public sector institutions are owners and

Collective rights on lands in indigenous territories whose title holders are Indigenous Integral Development Associations.

Legal situation of different tenure forms

Property rights can be registered or not at the National Registry, in which case it is known as possession. Property rights in Costa Rica are covered at the constitutional level (Art. 45), and are developed in the Civil Code including possession, use and enjoyment, transformation and alienation, defense and exclusion and restitution and indemnification rights.

As part of the Costa Rican reality, there is an important part of the national territory under public or private property without titling problems, as well as a wide territory under different management categories that are part of the State Natural Heritage. These properties also have the guaranty of registrar publicity provided by the National Registry, as a protection tool in front of third parties. There is also legislation that covers other type of land tenure such as the possession, which constitutes a minor part of the national territory, allowing the registration of such rights.

There can be some limitations referred to annotations and liens in the registration at the Real Estate Registry related to the property rights that could eventually jeopardize participation in the REDD program, but it cannot be affirmed at this time, because it will depend on the flexibility of the negotiation related to the legal requirements for the transfer of titles on emission reductions.

Indigenous collective rights on lands:

The regulations on indigenous territories go back to 1939; Indigenous Law No. 6172 set forth that the indigenous reserves remain the property of indigenous communities and are inalienable and imprescriptible and must be registered at the National Registrar under their name; their size cannot be modified but by Law. These changes have been reinforced with the adhesion to relevant international agreements. The Indigenous law sets that non-indigenous people who are good faith owners or holders within the indigenous reserves shall be relocated in similar lands, if they wish so; if it is not possible to relocate them or

if they do not accept the relocation, it will be necessary to expropriate and indemnify them in accordance with the procedures set forth in the Expropriations Law by the Lands and Colonization Institute, currently the Rural Development Institute. The expropriation and indemnification studies and procedures will be performed by that institution in coordination with the National Commission on Indigenous Affairs. Bad faith owners shall be evicted in the case of simple holders and in case of owners, it would be necessary to file a judicial proceeding for the invalidity of the respective title.

In the case of indigenous territories, the legislation is very clear; the problem is that it has not been followed by all the competent State institutions and no resources have been allocated as set forth in the National Commission on Indigenous Affairs for the execution of actions tending to recover the lands and make them available to the indigenous population as it legally corresponds. In concrete, the Rural Development Institute has not demarcated the indigenous territories and for this reason, the National Commission on Indigenous Affairs has not been able of performing the population census of indigenous peoples and therefore there is lack of formal identification of non-indigenous occupants that exercise occupation.

Rights on state lands

The State, autonomous institutions and Municipalities own rights on lands, some of public dominion, and other private property of those institutions, which for the purposes of interest are analyzed as follows:

State Natural Heritage

Was created in 1969 and is comprised by the forests and forest lands of national reserves, inalienable areas, properties registered under its name and those that belong to municipalities, autonomous institutions and other Public Administration organizations. They are non-seizable and inalienable. This Heritage constitutes a restrictive regime regarding land uses; research activities, training and ecotourism are the only activities accepted, prior permit. National reserves per Art. 11 of the Lands and Colonization Law No. 2825, and Art. 261 of the Civil Code are lands that are not registered as private property and are not covered by the ten-year possession rule.

Rural Development Institute

The Rural Development Institute, as part of its duties, has developed the titling of lands on behalf of private parties for a long time; however, from the judicial rulings and Declarations of the General Comptroller's Office of the Republic ordering the recovery of lands that were granted titles, it has been necessary to start administrative adverse effects and judicial proceedings requesting their invalidation.

Border zone 2000 meters

Border zones in an extension of 2,000 meters wide along the border were also declared inalienable and non-susceptible of acquisition through denounce or possession per Law No. 2825 of 10/14/1961 and its amendments. However, there are people in these zones with possession rights from many years ago.

In the case of possession rights that could exist in the areas that were national reserves or within the border zone, the holders cannot legalize their possession rights because the legislation is too old, and therefore it is impossible for them to show their rights existed prior to those laws. The Rural Development Institute is processing the invalidation of titles in this area in order to recover the assigned lands, before the Contentious-Administrative Treasure and Civil Courts.

Port Management and Economic Development Board of the Atlantic Coast:

The Port Management and Economic Development Board of the Atlantic Coast is the owner of the State lands located in the area crossed by navigable canals that comprehend a ten kilometers area from the sea

and inland, parallel to the coast and a strip of three kilometers width, parallel to both sides of the rivers and the canals managed by the Board, in the province of Limón. Likewise, those lands were occupied under institutional tolerance by local population that accumulated possession rights for many years. In order to contribute in solving the land tenure problem in this region, special law No. 9205 published in La Gaceta No. 40 on 2/26/14 was issued, authorizing the institution to issue titles within the aforementioned strip, based on the Possession Law, prior determination of the Ministry of the Environment and Energy of the areas that constitute State Natural Heritage.

Taking the foregoing into account, for the implementation of the REDD program, there is current disposition on titles on State private property lands part of the State Natural Heritage, the lands that are private property of individual persons and the lands property of Indigenous Development Associations that are under the Payment for Environmental Services program.

Likewise, at a later stage, the lands registered as private property will be disposed of and will be entered in some sort of agreement in which they will transfer their titles to the State to be negotiated. With regards to rights of possession on non-registered lands, Law No. 8640, article 9 will be applied, that enables the Payment for Environmental Services to non-registered land holders for the case of forest protection, under certain requirements[24]; holders within or outside areas belonging or assigned to the State that comply with the requirements of admissibility into the system according to the aforementioned law are included in this provision.

The experience in the Payment for Environmental Services shows that most of the requests processed correspond to properties registered and a small number of non-registered properties that can be included in the program as mentioned, based on the application of Law No. 8640.

Approach options of existing tenure conflicts

1. The current legislation and its interpretation in some cases, supports the eviction of the holders, the invalidation of the titles and cadastral plans, in order to consolidate the State Natural Heritage. For this purpose, it is necessary for the judicial offices to intervene and apply the legislation, invalidating titles and cadastral plans if corresponding, or defining the indemnifications for good faith holders.

2. Legislation to clarify the possession rights situation, permitting a solution for land tenure. It is a legislative reform to take care of the problem in an integral manner, because so far the efforts to partially amend the law to solve the problems have not been successful. This reform requires a modification in the scope on the form of doing conservation different than the current one, considering the people within the conservation dynamics of natural resources.

3. Also for the case of situations showing some level of incertitude even in the case of ownership of registered lands, the figure of payment for results or of year due currently applied for the Payment for

[24] Law No. 8640 has allowed the National Fund for Forest Financing to grant the Payment for Environmental Services to forest holders, and in this sense, it allows the legitimization of the acknowledgment of mitigation actions to those land holders who may receive the corresponding payment within the National REDD+ Strategy, as long as they can comply with the requirements there set.

Environmental Services can result in an instrument to favor the payment in those lands, reducing the risk of reversals.

4. In relation to other indigenous territories, what corresponds is the compliance of the legislation by the institutions involved, in order to restitute the indigenous population of the lands occupied by non-indigenous people.

The program will have positive impacts on owners and holders of land by valuing the emission reduction actions they might perform. Regarding the impact on land tenure arrangements, it is necessary to affirm that the possibility of significantly influencing surpasses the management possibilities of National REDD+ Strategy, since it is a matter that incorporates a variety of State institutions; it is possible to strategically contribute to some of the activities, not intending to provide an integral solution to such a complex problematic.

4.5. Analysis of laws, statutes and other regulatory frameworks

Legal framework on climate change and the forestry sector in Costa Rica

Climate change and international regulations

Costa Rica has been proactive in promoting and participating in the international conventions and agreements for environmental protection (**Chart 4.5.1.**). Additionally, it must be mentioned that the international agreements, per article 7 of the Costa Rican Political Constitution, have a higher rank than regular national laws. Said hierarchy is ratified in article of the Public Administration General Law N° 6227, 2/5/1978.

Chart 4.5.1. Main international conventions and agreements related to climate change and environmental protection ratified by Costa Rica.

Law	Convention Name	Date
Law N° 7414	United Nations Framework Convention on Climate Change	La Gaceta N° 126 of 7/4/94
Law N° 7513	Central American Convention on climate changes Guatemala	La Gaceta N° 128 of 7/6/1995
Law N° 5605	Convention on International Trade in Endangered Species of Wild Flora and Fauna	1/28/1975
Law N° 7224	Convention on Wetlands of International Importance especially as Waterfowl Habitat (RAMSAR Convention)	La Gaceta N° 86 de 8/5/1991
Law N° 7226	Central American Convention for Environmental Protection (Constitutes the Central American Committee for Environment and Development)	La Gaceta N° 88 of 5/10/1991
Law N° 7416	Convention on Biological Diversity	La Gaceta N° 143 of 7/28/1994

Law N° 7433	Convention for the conservation of biodiversity and the protection of priority wildlife areas in Central America	La Gaceta N° 193 of 10/11/1994
Law N° 7572	Regional convention for the management and conservation of forest ecosystems and the development of Tree plantations	La Gaceta N° 47 of 3/6/1996
Law N° 7699	United Nations Convention to Combat Desertification and Drought, in particular in African countries	La Gaceta of 11/3/1997

National forestry sector

In relation to specific legislation issued at the country level that aims to protect the forest, it must be started by the Political Constitution which is the highest norm, which in Article 50 incorporated the right of all people to enjoy a healthy and ecologically balanced environment, consistent with that principle, several Laws, regulations and executive decrees exist, whose purpose is ensuring the conservation of the environment, which are detailed below (**Chart 4.5.2.**).

Chart 4.5.2. Legal framework applicable to the national forestry sector.

Forestry Law N° 7575 of 4/14/1996 and its Forestry Regulation, Decree Nº 25721-MINAE of 10/17/1996 as amended.

The Law states as a function of the State to "ensure the conservation, protection and management of natural forests and the production, exploitation, industrialization and promotion of the country's forest resources." Prohibits changing the land use in forest-covered land and regulates the conditions for its use; regulates the industrialization and export of roundwood. Creates the figure of forest regents and involves civil society in the protection and conservation of forests and forest lands, defines environmental services and creates the National Forestry Financing Fund to finance sustainable management of forest activities, reforestation, agro forestry systems, recovery of denuded areas, improved utilization and industrialization and for the Payment for Environmental Services of forests and plantations. In relation to protected wildlife areas it grants the State the authority to expropriate private domain lands; it establishes the State Natural Heritage and regulates the activities that the State may authorize; creates the protection areas. It also includes a chapter on offenses and penalties for invasion of the State Natural Heritage, the use of forest resources without permission and environmental damage.

Executive Decree N° 38323-MINAE, La Gaceta N° 72 of 2/14/2014.

Regulates the Payment for Environmental Services, which is complemented with the Manual for Payment of Environmental Services, published in La Gaceta No. 46 of 3/6/2009, as amended, which provides for all the procedures for awarding payments for environmental services.

Decree N° 27998-MINAE, of 6/22/1999.

Sets the Principles, Criteria and Indicators for the Sustainable Management of Secondary Forests and the Forestry Certification in Costa Rica.

Executive Decree N° 27388-MINAE of 9/18/1998.

On Principles, Criteria and Indicators for the Exploitation and Management of Forests and Certification.

Executive Decree N° 34559- MINAE of 1/8/2008.

Sets the Sustainability Standards for Natural Forests Management: Principles, Criteria and Indicators, Code of Practices and Procedural Manual and the Regulations on Forestry Regencies.

Decree N° 38444-MINAE of 2/20/2014.
Regulates the requirements for the accreditation of forestry regents, develops the duties both of the regents, and of their Professional Association; it also includes all the formal procedures for the performance of regencies and sanctions in case of failure.

Executive Decree N° 25700-MINAE of 11/15/1996.
Sets a comprehensive and complete ban on the exploitation of endangered trees.

Organic Law of Environment N° 7554 de 10/4/1995.
Sets the Environmental Impact Assessment as a tool to protect the environment and creates the National Environmental Technical Secretariat as the office competent to perform them. Reiterates the authority of the Executive Branch to establish protected wildlife areas and to include as part of these private farms, establishing the expropriation as a means to achieve it, forbids the reduction of these areas unless technical studies justifying the change are issued. Creates the Environment Comptroller's office attached to the Minister of the Environment and Energy. Provides for administrative sanctions before the violation of rules that might be harmful to the environment and creates the Environmental Administrative Tribunal as a decentralized entity of MINAE, with exclusive competence and functional independence in the performance of its duties; its rulings will be mandatory. These instruments have been applied contributing in great extent with the conservation of the environment.

Biodiversity Law N° 7788 of 4/30/1998 and its Regulation, Executive Decree N° 34433-MINAE of 3/11/2008.
Article 22 creates the National System of Conservation Areas, a decentralized body of the Ministry of the Environment and Energy, which integrates the competences in forestry, wildlife and protected areas. It is in charge of the management and institutional coordination in order to plan and execute actions, as well as the issuance of policies to ensure the sustainable management of natural resources. The system incorporates the Directorate General of Wildlife, the State Forestry Administration and the National Parks Service that will fulfill their duties and responsibilities as a single instance, using the administrative structure of the System, without prejudice to the purposes for which they were established. Includes rules that promote the adoption of incentives and compensation for environmental services for the conservation and sustainable use of components of biodiversity, including criteria that respond to principles of environmental law of great importance for conservation, such as the precautionary principle or *indubio pro natura*, the environmental public interest and integration. It also refers to the payment for environmental services, as incentives for the conservation of biodiversity

National Parks Service Law, Nº 6084 of 8/24/1977.
Sets prohibited or permitted activities within the national parks.

Land Use, management and Conservation Law, N° 7779 of 4/30/1998 and its regulation, Executive Decree N° 29375-MAG of 8/8/2000.
It aims to protect, conserve and improve lands in integrated and sustainable management with the other natural resources; it states that the Ministry of Agriculture and Cattle Farming shall coordinate with the Ministry of the Environment and Energy the management actions for land conservation and the

conservation of environmental resources and regulates matters related to use practices, management and soil remediation.

Law for the Development, promotion and enhancement of organic agricultural activities, N° 8591 of 6/28/2007.
Defines the agricultural environmental benefits, including the mitigation of GHG emissions by means of fixing, reducing, seizing, storing and absorbing; the protection of water; the protection of biodiversity in integral organic agricultural systems, for their conservation and sustainable use, as well as the protection of organic agro-ecosystems.

The Indigenous Law N° 6172 of 11/29/1977 and its Regulation, Executive Decree No. 8487 of April 26, 1978 and Executive Decree No. 13568 of April 30, 1982 (Legal representation of Indigenous Communities by Development Associations as Local Governments).
Sets the inalienable and imprescriptible character of indigenous territories, stating that they are the property of indigenous communities; it also includes the rule mentioned in article 7 according to which forest lands must keep said nature in order to maintain the hydrological balance of watersheds, conserve wildlife; as a principle, it states that natural resources must be exploited in a rational manner.

Legal framework specific for REDD+ in Costa Rica

REDD+ Preparation

Executive Decree N° 37352-MINAET of 8/27/2012, published in La Gaceta N° 220 of 11/14/2012 sets the legal framework for the coordination and preparation of REDD+. This executive decree implements the Executive Secretariat that works as the support to the National Fund for Forest Financing in the design of National REDD+ Strategy, per the terms and conditions set forth in the FCPF Readiness Donation agreement, donation TF012692. This Secretariat is assigned with duties such as the development of the consultation plan, the execution of the Social and Environmental Strategic Assessment, the development of a forest reference level and the preparation of National REDD+ Strategy. The National Fund for Forest Financing is defined as the headquarters for the Secretariat. The decree also created a REDD+ Executive Committee and assigns it specific roles. Currently, said decree is undergoing an amendment in such a way that it clarifies the specific duties and responsibilities of the different public organizations involved in the implementation of the Emissions Reduction Program, as well as other provisions related to the safeguards and participation mechanisms of the relevant stakeholders in the implementation of the Emissions Reduction Program, as well as other provisions related to the safeguards and participation mechanisms of the relevant stakeholders. Since the aforementioned decree is still under negotiation, more explicit institutional arrangements are not included.

With a view of improving the implementation framework of National REDD+ Strategy and the Emissions Reduction Programs, a decree is being prepared to clarify the roles and responsibilities of the different relevant stakeholders. At this moment, there is a bipartite committee between and the relevant stakeholders represented at the National Forestry Office.

REDD+ Implementation

The legislation addressed to protect natural resources in Costa Rica is abundant and even though some weaknesses can be identified related to the legal interpretation, confusion about some competences and lack of institutional and financial capacity for their compliance in some areas, it can be affirmed that overall, its contents provide sufficient support for the policies, actions and activities proposed by the National

REDD+ Strategy and in the Emissions Reduction Program. The decree also includes regulations that clarify the issue related to the administrating entity of the Strategy which shall be the State Forestry Administration through the National System of Conservation Areas and the National Fund for Forest Financing for the competences of each institution according to the legislation in force.

Notwithstanding the foregoing, there are some features that the legislation might need to amend for it to be harmonic with other rules of higher rank, such as the handling of natural resources by indigenous peoples so that their right of self-determination and autonomy is included; however, taking into consideration the implications of a legal reform, it is possible to improve the regulations by means of executive decrees, that would not prevent the subsequent legislative amendment. The topics related to the participation and insertion in areas under special arrangements may be strengthened with the issuance or amendment of executive decrees to strengthen their participation according to the particular features of each group.

Regarding the legal security related to land tenure, the legislation provides legal tools to move forward in this process, such as the case of the indigenous territories. For other tenure rights included within the two thousand meters border zone, the State Natural Heritage, the lands under administration of the Port Management and Economic Development Board of the Atlantic Coast, titling projects of the Rural Development Institute, the situation is complex and although there is legislation related to land tenure, it does not respond to the existing reality, and the interpretation of the rules is made both at the administrative and judicial levels, that do not favor land holders. In order to solve the land tenure problem, a legal reform is necessary to include innovative ways to conserve natural resources, allowing for the integration of local populations.

Finally, it would also be appropriate to amend the definition of the environmental services at the legal level, allowing the incorporation of other type of activities in addition to those appearing in the legislation in force.

4.6. Expected lifetime of the proposed ER Program

Implementation period of actions and interventions

The main political actions that the country implements in the forestry sector are based on current legislation have public resource sources in the framework of the National Planning System and budget. The Payment for Environmental Services program is the largest investment and it has resources granted by Law or regulations, either due to taxes on fuel or for water use fees. The foregoing implies that the main policies for forest conservation are guaranteed ad perpetuam, at least as long as the legal framework remains valid, and it is very unlikely that it will be amended in the short term because of the high level of social support that these initiatives have. On the other hand, the country is working on a long term financing strategy to produce appropriate conditions to guarantee the sustainability of the National REDD+ Strategy, including access options to financial resources from the private sector, the World Bank (Green and Inclusive Development Program in Productive Rural Areas), the Climate Green Fund and bilateral cooperation.

The Emissions Reduction Program will be implemented in the 2010-2015 period. This, considering the formal finalization of the Carbon Fund in 2025 and the country assessment on the Nationally Determined Intended Contributions to be submitted before the United Nations Framework Convention on Climate Change during the 2020-2025 period. In this sense, the Program will be part of a larger effort that the

country will exercise in order to move sufficient financial funds for the full implementation of the National REDD+ Strategy.

5. Stakeholder Consultation and Participation

5.1. Description of stakeholder consultation process

Relationship between REDD+'s National Strategy and the Emission Reduction Program consultation process

The policies, actions and activities proposed in the Emissions Reduction Program Document are an integral part of Costa Rica's REDD+ National Strategy. Both documents were developed and discussed with a wide participation of relevant stakeholders. This process will continue until March 2016, to obtain their final feedback. The above-mentioned is developed in the consultation process framework, which was defined since the beginning of REDD+ readiness phase. The consultation process is composed by three stages: information, pre-consultation and consultation. The Policies and actions proposed in the Program and in the Strategy are a result of the information and pre-consultation stages, which included the systematization of risks and opportunities identified by the relevant stakeholders during the Social and Environmental Strategic Assessment (SESA).

The SESA workshop was held in 2011. It was an activity in which the stakeholders validated the different actors that encompass the forestry sector. The relevant stakeholders were defined as indigenous people, small and medium forestry producers, wood industries, academy and government. The stakeholders mentioned above, are now parties of REDD+ Executive Committee. During the workshop they also developed their feedback for Costa Rica's Readiness Preparation Proposal (R-PP). As a result of this workshop, the stakeholders provided the main risks and opportunities of the strategic options proposed in the R-PP. This risks and opportunities are approached in the Environmental and Social Management Framework. The process developed to define the policies, actions and activities is explained in **Section 4.3.**, sub-section Methodology for the definition of the measures proposed.

As part of the feedback process, in August 2015, the National REDD+ Strategy and the Emissions Reduction Program were presented to the Executive Committee, as the representative entity of Relevant Stakeholders . It was also presented to a larger audience, constituted by members from the social and private forestry sector. During both meetings, participants' comments were compiled and then incorporated in bothe document's relevant sections . Even though the consultation process is going to be extended until March 2016, no substantive modifications regarding proposals on policies and actions are expected; however, if that was the case, all contributions will be incorporated in updated versions of both documents. As part of the given participatory approach, both documents must be dynamic and they have to properly adjust, as information or political decisions arise in order to attend political goals or the relevant stakeholders' needs. These might arise as part of the consultation process itself, or from the Information, Feedback and Disconformities Mechanism, described in **Section 14** of this document.

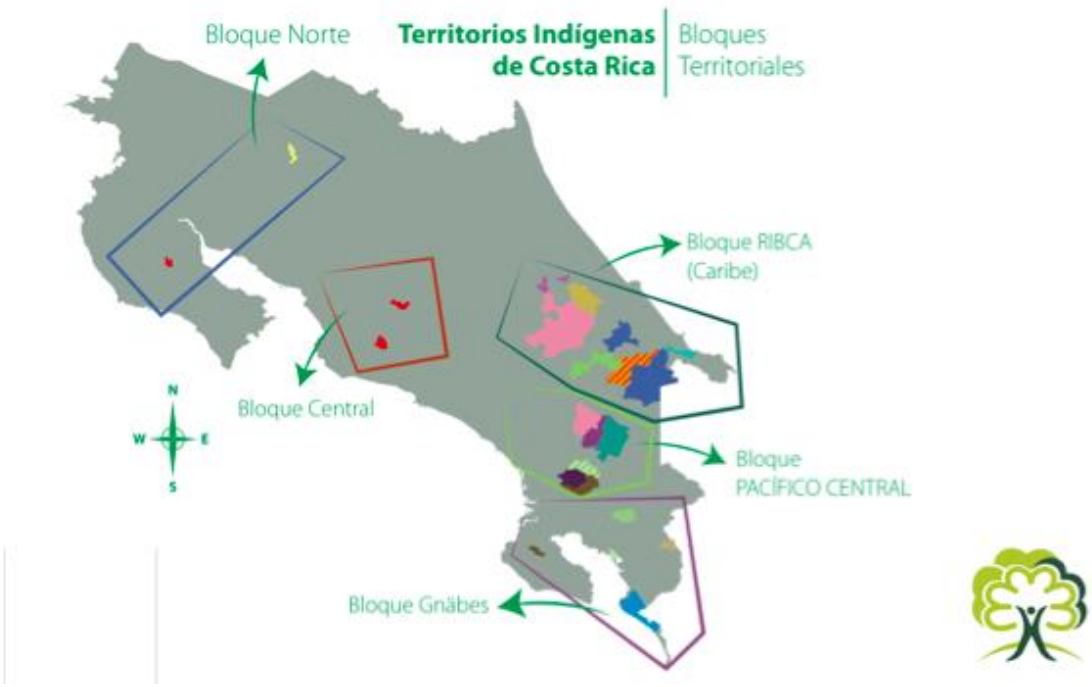


Figure 5.1.1. Structure of indigenous groups and territories in Costa Rica.

Consultation and exchange information mechanisms during the design of policies, actions and activities

As shown in the figure above, Costa Rica's twenty four indigenous communities, decided to organize themselves into four territorial groups, gathered according to their resemblances regarding geographic location, culture and worldview,. They also established their participation process during REDD+'s readiness phase, taking into account their culture and national and international legislation.

Indigenous people, defined that their participation would be based into a three-stage process: *information:* corresponding to a culturally appropriate explanation about REDD+ and the progress made during readiness phase, including a continuos communication process, informing about the main achievments and following steps. For this purpose, the cultural mediators program was implemented. Cultural mediators are indigenous people trained in topics related to REDD+, which have the ability of bringing simplified information in their own languages, using the same REDD+ conceptualization from their worldview. They developed this process through dialogues wihin the indigenous action plan. Additionally, cultural mediators performed using culturally appropriate materials, which were designed using a participatory approach, as a result of the participative communication plans that established the appropriate communication channels to spread the information. The second stage corresponded to *pre-consultation was* the space in which the analytical discussion on the indigenous special topics, safeguards, co-benefits and related aspects was undertaken. Finally, the *consultation* stage as so, is the final validation of REDD+ Strategy.

Likewise, in order to guarantee a sustainable dialogue with indigenous people, and upon their request, an indigenous committee shall be created. This entity will meet three times a year to keep an active dialogue with the government. The Committee's aime is to have a constant feedback in all REDD+'s stages.

Moreover, forestry and agro-forestry producers established their own participation structure aswell. In 2012-2013, a series of informative activities regarding REDD+ and its relation with the small and medium agroforestry producers were held along the country's regions and sub-regions. The participants defined the sector's representative structure during said meetings. In 2014, six regional workshops and a national workshop were held, as part of the early dialogue initiative, to discuss drivers of deforestation and degradation in each region. During the activities, they also analyzed REDD+'s strategic options, providing feedback and defining possible risks according to the sector's needs and perspectives. The activities mentioned above contribuited with the proper feedback to the elaborate the policies, actions and activities of Costa Rica's REDD+ National Strategy. These discussions deepened in 2015. During this process contributions were compiled into a payment for environmental services proposal, addressed to small forestry and agro-foresty producers. This proposal was included as a political action within the National REDD+ Strategy.

Understandable language and mechanism's cultural appropriate approach

As described in the preceding section, the information process is based on a participative communication strategy that contemplates the cultural mediators program, as well as the culturally appropriate communication channels, wich were defined jointly with the indigenous people. In this sense, didactic materials, such as banners with information about climate change, the importance of carbon in forests and REDD+ activities were prepared to enhance the cultural mediator's performance. Furthermore, two informational videos were created, local radio stations were used to transmit advertisments and invitations for the meetings, several posters, brochures and local communication channels were developed to describe how indigenous people interpret REDD+ concept according to their worldview. Moreover, a web site and social networks were created and the, Bank Information Center developed a case study analizing the whole process. National Mass Media has transmitted over 20 news.

Since early stages, indigenous leaders stated that REDD+ was a very complex and technical process, and would present a challenge to guarantee the indigenous people full understanding. Because of these, the Bri-bri-Cabecar Indiginous Network), , proposed to implement the *cultural mediators' program. Cultural Mediators are* indigenous people, who have been trained in matters related to REDD+ capable to provide the simplified information in their own language. This process is implemented through participative communication plans, in which the proper communication channels were defined to spread information, such as REDD+'s conceptualization according to their worldview . The main communication channels included banners, local media (radio) and dialogues among the community during the pre-consultation workshops. This initiative was implemented in the five indigenous blocks, according the organization structure defined..

The consultation process developed is considered a non-carbon benefit itself, because of the capacity building achieved. The activities undertaken were developed with culturally appropriate materiales. These materials were possible, because of the indigenous people active participation, which analyzed ILO 169, and Cancun safeguards along with the government. This way they interpreted the elements mentioned above according to their reality and culture. As a result of this process an early dialogue among the indigenous people and the central government has begun. This to improve communitie's quality of life , their rightscontinue to guarantee transparency in the future.. In the near future, the last stage of the consultation process will take place, as well as , broadcasting results, strengthening of women participation and the planning of the indigenouss people special topics; A series of studies will be developed with REDD+,

how ever, it is expected to be continue with the central government, since some of them, like land tenure go beyond REDD

Along the information and pre-consultation process with the small and medium agroforestry producers a didactic methodology and participatory approach has been undertaken. This way, the different concepts were understood by this sector allowing them to provide the proper feedback according to their needs.

Furthermore, different committees and a communication strategy have been created for each. This way the people and their have access to REDD+`s information. Regarding the small and medium forestry and agroforestry payment for environmental services proposal, it was the sector itself that carryied out the analysis and production activities, as well as their socialization, with a methodology that considers their daily lives in productive activities. There is an initial proposal that will be considered in subsequent analyses and dialogues.

General vision for the consultations process and sessions during the Program's implementation

The definition of formal and informal participation strucutres that promotes the dialogue among the sector is one of the main milestones of the readiness phase, regarding the participation and consultation process with the relevant stakeholders. REDD+'s Executive Committee is one of these structures. This instance serves as a consultative committee that facilitates dialogue and participation between indigenous people, agro-forestry producers; land overexploited owners and the government.

Publications and other information sources used

The information process is based on a participative communication strategy that comprises appropriate communication channels, defined in plans that were produced with each relevant stakeholder. For the indigenous people, the main communication process is the cultural mediators program. On the other hand, for small and medium forestry and agro-forestry producers, a communication plan was defined for the informative stage and a communication committee was created. Furthermore, corporate communication elements were set for the private sector, government and academy.

A diversity of communication tools has been developed, such as informational banners on climate change, importance of carbon in forests and REDD+ activities. Three informational videos were developed to inform about REDD+'s general vision. The videos are about REDD+ readiness phas, the cultural mediators training process and the latest video is about lessons learned and main challenges. Additionally, posters on how indigenous people interpret REDD+ concept according to their worldview were prepared, advertisement in local radio, brochures and local media, such as posters and flyers. Also, a web site is available, as well as social networks. The Bank Information Center wrote a study case about the participation process and approximately 100 lectures have been presented in universities and state institutions. Approximately, 20 news in local media were transmitted.

During the implementation of the Emissions Reduction Program and the National REDD+ Strategy, the aim is to continue with a two-way communication process, broadcasting the initiative's progress through the communication committees and communication channels in state institutions. There is also an intention to create a learning process in referent issues to co-benefits and it is expected that the communities themselves will empower the communication process.

Mechanisms to receive and respond to feedback

Several mechanisms to sustain a permanent dialogue with the stakeholders were set, such as the Information, Feedback and Disconformities Mechanism (described in detail in **Section 14** of this document), Costa Rica's REDD+ website, cultural mediators process, territorial coordinators and the Executive Committee. Additionally, product of the early dialogues with indigenous people and small agro-forestry producers, a direct relationship was established between the REDD+ Secretariat and the stakeholders, which has facilitated the achieved results and a participatory processes. It is also important to mention the broadcasting process for technical documents and reports to obtain stakeholders' feedback. The process starts by sharing each document's draft along with a matrix,. This way stakeholders can present their questions andof comments that the actors send with their consultations and/or remarks; they then present the documents developed in a workshop and finally, they are sent via e-mail and become available in the website.

Continuous and effective consultation process during the Program's implementation

Starting the readiness phase, the main challenge was to set the organizational and representative structures for each sector. However, upon completion of this phase, the challenge described above became one of its main results, because the stakeholders have their own structures or have strengthened the existing mechanisms.

Indigenous peoples created four territorial groups, defined according to their geographic location, culture, political vision and worldview. At the same time, they created a direct communication channel with the Presidency Minister form Government, with a defined agenda, being REDD+ one of the items. Additionally, small forestry and agro forestry producers defined the participation platforms in six regions along the country.

During th Emissions Reduction Program, implementation, the aim is to facilitate three meetings per year to strengthen the structures and promote dialogue and information exchange on the progress of the processes. Regional communication committees will also remain active for both sectors and annual strategic and operational communication plans will be prepared for each sector.

Comprehensive and effective participation of the relevant stakeholders

Costa Rica's readiness phase has been highly participative. The relevant stakeholders' needs are taken into consideration. An intersesectoral dialogue has been developed for over five years, with solid participation structures and feedback. The Executive Committee is one of these figures; it has representation of all the sectors and its purpose is to guarantee comprehensive and effective participation. The members of the Committee were selected through democratic procedures and it is consistent with Cancun safeguards.

It is of high importance that REDD+ opened the possibility to adapt the Payment for Environmental Services Program to the stakeholder's needs. This new proposarl takes into account indigenous people and small agro forestry producers' needs according to their culture and daily life. In this sense, both sectors have produced a proposal for additional modalities of Payments for Environmental Services that are being analyzed for their development during the implementation stage.

Participation and Transparency processes for the discusing issues related to land tenure and resource

During a national workshop, the strategic options for emission reductions defined in the R-PP were presented, to the relevant stakeholders. In the activity, the stakeholders analyzed the proposal's social and environmental impacts. This way, the indigenous people defined five main risks that would be addressed as thematic axes or special topics in order to mitigate the risks. These topics are: land tenure, benefit sharing , natural resource management in indigenous territories, participative monitoring and the overlap between protected areas and indigenous territories. Even though these five topics described above are a priority to this sector, a critical route to address them within REDD+'s Framework was developed. The critical route undertakes,+, studies such as the design of an Indigenous and Small foresty and agroforestry producersPSA, topography training for indigenous people, analysis of the Dualok Kimo Program, for the monitoring and assessment topic. However, it is important to mention that the implementation of some of them such as land tenure will be implemented through the central government. In **Section 4.4** form this document is an exhaustive explanation of these points. .

Transparency and participation process for the defining arrangements in benefit sharing

In 2011, an integral information and participation process began. During the process the stakeholders recommended benefit-sharing models beyond the Payment for Environmental Services Program. The reocmmendations promoted several discussions, leading to proposals of new financing mechanisms for the REDD+ National Strategy.. The political actions defined consider the possibility to continue working on these initiatives in order to reach an appropriate framework for the benefit-sharing.

5.2. Summary of the comments received and how these views have been taken into account in the design and implementation of the ER Program

Following the workshops held during the information and pre-consultation stages with the relevant stakeholders (indigenous populations, small and medium forestry and agro forestry producers, government, private sector, academy), risks and opportunities were identified in relation to the 10 strategic options initially proposed in the R-PP. Once the risks and opportunities were identified, over 100 repeated topics were systematized and grouped in 27 larger topics, which were wider and more integral. Afterwards, five risk axes were identified. From this information, the REDD+ Secretariat proposed six policies that cover the risk and opportunities axes. It is important to mention that the Secretariat performed a consistency analysis of the strategic options initially filed in the R-PP, with the policies, actions and tasks finally defined, finding compatibility amongst them. Finally, the six policies defined will be subject to the consultation process starting in November, 2015.

Additionally, and according to the practices implemented towards the participation of relevant stakeholders during the preparation stage, and following the guidelines of the consultation plan, a national workshop was held in order to have a first approach to the representatives of each sector and to show them the first version of the Emissions Reduction Program document. Members of the REDD+ Executive Committee, the Board of Directors of the Costa Rican Forestry Chamber, the National Forestry Office and the National Fund for Forestry Financing were invited, as well as the regional representatives, small and medium forestry and agro forestry producers, indigenous advisors to the REDD+ Secretariat, coordinators of indigenous territorial blocks, members of the business sector and government institutions. During the workshop, the Executive Director of the National Fund for Forest Financing welcomed the participants and explained that the activity represented a first approach and stated the relationship between the National

REDD+ Strategy and the Emissions Reduction Program. Subsequently, the REDD+ Secretariat presented the first drafts of the Strategy and the Program, and finally, a space for questions and comments on both presentations was opened.

In extraordinary meeting of the Executive Committee held on September 10, elements of the Emissions Reduction Program were with the World Bank's Mission and it was agreed to send this section to the attendants so the section was validated.

Below, there is a systematization of the comments and feedback of the document for the Emissions Reduction Program during the meetings mentioned above. Additionally, it was decided that this activity would be executed with each sector.

Table 5.2.1. Matrix of the comments received during the first socialization workshop of the Emissions Reduction Program.

Interested stakeholder	Comment	Response
Government	The agricultural sector sees potential in the program, as the REED+ process has been quite productive and innovative, providing studies with relevant technical data and platforms that give rise to multi-sector discussions	The secretariat recognizes the importance of these multi-sector platforms and discussions and will promote said dialogue.
	It was determined that there are opportunities to identify pilot experiences in coffee and cattle agro forestry schemes that could be useful. It is also necessary to define the agro forestry systems that could be within the REDD+ scheme, since they are part of the agricultural sector and could trigger inter-sector coordination processes	Currently, these proposals are being supported with the design of the Peasant IPSA. Furthermore, it will consider the progress in the coffee and cattle NAMAs and in any other NAMA to be designed by the Ministry of Agriculture, in order to achieve seamless integration.
	The sector suggests considering the possibility to include carbon captured in the ground within the accounting because it is an important reservoir for the agricultural sector.	Notes are taken with possibilities on how it can be included.
Private forestry sector	The draft of the Emissions Reduction Program addresses only 3 of the 5 REDD+ activities (conservation, avoided deforestation, rising stock). The sector expressed its concern about the non-inclusion of forest management within the program and wishes to know the reason for this decision and in what time the remaining activities will be included.	Given the strong interest of the sector in including these activities, the Emissions Reduction Program was amended to incorporate the five REDD+ activities, including sustainable management of forests and the enhancement of carbon stocks from forest plantations. This must be supported with data and methods for the accounting of emission reductions for these activities, and for this reason, FONAFIFO has assigned REDD+ preparation budget and its development is expected for 2016.

Interested stakeholder	Comment	Response
	It is understood that both the REDD+ Strategy as well as the Emissions Reduction Program will be developed in the framework of the forest and rural development program (pbdr); however, it is necessary to clarify pbdr's legal framework.	The forest and rural development program is a political initiative of the present government which should be based on an appropriate legal framework. In the meantime the National REDD+ Strategy and the Emissions Reduction Program will be conceptualized within the Forest and Rural Development Program, without implying an affectation to the strategic objectives of REDD+.
	The private forestry sector has participated in various activities for the preparation of the Strategy as well as in the follow-up consultancies to promote the sustainable use of wood. However, the sector considers that its participation in the construction of the proposed Program as well as in the drafting of document was not sufficient, which is reflected in the fact that forest management was not included in the draft program proposal which has a very strong focus towards conservation. Due to this circumstance, it is requested that these issues be included in the operational planning of the emissions reduction program.	With the new resources from the donation, the dialogue process including local, regional and national levels will be strengthened.
	It is requested to include in the preparation package activities ($5 million), the reference levels and other requirements for the prompt incorporation of forest management, forest plantations, carbon stocks in wood products and agro forestry systems.	Notes are taken with possibilities on how it can be included.

Interested stakeholder	Comment	Response
	The private forestry sector requests that sector negotiations of the benefit distribution mechanism be started, so that it generates ownership and trust amongst the relevant stakeholders.	Notes are taken with possibilities on how it can be included.
	The definition of the strategic role for this Program is very ambitious, eradicate poverty and contribute significantly to the purchase of lands in ASP, this could disperse the foundation of REDD+ in Costa Rica in relation with emissions reduction by deforestation and degradation of forests and the enhancement of carbon reserves, a key role of forest owners, located in private property.	REDD+, intends to contribute achieving the millennium goals, for instance, in reducing poverty, since eradicating poverty through REDD+ is in fact pretentious.
	To propose the reduction levels mentioned above in page 9, the country depends on the forests located in private property; however, as we will discuss below, the distribution of benefits is focused on promoting the consolidation of the ASP and other activities not linked to forest ecosystems, except the support they may receive through the payment for environmental services program.	Notes are taken with possibilities on how it can be included.
	It is evident that the country is unable to sustain its forest cover entirely with the PSA program and maintaining forests in full protection, so it is essential to foster productive linkages, as properly stated in the strategic role of the Emissions Reduction Program, namely: ...strengthen the participation of all relevant	Notes are taken with possibilities on how it can be included.

Interested stakeholder	Comment	Response
	stakeholders in the reactivation of production, processing, marketing and consumption of domestic wood, through a joint effort between the State and private forestry, in particular by fostering entrepreneurship amongst micro, small and medium producers. However, this is not reflected in the actions of the Program and is not either in the mechanism for the distribution of benefits. Reversing deforestation and forest degradation is only possible thanks to the effort of private owners. Hence the importance of resuming sustainable forest management with commercial purposes as part of the emissions reduction program, otherwise it will not be sustainable, given that the owner obtains no rent for submitting his land to forest conservation. Added to the fact that the deforested area within the ASP is small and therefore has little impact.	
	Notice how at the level of deforestation drivers in private forests the lack of competitiveness of the forestry management is considered as well as the high income of agricultural products, nonetheless, there is an administrative ban to forest management that severely restricts the adoption of management plans, which is not mentioned in the document..	Notes are taken with possibilities on how it can be included.

Interested stakeholder	Comment	Response
	The argument for excluding sustainable management of natural forests is the lack of information, however, during the consultancy mentioned in the preparation stage, minimum information required was produced to generate a baseline for this activity. Which as we saw is very low, so there are enormous opportunities for this activity. The forestry sector considers unacceptable that this Program does not include sustainable forest management although it stands out as one of the most important barrier to address deforestation drivers.	Notes are taken with possibilities on how it can be included.
	On page 25, it is confirmed that the Program is mainly focused in solving the problems of lands purchases within the ASP, and its benefits will be limited to reduce the deforestation drivers in Costa Rica; it only produces a small relief to the government in view of its inability to solve this problem.	Notes are taken with possibilities on how it can be included.
	It is questionable that the Program contemplates prioritization of the PSA for forest protection in ASP and to consider a possible increase of the amounts just because these are lands not properly expropriated by the government. Clearly, the purchase of some lands does not guarantee a significant impact on the reduction of deforestation, and it is clear that deforestation mostly takes place in private property lands. It is also unacceptable that it is intended to allocate a percentage of the	Notes are taken with possibilities on how it can be included.

Interested stakeholder	Comment	Response
	mechanism resources of REDD+ distribution of benefits to the purchase of lands in ASP.	
	The Private Forestry Sector considers that the focus of the Program is institutional, since it seeks to strengthen the PSA Program, the consolidation of Protected Wildlife Areas and the control programs of forest fires and illegal logging of SINAC; however, its impact is very limited in private property areas, which is where most of the deforestation and forest cover loss take place. It is requested to include activities that generate productive linkages, such as forest management, forest plantations and agro forestry systems. As these are the ones that can offer a greater contribution to improve the quality of life, rural development and forest sustainability. .	Notes are taken with possibilities on how it can be included.
	The CCF asks to develop the baseline for the productive sector; therefore, it is necessary to identify funding for this action, without decimating the scarce resources available to develop business models as proposed by the private forestry sector. A period no longer than one year must be established to develop a full baseline of the country including the productive actions such as forest plantations and forest management.	Notes are taken with possibilities on how it can be included.

Interested stakeholder	Comment	Response
	According to the CCF, it is essential to set a clause in the cooperation agreement of the Emissions Reduction Program that in the course of a year will be presented as action plans for all the strategic actions of REDD+ including increased carbon with forest plantations and sustainable forestry management.	Notes are taken with possibilities on how it can be included.
	The CCF considers that the country baseline must be reviewed so the lack of data does not produce wrong estimates on basic concepts such as the identification of areas under deforestation risk to complete the criteria for the distribution of benefits.	Notes are taken with possibilities on how it can be included.
	The CCF sets that resources to develop business models of the forestry sector should receive priority in Costa Rica.	Notes are taken with possibilities on how it can be included.
Small and Medium forestry and agro forestry producers	The sector considers that Fonafifo has made a good resource management and that it also has an executive secretariat with trustable technicians that have tried to train us on different subjects and have periodically informed of the process and their management. Additionally, the sector considers that both documents (the REDD+ Strategy and the Emission Reduction Program) are proposals, and consider they constitute good input; however, they ask for time to be able to analyze the documents in their respective regions.	One of the responsibilities of the Executive Secretariat is the periodical information of the progress on PIRs, as well as the strengthening of sectors' capacities. This document is a draft of the proposal which must receive feedback and be consolidated within the framework of the consultation process that is being performed with the PIRs. The process has a period for feedback on the proposals. The secretariat will clearly inform the terms for said feedback.

Interested stakeholder	Comment	Response
	The REDD+ process has had wide participation and it is natural in processes that the biggest the number of participants, the biggest the challenge to reach agreements; however, the members of the Executive Committee have great expectations before REDD+ and have been able to work harmonically and to achieve an inter-sector dialogue space.	REDD+ is a participative construction process that must have high participation of the relevant stakeholders as defined by the forestry sector. It is intended to continue promoting this participation, strengthening the existing inter-sector, and governance entities' dialogues, such as the REDD+ Executive Committee.
	The sector requests that the decree for REDD+ Strategy be ready prior to the consultation, the orienting principles are good, but the policies differ from them. It is necessary to negotiate in the decree, the peasant psa, the mechanism for the distribution of benefits.	The recommendation is taken.
	The sector considers that the emission reduction program should be oriented towards the strengthening of the country productive center, and not only to strengthen the State natural heritage but that it should be more balanced between the different relevant stakeholders of the Costa Rican forestry sector. The sector considers that the agro forestry systems should contribute to the country's REDD+ strategy.	As soon as the data is obtained, the reference level will be produced and included.
	The sector considers that the policies developed in the emission reduction program must be coherent with the input compiled during the SESA process. In the current scheme, only one of the six policies is addressed to the small producers' sector. This group stated that	The measures included in the Program are policies, actions and specific tasks derived from a participative process with the relevant stakeholders, especially within the framework of the Environmental and Social Assessment of the information and pre-consultation of the

Interested stakeholder	Comment	Response
	policy 5 is the one that could affect the sector the most.	REDD+ National Strategy. From the participation workshops, a series of risks and opportunities were identified, related to the 10 strategic options preliminarily proposed at the Costa Rica's R-PP. This participation process includes indigenous lands, forestry producers, relevant public entities and the private sector. With the risks and opportunities identified, over 100 repetitive topics were systematized in 27 common topics which were broader and more integral[25]. Subsequent to this, five strategic axes were identified for the attention of these risks and the promotion of opportunities. From that information, REDD+ Executive Secretariat proposed six policies that cluster the groups and risk and opportunities axes. In addition to this, the Secretariat included other specific actions within the framework of the six policies for emission reduction, according to the country interests as defined by the Ministry of the Environment and Energy. It must be noted that the REDD+ Executive Secretariat performed a consistency analysis of the strategic options initially proposed at the R-PP, along with the policies, actions and tasks finally defined, and found full compatibility between both.

[25] There is a risks and opportunities matrix that allows observing the traceability of the risks, as identified by the relevant stakeholders, up their systematization, clustering and conformation in policies, actions and tasks.

Interested stakeholder	Comment	Response
		Finally, the six policies defined will be subject to the consultation process. The sector is invited to start a dialogue in order to identify more clarity in the language of policies, actions and activities. However, the Secretariat considers that the policies respond completely to the participation and consultation processes that the Government of Costa Rica has developed within the framework of REDD+.
	It is necessary to set a baseline through regional practical models for small producers. The suggestion is to use the peasant psa model as defined within the REDD+ framework (meaning the participation of the small producer at the social level, and his actual contribution to carbon rupture).	The sector will continue to receive support in order to refine the Peasant PSA proposal.
	El sector considers that the Emission Reduction Program document has a good technical level; however, the background section should be better balanced to reflect the contribution of the rural sector and civil society to the achievements of the country in reducing deforestation.	Said section will be reviewed.
Indigenous populations	Within the framework of the REDD+ preparation process, the indigenous organizational structure was promoted. It is important to note that this sector has actively participated in the process by the development of regional meetings to analyze the documents. Notwithstanding this, the sector needs to consolidate the indigenous	Work will continue in the framework defined considering culturally appropriate spaces and reasonable times for feedback and for the systematization of the reports. The secretariat is making progress in the systematization of the resulting information of the reports per territory.

Interested stakeholder	Comment	Response
	territorial block in a language that is culturally appropriate to guarantee the input collected in the field is duly entered in the Strategy and of the Emission Reduction Program documents.	
	It is important to clarify the section of orienting principles, since they mix-up with actions and methodological guidelines. One of these principles should be oriented towards the respect of indigenous populations' rights.	It will be answered clarifying this item.
	The agreement entered with the 19 indigenous populations dated September 10 and 12, 2012 should be remembered and respected; said agreement addressed the following: -Implementation of the program within the framework of indigenous Payment for Environmental Service. The execution of at least 34.000 hectares in indigenous territories. -This project will give priority to the most deforested indigenous lands.	It will be taken into account in its due process, in the mechanism for the distribution of benefits, through the Indigenous PSA proposal.
	It is necessary to clarify the way in which the policies were defined, taking the SESA as the base. Additionally, there is a feeling that the policies do not give security to the consolidation of safeguards demanded by indigenous populations.	The SESA process included the participation of the PIRs, with which the most important concerns were compiled; these were entered into the existing policies and actions, however it is recognized that there might be gaps and said concerns could be satisfied during the consultation process. With respect to the safeguards, a socialization and consultation plan will be prepared about the

Interested stakeholder	Comment	Response
		MGAS in order to explain the practical applicability on how this instrument safeguards the Lands.
	What relationship does the Emission Reduction Program have with C-Neutrality? How will the topic of carbon rights for indigenous lands be addressed? It is necessary to identify the implications that this topic has for the indigenous populations and the rights acquired by purchasers.	The carbon rights issued is being addressed within the national legal framework in a way that it corresponds to the requirements of the different mechanisms in which the country might decide to participate. In this regards, the specific safeguards to protect the integrality of the Indigenous Lands will be applied. As this topic moves forward, the indigenous institutions with which the State is working will be trained.
	The indigenous sector stated its concern that the REDD+ processes allow for developed countries to continue polluting the atmosphere.	This is an important topic that is being addressed within the framework of the Framework Convention on Climate Change.

6. Operational and Financial Planning

6.1. Institutional and implementation arrangements

Institutional arrangements for REDD+ implementation

The required institutional arrangements for operating the ER-P are based on the Organic Law of the Environment, the Forestry Law, the Biodiversity Law and the Indigenous Law[26], per **Section 4.5**. Thus, Costa Rica's institutional and legal frameworks serve as the base for implementing the ER-P. In this way, the ER-P's arrangements are closely linked to the current legislation and the tasks mandated to the different public entities. **Table 6.1.1**. show the main and associate implementers for each policy action proposed.

All operating entities are part of the structure of the State Forestry Administration, and so are subject to the direction of the Minister of MINAE. Additional arrangements may be required outside the existing regulatory framework. For example, new operational procedures among SINAC, FONAFIFO and CENIGA must be agreed, especially for MRV and to operate the SIS. Other sub-arrangements will be required with public institutions, for example, with the Costa Rican Institute of Electricity (ICE), the National Institute of Rural Development (INDER), as well with with other land-holders that are part of the State Natural Heritage[27] but have not formally registered their lands yet.

Organization for the day-to-day operation of the ER-P

- The office of the Minister of MINAE is the political director of the ER-P,
- FONAFIFO will be in charge of managing the ER-P administratively and financially[28]
- The implementation of policies, actions and activities will be jointly coordinated by SINAC, FONAFIFO and CENIGA, according to their legal responsibilities. Each policy action has a leading implementation entity (Table 6.1.1., based on Section 4.3.),
- With regards to MRV, CENIGA under the supervision of the high-level committee (Section 1.3.), will coordinate the follow-up of the reference level through the national land use/cover monitoring system (Section 9),
- Benefit sharing will be a responsibility of FONAFIFO, under the political direction of the Minister of MINAE and under supervision of the high-level committee,
- FONAFIFO will execute the Safeguards Plans and ensure complianc with the relevant World Bank's operational policies (Section 14),

[26]If necessary, additional arrangements may be agreed with Indigenous Development Associations for Indigenous Territories.

[27] Article Nº15 of the Forestry Law determined that such lands must be immediately incorporated to the State Natural Heritage.

[28]FONAFIFO has ample experience managing financial operations.,For example, Ecomercados I and II and the FCPF readiness grant.

- CENIGA will report how the Costa Rica addresses safeguards through the SIS,

- FONAFIFO runs the Feedback and Grievance Redress Mechanism (FGRM) through its Comptroller of Services,

- FONAFIFO is in charge of coordinating the consultation and information exchange process with stakeholders.

Other public entities/institutions will be involved in the implementation of specific policy actions, for example, the Ministry of Agriculture and Livestock (MAG), ICE and the Port Administration Board of the Atlantic Coast (JAPDEVA). These entities are part of the Environment Sector, according to a organization decree issued by the Executive Branch of the Government, and as such they are subject to the political direction of the Minister of MINAE. Moreover, these entities are subject to the political direction of the Minister through the Environment Sector Council (visit here for a brief history of MINAE and its relation to the Environment Sector Council).

Table 6.1.1. Main (IP) and associate implementers (IA) of specific activities. Table 4.3.1. showed policy actions; this table shows activites, a more detail level of the ER-P operations.

Activities	MINAE	AFE	FONAFIFO	ONF	CIAGRO	SINAC	SNIT	RN-C	CONAGEBIO	DCC	MAG	ADI	CENIGA	IMN
	Entities/institutions (see not below for definition of acronyms)													
1.1.1. Update the Illegal Logging Control and Forest Fires Management Strategies	IA					IP								
1.1.2. Capacity building workshops	IA					IP								
1.1.3. Assemble fire crews to control wildfires	IA					IP								
1.1.4. Purchase of equipment and supplies	IA					IP								
1.1.5. Improve control over critical forest areas (consider satellite technology)	IA					IP								
1.1.6. Conduct awareness campaigns	IA					IP								
1.1.7. Strenghen the role of SINAC's regional offices in fire management	IA					IP								
1.1.8. Strenghen institutional capacities (admin, human resources, financing, operational and technological)	IA					IP								
1.2.1. Implement the Illegal Logging Control Strategy	IA					IP								
1.2.2 Reactivate the Natural Resources Watch Committees and the Volunteers Associations and develop an action plan in coordination with SINAC	IA					IP								
1.2.3. Build capacity in public officers at CIAgro, the Police, the Prosecutor's Office, the Administrative Environmental Court, the Environmental Comptroller, courts, MAG, MINAE, the members of the Natural Resource Watch Committees and other organized groups			IA			IP								IA
1.2.4. Execute additional law enforcement operations to reduce the illegal use, exploitation and transportation of forest products						IP								
1.2.5. Design audit plans to guarantee transparency, fraud control and consistency of timber harvesting permits issued for forest management by the State Forestry Management and CIAgro					IA	IP								
1.2.6. Ensure additional financial resources to increase current accountability and control of measures by SINAC and CIAgro, related to the implementation of forestry activities					IA	IP								
1.2.7. Include additional mechanisms in the Grievance and Redress Mechanism for allowing citizens to participate in the identification of illegal forestry						IP								
1.2.8. Develop monitoring programs with indigenous peoples and other communities with high forest loss						IP								
1.2.9. Strengthen illegal logging control measures in Protected Conservation Areas and in the State Natural Heritage						IP								
1.2.10. Increase the participation of Environmental Regional Councils, SINAC's Regional and Local						IP								

Activities	Entities/institutions (see note below for definition of acronyms)													
	MINAE	AFE	FONAFIFO	ONF	CIAGRO	SINAC	SNIT	RN-C	CONAGEBIO	DCC	MAG	ADI	CENIGA	IMN
Councils in the sustainable management of forest.														
1.2.11. Improve institutional capacities (management, human resources, financial, operational and technological) of SINAC and other entities related to logging control						IP								
1.2.12. Update regulations, operational and financial capacities to strenghen control measures by CIAgro					IP									
1.2.13. Revise the comptroller role of SINAC and CIAGro in relation to indigenous territories					IA	IP								
1.2.14. Strengthen logging control by indigenous peoples through the *Dualök Kimö* program						IP						IA		
1.3.1. Design/adjust a national land use/cover monitoring system according to the methodological requirements of REDD+ and in consistency with the national GHG inventory and any other specific requirements defined by IMN						IA							IP	IA
1.3.2. Define a MRV strategy consistent with the requirements of REDD+						IA							IP	IA
1.3.3. Identify a financing and sustainability strategy to guarantee that the monitoring system (activity 1.3.1.) is able to regularly provide the information necessary for the REDD+ MRV						IA							IP	IA
1.3.4. Identify any potential additional institutional arrangements required to implement the monitoring system defined in activity 1.3.1.						IA							IP	IA
1.3.5. Implement a community-based monitoring strategy in areas with critical deforestation or forest degradation and that have high conservation value.						IP						IA		
1.3.6. Develop a participative M&E mechanism with Indigenous Territories						IP						IA		
1.3.7. Implement special C monitoring protocols for mixed lands (agriculture and forestry) and consider MRV for existing AFOLU[29] NAMAs						IP	IA	IA			IA			
1.3.8. Implement special C monitoring protocols for urban forest C stocks and stock changes (Settlements; S)						IA							IP	
1.4.1. Update (and improve) the State Natural Heritage's land inventory, especially for lands yet to be registered by MINAE						IP		IA						
1.4.2. Conduct a specific land-tenure analysis in the State Natural Heritage						IP								
1.4.3. Apply appropriate procedures for including public lands (pending formal registration) to the State Natural Heritage	IA					IP								
1.4.4. Perform a land use and land use potential analysis for the State Natural Heritage, in order to define specific REDD+ goals	IA		IA			IP					IA			
1.4.5. Develop management plans for lands in the State Natural Heritage, to increase REDD+ results,						IP								

[29] AFOLU: Agriculture, Forestry and Other Land Uses, as defined by the 2006 IPCC Guidelines for national GHG inventories.

Activities	Entities/institutions (see note below for definition of acronyms)														
	MINAE	AFE	FONAFIFO	ONF	CIAGRO	SINAC	SNIT	RN-C	CONAGEBIO	DCC	MAG	ADI	CENIGA	IMN
through a variety of interventions, including the need of additional institutional arrangements														
1.4.6. Secure funding for transferring lands to the State National Heritage.	IA		IA			IP								
1.4.7. Develop a resource management strategy for the full incorporation of lands to the State Natural Heritage	IA		IA			IP								
1.4.8. Achieve consistency of delimitation and demarcation rules on areas under special land-tenure regimes						IP		IA						
1.5.1. Update the inventory of land under tenure by third parties in Protected Conservation Areas						IP		IA						
1.5.2. Update the Protected Areas Project (PAP) and develop an implementation and financing strategy						IP								
1.5.3. Design and execute a long-term financing strategy for purchasing lands in Protected Conservation Areas						IP								
1.5.4. Prioritize PSA payments in Protected Conservation Areas, and consider potential increases in payments			IP											
1.5.5. Increase the designated amount from the national budget for purchasing lands in Protected Conservation Areas						IP								
1.5.6. Promote the voluntary adherence to the state forest regime						IP								
1.5.7. Allocate REDD+ monetary benefits to purchase lands in Protected Conservation Areas						IP								
1.5.8. Update management plans for Protected Conservation Areas to promote REDD+ activities						IP								
1.6.1. Harmonize the National REDD+ Strategy, the National Biodiversity Strategy and the National Action Plan to avoid Desertification and Drought			IP			IA								
1.6.2. Harmonize the National REDD+ Strategy , the National Strategy on Climate Change and the National Adaptation Plan			IP							IA				
1.6.3. Integrate the National REDD+ Strategy and the planned framework for Sustainable Development Goals.	IA		IP											
1.6.4. Target REDD+ efforts in priority biodiversity conservation areas, watershed protection zones and prioritiy land restoration areas, including the increase of restoration actions associated to endangered species			IA			IP					IA			
1.6.5. Implement strategies to communicate the importance of forest and biodiversity conservation, as well as other environmental services	IA					IP								
1.6.6. Support the Sustainable Biodiversity Fund (FBS) with REDD+ resources			IP											
1.6.7. Develop an assessment of low- environmental impact practices available for biodiversity conservation	IA					IP								
1.6.8. Direct REDD+ investments in priority biological corridors			IA			IP			IA					

Activities	Entities/institutions (see notes below for definition of acronyms)														
	MINAE	AFE	FONAFIFO	ONF	CIAGRO	SINAC	SNIT	RN-C	CONAGEBIO	DCC	MAG	ADI	CENIGA	IMN
1.6.9. Analyze SINAC's and FONAFIFO's operational efficiency to implement REDD+ and define first steps for operation			IP			IA								
1.6.10. Develop, jointly with relevant entities, monitoring mechanisms of social and environmental impacts of REDD+ actions in priority areas			IP											
1.6.11. Harmonize the National REDD+ Strategy with the Rural Landscape Restoration Strategy			IP											
1.7.1. Regularly update the deforestation and forest degradation driver analysis			IP											
1.7.2. Analyze, review and adjust public policies and incentives to diminish deforestation and forest degradation			IP											
1.7.3. Ensure consistency of forest-related policies with REDD+			IP											
2.1.1. Update the National Forestry Development Plan with the participation of Indigenous Territories, according to the principles of Free, Prior and Informed Consent (FPIC)	IP		IA	IA		IA								
2.1.2. Identify gaps between national and international legal regulations in regards to resource management in Indigenous Territories	IA		IP									IA		
2.1.3. Adopt any appropriate modifications to the current National Forest Development Plan by means of a decree or a specific legal amendment	IA		IP									IA		
2.2.1. Support conflict resolution mechanisms for areas where land-tenure is disputed and consider the participation of the Ministry of Justice and Peace (MJP) and the Ombudsman Office, including the development of protocols where relevant	IA					IP								
2.2.2. Develop an alternative mechanism for settling land tenure disputes in indigenous territories and small agroforestry producers in relation to REDD+	IA		IP											
2.2.3. Improve and make widely available a mechanism to report disconformities by other public institutions and communal territories, as well as provide additional opportunities for its periodical assessment			IP			IA					IA			
2.3.1. Assess if limitations exists (legal, economic, technical, logistic) of small and medium agroforestry producers in areas under special land tenure regimes for participating in REDD+			IP											
2.3.2. Develop studies and implement plans for producing additional economic and social benefits through REDD+ or other policy actions for small and medium forestry producers			IP											
2.3.3 Develop a joint plan between MINAE, MAG and the private sector to inform, train, and assist efforts by farmers and small agroforestry producers, including indigenous territories, for marketing goods and services	IP										IA			
3.1.1. Develop guidelines and implementation plans for those components of the National Forestry Development Plan related to techonological and managerial capacities, especially those related to timber industrualization	IA			IA		IP								

Activities	Entities/institutions (see notes below for definition of acronyms)														
	MINAE	AFE	FONAFIFO	ONF	CIAGRO	SINAC	SNIT	RN-C	CONAGEBIO	DCC	MAG	ADI	CENIGA	IMN
3.1.2. Update studies, start dialogues and capacity building processes to address current competitiveness weaknesses in the forestry sector across the production chain, and propose solutions	IA			IA		IP								
3.1.3. Conduct studies and implement strategies to identify markets for national and international timber and non-timber forest products and identify sources of financing for starting business models	IA					IP								
3.1.4. Strenghen the participation of research and academic centers to update knowledge on potential improvements to management, silviculture and genetic management of tree species	IA			IA		IP								
3.1.5. Document successful experiences in silvicultural mangament by region, species, for tree plantations, forest management and agroforesrty systems	IA			IA		IP								
3.1.6. Promote a dialogue with relevant stakeholders on the lessons learned in silvicultural management	IA					IP								
3.1.7. Foster exchanges between farmers and indigenous territories on forest and agroforestry system management	IA					IP						IA		
3.1.8. Design quality indicators for forest management and for evaluating PSA reforestation	IA			IA		IP								
3.1.9. Assess legal and administrative options to use fallen timber in forests, including in Protected Conservation Areas is adequate, mainly for increasing benefits for small organizations and forestry producers	IA			IA		IP								
3.2.1. Develop a joint MAG-MINAE plan to build capacity of forestry producers on sustainable management of forests, plantations and agriculture, including the reactivation of the Forest-Agriculture Comission	IA					IP					IA			
3.2.2. Develop a system to award timber produced in sustainable ways and supported with PSA payemnts	IA		IA			IP								
3.2.3. Promote low-cost certification systems for forestry producers	IA					IP								
3.2.4. Strenghen regional and local organizations providers of genetically-improved trees				IA		IP					IA			
3.2.5. Develop good practice manuals for silvicultural production in collaboration with academia	IA			IA		IP					IA			
3.2.6. Improve outreach activities in MAG, CIAgro and MINAE to provide assistance to producers	IA					IP					IA			
4.1.1. Contribute to the update of land-tenure studies in all indigenous territories in coordination with the relevant government institutions			IP				IA	IA						
4.1.2. Support the development of a long-term plan for regularizing indigenous land rights			IP									IA		
4.1.3. Contribute to the design of a culturally- appropriate mechanism for settling legal disputes related to land tenure in indigenous territories; such mechanism will be designed in coordination with			IP									IA		

Activities	Entities/institutions (see note below for definition of acronyms)													
	MINAE	AFE	FONAFIFO	ONF	CIAGRO	SINAC	SNIT	RN-C	CONAGEBIO	DCC	MAG	ADI	CENIGA	IMN
the Ombudsman Office, the Ministry of Justice and Peace and the Ministry of the Presidency														
4.1.4. Determine the status of rights to emission reductions and potential mechanisms for their transfer to the FCFP Carbon Fund			IP											
4.1.5. Support the design of a legal and cadastral assistance mechanism for indigenous territories, with the goal to help clarify land-tenure rights			IP											
4.2.1. Contribute in the assessment of land-tenure in every area under special land-tenure regimes (with the exception of indigenous territories			IP											
4.2.2. Support the development of a long-term plan for clarifying land-tenure rights in areas under special land-tenure regimes			IP											
4.2.3. Contribute to the design of a mechanism for settling legal disputes related to land tenure for areas under special land-tenure regimes (excluding indigenous territories); such mechanism will be designed in coordination with the Ombudsman Office, the Ministry of Justice and Peace and the Ministry of the Presidency			IP											
4.2.4. Determine the status of rights to emission reductions and potential mechanisms for their transfer to the FCFP Carbon Fund			IP											
4.2.5. Support the design of a legal and cadastral assistance mechanism for areas under special land-tenure regimes, with the goal to help clarify land-tenure rights			IP											
4.3.1. Develop a registry of public lands elegible for REDD+ implementation			IP				IA	IA						
4.3.2. Assess public land-tenure regimes and determine institutional arrangements for the transferring emission reductions rights to the FCPF Carbon Fund			IP			IA								
4.4.1. Review current legislation to identify potential contradictory provisions on border delimitation in areas under special land-tenure regimes.			IP				IA	IA						
4.4.2. Propose legal and/or regulatory amendments to fix potential delimitation issues in conflict zones			IP				IA	IA						
5.1.1. Prioritize Costa Rica's territory according to its potential for REDD+, considering all REDD+ activities			IA			IP								
5.1.2. Harmonize criteria between the National Forestry Development Plan and the FBS for guaranteeing legal and political security to citizens when investing in REDD+	IP		IA			IA								
5.1.3. Develop public policy to add value to forests and forestry production to reduce pressure for land use change	IP		IA	IA		IA			IA					
5.1.4. Identify high REDD+ social and environmental co-benefits areas to prioritize investments			IP			IA								
5.1.5. Expand PSA payments to other environmentalservices currently not defined in the Forestry Law, but with legal basis in other regulatory bodies (through a legislative or regulatory review).			IP											

Activities	Entities/institutions (see note below for definition of acronyms)														
	MINAE	AFE	FONAFIFO	ONF	CIAGRO	SINAC	SNIT	RN-C	CONAGEBIO	DCC	MAG	ADI	CENIGA	IMN
5.1.6. Conduct information campaigns on the importance of PSA, REDD+,, the social and environmental benefits of sutainably managing forests, and the promotion of tree plantations and forest conservation.			IP											
5.1.7. Explore opportunities to expand PSA payments to other activities and consider increases in current payments per activity			IP											
5.2.1. Identify options to broaden the scope of the PSA to allow coexistence of productive activities, agricultural and forest conservation.			IP								IA			
5.2.2. Identify legal, technical and operational restrictions to expand PSA and implement measures to allow for expansion.			IP											
5.2.3. Identify additional sources of finance beyond PSA			IP											
5.2.4. Design innovative financing modalities, develop pilot applications and assess results			IP											
5.2.5. Design and test a mechanism for the integral management of agroforestry farms, by combining forest-related environmental services and agroecosystem services, with social benefits (i.e. a new PSA modality).			IP								IA			
5.2.6. Design and test a culturally appropriate forestry management and financing mechanism for indigenous territories (i.e. new PSA modality).			IP									IA		
5.2.7. Develop a capacity building program for farmers, agroforestry producers and indigenous peoples to improve knowledge on how to access benefits from these new financing mechanisms (see activity 5.2.5 and 5.2.6.)			IP	IA							IA	IA		
5.2.8. Explore further options to prioritize PSA allocation to indigenous territories			IP			IA								
5.3.2. Identify ways for the Domestic Carbon Market (DMC) to finance REDD+ activities			IP							IA				
5.3.4. Develop a long-term financing strategy for the full implementation of the National REDD+ Strategy			IP			IA					IA			IA
5.3.5. Operate and regularly assess the performance of the Benefit Sharing Mechanism (BSM) with participation of relevant stakeholders			IP											
6.1.1. Define a Safeguards Information System (SIS) to comply with REDD+'s safeguards under the UNFCCC and other applicable safeguards (i.e. World Bank and other implementation partners)	IA		IP			IA								
6.1.2. Clarify the variables, criteria and indicators of the SIS and a format for reporting to the UNFCCC	IA		IP			IA								
6.1.3. Develop a plan to integrate the SIS to the National Environmental Information System (SINIA) and determine if further arrangements are required for generating regular information	IA		IP			IA								
6.1.4 Share the design, results and reports derived from the SIS, including a Results and Reports Sharing Mechanism	IA		IP			IA								

Activities	Entities/institutions (see note below for definition of acronyms)													
	MINAE	AFE	FONAFIFO	ONF	CIAGRO	SINAC	SNIT	RN-C	CONAGEBIO	DCC	MAG	ADI	CENIGA	IMN
6.1.5. Build capacity to ensure the timely generation of information as part of the SIS	IA		IP			IA								
6.1.6. Prepare regular SIS reports consistent with national and international requirements	IA		IP			IA								
6.2.1. Share with stakeholders and formally recognize (make official) the Social and Environmental Management Framework (ESMF) of the National REDD+ Strategy			IP											
6.2.2. Inform and build capacity in civil society and public officers involved in the operation of the FGRM			IP											
6.2.3. Implement and assess on a annual basis, with participation of the relevant stakeholders, the results of the ESMF and the FGRM			IP											
6.2.4. Develop a dialogue and systematic communication platform with relevant stakeholders.			IP											
6.3.1. Achieve consistency between REDD+ MRV and the National MRV Framework for informing the COP on Costa Rica's progress towards achieving the ultimate goal of the UNFCCC			IA			IA							IP	
6.4.1. Develop a strategy to further consider gender, and cultural diversity in REDD+, based on available preliminary studies	IP													
6.4.2. Develop information, training, outreach and obtain financing to promote the participation of women in REDD+	IP													

Entities/institutions: MINAE: Ministry of Environment and Energy, SINAC: National System of Conservation Areas, AFE: State Forestry Administration, FONAFIFO: National Fund for Forestry Financing, CENIGA: National Center for Geo-Environmental Information, IMN: National Meteorological Institute, ONF: National Forestry Office, CIAgro: Agronomists Association, SNIT: National System of Territorial Information, RN-C: National Registrar – Cadastral Office, CONAGEBIO: National Committee for Biodiversity Management, DCC: Climate Change Direction, MAG: Ministry of Agriculture and Livestock, ADI: Indigenous Development Associations.

Institutional capacity for the implementation of the Program

Operational arrangements of the ER-P are based on current legislation, including specific tasks and capacities of the existing institutions. According to Section 1.3., institutions in charge of managing and implementing the ER-P have demonstrable technical, political and managerial capacities. For instance, MINAE is political director of the forestry sector. FONAFIFO executes the PSA since 1997. SINAC has regional offices across the country and run numerous programs for the management of forest resources and emission reductions (i.e. illegal clearing and forest fire management).

The government's legal ability to sign an ERPA is explained in Section 1.3. and 4.5. Institutions such as FONAFIFO have institutional capacity to sign contracts with land-owners and market environmental services, i.e. PSA is a benefit sharing mechanism and has been operating since 1997. Particularly for the ER-P, MINAE provides political direction, as well as technical, administrative and financial management capacities for benefit sharing.

The reference level was defined by FONAFIFO during the REDD+ readiness phase. SINAC has demonstrated ability to implement a national forest inventory (NFI). FONAFIFO runs a Service Comptroller and so is able to manage the FGRM, as well as follow-up on Safeguards Plans and the ongoing National REDD+ Consultation process.

Relationship of the national implementation framework for REDD+ with the implementation framework for the ER-P

The National REDD+ Strategy is implemented through the ER-P, so the implementation framework is the same. Both are based on the Environment Organic Law, the Forestry Law, the Biodiversity Law and the Indigenous Law, as well as relevant international legislation for REDD+. All REDD+ related emission reductions will be produced under the ER-P. The ER-P may go beyond the ERPA term and future innovations to the REDD+ Strategy will be consistent to the currently proposed REDD+ policy and program framework.

6.2. ER Program budget

The ER-P budget was prepared in collaboration with relevant government institutions, such as FONAFIFO, IMN, SINAC and MAG. Most ER-P finance comes from PSA and SINAC's forestry programs. Two workshops were held (May and September 2015) to analyze the required methods and data to develop a REDD+ financing plan.

The selected methodology considers all costs and income sources, and identifies necessary financial resources for implementing the ER-P[30]. The financial planning was focused on the REDD+ policy framework presented in the ER-P (Section 4.3.)[31]. Each policy action was classified according to: i) Direct or indirect impact on emission reductions, ii) Land-tenure regime,, iii) Whether the action is new, iv) Budget origin, v) Main implementer, vi) Financing planning level.

There are four financing planning levels:

[30]Terra Global Capital: Description and Process of the Planning Financing Program for Emission Reduction (ER) in Costa Rica. June 2, 2015

[31]Policies in the EN-REDD+ CR, V4 SEPT 24.

- Level 1-REDD+ Program Administration: additional budget expenses of institutions managing the ER-P

- Level 2-REDD+ National Policies: transaction costs to implement new policies

- Level 3- REDD+ Sub-programs: costs to run program actions for implemeting (new) policies. These are not administrative costs, but refer to direct investments such as training, technical assistance, infrastructure , direct payments or others

- Level 4-REDD+ Activities: costs associated to the individual REDD+ activities to reduce emissions or enhance carbon stocks, including REDD+ activities promoted by REDD+ Sub-programs (Level 3)

Annex 1 includes a table with Financial Projections for the ER-P (period 2010-2025) which includes: i) sellable emission reductions by year, ii) total ER-P costs, iii) source of income, (mainly, FONAFIFO's PSA and and SINAC's forestry programs and; iv) an estimated price per t of CO_2-e ,.

At this stage of financial planning, it is assumed that the main implementers are FONAFIFO and SINAC. Thus, only their budgets were analyzed. The goal of the financial planning process is to determine the cost of reducing emissions for 2010-2015. . Annex 1 is based on the methods described here.

Financial Projections may be subject to review and modification by Costa Rica at any time.

7. Carbon pools, sources and sinks

7.1. Description of Sources and Sinks selected

Sources/Sinks	Included?	Justification / Explanation
Emissions from deforestation	Yes	Emissions from anthropogenic deforestation are a significant source[32] of GHG emissions; this source is included in the reference level. For the 1996-2009 period, average annual emissions from anthropogenic deforestation is 7,217,881 t CO_2-e yr^{-1} (98.36% of the de total emissions from deforestation) and is comprised of: • Emissions from anthropogenic deforestation of primary forests[33]: 5.293,057 t CO_2-e yr^{-1} (72,13%) • Emissions from anthropogenic deforestation of new forests[34]: 1,924,824 t CO_2-e yr^{-1} (26.23%) Emissions associated to non-anthropogenic forest loss (120,282 t CO_2-e yr^{-1}, 1,64%) are excluded because they are associated to the impact of volcanic activity and to the natural variation of river courses and other natural water bodies in areas with forest cover. Of these emissions, 87,824 t CO_2-e $year^{-1}$ (1,20%) correspond to non-anthropogenic loss of primary forest and 32.458 tCO_2-e $year^{-1}$ (0,44%) to loss of non-anthropogenic loss of new forests. Emissions from non-anthropogenic forest loss are excluded from the reference level. Non-anthropogenic emissions will be consistently measured and transparently reported in future monitoring events. *Note*: Non-anthropogenic emissions were excluded because future natural disturbance events may present an important risk, especially given Costa Rica's geograhical location and its vulnerability to stand-replacing disturbances such as volcanic activity, landslides and flooding.
Emissions from forest degradation	No	Emissions from forest degradation are excluded due to the lack of reliable data and methods. However, Costa Rica has proxy-derived *indications* suggesting that forest degradation could be a significant source of emissions. Nonetheless, the 2012 national GHG inventory determined that

[32] According to indicator 3.3 of the Methodological Framework of the World Bank's Carbon Fund, "significant" is defined as >= 10% of the total emissions related to forests in the accounting area for the historical reference period and during the term of the Emission Reduction Payment Agreement.

[33]Forthe construction of the reference level of emissions and forest absorptions and for future measurement, report and verification of emissions and absorptions associated to forests, "primary forests" are defined as all the forests that were not "new forests" by 1986 (see next footnote for the definition of "new forests").

[34]Within the context of the reference level and the future measurement, report and verification, "new forests" are the secondary forests and forestry plantations. Secondary forests are natural forests that grow in lands that in the past were not classified as forest lands.

Sources/Sinks	Included?	Justification / Explanation
		forest land remaining forest land (FLFL) is a net sink which absorbed 7.438.500 t CO_2-e in 2012. According to a pilot study conducted in 2014, proxy data may suggest that emissions from forest degradation may be higher than previously thought, (although they are not greater than removals). This was determined by an assessment of canopy cover change in FLFL (primary forest only) between years 2001 y 2013[35]. Results showed that 1,322,217.00 hectares of forest presented a "stable" canopy cover (no gains or losses recorded), while in 398,747.97 hectares canopy cover was reduced and in 494,578.26 hectares it actually increased. Thus, canopy cover increases are 24% greater than canopy cover losses at the national level. This assessment is based on proxy data and does not consider carbon stock changes (CSC) in terms of t Co_2-e yr^{-1}. However, CID 2015.c[36] includes a first approximation. According to these results, forest degradation should be addressed in future MRV to avoid underestimating emissions in FLFL. Costa Rica acknowledges that forest degradation could be a significant source of GHG emissions. However, neither methods nor data are yet available to fully understand emissions in FLFL. This poses significant technological and methodological challenges that must be addressed as part of the planned improvements for the national land use/cover monitoring system (Section 9). Noting paragraph 10 of Decision 12/CP.17, Costa Rica will implement a *step-wise approach* for improving its reference level and MRV by incorporating better methods and data, considering adequate and predictable support as mentioned in paragraph 71 of Decision 1/CP.16. Therefore, Costa Rica excludes emissions for forest degradation from the ER-P, until better methods and data are available. If methods and data are improved, the reference level may be recalculated. However, until this is done, Costa Rica proposes to repeat the assessment methodology every 4 years (every second Biennial Update Report or BUR) to ensure emissions (using proxy data) from FLFL are not significantly increasing during the

[35] The pilot assessment was developed for the Government of Costa Rica by Agresta *et al.* (2015.b) for yrs 2000 and 2012. According to the rules used to define the map dates (explained in section 8.3 of the ERPD), the map which Agresta *et al.*calls 2000 corresponds in reality to yr 2001, while the map for 2012 does correspond for yr 2012. In order to assess the canopy cover percentage of primary forests, the map of canopy cover percentage for yr 2000 (in reality 2001) was intersected with the land-cover map for 2001. For yr 2013, since there was no map on land-cover for 2012, the estimate of primary forest canopy cover was estimated by crossing the map of canopy covers for 2012 with the land-cover map for 2013.

[36] The methodology and the results of the significance analyses are presented in: CDI, 2015.c. Analysis of the significance of carbon stocks in forests that remained as forests. Report on the consultancy prepared for the Government under the Carbon Fund of the Forest Carbon Partnership (FCPF). 12 p.

Sources/Sinks	Included?	Justification / Explanation
		term of the ERPA.
Enhancement of forest C stocks	Yes	Removals in FLFL (primary forests) are not included as part of the C accounting framework due to lack of reliable data and to keep consistency with the exclusion of emissions in FLFL (forest degradation). Removals in land converted to FL (new forests) are a significant sink (-4.422,008 tCO_2-e yr^{-1} between 1996 and 2009). This sink is expected to remain significant during the ERPA term, given that at the beginning of the ER-P (2010) there were 810.671 hectares (36,17% of the total forest areas) of new growing forests and that in average, between 1996 and 2009, a total 27.707 hectares of new forests were regenerated every year. C stock changes per hectare in new forests are estimated using biomass accumulation curves, calibrated with *in situ* field data according to Cifuentes (2008).
Conservation of forest C stocks	Yes (but not in the reference level)	It is included in the ER-P, but not in the reference level. This sink refers to all existing C stocks in FLFL (primary forests) since 1986. Costa Rica is not seeking results-based payments for this activity from the FCPF Carbon Fund. It is included in the ER-P, as the ER-P is the implementation framework for the National REDD+ Strategy, and therefore, it includes all REDD+ activities. This activity is not part of the reference level, but is reported biennially. The goal is to quantify the effort made by the country in mantaining existing forests. For this reason, MRV results should be understood as: $\mathbf{X}_{i...j}tCO_2$-e yr^{-1}, $\mathbf{Y}_{i...j}tCO_2$-e where: • **X**: Net emissions reductions for years $_{i...j}$ • **Y**: Conserved C stocks for years $_{i...j}$
Sustainable management of forests	No	Emissions/removals associated to forest management are excluded due to the lack of reliable data. Furthermore, the total area under forest management in Costa Rica is very small (<500 ha yr^{-1}). Additionally, silvicultural practices are not stand-replacing, but remove small timber volumes every 15 years. For these reasons, it is considered plausible that emissions/removals may not be significant. As part of the concluding readiness activities, Costa Rica will collect better information to eventually be able to estimate these emissions/removals, given its goal to increase forest management and harvested wood produts (HWP) as part its

Sources/Sinks	Included?	Justification / Explanation
		National REDD+ Strategy (Section 4.3.).

7.2. Description of Carbon pools and GHGes selected

Carbon stocks	Selected?	Justification / Explanation
Above-ground biomass (AGB)	Yes	AGB contains the highest proportion of C stored in forests (between 50-79% of the total estimated C per ha). Hence, AGB is included in the ER-P's C accounting framework. AGB was estimated by using preliminary data[37] of the National Forest Inventory (NFI) and other data sources obtained from scientific literature relevant to Costa Rica.
Below-ground biomass (BGB)	Yes	BGB represents between 12-21% of total C stocks per ha. BGB C is included in the C accounting framework. BGB C stocks were estimated from the AGB by using the Cairns *et al.* equation (1997)[38], which is consistent the national GHG inventory.
Litter	Yes	Even though litter represents <10% of emissions from deforestation (and <10% of total C stocks), it was included in the estimation of C stock changes, because there are high quality Tier 2 data for its estimation. Most litter data come from relevant and nationally derived scientific literature.
Deadwood	Yes	Even though it only contributes to <10% of emissions from deforestation, deadwood was included in the estimation of emission factors because there are Tier 2 national data available for its estimation.
Soil C	No	Soil C was excluded from the C accounting framework due to lack of reliable national data to estimate the exchange rates of C in the different land use change transitions. It is assumed that during the term of ERPA (15 years), C stock changes would not result in significant emissions. On the contrary, considering that lands converted to FL are greated than deforested areas, it is possible that soil C is a net sink in Costa Rica. However, it is acknowledged that better national data is required for the estimation of soil C stocks

[37] "Preliminary" because during the months in which the reference level was built the final results of the National Forest Inventory were not yet available and the database facilitated by the Conservation Areas National System was still undergoing revision.

[38]Cairns, M. a., S. Brown, E. H. Helmer, G. A. Baumgardner, 1997. Root biomass allocation in the world's upland forests. Oecologia 111:1-11.

		changes. The exclusion of soil C may generate conservative emission factor estimates, with the likely exception of wetlands and FL with high water tables and soil C contents. This might be the case of palm forests (yolillales), but the anthropogenic deforestation in this forest type represented 5,18 % (1,603.82 ha $year^{-1}$) of the total anthropogenic deforestation. Another example is mangroves, but deforestation in this forest type was 1,00% (310.04 ha $year^{-1}$) of the total deforestation.

GHG	Selected?	Justification / Explanation
CO_2	Yes	Carbon dioxide is the main gas emitted by anthropogenic activities in the LULUCF sector; CO_2 is the only gas absorbed when forest C stocks are enhanced.
CH_4	Yes	Considering that *slash-and-burn* is the most accessible technology to convert forests, methane was considered to account for non-CO_2 emissions associated to biomass burning (FL converted to other land use categories). Expert judgement was used to estimate the percentage of C stocks that were burned. Such estimates vary with time as this practice has considerably decreased in Costa Rica following the promulgation of the Forestry Law in 1996.
N_2O	Yes	Same as for methane.

8. Reference level

The reference level presented to the FCPF Carbon Fund is preliminary. Costa Rica may modify it to keep consistency with the 2012 national GHG inventory included in Costa Rica's first Biennial Update Report (BUR). The 2012 national GHG inventory was presented at COP21 in Paris. Costa Rica will ensure proper alignment with the reference level by January 4th (due date for the submission of the forest reference emission level/forest reference level [FREL/FRL] to the UNFCCC Secretariat for technical assessment). Hence, by this date, Costa Rica will:

- Submit a REDD+ FREL/FRL to the UNFCCC Secretariat,

- Update Sections 8 and 13 of the ERPD to reflect changes in the reference level included in the ER-P to the FCPF Carbon Fund (the relationship between the FREL/FRL and the reference level included in the ERPD is discussed in Section 8.6).

8.1. Reference Period (preliminary).

Start and End Dates of the reference period

01.01.**1996** - 12.31.**2009** (14 years).

Rationale of the historical reference period

Base year (1996): 1996 is the year when the Forestry Law was passed including its instruments and mechanisms (e.g. PSA). Considering 1996 as the base year would imply a historical period not longer than 15 years per indicator 11.1 of the Carbon Fund methodological framework. Starting the historical reference period at 1996 allows for the consideration of emissions and removals that have resulted from the implementation of the current Forest Law. Because of this, it can be used to measure emission reductions that are "additional" to the normal performance of current forest policies and programs. This date was strategically selected to show the impact of the Forestry Law, and has an important role in the FREL/FRL to be submitted to the UNFCCC. Costa Rica believes this is sufficient and convincing justification for selecting the base year, as it related to a key national circumstance.

End year (2009): according to Costa Rica's R-PP and ER-PIN[39], the country's National REDD+ Strategy began in 2010. Moreover, this date is close to July 03, 2008[40], in which Law No. 8640 of Ecomercados II was passed. This Law increased PSA financial resources in $30 million and directed a $10 million donation to create a heritage fund for the protection of biodiversity (FBS). Hence, an important step was taken to increase ambition in compensating environmental services, including GHG mitigation.

Additionally, during years 2009-2010, following a mandate from the General Comptroller Office of the Republic, the National Forestry Development Plan was updated for the period 2011-2020, which included

[39] Approved by the Carbon Fund in its resolution CFM/5/2012/1, which acknowledged the high quality of the ER-PIN (para. 1) and granted additional financing to move towards the ER-P (para. 2 and 3). In addition, the annex of the resolution identified key issues, these do not include an objection to the start of the National REDD+ Strategy or the ER-P in 2010.

[40] Year 2010 is also defined as the end year considering that between the Law approval by the Legislative Assembly in 2008 and its full implementation in 2010 it was necessary to complete operational and financial procedures to execute disbursements by the World Bank. Administrative measures also took additional time, for example, the incorporation of financial to the annual budget, the implementation of adjustments to the Procedural Manual on the PSA reviewed on an annually basis.

specific REDD+ and GHG mitigation objectives in its forest policies . The plan also includes a reference to the FCPF and the readiness activities that Costa Rica should undertake.

It is also very important to note that the ongoing information, pre-consultation and consultation processes with stakeholders are based on the start of REDD+ implementation in 2010, with the goal of increasing ambition over time.

8.2. Forest definition used in the construction of the Reference Level

Forest definition

The definition used for the reference level is:

- Minimum area: 1,00 ha
- Minimum forest canopy cover: 30%
- Minimum height of trees: 5,00 m

This is consistent with Costa Rica's definition submitted to the UNFCCC's Clean Development Mechanism (CDM) and is also consistent with the national GHG national inventory . However, it is not consistent with the definition of forest reported in the FAO's Forest Resources Assessment (FRA). Under FAO-FRA, Costa Rica defines forest as:

- Minimum area: 0,50 ha
- Minimum forest canopy cover: 10%
- Minimum height of trees: 5,00 m

Additionally, article 3 of Costa Rica's Forestry Law 7575 defines "forest" as a "Native or indigenous ecosystem, intervened or not, regenerated by natural succession or other forestry techniques that occupies a surface of two or more hectares, characterized by the presence of mature trees of different ages, species and appearance, with one or more canopies covering over seventy percent (70%) this area and with more than sixty trees per hectare of fifteen or more centimeters diameter measured at chest height (DAP)". This definition translates to:

- Minimum area: 2,00 ha
- Minimum forest canopy cover: 70%
- Minimum height of trees: N/A
- Minimum number of trees: 60/ha (with at least 15 cm at breast height)

However, this is only applicable for internal purposes and for activities regulated by national legislation. For complying with COP decisions for REDD+, Costa Rica employs a broader definition as explained above (which largely includes the forest definition by law).

The definition of forest depends on parameters that are measured in very different ways (i.e. tree height or percent canopy cover are not measured with LANDSAT imagery), however the minimum area is readily

estimated using appropriate satellite imagery. For this reason, when defining forest for the historical reference period, more importance was given to the minimum area parameter. It was assumed that if the minimum area was large enough for a land unit to be defined as forest land, then it is very likely that the percent canopy cover and tree height were also within the range defined as forest, given Costa Rica's vegetation and forest types. Nonetheless, a test was carried our to determine how well the remote sensing analysis did in determining forest lands. This was done because in the processing and classification of spectral data, it is likely that a proportion of the areas that are classified as "forest" actually present a lower canopy cover and average tree height. Inconsistencies in the area classified as "forest" and the definition of "forest" are almost never reported, but are unavoidable when land-cover maps are produced from remote sensing images. These inconsistencies contribute to overall uncertainty of activity data (AD).

For the test, percent canopy cover of the areas classified as "forest" and of the areas classified as "non-forest" (according to the minimum area criteria) was estimated by using two canopy density maps prepared by an independent study[41] for years 2001 and 2012. The result of this assessment revealed that in 2001 92,36% of the primary forests and 79,03% of new forests had over 30% of canopy cover, while for 2012 the result was 93,45% and 79,33% respectively. Results for "non-forest" areas showed lower consistency, 53,31% of the areas classified as "non-forest" in 2001 had less than 30% of canopy cover while for 2012 the percentage was 56,61%. This could be explained by the presence of wooded pastures and agroforestry systems in Costa Rica which are often classified as forest from remote sensing data.

Definition of REDD+ activities

Although there are many definitions for "forestation" (A – "Afforestation"), "reforestation" (R – Reforestation") and "deforestation" (D – "Deforestation"), collectively "ARD" and "forest management" (FM – "*Forest Management*") applicable to Annex 1 countries in the context of the Kyoto Protocol, the COP has not decided on definitions regarding REDD+ activities, which can lead to different interpretations.

On the other hand, the Carbon Fund Methodological Framework (CF-MF), does not provide additional elements to define REDD+ activities in a way that these activities may be identified in space and time, into the C accounting framework.

In the absence of mandated definitions by the COP regarding REDD+ activities, and considering the CF-MF, Costa Rica defined REDD+ activities based on AD classes[42]. Namely, when determining AD from a land use change matrix, each cell is assigned a REDD+ activity (Figure 8.3.1.). A requirement for a REDD+ activity to be assigned to a cell is that changes in forest C stocks must occur. For example, biomass burning in FLFL or removals in land converted to FL. This consideration is consistent with REDD+ decisions by the COP, which consistently use the language "*forest carbon stocks*".

[41]Agresta, Dimap, University of Costa Rica, Universidad Politécnica de Madrid, 2015. b. Index of cover as base for the estimate of degradation and increase of carbon stocks: Generating a consistent historical time series of activity data from land use change for the development of Costa Rica's REDD plus reference level. Consultancy report prepared for the Government of Costa Rica under the Carbon Fund of Forest Carbon Partnership (FCPF). 18 p.

[42] This approach is similar to what IPCC suggests for relating land use categories and the activities under the Kyoto Protocol (see Table 2.1 of IPCC 2013, Chapter 2. Section 2.1, p. 2.12). For Costa Rica's case, all REDD+ activities were assigned to the land use change matrix (Figure 8.3.1.). More detail is presented in the FREL TOOL CR v.1 tool in the "Activities" worksheet.

8.3. Average annual historical emissions over the Reference Period

Description of method used for calculating the average annual historical emissions over the historical reference period

Consistency with the national GHG inventory and application of the most recent IPCC guidelines

The methods used to estimate the average annual historical emissions and to construct the reference level are fully described in a separate report (available here)[43]. The methods used were discussed and agreed with the IMN experts, in order to ensure maximum consistency between the reference level and the national GHG inventory. In both cases, the 2006 IPCC guidelines were adopted, employing as much as possible the methods corresponding to Tier 2 or higher. However, it is important to consider the opening statement in Section 8 of the ERPD, which explained that the reference level presented here is preliminary and will be adjusted according to the 2012 national GHG inventory included in Costa Rica's first BUR to be presented at COP21 in Paris. This section will be updated accordingly.

Transparent, complete, consistent and accurate information

Several decisions of the COP refer to the need that emissions and absorptions estimates for sources and sinks, within the context of the construction of reference levels and of national GHG inventories should be transparent, complete, comparable, consistent and accurate. For Costa Rica's ER-P reference level, this was interpreted as follows:

- **Transparency**: all information used in the construction of the reference level is explained in CDI, 2015.b. This includes methods, data and assumptions. If additional information is required, it can be requested to Costa Rica's REDD+ Secretariat[44]. All calculations steps are explicit in the MS Excel-based FREL TOOL CR v.1

- **Completeness:** significant GHG sources and sinks, C pools and gases were included in the C Accounting Framework and are reported and included in the reference level. Soil C was not included due to lack of data. C stock changes in FLFL are not estimated for primary forests. C losses are not reported for new forests (-->FL). C fluxes are not estimated for areas under forest management or tree plantations due to data unavailability. Non-CO_2 gases were not estimated for biomass burning in FLFL.

- **Consistency:** methodologies for estimating emissions and absorptions were the same for 1986-2013 and will be the same for future measurement and reporting periods. This means that C stock changes are not due to changes in methodologies. For example, for AD a 27-year time series with 7 points in time was developed following the same procedures. EFs were kept constante during the historical reference period, except for N_2O and CH_4 which were adjusted for >1996, based on expert judgement.

- **Accuracy:** Uncertainties associated to AD, EF and emissions and absorptions were estimated following 2006 IPCC Guidelines. Secion 9 presents planned improvements for MRV, aimed at improving accuracy over time.

[43] CDI, 2015.b. Forest emission and removal reference level for Costa Rica and methodology used to construct it. Consultancy report prepared for the Government of Costa Rica under the Carbon Fund for the Forest Carbon Partnership (FCPF). 223 p.

[44] Contact Alexandra Sáenz (asaenz@fonafifo.go.cr)

Method for estimating AD

AD were estimated following Approach 3 of the 2006 IPCC Guidelines (Chapter 3, section 3.3.1, p.3.13 and Annex 3.A.4, p.3.35). Firstly, land-cover maps with the six IPCC land use categories (and several sub-categories, as explained later) were developed for years 1985/86, 1991/92, 1997/98, 2001/02, 2008/09, 2011/12 and 2012/13[45] and were compared in a geographical information system to detect changes in time.

Multi-annual land use changes are reported in hectares for each historical period analyzed (1986-1991,1992-1997,1998-2001,2002-2008,2009-2011,2012-2013) as MS Excel sheets in the FREL TOOL CR v.1. Considering that these matrixes are very large (due to the number of land use categories and sub-categories) it is not possible to present them in the ERPD. The general structure of the matrixes is shown in **Figure 8.3.1**. Annual AD are estimated by interpolating multi-annual matrixes. The results of these interpolations are shown the annual matrixes in the "FREL TOOL CR v.1. AD for harvested wood products (HWP) and for the emission of non-CO_2 gases from AGB burning are explained in a later section.

Method for estimating EF

Each cell of the annual land use change matrixes was assigned an EF, estimated as the difference between C stocks per hectare before (*i*) and after (*f*) conversion or due to changes in age classes in FLFL (new forests; assuming that C is continously sequestered in aging forests). Thus,

$$EF_{i \to f,t} = C_{i,t} - C_{f,t} \quad (1)$$

Where:

$EF_{i \to f,t}$ EF for category change *i*→*f* at time *t*, in tCO_2-e ha^{-1}.

$C_{i,t}$ C stocks per hectare for land use category *i* at time *t*, in t CO_2-e ha^{-1}

$C_{f,t}$ C sotcks per hectare for land use category *f* at time *t*, in t CO_2-e ha^{-1}

Note that in the case of FLFL, the category before and after conversion is the same, hence *i*=*f*. However, for -->FL, C stocks increase with time. EF are reported for all possible conversions in correspondence to the annual land use change matrixes available in the FREL TOOL CR v.1.

Method for estimating emissions and absorptions (removals)

Annual emissions and absorptions were estimated in t CO_2-e for 1986-2013. As shown in the following equation, emissions and absorptions were estimated as the product of the annual AD (AD_i) and its associated emission factors ($EF_{i,t}$). These calculations may be reviewed in the sheets "E AAAA" in the FREL TOOL CR v.1.:

$$E_t = \sum_{i=1}^{I} \left(DA_{i,t} * FE_{i,t} \right) \quad (2)$$

Where:

E_t Emissions or absorptions related to a REDD+ activity in year *t*; in t CO_2-e $year^{-1}$

[45]Notations 1985/86,..., 2002/13 to indicate the date in a land-cover map are used to indicate the maps corresponding to the situation in the lands as of December 31 of the first yr mentioned and as of January 01 of the second yr entered in the notation.

$AD_{i,t}$ Activity data in sub-category *i* of category *LU* in year *t* related to a REDD+ activity (for instance: *LU* = "Forest lands", *i* = "Primary, Dry Forest converted to Grassland"); in ha $year^{-1}$

$EF_{i,t}$ Emission factor applicable to sub-category *i* of category *LU* in year *t*; in tCO_2-e ha^{-1}

i *Sub-category i* in category *LU*; dimensionless

I Total number of *sub-categories* in all *LU* categories related to a REDD+ activity; dimensionless

t Year in the period 1986-2013; dimensionless

LU One of the IPCC defined land use categories: Forest lands ("FL"), Cropland ("CL"), Grassland ("GL"), Wetlands ("WL"), Settlements ("SL"), Other lands ("OL").

Relation to IPCC Guidelines and Equations

The term $DA_{i,t}$ in IPCC equations

IPCC equations do not always use the same notation to refer to AD. For instance, in **equation 2.6**[46] and **equation 2.8**[47], IPCC uses letter *A* to describe the amount of land that remained in the same land use category, while in **equation 2.16**[48] the notation $\Delta A_{TO\_OTHERS_i}$ is used to refer to land that converted to other land use category. Regardless, the concept is the same: the extent of land is used to calculate the C stock changes.

Notations *A*, $\Delta A_{TO\_OTHERS_i}$, and others used in the IPCC equations that refer to areas or area changes are equivalent to notation $AD_{i,t}$ used in equation 2 of the ERPD. See CDI 2015.b, Annex 2, for more details.

The term $EF_{i,t}$ in IPCC equations

Furthermore, the term $EF_{i,t}$ in equation 2 should be understood as the sum of:

(1) CO_2 emissions or absorptions associated to C stock changes taking place in <u>one hectare</u> that remains under the same land use category (i.e. when forest grows or for FLFL) or when the land use category changes (i.e. when FL is converted to any another land use category); and

(2) Non-CO_2 gas emissions occurring in this <u>same hectare</u> of land when it remains in the same land use category or when it converts to another land use category.

This is shown in the following equation:

$$FE_{i,t} = \Delta C_{i,t} + ENCO2_{i,t} \qquad (3)$$

<u>Where</u>:

$FE_{i,t}$ Emission factor applicable to sub-category *i* of category *LU* in year *t*; in tCO_2-e ha^{-1}

$\Delta C_{i,t}$ C stock changes in sub-category *i* of category *LU* in year *t*; in tCO_2-e ha^{-1}

$ENCO2_{i,t}$ Non-CO_2 gas emissions in sub-category *i* of category *LU* in year *t*; in tCO_2-e ha^{-1}

[46] Ch.2, section 2.2.2, p.2.10. 2006 IPCC Guidelines.
[47] Ch.2, Section 2.3.1.1, p.2.12. 2006 IPCC Guidelines.
[48] Ch.2, Section 2.3.1.2, p.2,20. 2006 IPCC Guidelines.

IPCC methods and equations used to estimate $\Delta C_{i,t}$ and $ENCO2_{i,t}$ of equation 3 are shown in detail in Annex 2 of CDI 2015.b.

Method used to construct the reference level

The reference level (*RL*) was estimated by adding the annual average of emissions for 1996-2009 for each REDD+ activity:

$$RL = \left(\sum_{t=1996}^{2009} E_t \right) * (2009 - 1996 + 1)^{-1} \quad (4)$$

Where:

RL Reference level; in tCO_2-e $year^{-1}$

E_t Emissions in year *t*; in tCO_2-e $year^{-1}$

t a year between 1996 and 2009

Figure 8.3.1. Definition of REDD+ activities in relation to the land use change matrix for Costa Rica (simplified version). More information available in the FREL TOOL CR v.1.

				FL														CL	GL	WL	SL	OL
				Bmh					Bh					etc…								
				bp	Bn				bp	bn				bp	bn							
					… - 1985	1986 - 1991	…	2022 - 2023		… - 1985	1986 - 1991	…	2022 - 2023		… - 1985	1986 - 1991	…	2022 - 2023					
FL	Bmh	bp		C_{FL}														ΔC_{CL}	ΔC_{GL}	ΔC_{WL}	ΔC_{SL}	ΔC_{OL}
		bn	… -1985		ΔC_{FL}													ΔC_{CL}	ΔC_{GL}	ΔC_{WL}	ΔC_{SL}	ΔC_{OL}
			1986-91			ΔC_{FL}												ΔC_{CL}	ΔC_{GL}	ΔC_{WL}	ΔC_{SL}	ΔC_{OL}
			…				ΔC_{FL}											ΔC_{CL}	ΔC_{GL}	ΔC_{WL}	ΔC_{SL}	ΔC_{OL}
			2022-23					ΔC_{FL}										ΔC_{CL}	ΔC_{GL}	ΔC_{WL}	ΔC_{SL}	ΔC_{OL}
	Bh	bp							C_{FL}									ΔC_{CL}	ΔC_{GL}	ΔC_{WL}	ΔC_{SL}	ΔC_{OL}
		bn	… -1985							ΔC_{FL}								ΔC_{CL}	ΔC_{GL}	ΔC_{WL}	ΔC_{SL}	ΔC_{OL}
			1986-91								ΔC_{FL}							ΔC_{CL}	ΔC_{GL}	ΔC_{WL}	ΔC_{SL}	ΔC_{OL}
			…									ΔC_{FL}						ΔC_{CL}	ΔC_{GL}	ΔC_{WL}	ΔC_{SL}	ΔC_{OL}
			2022-23										ΔC_{FL}					ΔC_{CL}	ΔC_{GL}	ΔC_{WL}	ΔC_{SL}	ΔC_{OL}
	etc…	bp												C_{FL}				ΔC_{CL}	ΔC_{GL}	ΔC_{WL}	ΔC_{SL}	ΔC_{OL}
		bn	… -1985												ΔC_{FL}			ΔC_{CL}	ΔC_{GL}	ΔC_{WL}	ΔC_{SL}	ΔC_{OL}
			1986-91													ΔC_{FL}		ΔC_{CL}	ΔC_{GL}	ΔC_{WL}	ΔC_{SL}	ΔC_{OL}
			…														ΔC_{FL}	ΔC_{CL}	ΔC_{GL}	ΔC_{WL}	ΔC_{SL}	ΔC_{OL}
			2022-23														ΔC_{FL}	ΔC_{CL}	ΔC_{GL}	ΔC_{WL}	ΔC_{SL}	ΔC_{OL}
CL					ΔC_{FL}	ΔC_{FL}	ΔC_{FL}	ΔC_{FL}		ΔC_{FL}	ΔC_{FL}	ΔC_{FL}	ΔC_{FL}		ΔC_{FL}	ΔC_{FL}	ΔC_{FL}	ΔC_{CL}	ΔC_{GL}	ΔC_{WL}	ΔC_{SL}	ΔC_{OL}
GL					ΔC_{FL}	ΔC_{FL}	ΔC_{FL}	ΔC_{FL}		ΔC_{FL}	ΔC_{FL}	ΔC_{FL}	ΔC_{FL}		ΔC_{FL}	ΔC_{FL}	ΔC_{FL}	ΔC_{CL}	ΔC_{GL}	ΔC_{WL}	ΔC_{SL}	ΔC_{OL}
WL					ΔC_{FL}	ΔC_{FL}	ΔC_{FL}	ΔC_{FL}		ΔC_{FL}	ΔC_{FL}	ΔC_{FL}	ΔC_{FL}		ΔC_{FL}	ΔC_{FL}	ΔC_{FL}	ΔC_{CL}	ΔC_{GL}	ΔC_{WL}	ΔC_{SL}	ΔC_{OL}
SL					ΔC_{FL}	ΔC_{FL}	ΔC_{FL}	ΔC_{FL}		ΔC_{FL}	ΔC_{FL}	ΔC_{FL}	ΔC_{FL}		ΔC_{FL}	ΔC_{FL}	ΔC_{FL}	ΔC_{CL}	ΔC_{GL}	ΔC_{WL}	ΔC_{SL}	ΔC_{OL}
OL					ΔC_{FL}	ΔC_{FL}	ΔC_{FL}	ΔC_{FL}		ΔC_{FL}	ΔC_{FL}	ΔC_{FL}	ΔC_{FL}		ΔC_{FL}	ΔC_{FL}	ΔC_{FL}	ΔC_{CL}	ΔC_{GL}	ΔC_{WL}	ΔC_{SL}	ΔC_{OL}

Notes: FL: Forest Lands; **CL**: Cropland; **GL**: Grassland; **SL**: Settlements; **OT**: Other Lands; **Bmh** = Pluvial very wet forests; **Bh**: Wet forests; **bp**: primary forests; **bn**: new forests; **AAAA-AA** (e.g. 1986-91): age cohort of new forests (period during which new forests appeared in non-forested lands).

ΔC = C stocks changes included in the "deforestation" activity.

C = C stocks included in the "conservation" activity".

ΔC = C stocks changes included in the "enhancement of forest C stocks" activity in land previously converted to FL.

ΔC = C stocks changes included in the "enhancement of forest C stocks" activity in land converted to FL.

Other remarks

- Both $AD_{i,t}$ and $EF_{i,t}$ were estimated on an annual basis, for each sub-category represented in the land use change matrices; especially for -->FL, EF vary every year according to growth curves by Cifuentes (2008).

- Depending on the REDD+ activity considered[49], $EF_{i,t}$ and E_t may be positive, representing a net emission of GHG to the atmosphere (and a reduction of C stocks in the forest), or be negative, in which case it represents a net absorption of GHG from the atmosphere (and an increase of C stocks in the forest).

Activity data and emission factors used for calculating the average annual historical emissions over the Reference Period

Activity data

Construction of land-cover maps based on satellite imagery

For estimating AD, seven land-cover maps were constructed in the period 1986-2013[50]. The methods used for processing and classifying satellite imagery are fully described in a separate report (Agresta *et al.,* 2015.a)[51]. The report and annexes are available here. Data for constructing the land-cover maps was obtained from four different satellite sensors of the Landsat family (Landsat 4 TM, Landsat 5 TM, Landsat 7 ETM+, Landsat 8 OLI/TIRS). In order to minimize cloud cover, several scenes from the same season (from the current or following year) were combined to obtain cloud-free maps within a 14- month timeframe.

Consistent land representation

All land-cover maps consistently represented IPCC's land use categories for 1986-2013. In some cases, categories were further divided into sub-categories as suggested by IPCC. Sub-categories were defined according to the feasibility of mapping them in a reliable and accurate way, and when the creation of a sub-category was appropriate for the estimation EFs. All categories and sub-categories are consistent with the GHG national inventory.

Forest stratification in Costa Rica

Considering that forest C stocks vary with forest type, and that they also depend on forest age, forest land was stratified using two criteria:

1. Holdrige's Life Zone classification system (1966)[52] which stratifies forests according to elevation, evapotranspiration and rainfall
2. Approximate forest age according to the time series analysis

[49] The activities are: DF: ·Deforestation", DG: ·Degradation"; AE: Enhancement of forest carbon stockss"; MF: Sustainable management of forest"; and CO: " Conservation of forest carbon existences".

[50] It must be noted that Agresta *et al. (2015.a)* showed annual AD assuming that all sub-periods are equal to 5 years, when in reality the duration of the sub-periods ranges between 2 and 7 years. This explains the difference between the annual deforestation data presented by Agresta *et al.* (2015.a) and the results presented in the ERPD and in the technical document describing the reference level (CDI, 2015.b)[50]. A detailed explanation of the consistency of data presented by Agresta *et al.* (2015.a) and in the ERDP (that is consistent with the data presented in CDI, 2015.b) is presented in a separate report (CDI, 2015.d)[50].

[51] Agresta, Dimap, Universidad de Costa Rica, Universidad Politécnica de Madrid, 2015.a. Final Report: Generating a consistent historical time series of activity data from land use change for the development of Costa Rica's REDD plus reference level: Methodological Protocol. Report prepared by the Government of Costa Rica under the Carbon Fund of the Forest Carbon Partnership (FCPC). 44 p.

[52] Holdridge, L.R.1966. The Life Zone System, *Adansonia VI: 2*: 199.

AD by forest type were obtain by intersecting classified satellite imagery with Holdrige's Life Zones (1966). Resulting classes were grouped in three groups: "Very wet and pluvial forests", "Rain forests" and "Dry forests". **The** FREL TOOL CR v.1. shows how Life Zones were grouped into these three main groups. Additionally, mangroves and palm forests (yolillales) were classified as separate groups. These two were identified by spectral analysis and by creating "masks".

In order to estimate AD for by age class, the following assumptions were made:

1. New forests become detectable as "forest" in the satellite images when they reach a certain minimum age. This minimum age depends on the forest type and was defined according to expert judgement in collaboration with IMN experts. The minimum age at which forests become detectable in Landsat images is 8 years for "Dry forests" and 4 years for all other forest types.
2. Detected area of new forest for a certain period (e.g. 1997-2001), was assumed to be equally distributed for each year in the period (e.g. 1997, 1998, 1999, 2000 and 2001). Therefore, total area for new forest that appeared in each period was divided by the number of years in each period to estimate the annual AD for each age class.
3. To identify new forests before 1986, an auxiliary map provided by IMN was used to discern primary forests from secondary forests. It was assumed that age classes of secondary forests were proportionally equivalent prior to 1986.

Key dates in the historical time series

Before defining the dates that would be part of the AD time series, a number of meetings with high-level MINAE officers were held to determine key policiy milestones in the forestry sector. The goal behind this approach was to transparently reflect national circumstances.

Some of the most important dates included in the time series are:

- **January 23, 1997**: the Forestry Law #7575 was formally and publicly officialized. This law created FONAFIFO's PSA, defined four forest environmental services and among other policy instruments and mechanisms.
- **July 03, 2008**: the Ecomercados II Law #8640 was formally and publicly officialized. This law provided $30 million for an expanded PSA operation and ensured a donation of $10 million to create a heritage fund for the protection of biodiversity (FBS).
- **January 01, 2010**: the National REDD+ Strategy began formal implementation, according to Costa Rica's ER-PIN, dated February 15, 2013. Additionally, the National Forestry Development Plan for 2011-2020 which included REDD+ as part of its policy framework.

AD time series and land cover maps

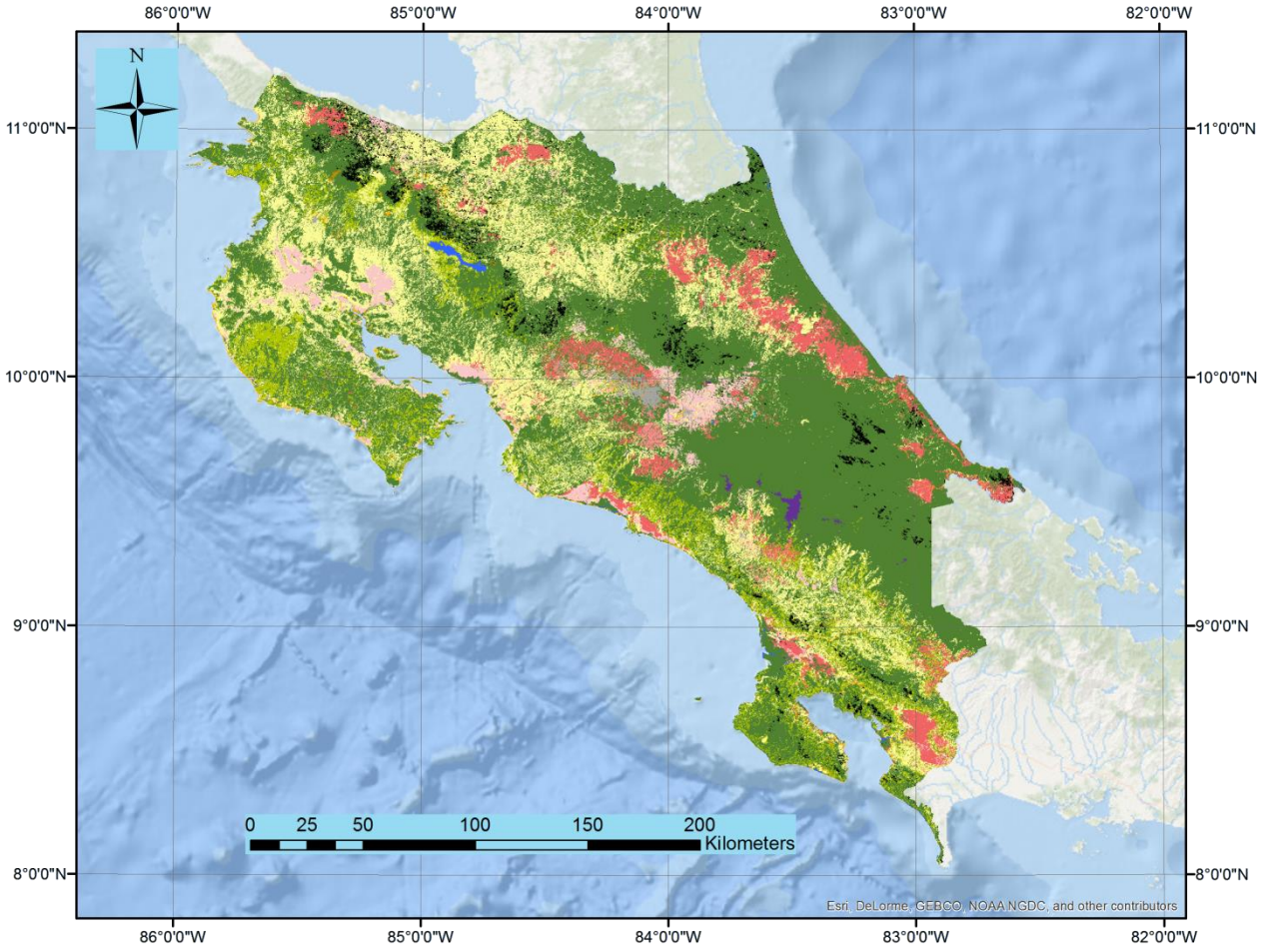
The following land-cover maps (LCM) were produced:

- **LCM 1986/87**: Land-cover map for 12.31.1986-01.01.1987.
- **LCM 1991/92**: Land-cover map for 12.31.1991-01.01.1992.
- **LCM 1997/98**: Land-cover map for 12.31.1997-01.01.1998.
- **LCM 2000/01**: Land-cover map for 12.31.2000-01.01.2001.
- **LCM 2007/08**: Land-cover map for 12.31.2007-01.01.2008.
- **LCM 2011/12**: Land-cover map for 12.31.2011-01.01.2012.
- **LCM 2013/14**: Land-cover map for 12.31.2013-01.01.2014.

These LCM and the forest cover change maps constructed for the historical series 1986-2013 are shown in **Figure 8.3.2.**

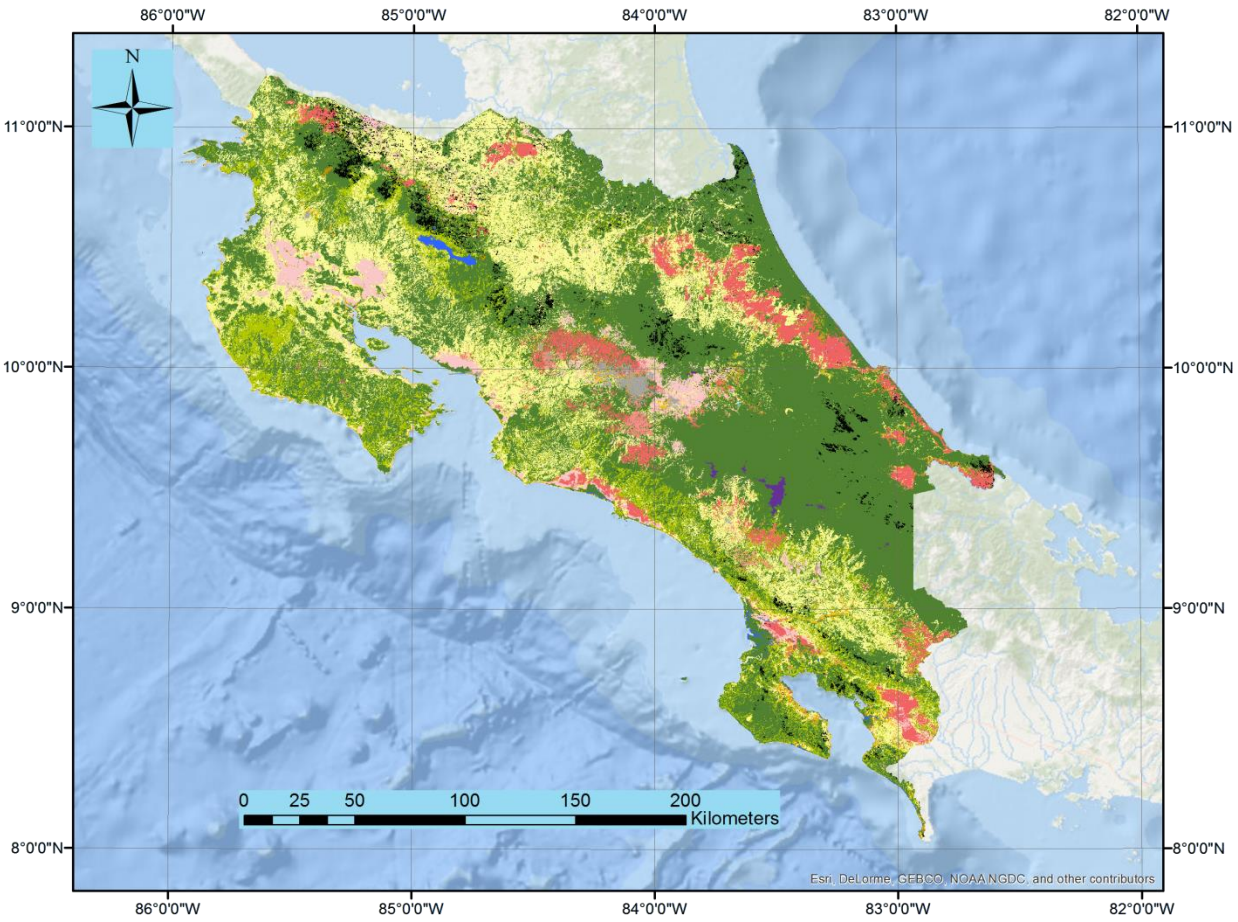
Figure 8.3.2. Land-cover Maps (LCM) and Land-cover Change Maps constructed for the historical series 1986-2013.

1985/86



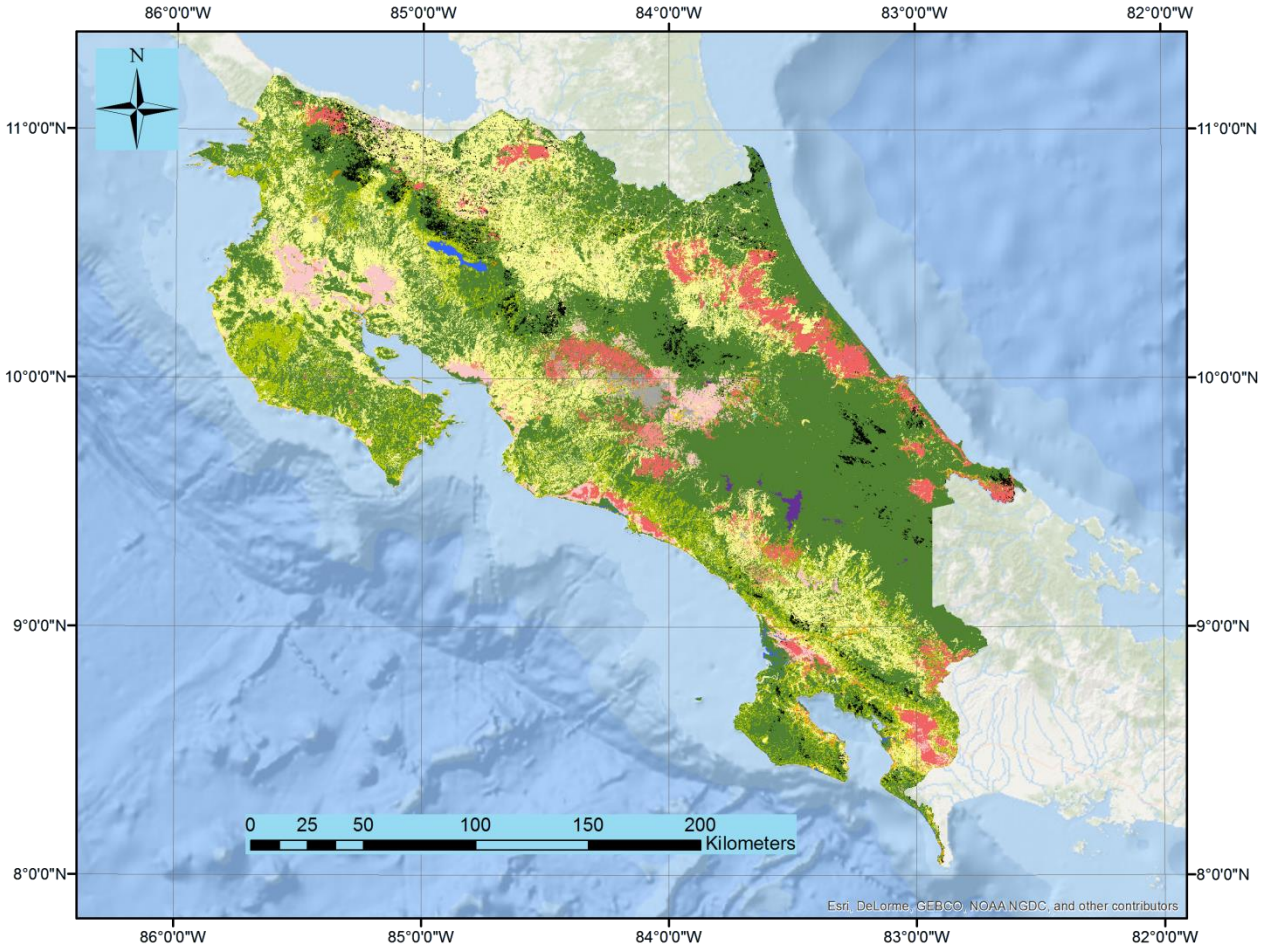
Land-cover		Area
Color	Description	ha
	Forest lands (FL)- Primary forests	2,807,028.90
	Lands converted to FL – New forests	380,685.24
	Cropland - permanent	336,664.35
	Cropland – annual	197,797.23
	Grassland	1,190,245.23
	Settlements	22,876.92
	Wetlands - natural	12,993.03
	Wetlands - artificial	89.55
	Other land - moor	10,412.37
	Other land–natural bare lands	1,479.33
	Other land–artificial bare lands	38,303.19
	No information – clouds and shadows	115,364.16
	Total Area	**5,113,939.50**

1991/92



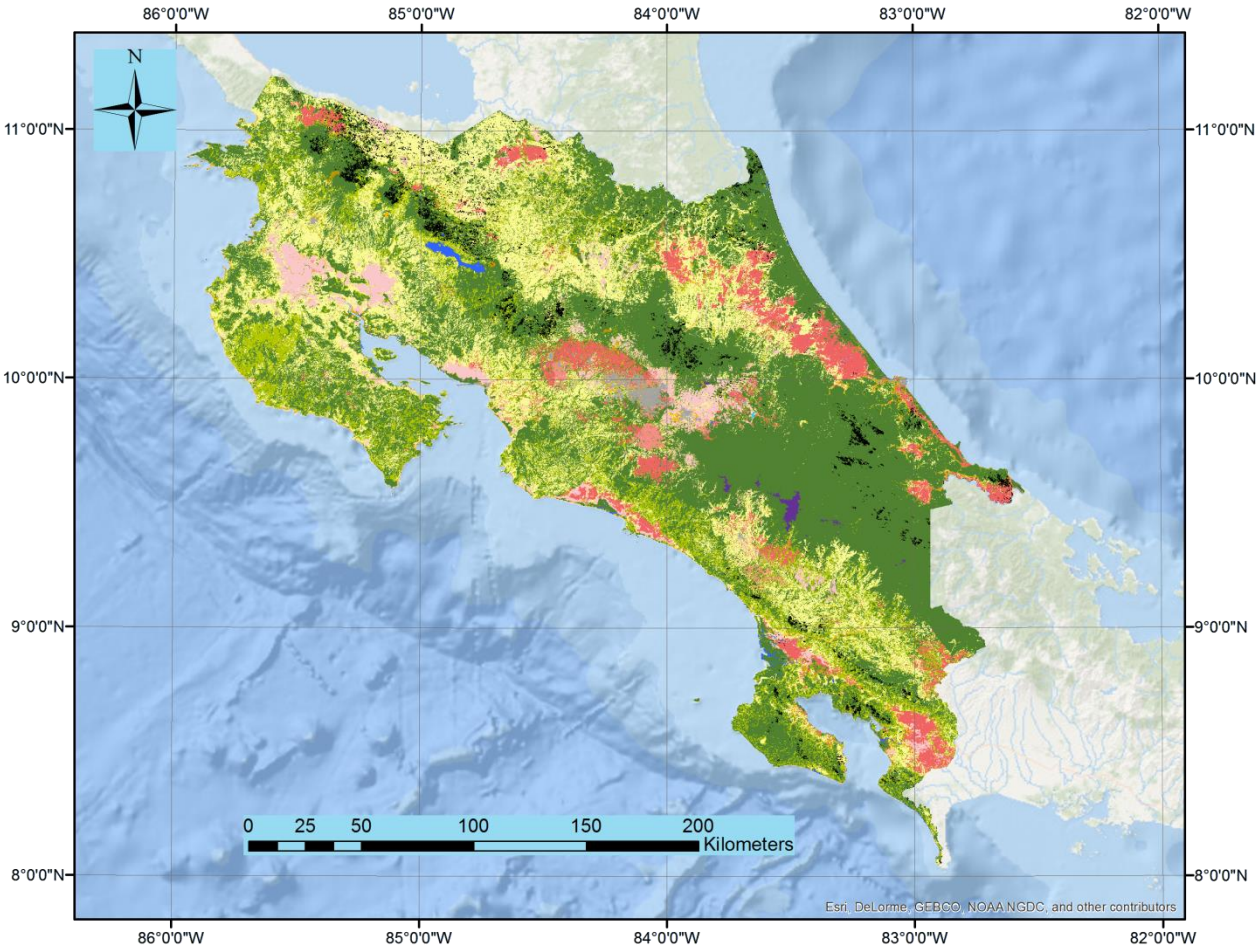
Land-cover		Area
Color	Description	ha
	Forest lands (FL)- Primary forests	2,532,567.87
	Lands converted to FL – New forests	586,538.10
	Cropland - permanent	331,386.39
	Cropland – annual	203,960.88
	Grassland	1,239,471.36
	Settlements	30,210.12
	Wetlands - natural	17,814.33
	Wetlands - artificial	659.88
	Other land - moor	10,411.92
	Other land–natural bare lands	1,392.21
	Other land–artificial bare lands	44,162.28
	No information – clouds and shadows	115,364.16
	Total Area	**5,113,939.50**

1997/98



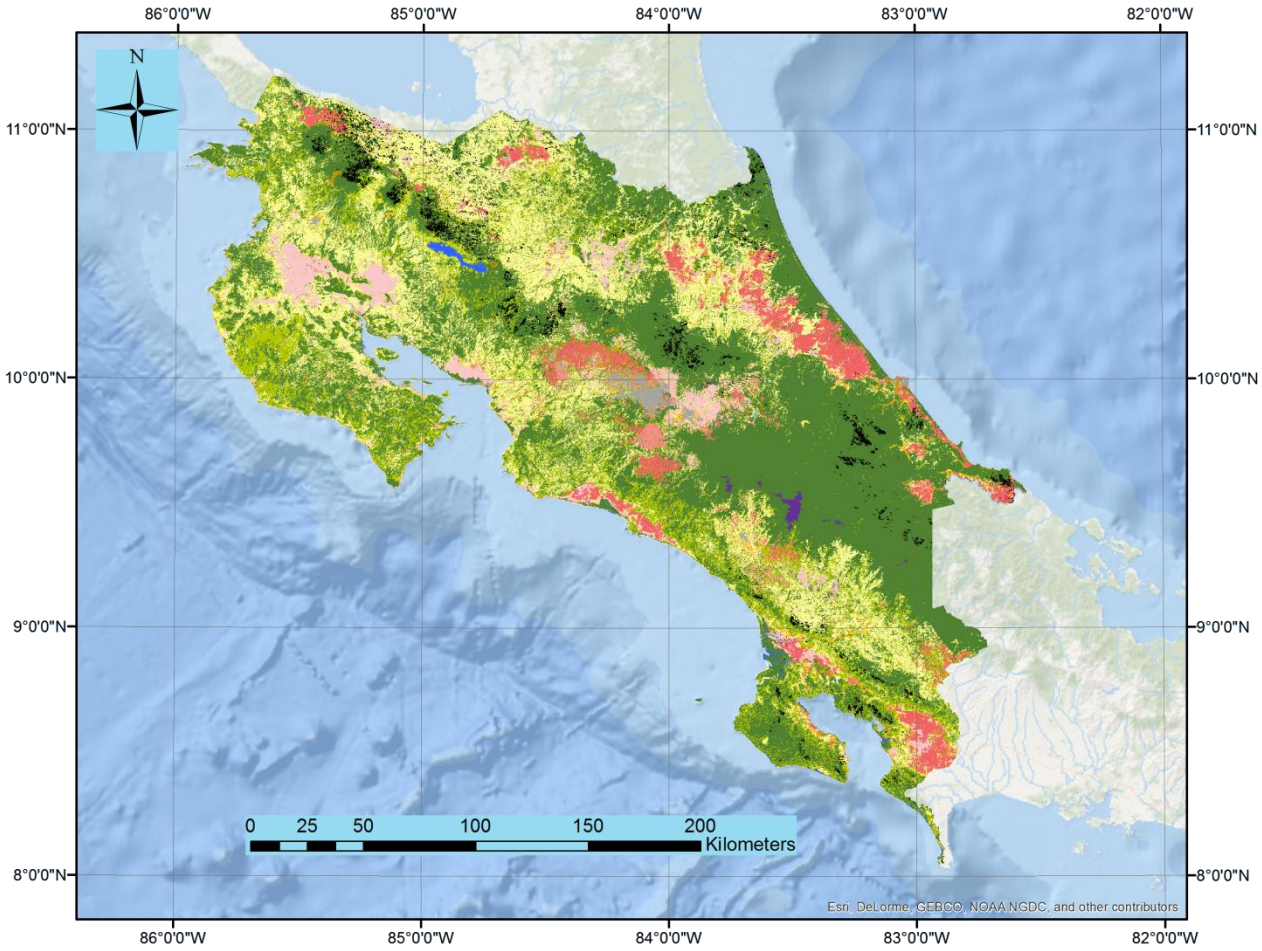
Land-cover		Area
Color	Description	ha
	Forest lands (FL)- Primary forests	2,420,974.53
	Lands converted to FL – New forests	670,106.25
	Cropland - permanent	345,113.28
	Cropland – annual	211,800.60
	Grassland	1,239,510.42
	Settlements	35,203.86
	Wetlands - natural	17,126.55
	Wetlands - artificial	190.08
	Other land - moor	10,416.96
	Other land–natural bare lands	2,009.43
	Other land–artificial bare lands	46,123.38
	No information – clouds and shadows	115,364.16
	Total area	**5,113,939.50**

2000/01



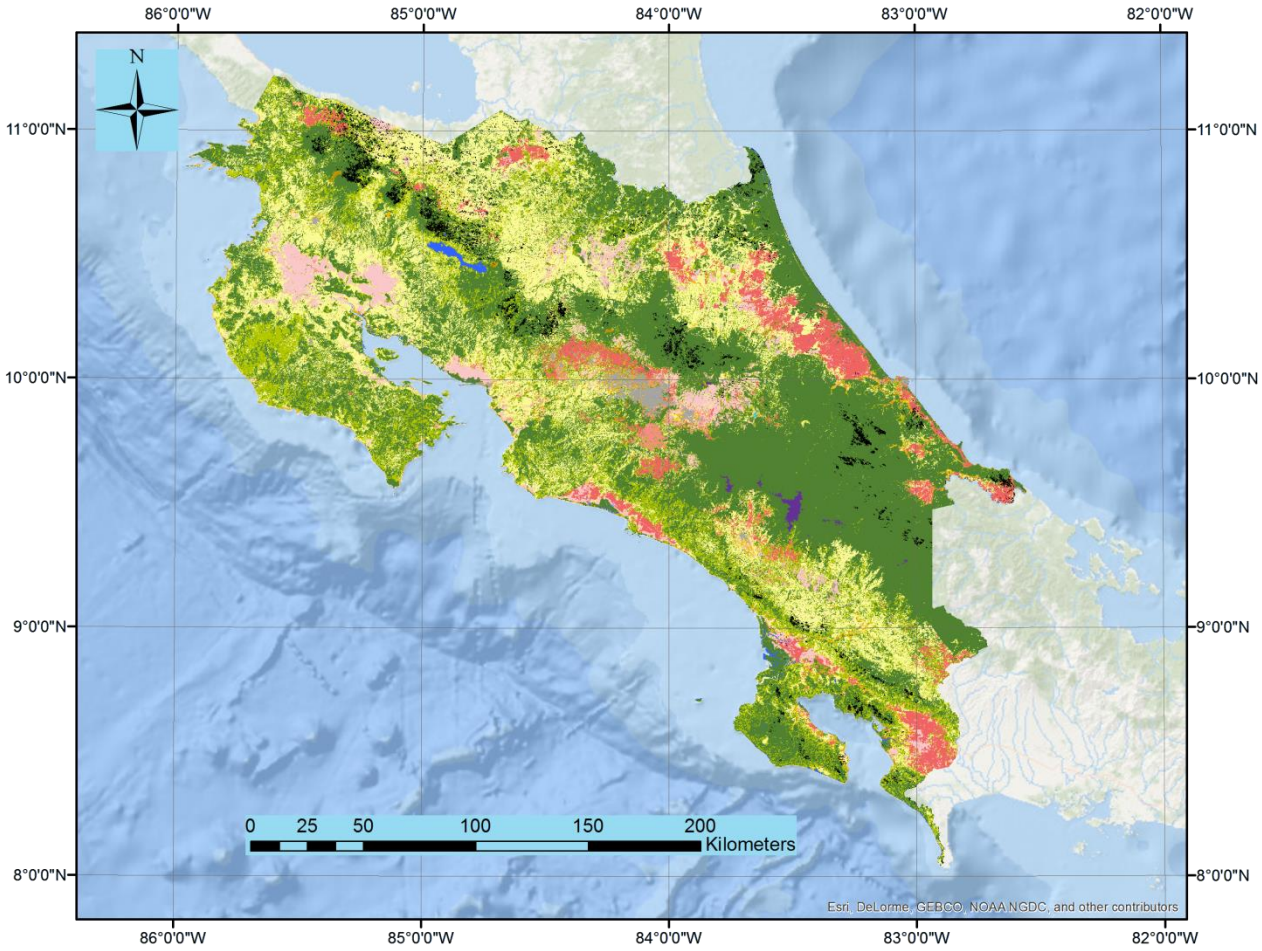
Land-cover		Area
Color	Description	ha
	Forest lands (FL)- Primary forests	2,335,604.94
	Lands converted to FL – New forests	735,865.83
	Cropland - permanent	351,353.43
	Cropland – annual	218,656.71
	Grassland	1,242,871.56
	Settlements	38,819.97
	Wetlands - natural	18,742.95
	Wetlands - artificial	324.36
	Other land - moor	10,416.33
	Other land–natural bare lands	1,662.48
	Other land–artificial bare lands	44,256.78
	No information – clouds and shadows	115,364.16
	Total area	**5,113,939.50**

2007/08



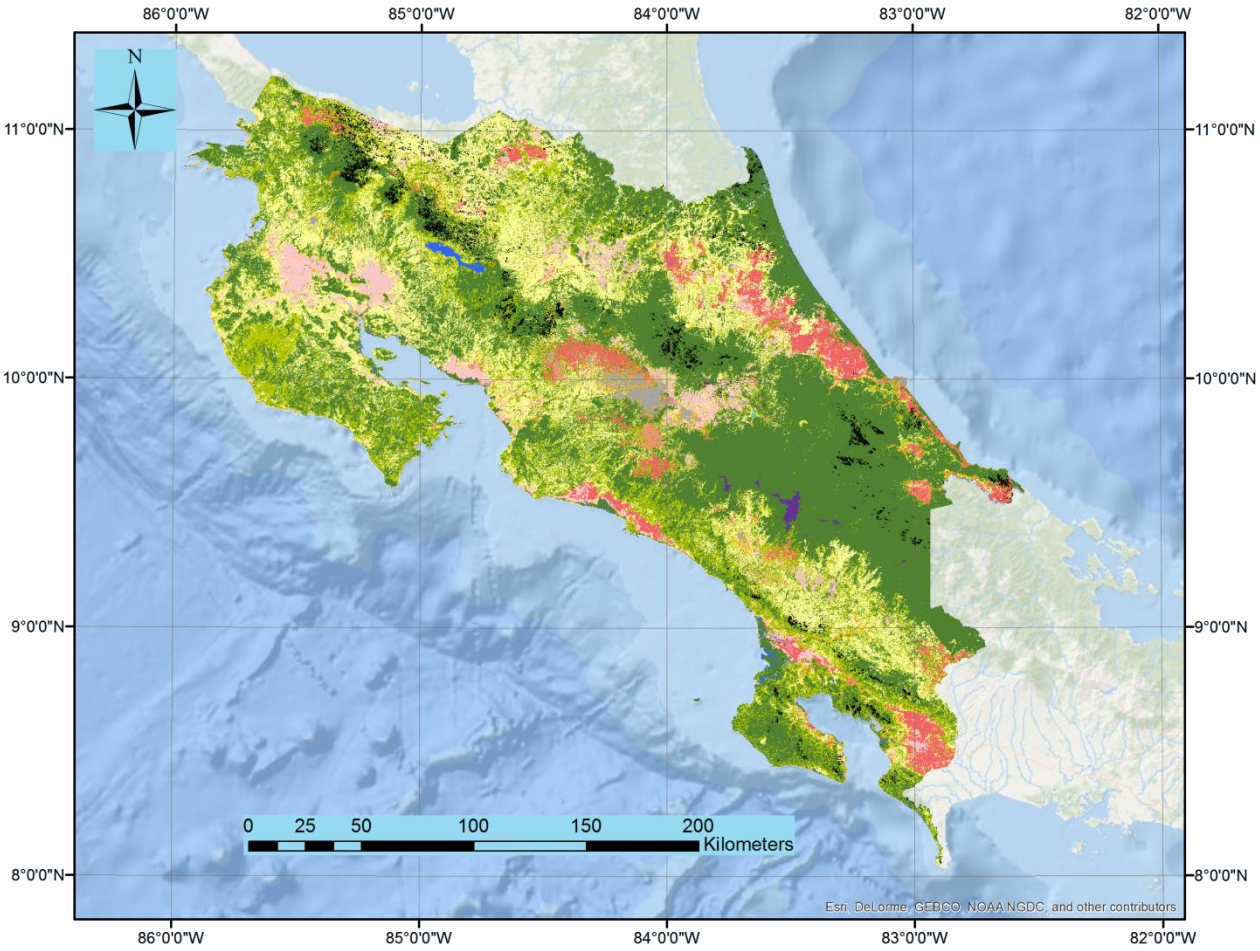
Land-cover		Area
Color	Description	ha
	Forest lands (FL)- Primary forests	2,265,429.96
	Lands converted to FL – New forests	770,395.05
	Cropland - permanent	323,930.52
	Cropland – annual	242,276.76
	Grassland	1,260,219.24
	Settlements	43,086.69
	Wetlands - natural	21,875.85
	Wetlands - artificial	294.12
	Other land - moor	10,422.45
	Other land–natural bare lands	1,948.32
	Other land–artificial bare lands	58,696.38
	No information – clouds and shadows	115,364.16
	Total area	**5,113,939.50**

2011/12



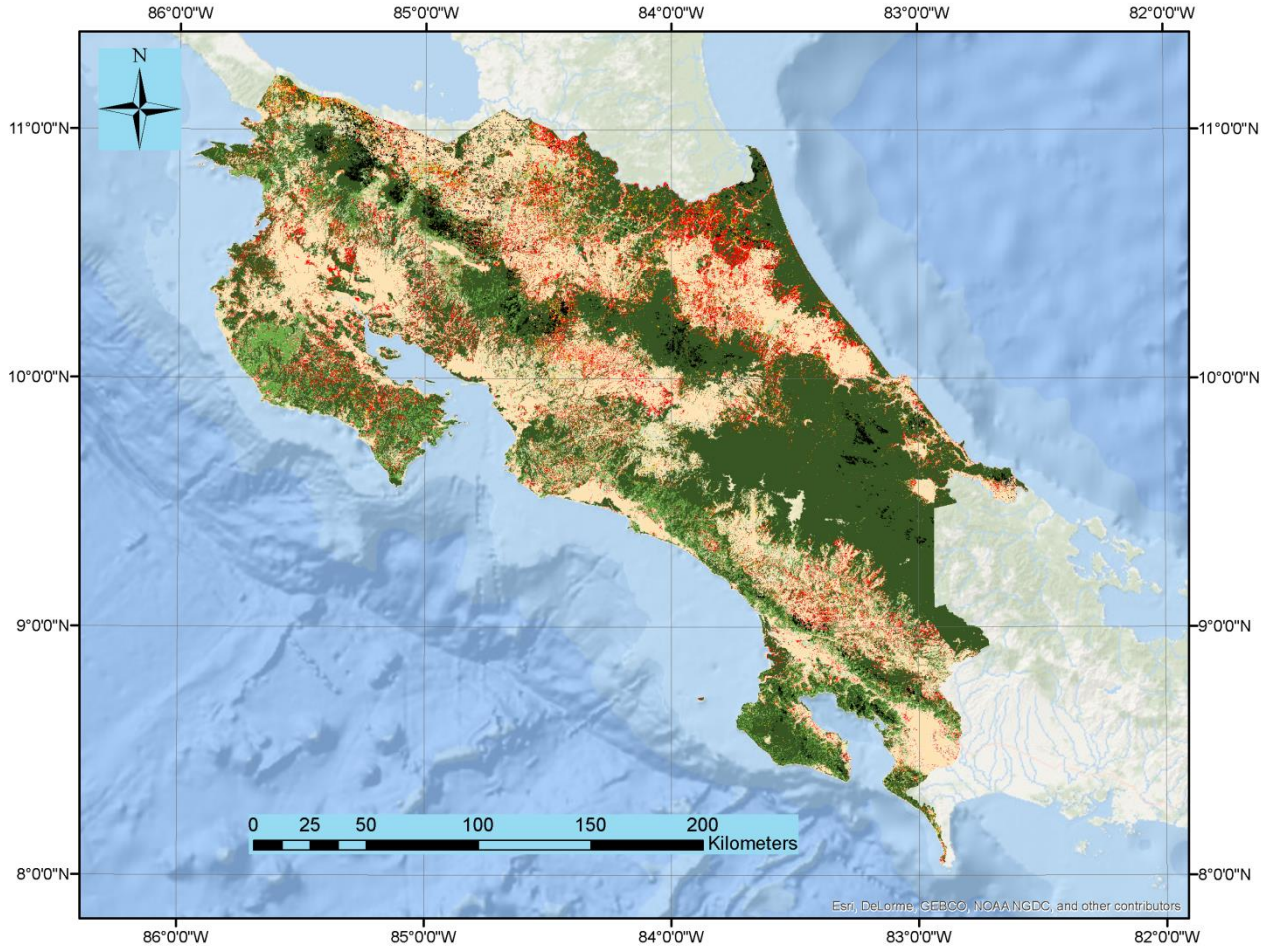
Land-cover		Area
Color	Description	ha
	Forest lands (FL)- Primary forests	2,233,118.88
	Lands converted to FL – New forests	824,096.61
	Cropland - permanent	311,794.20
	Cropland – annual	244,122.84
	Grassland	1,247,688.99
	Settlements	45,039.24
	Wetlands - natural	22,350.60
	Wetlands - artificial	336.69
	Other land - moor	10,420.38
	Other land–natural bare lands	1,973.43
	Other land–artificial bare lands	57,633.48
	No information – clouds and shadows	115,364.16
	Total area	**5,113,939.50**

2013/14



Land-cover		Area
Color	Description	ha
	Forest lands (FL)- Primary forests	2,215,543.23
	Lands converted to FL – New forests	918,483.39
	Cropland - permanent	277,262.82
	Cropland – annual	251,873.55
	Grassland	1,190,834.73
	Settlements	46,998.90
	Wetlands - natural	24,484.86
	Wetlands - artificial	382.32
	Other land - moor	10,423.71
	Other land–natural bare lands	1,897.29
	Other land–artificial bare lands	60,390.54
	No information – clouds and shadows	115,364.16
	Total area	**5,113,939.50**

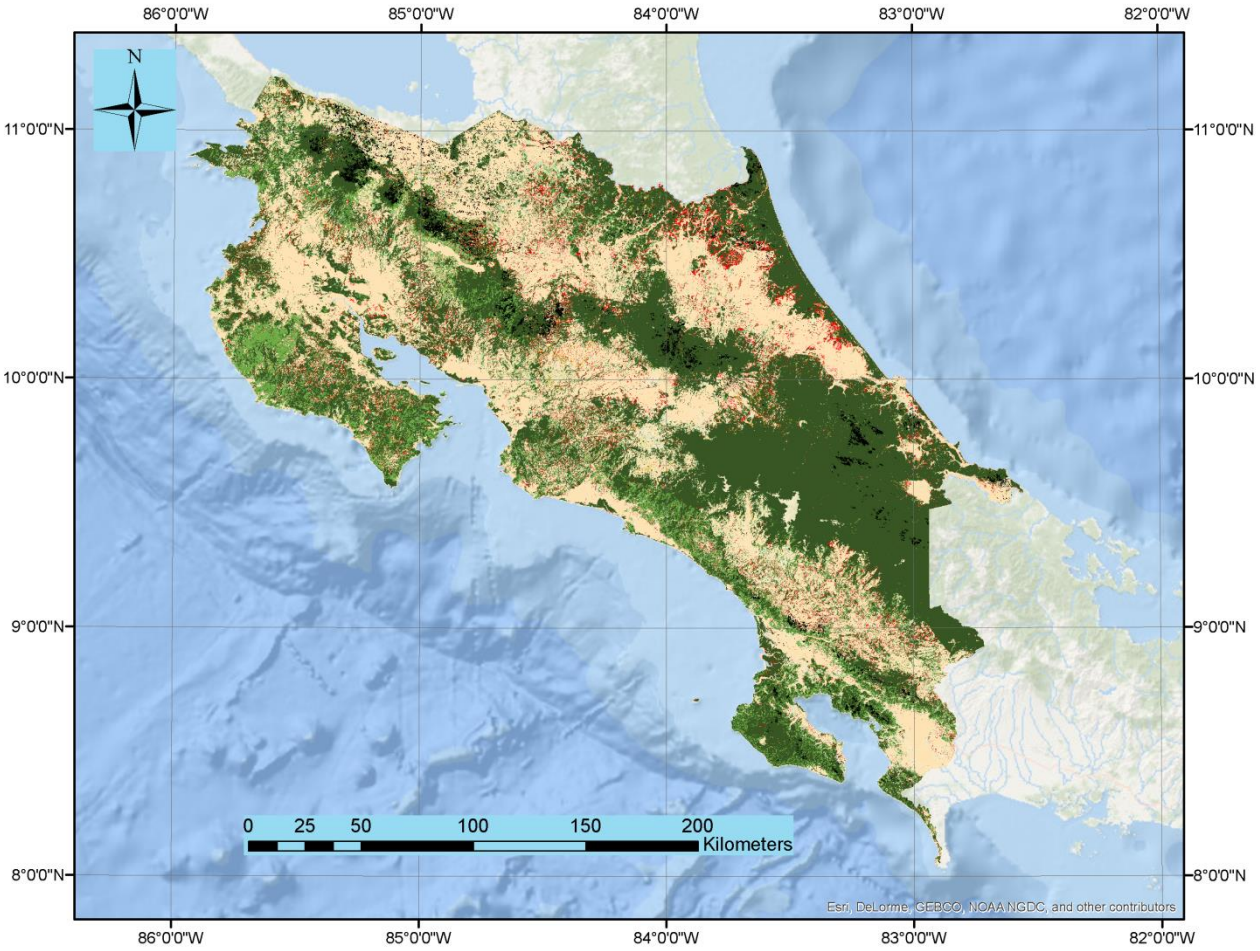
Forest Cover Change Map **1986-2013**



Category in	Category in	Activities*	Color	Area*
LCM 1985/86	LCM 2013/14	REDD+		ha
Primary forest	Primary forest	CO		2,215,543.23
	New forest	DF.bp+AE.bn		190,090.98
	Non-forest	DF		398,711.52
New forest	New forest	AE.bn		323,697.24
	Non-forest	DF.bn		59,671.17
Non-forest	New forest	AE.bn		404,695.17
	Non-forest	N.A.		1,406,166.03
Without information				115,364.16
Total				5,113,939.50

* There might be more activities considering that some areas may have changed their category during 1986-2013. For this reason, the areas are not the same as those showed in other tables (except for the case of FLFL (primrary forests)).

Forest Cover Change Map **1997-2011**



Category in	Category in	Activities*	Color	Area*
LCM 1997/98	LCM 2011/12	REDD+		ha
Primary forest	Primary forest	CO		2,233,118.88
	New forest	DF.bp + AE.bn		36,940.50
	Non-forest	DF		150,915.15
New forest	New forest	AE.bn		529,521.93
	Non-forest	DF.bn		140,584.32
Non-forest	New forest	AE.bn		257,634.18
	Non-forest	N.A.		1,649,860.38
Without information				115,364.16
Total				5,113,939.50

* There might be more activities considering that some areas may have changed their category during 1986-2013. For this reason, the areas are not the same as those showed in other tables (except for the case of FLFL (primrary forests)).

Land use change matrices

LCM were combined in a geographic information system to obtain information on land-cover changes for each historical period analyzed. The following land use change matrices (CM) were developed:

- **CM 1986-91**: Land use changes for period 01.01.1986-12.31.1991.
- **CM 1992-97**: Land use changes for period 01.01.1992-12.31.1997.
- **CM 1998-00**: Land use changes for period 01.01.1998-12.31.2000.
- **CM 2001-07**: Land use changes for period 01.01.2001-12.31.2007.
- **CM 2008-11**: Land use changes for period 01.01.2008-12.31.2011.
- **CM 2011-13**: Land use changes for period 01.01.2012-12.31.2013.

These matrices and their corresponding multi-annual AD are reported in the FREL TOOL CR v.1. These matrices are not shown here due to their size.

Interpolation of multi-annual land use change matrices to estimate annual AD

Annual AD land change matrices are shown in the FREL TOOL CR v.1. The conversion of multi-annual data to annual data assumed each year presented equal annual changes. For instance, to estimate AD for year 1986, AD reported for 1986-1991 were divided by six (except for AD representing cells with no changes, which are calculated by subtracting the annual changes in the cells representing changes from the cells with no changes). **Table 8.3.1** shows a summary of the estimated AD. That same table is found in more detail, in the FREL TOOL CR v.1.

Use of land use change matrices to define the REDD+ activities

Besides estimating annual AD, land use change matrices were also used to define the REDD+ activities in a transparent way, and therefore avoid any possibility of double counting. As shown in summary in **Figure 8.3.1.**, this was achieved by assigning a REDD+ activity to each cell in the land use change matrix.

Table 8.3.1. Activity data by source and sink (in hectares per year).

Notes: **DF** = deforestation; **DG** = Forest Degradation; **AE** = C Stocks Enhancement; **MF** = Sustainable management of forest; **CO** = Conservation forest C stocks; **NI** = No information; **OT** = Other lands (non-forest); **an** = anthropogenic; **na** = non-anthropogenic; **to** = total; **bp** = primary forest; **bn** = new forest; *AAAA-AA* = age classes; -->FL = Lands converted to forest lands.

Years 1996-1999.

Note: years 1986-1995 are notpart of the reference level under the FCPF Carbon Fund but are reported in order to comply with the transparency principle.

Activity	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
DF.an.to	**50,947**	**50,947**	**50,947**	**50,947**	**50,947**	**50,947**	**28,666**	**28,666**	**28,666**	**28,666**	**28,666**	**28,666**	**54,442**	**54,442**
DF.an.bp	**44,550**	**44,550**	**44,550**	**44,550**	**44,550**	**44,550**	**18,363**	**18,363**	**18,363**	**18,363**	**18,363**	**18,363**	**28,194**	**28,194**
DF.an.bn	**6,397**	**6,397**	**6,397**	**6,397**	**6,397**	**6,397**	**10,304**	**10,304**	**10,304**	**10,304**	**10,304**	**10,304**	**26,249**	**26,249**
... - 1985	6,397	6,397	6,397	6,397	6,397	6,397	2,884	2,884	2,884	2,884	2,884	2,884	4,169	4,169
1986-91	-	-	-	-	-	-	7,420	7,420	7,420	7,420	7,420	7,420	13,250	13,250
1992-97	-	-	-	-	-	-	-	-	-	-	-	-	8,830	8,830
1998-00	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2001-07	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2008-11	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2012-13	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DF.na.to	**894**	**894**	**894**	**894**	**894**	**894**	**351**	**351**	**351**	**351**	**351**	**351**	**775**	**775**
DF.na.bp	**747**	**747**	**747**	**747**	**747**	**747**	**236**	**236**	**236**	**236**	**236**	**236**	**263**	**263**
DF.na.bn	**147**	**147**	**147**	**147**	**147**	**147**	**114**	**114**	**114**	**114**	**114**	**114**	**513**	**513**
... - 1985	*147*	*147*	*147*	*147*	*147*	*147*	*21*	*21*	*21*	*21*	*21*	*21*	*20*	*20*
1986-91	-	-	-	-	-	-	*93*	*93*	*93*	*93*	*93*	*93*	*51*	*51*
1992-97	-	-	-	-	-	-	-	-	-	-	-	-	*442*	*442*
1998-00	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2001-07	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2008-11	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2012-13	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DF.to.to	**51,841**	**51,841**	**51,841**	**51,841**	**51,841**	**51,841**	**29,017**	**29,017**	**29,017**	**29,017**	**29,017**	**29,017**	**55,218**	**55,218**
DF.to.bp	**45,296**	**45,296**	**45,296**	**45,296**	**45,296**	**45,296**	**18,599**	**18,599**	**18,599**	**18,599**	**18,599**	**18,599**	**28,457**	**28,457**

Activity	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
DF.to.bn	6,544	6,544	6,544	6,544	6,544	6,544	10,418	10,418	10,418	10,418	10,418	10,418	26,761	26,761
... - 1985	*6,544*	*6,544*	*6,544*	*6,544*	*6,544*	*6,544*	*2,905*	*2,905*	*2,905*	*2,905*	*2,905*	*2,905*	*4,189*	*4,189*
1986-91	-	-	-	-	-	-	*7,513*	*7,513*	*7,513*	*7,513*	*7,513*	*7,513*	*13,301*	*13,301*
1992-97	-	-	-	-	-	-	-	-	-	-	-	-	*9,271*	*9,271*
1998-00	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2001-07	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2008-11	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2012-13	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AE.bp														
AE.bn	417,230	451,092	484,953	518,815	552,676	586,538	600,466	614,394	628,322	642,250	656,178	670,106	692,026	713,946
... - 1985	*376,824*	*370,280*	*363,735*	*357,191*	*350,646*	*344,102*	*341,197*	*338,292*	*335,387*	*332,483*	*329,578*	*326,673*	*322,484*	*318,294*
1986-91	-	*40,406*	*80,812*	*121,218*	*161,624*	*202,030*	*234,923*	*227,410*	*219,897*	*212,383*	*204,870*	*197,357*	*184,057*	*170,756*
1992-97	-	-	-	-	-	-	-	*24,346*	*48,692*	*73,038*	*97,384*	*121,730*	*136,805*	*127,533*
1998-00	-	-	-	-	-	-	-	-	-	-	-	-	-	*48,681*
2001-07	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2008-11	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2012-13	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TCTF	*40,406*	*40,406*	*40,406*	*40,406*	*40,406*	*40,406*	*24,346*	*24,346*	*24,346*	*24,346*	*24,346*	*24,346*	*48,681*	*48,681*
MF.bp	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MF.bs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO.bp	2,759,049	2,713,753	2,668,457	2,623,160	2,577,864	2,532,568	2,513,969	2,495,370	2,476,771	2,458,172	2,439,573	2,420,975	2,392,518	2,364,061
SI.b	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OT	1,885,819	1,897,254	1,908,689	1,920,123	1,931,558	1,942,993	1,970,487	1,975,158	1,979,829	1,984,500	1,989,171	1,993,842	1,974,178	1,980,714
Total area	5,113,940	5,113,940	5,113,940	5,113,940	5,113,940	5,113,940	5,113,940	5,113,940	5,113,940	5,113,940	5,113,940	5,113,940	5,113,940	5,113,940

Years 2000-2013.

Note: years 2010-2013are not part of the reference level under the FCPF Carbon Fund; the results of the first year of the ER-P are shown instead (see Section 13).

Activity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
DF.an.to	**54,442**	**23,255**	**23,255**	**23,255**	**23,255**	**23,255**	**23,255**	**23,255**	**25,009**	**25,009**	**25,009**	**25,009**	**33,842**	**33,842**
DF.an.bp	**28,194**	**9,761**	**9,761**	**9,761**	**9,761**	**9,761**	**9,761**	**9,761**	**7,787**	**7,787**	**7,787**	**7,787**	**8,510**	**8,510**
DF.an.bn	**26,249**	**13,494**	**13,494**	**13,494**	**13,494**	**13,494**	**13,494**	**13,494**	**17,222**	**17,222**	**17,222**	**17,222**	**25,332**	**25,332**
... - 1985	*4,169*	*1,826*	*1,826*	*1,826*	*1,826*	*1,826*	*1,826*	*1,826*	*1,188*	*1,188*	*1,188*	*1,188*	*1,607*	1,607
1986-91	*13,250*	*2,891*	*2,891*	*2,891*	*2,891*	*2,891*	*2,891*	*2,891*	*2,194*	*2,194*	*2,194*	*2,194*	*2,128*	2,128
1992-97	*8,830*	*4,429*	*4,429*	*4,429*	*4,429*	*4,429*	*4,429*	*4,429*	*2,335*	*2,335*	*2,335*	*2,335*	*1,751*	1,751
1998-00	-	*4,349*	*4,349*	*4,349*	*4,349*	*4,349*	*4,349*	*4,349*	*5,824*	*5,824*	*5,824*	*5,824*	*4,918*	4,918
2001-07	-	-	-	-	-	-	-	-	*5,681*	*5,681*	*5,681*	*5,681*	*7,229*	7,229
2008-11	-	-	-	-	-	-	-	-	-	-	-	-	*7,699*	7,699
2012-13	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DF.na.to	**775**	**554**	**554**	**554**	**554**	**554**	**554**	**554**	**720**	**720**	**720**	**720**	**863**	**863**
DF.na.bp	**263**	**264**	**264**	**264**	**264**	**264**	**264**	**264**	**291**	**291**	**291**	**291**	**278**	**278**
DF.na.bn	**513**	**289**	**289**	**289**	**289**	**289**	**289**	**289**	**429**	**429**	**429**	**429**	**585**	**585**
... - 1985	20	25	25	25	25	25	25	25	22	22	22	22	10	10
1986-91	51	33	33	33	33	33	33	33	29	29	29	29	31	31
1992-97	442	106	106	106	106	106	106	106	67	67	67	67	54	54
1998-00	-	125	125	125	125	125	125	125	76	76	76	76	51	51
2001-07	-	-	-	-	-	-	-	-	235	235	235	235	106	106
2008-11	-	-	-	-	-	-	-	-	-	-	-	-	333	333
2012-13	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DF.to.to	**55,218**	**23,808**	**23,808**	**23,808**	**23,808**	**23,808**	**23,808**	**23,808**	**25,729**	**25,729**	**25,729**	**25,729**	**34,705**	**34,705**
DF.to.bp	**28,457**	**10,025**	**10,025**	**10,025**	**10,025**	**10,025**	**10,025**	**10,025**	**8,078**	**8,078**	**8,078**	**8,078**	**8,788**	**8,788**
DF.to.bn	**26,761**	**13,783**	**13,783**	**13,783**	**13,783**	**13,783**	**13,783**	**13,783**	**17,651**	**17,651**	**17,651**	**17,651**	**25,917**	**25,917**
... - 1985	4,189	1,851	1,851	1,851	1,851	1,851	1,851	1,851	1,210	1,210	1,210	1,210	1,617	1,617
1986-91	13,301	2,924	2,924	2,924	2,924	2,924	2,924	2,924	2,223	2,223	2,223	2,223	2,160	2,160
1992-97	9,271	4,535	4,535	4,535	4,535	4,535	4,535	4,535	2,402	2,402	2,402	2,402	1,805	1,805

Activity	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1998-00	-	4,473	4,473	4,473	4,473	4,473	4,473	4,473	5,900	5,900	5,900	5,900	4,969	4,969
2001-07	-	-	-	-	-	-	-	-	5,916	5,916	5,916	5,916	7,335	7,335
2008-11	-	-	-	-	-	-	-	-	-	-	-	-	8,032	8,032
2012-13	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DG	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AE.bp	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AE.bn	**735,866**	**740,799**	**745,731**	**750,664**	**755,597**	**760,530**	**765,462**	**770,395**	**783,820**	**797,246**	**810,671**	**824,097**	**871,290**	**918,483**
... - 1985	314,105	312,254	310,403	308,552	306,701	304,850	302,999	301,148	299,938	298,728	297,518	296,309	294,691	293,074
1986-91	157,455	154,532	151,608	148,684	145,760	142,836	139,912	136,988	134,765	132,542	130,319	128,096	125,936	123,776
1992-97	118,262	113,727	109,192	104,656	100,121	95,586	91,051	86,516	84,113	81,711	79,309	76,906	75,101	73,296
1998-00	97,362	141,570	137,096	132,623	128,150	123,676	119,203	114,729	108,829	102,929	97,029	91,129	86,161	81,192
2001-07	-	-	18,716	37,432	56,149	74,865	93,581	112,297	125,097	119,181	113,265	107,349	100,015	92,680
2008-11	-	-	-	-	-	-	-	-	-	31,077	62,154	93,231	116,275	108,243
2012-13	-	-	-	-	-	-	-	-	-	-	-	-	-	73,111
TCTF	48,681	18,716	18,716	18,716	18,716	18,716	18,716	18,716	31,077	31,077	31,077	31,077	73,111	73,111
MF.bp	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MF.bs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO.bp	**2,335,605**	**2,325,580**	**2,315,555**	**2,305,530**	**2,295,505**	**2,285,480**	**2,275,455**	**2,265,430**	**2,257,352**	**2,249,274**	**2,241,197**	**2,233,119**	**2,224,331**	**2,215,543**
SI.b	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OT	**1,987,251**	**2,023,753**	**2,028,845**	**2,033,937**	**2,039,029**	**2,044,122**	**2,049,214**	**2,054,306**	**2,047,038**	**2,041,690**	**2,036,342**	**2,030,995**	**1,983,613**	**1,945,208**
Total area	**5,113,940**	**5,113,940**	**5,113,940**	**5,113,940**	**5,113,940**	**5,113,940**	**5,113,940**	**5,113,940**	**5,113,940**	**5,113,940**	**5,113,940**	**5,113,940**	**5,113,940**	**5,113,940**

Additional information on the methods used to estimate the AD and results obtained

DEFORESTATION (included in the reference level):

Annual AD for 1996-2009 and the corresponding deforestation rates (for primary forests) are presented below:

All forests:

- Total deforestation: 31,557.48 ha yr^{-1}
- Anthropogenic deforestation: 30,961.56 ha yr^{-1}
- Non-anthropogenic deforestation: 595.92 ha yr^{-1}

Primary forests:

- Total deforestation: 14,921.28 ha yr^{-1} (-0.63 % yr^{-1})
- Anthropogenic deforestation: 14,657.49 ha yr^{-1} (-0.62 % yr^{-1})
- Non-anthropogenic deforestation: 263.79 ha yr^{-1} (-0.01 % yr^{-1})

New forests:

- Total deforestation: 16,636.20 ha yr^{-1}
- Anthropogenic deforestation: 16,304.07 ha yr^{-1}
- Non-anthropogenic deforestation: 332.13 ha yr^{-1}

Annual AD were calculated as follows:

$$DA_{DF} = (A_1 - A_2)/(t_2 - t_1 + 1) \quad (5)$$

Where:

DA_{DF} Deforestation annual average AD; in ha $year^{-1}$

A_1 Forest area at the beginning of the sub-period assessed; in ha

A_2 Forest area at the end of the sub-period assessed; in ha

t_1 Start year of sub-period assessed; years

t_2 Final year of sub-period assessed; years

Note: the historical period analyzed (1986-2013) is divided in 6 sub-periods: 1986-91, 1992-97,1998-2000, 2001-07,2008-11,and 2011-13.

The deforestation rates were calculated as follows:

$$Rate_{DF} = \left(\frac{A_2}{A_1}\right)^{\frac{1}{t_2 - t_1 + 1}} - 1 \quad (6)$$

Where:

$Rate_{DF}$ Percentage of area lost (in the case of deforestation: *DF*) or gained (in the case of new forests) annually in relation to the area of the previous year; %

A_1 Forest area at the beginning of the sub-period assessed; in ha

A_2 Forest area at the end of the sub-period assessed; in ha

t_1 Start year of sub-period assessed; years

t_2 Final year of sub-period assessed; years

Anthropogenic and non-anthropogenic deforestation

The ER-P and the C accounting framework makes a distinction between anthropogenic and non-anthropogenic emissions, including non-anthropogenic deforestation. For example, this could be related to volcanic activity and flooding. To do this, satellite images were digitilized and forest loss associated around craters were assumed to be non-anthropogenic. Likewise, the conversion of forest land to wetlands (natural water bodies) were also considered non-anthropogenic deforestation, since in these cases forest losses are attributable to the natural movement of river courses. Furthermore, changes in forest areas to artificial water bodies (such as the dams) were considered human-induced and , thus, are identified as anthropogenic deforestation. The same accounting rules used to exclude non-anthropogenic deforestation will be applied in future MRV for keeping consistency.

New forests and tree plantations

AD for new forests includes changes in areas of secondary forests and tree plantations. Tree plantations are part of "new forests" because Costa Rica does not have consistent and reliable historical information to distinguished them. This means that it was not possible to classify tree plantations with sufficient accuracy in the analysis of satellite images to be able to keep them as a separate land use category. For these reasons, the "new forests" class includes tree plantations.

To estimate EF for new forests, the equations by Cifuentes (2008)[53] for secondary forests were used. Tree plantations grow faster (and absorb more C in the first years of establishment) than secondary forests. Therefore, given the current lack of data, it was considered conservative to apply these equations to the entire "new forests" class, which includes tree plantations. This would underestimate removals in the reference level and in the MRV.

Finally, Costa Rica acknolwedges that better data must be collected and reported for tree plantations. This is considered as a plan improvement in the national land cover/use monitoring system (Section 9).

All the technical elements presented and discussed above are summarized in the following table, which is part of the ERPD template:

Description of the parameter including the time period covered (e.g. forest-cover change between 2000 – 2005 or transitions between forest categories X and Y between 2003-2006):	• AD for anthropogenic deforestation • Average annual forest loss for 1996-2009 (14 years)
Explanation for which sources or sinks the parameter is used (e.g deforestation or forest degradation):	Anthropogenic deforestation
Data unit (e.g. ha/yr):	ha $year^{-1}$
Value for the parameter:	• Total anthropogenic deforestation: 30,961.56 ha yr^{-1} • Primary forest anthropogenic deforestation: 14,657.49 ha yr^{-1} • New forest anthropogenic deforestation: 16,304.07 ha yr^{-1}
Source of data (e.g. official	• Land-cover maps (LCM). The methods used to produce these maps are described in a separate report[54]

[53]Cifuentes, M. 2008. Aboveground Biomass and Ecosystem Carbon stocks in Tropical Secondary Forests Growing in Six Life Zones of Costa Rica. Oregon State University. School of Environmental Sciences. 2008. 195 p.

[54]Agresta, Dimap, Universidad de Costa Rica, Universidad Politécnica de Madrid, 2015.a. Informe Final: Generating a consistent historical time series of activity data from land use change for the development of Costa Rica's REDD plus reference level:

statistics) or description of the method for developing the data, including (pre-) processing methods for data derived from remote sensing images (including the type of sensors and the details of the images used):	• Land Use Change Matrices produced by intersecting LCM. These matrices may be reviewed in the FREL TOOL CR v.1. • Annualized Land Use Change Matrixes produced by interpolation of Land Use Change Matrices by period. These marices can be reviewed in the FREL TOOL CR v.1.
Spatial level (local, regional, national or international):	National, differentiated by type, six forest types sub-divided in "primary" and "new forest" sub-categories: age cohorts corresponding to the measurement periods (... - 1985, 1986-91, 1992-97, 1998-01, 2002-07, 2008-11, 2012-13).
Discussion of key uncertainties for this parameter:	As described in section 12, the uncertainty level of the deforestation activity forest is very high.
Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	The methods used to conduct the uncertainty analysis are described in detail in a separate report[55]. However, as described in section 12, uncertainties associated to AD are very high, with a relative error of 22% for the deforestation activity data, at 90% of the significance level.

DEGRADATION (excluded from the reference level):

Costa Rica does not have spatially-explicit information to estimate forest degradation AD for 1986-2013 or for the historic reference period considered in the construction of the reference level (1996-2009). Data is lacking on C stock changes in FLFL (both for forest degradation and ehnancement of C stocks). Hence, forest degradation is excluded from the reference level, mainly because Costa Rica is unable to include it at this time.

Considering that indicator 3.3 of the CF-MF requires the inclusion of emissions from forest degradation when they exceed 10% of total forest-related emissions in the accounting area, during the reference historical period and during the period covered by the ERPA, an assessment was made on the significance of forest degradation. The details of the assessment are fully explained in a separate report[56].

The best information currently available to assess C stock changes in FLFL consist of two canopy density maps that for 2000/01 and 2013/14. These maps were prepared by extrapolating the correlation between a vegetation index (= combination of Landsat image spectral bands) and the canopy cover percentage measured in a sample of forest land areas in RapidEye images. According to Agresta *et al.*, 2015.b[57], the accuracy of these maps was 95% with a confidence interval between 94 and 97% ($p<0.05$).

Protocolo metodológico. Informe preparado para el Gobierno de Costa Rica bajo el Fondo de Carbono del Fondo Cooperativo para el Carbono de los Bosques (FCPF). 44 p.

[55] CDI, 2015.b. Nivel de referencia de emisiones y remociones forestales de Costa Rica y metodología empleada para construirlo. Informe preparado para el Gobierno de Costa Rica bajo el Fondo de Carbono del Fondo Cooperativo para el Carbono de los Bosques (FCPF). 223 p.

[56] CDI, 2015.c. Evaluación de la significancia de los cambios de existencias de carbono en los bosques primarios de Costa Rica. Informe preparado para el Gobierno de Costa Rica bajo el Fondo de Carbono del Fondo Cooperativo para el Carbono de los Bosques (FCPF). 12 p.

[57] Agresta, Dimap, Universidad de Costa Rica, Universidad Politécnica de Madrid, 2015.b. Índice de cobertura como base para la estimación de la degradación y aumento de existencias de carbono: Generating a consistent historical time series of activity

Both canopy density maps were intersected with land-cover maps to identify these three sub-categories:

- "intact" (= canopy cover > 85%);
- "degraded" (= canopy cover between 60% y 85%); y
- "very degraded" (= canopy cover < 60%).

Forest areas with loss of canopy cover between 2001 and 2013 were classified as degraded areas. Forest areas may have gained canopy cover density in time, these may be considered to be areas where C stocks were enhanced. However, C gains in FLFL (primary forests) are not included in the C accounting framework, due to lack of appropriate EF and because this assessment did not cover the historical reference period 1986-2009 but only 2001-2013. Unfortunately due to lack of data, it is not possible to quantify correlation between changes in canopy cover density and forest C stock changes, hence the following approximation should be interpreted with caution.

To estimate forest C stock changes associated to changes in canopy cover density, the following was applied:

For 2000/01:

1. It was assumed that forests classified as "intact" had, in average, 100% of C stocks per ha estimated for primary forests. "Intact" primary forests have a natural mortality and regeneration dynamics based on frequent forest clearings with a certain level of canopy openness that could reach 15% and still be considered normal for a primary forest with no human intervention.
2. It was assumed that forests classified as "degraded" had an average of 78.38% of the AGB of "intact" forests' [78.38% = ((85%+60%)/2))/((85%-100%)/2))][58].
3. It was assumed that forests classified as "very degraded" had, in average, 48.65% of the AGB of "intact" forests [48.65%=((60%+30%)/2))/((85%-100%)/2))].

For year 2013/14:

1. When canopy cover density decreased in comparison to 2000/2001, C stocks were calculated the same as for 2000/2001.
2. When canopy cover density increased in comparison to 2000/2001, it was assumed that C stocks for 2000/2001 forests were equal to C stocks for 2013/2014. Absorbed C in these areas was calculated assuming a growth rate equivalent to a 1-12 yr age class according to Cifuentes' equations (2008).

Results suggest that forest degradation may be significant (>10% of the total forest-related emissions; Table**s 8.3.2** and **8.3.3**).

data from land use change for the development of Costa Rica's REDD plus reference level. Report prepared for the Government of Costa Rica under the Carbon Fund of the Forest Carbon (FCPF). 18 p.

[58] The percentages in parentheses refer to the minimum and maximum value of canopy cover for forests classified as "intact", "degraded" and "too degraded".

Table 8.3.2. Canopy cover density changes between 2000/2001 and 2013/2014.

Condition in year:		Area
2000/01	2013/14	Ha
Intact	Intact	814,752.81
Intact	Degraded	226,317.06
Intact	Too degraded	55,896.66
Degraded	Intact	272,344.50
Degraded	Degraded	247,865.13
Degraded	too degraded	116,534.25
too degraded	Intact	86,688.99
too degraded	degraded	135,544.77
too degraded	too degraded	259,599.06
Total area		**2,215,543.23**

Area without change	1,322,217.00
Area with increased canopy cover density	494,578.26
Area with decreased canopy cover density	398,747.97
Total area	**2,215,543.23**

As seen in Table **8.3.2.**, the area in which canopy cover density decreased (398,747.97 ha) is significantly lower (80.62%) than the area in which the canopy cover density increased (494,578.26 ha). However, it must be assumed that when canopy is lost, emissions may be muchh higher than the potential absorptions during canopy recovery in an equivalent area, since under a conservative assumption, canopy loss is usually due to mortality of older, higher C trees, and that canopy recovery occurs when younger trees regenerate and fill forest gaps.

Results in terms of C stock changes are shown inTable **8.3.3**. All calculations steps are available in the Excel file "Significance of forest degradation" and are described in detail in CDI (2015.c)[59].According to Table **8.3.3.**, net emissions for 2000/2001 to 2013/2014 are 3,231,251.46 tCO_2-e yr^{-1} [60], which would represent 35% of total forest-related emissions between 2000/2001 and 2013/2014.

The results from this assessment must not be considered an estimate of emissions from forest degradation and of absorptions from the enhancement of forest C stocks in FLFL (primary forests), but as indication FLFL was a net source of emissions during the analysis period, and that those net emissions could be significant (> 10% of the total emissions) according to the CF-MF.

[59] CDI, 2015.c. Analysis of significance of carbon stock changes in forests that remained forests. Report prepared for the Government of Costa Rica under the Carbon Fund of the Forest Carbon Partnership (FCPF). 12 p.

[60]The emissions from canopy cover loss are estimated in 4,263,434 t CO_2-e yr^{-1} while the absorptions from canopy cover gains are estimated in -1,032,182 t CO_2-e yr^{-1}, which results in a net balance of 3,231,251.46 tCO_2-e yr^{-1}.

Table 8.3.3. Emissions and absorptions related to changes in the canopy cover density in FLFL (Primary forests) for 2000/2001 to 2013/2014.

Forest type	2000/01			2013/14						Area	Results	
	Condition	Canopy Cover Density	C stocks	Condition	Canopy Cover Density	C in original forest	Regenerated area %	C in regeneration	C stocks		C stock changes	
		%	t CO_2-e ha^{-1}		Average	t CO_2-e ha^{-1}	%	t CO_2-e ha^{-1}	t CO_2-e ha^{-1}	ha	t CO_2-e	t CO_2-e $año^{-1}$
BHP	i	96.0%	647.57	i	96.2%	647.57	0.1%	0.16	647.73	637,156.71	(99,640.61)	(7,664.66)
BHP	i	94.1%	647.57	d	76.4%	521.97	0.0%	-	521.97	141,482.88	17,769,981.71	1,366,921.67
BHP	i	93.4%	647.57	md	45.7%	348.49	0.0%	-	348.49	34,876.35	10,431,022.73	802,386.36
BHP	d	75.6%	521.97	i	94.3%	521.97	18.7%	19.62	541.59	167,559.03	(3,287,014.67)	(252,847.28)
BHP	d	74.4%	521.97	d	75.3%	521.97	0.9%	0.96	522.93	102,636.27	(98,547.17)	(7,580.55)
BHP	d	72.8%	521.97	md	42.5%	348.49	0.0%	-	348.49	46,140.30	8,004,776.50	615,752.04
BHP	md	45.6%	348.49	i	93.7%	348.49	48.1%	50.58	399.06	58,863.24	(2,977,110.01)	(229,008.46)
BHP	md	43.0%	348.49	d	73.7%	348.49	30.8%	32.32	380.81	62,952.30	(2,034,673.64)	(156,513.36)
BHP	md	34.4%	348.49	md	33.5%	348.49	0.0%	-	348.49	106,209.81	-	-
BH	i	93.8%	473.46	i	93.7%	473.46	0.0%	-	473.46	119,199.87	-	-
BH	i	92.0%	473.46	d	76.1%	384.37	0.0%	-	384.37	64,652.76	5,759,580.58	443,044.66
BH	i	91.4%	473.46	md	43.1%	261.31	0.0%	-	261.31	17,183.97	3,645,561.51	280,427.81
BH	d	75.9%	384.37	i	92.1%	384.37	16.2%	17.95	402.32	72,551.70	(1,302,537.00)	(100,195.15)
BH	d	74.0%	384.37	d	73.9%	384.37	0.0%	-	384.37	118,014.57	-	-
BH	d	72.0%	384.37	md	40.8%	261.31	0.0%	-	261.31	60,052.14	7,390,264.47	568,481.88
BH	md	44.0%	261.31	i	91.6%	261.31	47.6%	52.73	314.03	21,097.35	(1,112,394.45)	(85,568.80)
BH	md	40.8%	261.31	d	72.0%	261.31	31.2%	34.60	295.91	60,937.65	(2,108,379.78)	(162,183.06)
BH	md	32.0%	261.31	md	31.4%	261.31	0.0%	-	261.31	132,791.94	-	-
BS	i	92.1%	357.82	i	92.3%	357.82	0.3%	0.22	358.04	2,870.64	(637.21)	(49.02)
BS	i	91.3%	357.82	d	74.3%	298.34	0.0%	-	298.34	3,687.66	219,331.82	16,871.68
BS	i	90.9%	357.82	md	45.3%	216.17	0.0%	-	216.17	990.72	140,335.65	10,795.05
BS	d	76.4%	298.34	i	91.4%	298.34	15.0%	13.30	311.64	2,820.06	(37,505.27)	(2,885.02)
BS	d	73.9%	298.34	d	72.5%	298.34	0.0%	-	298.34	8,947.26	-	-
BS	d	71.7%	298.34	md	40.3%	216.17	0.0%	-	216.17	5,490.81	451,195.96	34,707.38
BS	md	43.8%	216.17	i	90.4%	216.17	46.6%	41.28	257.45	454.86	(18,778.20)	(1,444.48)
BS	md	41.5%	216.17	d	70.9%	216.17	29.4%	26.04	242.21	3,353.94	(87,348.46)	(6,719.11)
BS	md	32.9%	216.17	md	30.4%	216.17	0.0%	-	216.17	8,150.85	-	-
MA	i	92.5%	334.22	i	93.0%	334.22	0.5%	0.15	334.37	14,141.79	(2,162.47)	(166.34)
MA	i	90.8%	334.22	d	79.0%	264.56	0.0%	-	264.56	4,449.42	309,965.23	23,843.48
MA	i	90.7%	334.22	md	42.7%	168.31	0.0%	-	168.31	212.67	35,283.42	2,714.11
MA	d	80.0%	264.56	i	92.0%	264.56	12.0%	3.64	268.20	7,319.25	(26,677.54)	(2,052.12)
MA	d	77.8%	264.56	d	77.5%	264.56	0.0%	-	264.56	5,687.28	-	-
MA	d	73.3%	264.56	md	46.6%	168.31	0.0%	-	168.31	516.06	49,667.01	3,820.54

Forest type	2000/01			2013/14						Area	Results	
	Condition	Canopy Cover Density	C stocks	Condition	Canopy Cover Density	C in original forest	Regenerated area %	C in regeneration	C stocks		C stock changes	
		%	t CO_2-e ha^{-1}		Average	t CO_2-e ha^{-1}	%	t CO_2-e ha^{-1}	t CO_2-e ha^{-1}	ha	t CO_2-e	t CO_2-e $año^{-1}$
MA	md	45.3%	168.31	i	90.2%	168.31	44.9%	13.60	181.92	208.71	(2,839.48)	(218.42)
MA	md	45.6%	168.31	d	72.6%	168.31	27.0%	8.18	176.49	669.42	(5,475.49)	(421.19)
MA	md	28.6%	168.31	md	30.5%	168.31	2.0%	0.59	168.91	1,357.11	(803.81)	(61.83)
BP-Y	i	94.0%	241.66	i	94.7%	241.66	0.6%	0.14	241.80	41,383.80	(5,874.64)	(451.90)
BP-Y	i	93.3%	241.66	d	76.2%	191.56	0.0%	-	191.56	12,044.34	603,433.17	46,417.94
BP-Y	i	93.2%	241.66	md	45.9%	122.34	0.0%	-	122.34	2,632.95	314,172.14	24,167.09
BP-Y	d	74.8%	191.56	i	93.9%	191.56	19.2%	4.20	195.76	22,094.46	(92,846.98)	(7,142.08)
BP-Y	d	73.9%	191.56	d	75.5%	191.56	1.6%	0.35	191.91	12,579.75	(4,403.16)	(338.70)
BP-Y	d	72.4%	191.56	md	43.7%	122.34	0.0%	-	122.34	4,334.94	300,074.40	23,082.65
BP-Y	md	48.2%	122.34	i	93.2%	122.34	45.0%	9.86	132.20	6,064.83	(59,812.21)	(4,600.94)
BP-Y	md	42.6%	122.34	d	74.2%	122.34	31.6%	6.93	129.27	7,631.46	(52,915.02)	(4,070.39)
BP-Y	md	33.5%	122.34	md	32.7%	122.34	0.0%	-	122.34	11,089.35	-	-

Emissions for canopy cover loss in period 2001-2013	55,424,646.30	4,263,434.33
Absorptions for increase of canopy cover in period 2001-2013	(13,418,377.27)	(1,032,182.87)
Balance of net emissions for canopy cover changes in primary forests in period 2001-2013	42,006,269.03	3,231,251.46

Total emissions for anthropogenic deforestation in historical reference period 2001-2013	61,662,925.09	4,743,301.93

Total emissions 2001-2013		9,006,736.26

BHP = Pluvial and very wet forests; **BH** = Rain forests; **BS** = Dry forests; **MA** = Mangrove; **BP-Y** = Palm Forests (Yolillales).
i = intact; **d** = degraded; **md** = very degraded.

Considering forest degradation could represent a significant source of GHG emissions in Costa Rica, and recognizing that the country does not have appropriate methods or data yet to estimate C stock changes in FLFL (primary forests), Costa Rica will employ paragraph 10 of Decision 12/CP.17 which states that the Parties to the UNFCCC agreed on a *step-wise approach* for developing REDD+ FREL/FRL, and that such improvements could be done by incorporating better data and methodologies and, where appropriate, additional C pools, noting the need for appropriate and predictable support, as mentioned in paragraph 71 of Decision 1/CP.16.

Considering such decisions, Costa Rica decides not to include forest degradation (and C stocks enhancement from FLFL) in its reference level at this point, and to consider, according to the availability of appropriate and predictable international support, the development of methodologies and data to estimate the emissions from forest degradation. Plans are already in place to improve current MRV, as explained in Section 9.

ENHANCEMENT OF FOREST C STOCKS (<u>included</u> in the reference level)

Average annual AD for 1996-2009 and the areas new growing forests in each age class at the end of the historical period (2009):

	<u>Average 1996-2009:</u>	<u>Area of new forests in 2009 in 2009:</u>
• Total for new forests in all age classes:	738,455 ha yr^{-1}	797,246 ha
• New forests that appeared in prior to a 1985:	311,194 ha yr^{-1}	298,728 ha
• New forests that appeared in 1986 – 1991:	157,294 ha yr^{-1}	132,542 ha
• New forests that appeared in 1992 – 1997:	104,885 ha yr^{-1}	81,711 ha
• New forests that appeared in 1998 – 2000:	89,632 ha yr^{-1}	102,929 ha
• New forests that appeared in 2001 – 2007:	45,523 ha yr^{-1}	119,181 ha
• New forests that appeared in 2008 – 2011:	2,220 ha yr^{-1}	31,077 ha
• New forests that appeared in 2008 – 2011:	0 ha yr^{-1}	0 ha
• Average area of new forests that appeared each year:	27,707 ha yr^{-1}	31,077 ha

AD were calculated as follows:

$$AD_{AE} = (A_1 - A_2)/(t_2 - t_1 + 1) \quad (7)$$

<u>Where</u>:

AD_{AE} Annual average AD of C stocks enhancement in new forests; in ha $year^{-1}$

A_1 New forest area at the beginning of the sub-period assessed; in ha

A_2 New forest area at the end of the sub-period assessed; in ha

t_1 Start of sub-period assessed; years

t_2 End of sub-period assessed; years

New forests are established every year and their C stocks depend on their age. For this reason, the reference level for the activity "enhanment of forest C stocks" cannot be estimated by multiplying average AD by an average

carbon EF, but must be determined by estimating yearly historical absorptions forest type and age class, and then calculate the average over the historical period (1996-2009).

Conceptually, there are three possible situations in which enhancement of forest C stocks may take place:

1. In primary forests, when they recover from a degraded condition;
2. In forests established in previous periods, by growing and passing to older age clasess;
3. In non-forest lands when vegetation appears that complies with the definition for "forest".

For constructing the reference level, these three situations were address in the following way:

- Enhancement of forest C stocks FLFL (primary forests):
  (**excluded from the reference level**)

Data and methods required to estimate enhancement of C forest C stocks in FLFL (primary forests) are similar to the methods that would be used to estimate emissions for gross degradation in these forests. As mentioned in the previous discussion regarding emissions for forest degradation, Costa Rica does not have sufficient quality information yet to estimate C stock changes in FLFL (primary forests). Additionally, because forest degradation in FLFL (primary forests) was not included in the C accounting framework, it may be argued that it is conservative to excluded enhancement of forest C stocks due to forest growth in these same areas.

- Enhancement of forest C stocks in existing new forests:
  (**included in the reference level**)

New existing forests are all forests not classified as primary forests in the 1985/86 land-cover map and that emerged at some point of the 1986-2013 time series. This means that new forests grow in previously non-forested lands where vegetation did not comply with the definition of "forest".For each year of the historical time series, the area in which new forests remained standing at the end of the year in each *age cohort*[61] was determined, obtaining the AD shown inTable **8.3.4.** The areas of new forests at the end of each year in each *age class*[62] constitute AD for the activity enhancement of forest C stocks. By multiplying these areas (AD) by the EF that corresponds to a particular forest age class, the estimate enhancement of C stocks is obtained. .

In order to know the area for each age class and each forest type in each year of the historical period, its was assumed that if in a historical period of *T* years (*T* = number of years between two land-cover maps) *A* hectares of new forest had appeared, then – in each year of period *T -A*/*T* hectares had become forest lands.

In order to assign age to areas of new forests, IMN experts were consulted to determine the minimum age (MA) at which new forests are supposed to become visible in satellite images (complying also with the definition of "forest"). As shown in **Figure 8.3.4.**, this methodology and assumption of initial age allowed determining the area for each class of age for all forest types in all years.

[61] "*Age cohort*" is understood as the annual age clases that were regenerated in a historical period between two land-cover maps:…*-1985*, *1986-91*, *1992-97*, *1998-01*, *2002-07*, *2008-11*, *2012-13*.

[62] "*Age class"* comprises all the forests with the same age in yrs. The number of age clases differs according to the age cohort since some of them include more yrs than others.

Table 8.3.4. AD for C stock enhancement in new forests.

REDD+ Activity	Annual AD; hectares per year														
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
AE.bn	**417,230**	**451,092**	**484,953**	**518,815**	**552,676**	**586,538**	**600,466**	**614,394**	**628,322**	**642,250**	**656,178**	**670,106**	**692,026**	**713,946**	**735,866**
... - 1985	*376,824*	*370,280*	*363,735*	*357,191*	*350,646*	*344,102*	*341,197*	*338,292*	*335,387*	*332,483*	*329,578*	*326,673*	*322,484*	*318,294*	*314,105*
1986-91	-	*40,406*	*80,812*	*121,218*	*161,624*	*202,030*	*234,923*	*227,410*	*219,897*	*212,383*	*204,870*	*197,357*	*184,057*	*170,756*	*157,455*
1992-97	-	-	-	-	-	-	-	*24,346*	*48,692*	*73,038*	*97,384*	*121,730*	*136,805*	*127,533*	*118,262*
1998-01	-	-	-	-	-	-	-	-	-	-	-	-	-	*48,681*	*97,362*
2001-07															
2008-11															
2012-13															
Of year	*40,406*	*40,406*	*40,406*	*40,406*	*40,406*	*40,406*	*24,346*	*24,346*	*24,346*	*24,346*	*24,346*	*24,346*	*48,681*	*48,681*	*48,681*

REDD+ Activity	Annual AD; hectares per year														
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
AE.bn	**740,799**	**745,731**	**750,664**	**755,597**	**760,530**	**765,462**	**770,395**	**783,820**	**797,246**	**810,671**	**824,097**	**871,290**	**918,483**	No data	No data
... - 1985	*312,254*	*310,403*	*308,552*	*306,701*	*304,850*	*302,999*	*301,148*	*299,938*	*298,728*	*297,518*	*296,309*	*294,691*	*293,074*	No data	No data
1986-91	*154,532*	*151,608*	*148,684*	*145,760*	*142,836*	*139,912*	*136,988*	*134,765*	*132,542*	*130,319*	*128,096*	*125,936*	*123,776*	No data	No data
1992-97	*113,727*	*109,192*	*104,656*	*100,121*	*95,586*	*91,051*	*86,516*	*84,113*	*81,711*	*79,309*	*76,906*	*75,101*	*73,296*	No data	No data
1998-01	*141,570*	*137,096*	*132,623*	*128,150*	*123,676*	*119,203*	*114,729*	*108,829*	*102,929*	*97,029*	*91,129*	*86,161*	*81,192*	No data	No data
2001-07	-	*18,716*	*37,432*	*56,149*	*74,865*	*93,581*	*112,297*	*125,097*	*119,181*	*113,265*	*107,349*	*100,015*	*92,680*	No data	No data
2008-11	-	-	-	-	-	-	-	-	*31,077*	*62,154*	*93,231*	*116,275*	*108,243*	No data	No data
2012-13	-	-	-	-	-	-	-	-	-	-	-	-	*73,111*	No data	No data
Of year	*18,716*	*18,716*	*18,716*	*18,716*	*18,716*	*18,716*	*18,716*	*31,077*	*31,077*	*31,077*	*31,077*	*73,111*	*73,111*	No data	No data

AE.bn = Enhancement of C stocks in new forests. Years in the first column represent age cohorts. Area reported under "Of year" is the new area converted to forest land in the current year.

Figure 8.3.4. Chart used to assign age classes to the AD of new forests (age cohort 1992-97 is used as an example).

	Reference year										
	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Age classes present in cohort 1992-97			*MA*	*MA+1*	*MA+2*	*MA+3*	*MA+4*	*MA+5*	*MA+6*	*MA+7*	*MA+8*
				MA	*MA+1*	*MA+2*	*MA+3*	*MA+4*	*MA+5*	*MA+6*	*MA+7*
					MA	*MA+1*	*MA+2*	*MA+3*	*MA+4*	*MA+5*	*MA+6*
						MA	*MA+1*	*MA+2*	*MA+3*	*MA+4*	*MA+5*
							MA	*MA+1*	*MA+2*	*MA+3*	*MA+4*
								MA	*MA+1*	*MA+2*	*MA+3*
									MA	*MA+1*	*MA+2*

Note: *MA*= minimum age at which forests are assumed to become visible in Landsat images and comply with the definition of "forest"" (8 years for "Dry forests" and 4 years for all other forests).

- Enhancement of C stocks in new forests that will be established on lands that did not meet the definition of forest land in 2009
  (<u>included</u> the reference level)

These are forests that will contribute to enhancing forest C stocks that did not exist by the end of the reference period (2009). They include lands that by the end year of the reference historical period did not comply with the definition of "forest". As seen in Table **8.3.4.,** in average, between 1996 and 2009, -27,707 ha yr^{-1} of non-forest lands were converted to FL (line *"Of year"* inTable **8.3.4**). The reference level assumes, implicitly, that in the future Costa Rica will be able of convert non-forest lands to FL at an average rate of at least 27,707 ha yr^{-1}. In conclusion, the reference level for the activity enhancement of forest C stocks was calculated as the annual historical average of new forests removals during the 1996-2009 period.

All the technical elements presented and discussed are summarized in the following table:

Description of the parameter including the time period covered (e.g. forest-cover change between 2000 – 2005 or transitions between forest categories X and Y between 2003-2006):	• AD for forest C stocks enhancement • Annual average for period 1996-2009 (14 years)
Explanation for which sources or sinks the parameter is used (e.g deforestation or forest degradation):	Forest C stocks enhancement in new forests (C gains in FLFL (primary forests) are excluded from the reference level).
Data unit (e.g. ha/yr):	ha $year^{-1}$
Value for the parameter:	• Total for new forests: 738,455 ha yr^{-1} • Cohort … - 1985: 311,194 ha yr^{-1} • Cohort 1986 – 1991: 157,294 ha yr^{-1}

	• Cohort 1992 – 1997: 104,885 ha yr^{-1} • Cohort 1998 – 2000: 89,632 ha yr^{-1} • Cohort 2001 – 2007: 45,523 ha yr^{-1} • Cohort 2008 – 2011: 2,220 ha yr^{-1} • Cohort 2008 – 2011: 0 ha yr^{-1} • New forests for the year: 27,707 ha yr^{-1}
Source of data (e.g. official statistics) or description of the method for developing the data, including (pre-)processing methods for data derived from remote sensing images (including the type of sensors and the details of the images used):	• Land-cover maps. The methods used to produce these maps are described in a separate report[63]; • Land Use Change Matrixes produced by intersecting these maps. These matrices can be reviewed in the "FREL TOOL CR v.1" tool. • Annualized Land Use Change Matrixes produced by interpoling the land use change matrices. These matrices can also be reviewed in the "FREL TOOL CR v.1" tool.
Spatial level (local, regional, national or international):	National, stratified in six forest types and sub-categories "primary" and "new"; the latter, divided in age cohorts:... - 1985, 1986-91, 1992-97, 1998-01, 2002-07, 2008-11, 2012-13.
Discussion of key uncertainties for this parameter:	As mentioned for previous parameters, AD uncertainty is high.
Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	The methods for conducting the uncertainty analysis are fully described in a separate report[64].The section dedicated to deforestation mentioned AD uncertainty is high, with a relative error of 20% for the AD in new forests, with a 90% of confidence.

SUSTAINABLE MANAGEMENT OF FOREST (<u>excluded</u> from the reference level)

Costa Rica does not have a spatially-explicit database for the estimation of C stock changes associated to sustainable management of forests for 1986-2013 or for the historical reference period (1996-2009). Due to the lack of data, this activity is excluded from the reference level.

Since emissions from forest degradation and absorptions from the enhancment of forest C stocks in FLFL (primary forests) were excluded, and because it is not possible to estimate C stock changes in FLFL (whether these are

[63]Agresta, Dimap, Universidad de Costa Rica, Universidad Politécnica de Madrid, 2015.a. Final Report: Generating a consistent historical time series of activity data from land use change for the development of Costa Rica's REDD plus reference level: Methodological Protocol. Report prepared for the Government of Costa Rica under the Carbon Fund of the Forest Carbon Partnership (FCPF). 44 p.

[64] CDI, 2015.b. Reference level of emissions and forest absorptions in Costa Rica and methodology used to construct it. Repor prepared for the Government of Costa Rica under the Carbon Fund of the Corest Carbon Partnership (FCPF). 223 p.

sustainably managed or not), , they remain constant in the historical reference period (1986-2009) and it is assumed that they will also remain constant during the ERPA term.

CONSERVATION OF FOREST C STOCKS (excluded from the reference level)

Data presented in this section is only for information; this activity is not part of the reference level. Costa Rica is not expecting payments for conservation of forest C stocks. However, Costa Rica will MRV C stocks in standing forests and will report this information through BURs and National Communications with the goal to show the extensive efforst made by the country in protecting forests in terms of t CO_2, understood as the amount of C stored in wood and other C pools.

Data on the average area of standing primary forests for 1996-2009 and of primary forest areas existing at the end of the reference historical period (2009) are presented here:

	Average area 1996-2009:	Area at the end of 2009:	Total deforestation rate 1996-2009:
• Total for primary forests:	2,323,420.97 ha	2,249,274.42 ha	-0.63%
• Very wet and pluvial forests:	1,396,977.62 ha	1,370,550.47 ha	-0.36%
• Rain forests:	723,783.04 ha	683,849.61 ha	-1.12%
• Dry forests:	38,682.47 ha	37,459.03 ha	-0.78%
• Mangroves:	36,067.30 ha	35,002.89 ha	-0.50%
• Palm forests (Yolillales):	127,910.54 ha	122,412.42 ha	-0.81%

More information is available in table 8.3.5.

Description of the parameter including the time period covered (e.g. forest-cover change between 2000 – 2005 or transitions between forest categories X and Y between 2003-2006):	• AD for the conservation of forest C stocks
Explanation for which sources or sinks the parameter is used (e.g deforestation or forest degradation):	Conservation of forest carbon stocks in primary forests.
Data unit (e.g. ha/yr):	ha $year^{-1}$
Value for the parameter:	See**Table 8.3.5**.
Source of data (e.g. official	• Land-cover Maps. The methods used to produce these maps are described in a separate report[65];

[65]Agresta, Dimap, Universidad de Costa Rica, Universidad Politécnica de Madrid, 2015.a. Informe Final: Generating a consistent historical time series of activity data from land use change for the development of Costa Rica's REDD plus reference level:

statistics) or description of the method for developing the data, including (pre-)processing methods for data derived from remote sensing images (including the type of sensors and the details of the images used):	• Land Use Change Matrixes produced by intersecting land use change maps. These matrices can be reviewed in the "FREL TOOL CR v.1" tool. • Annualized Land Use Change Matrixes produced by interpoling the land use change matrices. These matrices can be reviewed in the "FREL TOOL CR v.1" tool.
Spatial level (local, regional, national or international):	National, differentiating by six forest types of primary forest.
Discussion of key uncertainties for this parameter:	As shown in section 12, the level of uncertainty of the activity data for stable forests is low.
Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	The methods used to prepare the uncertainty analysis are fully described in a separate report[66]; As shown in section 12, the uncertainties associated to AD are low, with a relative error of 4% with a confidence level of 90%..

Protocolo metodológico. Report prepared for the Government of Costa Rica under the Carbon Fund of the Forest Carbon Partnership (FCPF). 44 p.

[66]CDI, 2015.b. Reference level of emissions and forest absorptions in Costa Rica and methodology used to construct it. Repor prepared for the Government of Costa Rica under the Carbon Fund of the Corest Carbon Partnership (FCPF). 223 p.

Table 8.3.5. Information on AD for the conservation of forest carbon stocks.

Year	Areas						Carbon stocks					
	Very wet and pluvial forests	Rain forests	Dry forests	Mangroves	Palm forests (Yolillales)	Total	Very wet and pluvial forests	Rain forests	Dry forests	Mangroves	Palm forests (Yolillales)	Total
	-0.36%	-1.12%	-0.78%	-0.50%	-0.81%		647.57	473.46	357.82	334.22	241.66	
year	ha	ha	ha	ha	ha	ha	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e	tCO_2-e
2009	1,370,550	683,850	37,459	35,003	122,412	2,249,274	887,531,265	323,772,921	13,403,575	11,698,686	29,581,989	1,265,988,436
2010	1,365,617	676,219	37,166	34,827	121,425	2,235,254	884,336,552	320,160,384	13,298,732	11,639,928	29,343,316	1,258,778,913
2011	1,360,701	668,674	36,875	34,652	120,445	2,221,349	881,153,340	316,588,155	13,194,709	11,581,466	29,106,568	1,251,624,238
2012	1,355,804	661,214	36,587	34,478	119,473	2,207,556	877,981,585	313,055,783	13,091,500	11,523,297	28,871,731	1,244,523,897
2013	1,350,923	653,836	36,301	34,305	118,509	2,193,874	874,821,248	309,562,823	12,989,098	11,465,421	28,638,789	1,237,477,379
2014	1,346,061	646,541	36,017	34,133	117,553	2,180,304	871,672,286	306,108,837	12,887,497	11,407,835	28,407,725	1,230,484,181
2015	1,341,215	639,327	35,735	33,961	116,605	2,166,843	868,534,659	302,693,390	12,786,691	11,350,539	28,178,527	1,223,543,804
2016	1,336,388	632,194	35,456	33,791	115,664	2,153,491	865,408,326	299,316,050	12,686,673	11,293,530	27,951,177	1,216,655,756
2017	1,331,577	625,140	35,178	33,621	114,731	2,140,247	862,293,246	295,976,394	12,587,438	11,236,807	27,725,661	1,209,819,547
2018	1,326,784	618,165	34,903	33,452	113,805	2,127,109	859,189,380	292,674,000	12,488,979	11,180,370	27,501,966	1,203,034,694
2019	1,322,008	611,267	34,630	33,284	112,887	2,114,077	856,096,686	289,408,453	12,391,290	11,124,216	27,280,075	1,196,300,718
2020	1,317,250	604,447	34,359	33,117	111,976	2,101,149	853,015,124	286,179,342	12,294,365	11,068,344	27,059,974	1,189,617,148
2021	1,312,508	597,703	34,090	32,951	111,073	2,088,325	849,944,654	282,986,260	12,198,198	11,012,752	26,841,649	1,182,983,513
2022	1,307,784	591,034	33,824	32,785	110,177	2,075,603	846,885,237	279,828,805	12,102,783	10,957,440	26,625,085	1,176,399,351
2023	1,303,076	584,440	33,559	32,620	109,288	2,062,983	843,836,832	276,706,580	12,008,115	10,902,406	26,410,269	1,169,864,202
2024	1,298,386	577,919	33,297	32,457	108,406	2,050,463	840,799,400	273,619,192	11,914,188	10,847,648	26,197,186	1,163,377,613
2025	1,293,712	571,470	33,036	32,294	107,531	2,038,044	837,772,902	270,566,251	11,820,995	10,793,165	25,985,822	1,156,939,134

Note: the cells in yellow show (on the left) the average historical deforestation rates for 1996-2009 (in %) and (on the right) the average C stocks per hectare estimated for each type of forest (in tCO_2-e ha^{-1}).

Emission factors

Method for the estimation of EF

As mentioned in section 8.3, the method used to estimate the emission factors (or absorption) is the IPCC method called "carbon stock changes" ("*stock difference method*", see **IPCC GL, 2006, Chapter 2, Section 2.2.1, p. 2.6 on**). The calculations were implemented in all the cells of the land use change matrixes that represent transitions between categories or transactions from one condition to another (i.e. forest age) within the same category. The calculations were made by applying equation (1) explained above.

The emission factors were calculated as follows:

- **In conversions of areas classified as "forest" to categories of non-forest (i.e. "deforestation")** the emission factor was calculated by assuming, on one side, the immediate oxidization of the 100% carbon stocksed in forests, with the exception of a fraction of aboveground biomass transferred to long-life Harvested Wood products, and on the other hand, carbon accumulation for an amount equivalent to the first year of growth of the land categories following deforestation.

  In conversions from "forest" to non-forest categories, it was also assumed that it is a common practice to burn living and dead biomass of the forest that is not extracted in the form of wood. The slash-and-burn practice was common in Costa Rica as it was and continues to be in many other countries. However, after adopting Forestry Law 7575 in 1996, this practice started to considerably decrease. For that reason, it was estimated, for each historical sub-period analyzed, a conservative percentage of forest areas turned into non-forests in which it is considered that the conversion involved the slashing of biomass. . The percentages applied were the following (See also sheet "DECISIONS" of "FREL TOOL CR v.1"):

  - Period 1986-1991: 100%
  - Period 1992-1997: 100%
  - Period 1998-2000: 50%
  - Period 2001-2007: 25%
  - Period 2008-2011: 25%
  - Period 2012-2013: 25%

- **In categories conversions from non-forest to "new forest" (i.e. "forest carbon stocks increase"):** the emission factor was calculated assuming, on one side, the immediate oxidization of 100% of the carbon stocksed in the non-forest categories, with the exception of the cases of pastures and permanent crops – where it was assumed that the existing arboreal biomass in these categories remains even after the conversion - , and, on the other hand, immediate accumulation of the carbon contents estimated for new forests at the minimum age in which these forests can be detected in the satellite images (8 years for "Dry forests" and 4 years for the other types of forests).

  Biomass burns was not assumed for that type of conversion.

- **In carbon stocks changes in new forest categories that remained new forests (i.e. "forest carbon pool increases"):** the absorption factor was calculated by assuming one year of growth, using the models developed by (2008)[67].

- **In the case of primary forests that remained primary forests (i.e. "forest carbon stocks conservation"):** it was assumed that the carbon contents in these forests does not change, i.e. that the emission or absorption factors are equal to zero.

[67] Cifuentes, M., 2008. Aboveground Biomass and Ecosystem Carbon stocks in Tropical Secondary Forests Growing in Six Life Zones of Costa Rica. Oregon State University. School of Environmental Sciences. 2008. 195 p.

The emission or absorption factors calculated are reported in annual land use change matrixes in the sheets "FE AAAA" (where "AAAA" indicates the year, for instance 1986) of the "FREL TOOL CR v.1" tool. For space reasons it is no possible to report in this document all the emission factors calculated for each of the cells in the land use change annual matrixes.

IPCC Tier

As explained in detail in a separate report[68] the emission factors were estimated:

- At Tier 2 (using specific data of the country or the region) in the case of significant deposits (= that represent >10% of the total forest origin emissions);
- Using values for defects obtained from literature (meaning, those derived from IPCC and from scientific literature) only in some cases in which the carbon deposit represented less than 15% of the total carbon stocks and for the categories for which no national data were available.

Data used to estimate carbon stocks in relevant C pools

As indicated in the IPCC guidelines (2006 IPCC), in its decision trees, before collecting data on any carbon deposit, it is important to prove whether there are data or not and if they are according to the quality required and if they can be used for the defined purposes. Applying said guidelines, the following carbon stocks were obtained:

- **National Forest Inventory (NFI):** In 2015, Costa Rica completed its first National Forestry Inventory. As shown in **Figure 8.3.5**., the field work of the inventory was performed in 2013 and it had forecasted the collection of data from 531 different parcels distributed in six different stratums for the estimate of aerial biomass carbon deposits, root biomass, dead wood biomass, litter biomass and Soil organic carbon[69].

Figure 8.3.5. Basic data on the sampling design of national forest inventory for Costa Rica.

Stratum	Sampling points	km²	%
Primary forest	2,652	12,725	24,8
Secondary forest	2,120	10,172	19,2
Grassland	1,487	7,135	14,0
Palm forest	123	590	1,2
Tree plantations	81	388	0,8
Mangroove	71	340	0,7

[68] CDI, 2015.b. Reference level of emissions and forest absorptions in Costa Rica and methodology used to construct it. Repor prepared for the Government of Costa Rica under the Carbon Fund of the Corest Carbon Partnership (FCPF). 223 p.

[69] SINAC – Programa REDD-CCAD-GIZ, 2014. Field manual for national forest inventory in Costa Rica: Parcel design and measurement of location and plot-related variables. Prepared by Jorge Fallas – consultant for the Emission reduction from deforestation and Forest Degradation in Central America and the Dominican Republic Program (REDD/CCAD/GIZ). San José, Costa Rica. 74 p.

Data in the national forest inventory represent the main source of data used to estimate the emission factors, since these data are obtained in all the country with a consistent methodology and a sampling plan that makes that the estimated values be representatives for the whole country.

Following IPCC guidelines, the data processed per parcel were analyzed to determine if they could be used in exclusive for the purpose of estimating the emission factors for the REDD+ activities included in the reference level. The conclusion obtained is that those data had to be complemented by data from another sources for the following reasons:

- Lack of data for some categories: The inventory provides no carbon pool data for some of the inventory categories of the GHGes, with which the REDD+ reference level should have consistency per several decisions of the CP related to the REDD+. For instance, the forestry inventory does not contribute with carbon stocks data for the IPCC categories that are not forest lands. Another example is that it does not contribute with carbon stocks data for different classes of new forests, without which it is not possible to construct a reference level for the activity "forest carob pools increase".

- Incomplete database: Although **Figure 8.3.5.**, taken from the inventory manual states that 532 parcels were to be measured at the moment of constructing the reference level, only data for 289 parcels were available, and therefore the database is still incomplete.

- Incomplete documentation: In the months that the reference level construction was worked, it was not possible to have Access to full information and documentation related to the methodology used by the forestry inventory and the data provided, since they were still under development and revision;

- Non-published data: As of the date of preparation of the reference level, the IFN data had not been officially published, so they were still under revision and internal validation.

After assessing the data available at the forestry inventory and considering their characteristics at the time of doing the estimates of emission factors, it was decided that it was necessary to look for additional data to complement the information on the forestry inventory. This search was done through a meth-analysis of the data published.

- **Mehta-analysis of studies published.** Following IPCC guidelines, a meth-analysis of studies already published on biomass and carbon contents was made, in order to find additional information originated at the national level and in a temporary horizon not to exceed 10 years that could complement the IFN data in an appropriate way. The methods used and the results obtained in this meth analysis are fully described in a separate report[70].

The meth-analysis allowed finding numerous studies with quality data enough as to estimate the contents of carbon in all the land use categories in the GHG inventory and represented in the land use change matrixes constructed for the reference level.

Independent revision of carbon stocks estimates

Carbon stocks compiled were ordered, documented and analyzed based on an Excel Microsoft database called "CARBON DATABASE". The data sources used are also reported for each category and deposit, at the end of the "CARBON" sheet in the "FREL TOOL CR v.1" tool. Due to the large number of references consulted, they are not hereby reported.

[70] CDI, 2015.b. Nivel de referencia de emisiones y remociones forestales de Costa Rica y metodología empleada para construirlo. Informe preparado para el Gobierno de Costa Rica bajo el Fondo de Carbono del Fondo Cooperativo para el Carbono de los Bosques (FCPF). 223 p.

The "CARBON DATABASE" along with its data sources and calculations on carbon stocks was presented to the National Meteorological Institute for an independent revision. Based on the revision of the Institute, it was concluded that the data collected and the estimates made on carbon stocks comply with the IPCC guidelines and the requirements of the Methodological Framework of the FCPF Carbon Fund, so the estimated average carbon stocks for each deposit and land use category were used both for the construction of the reference level and for updating the GHG national inventory (currently in use) and to report the preparation of the National Contribution within the Convention framework.

The result of the values of carbon stocks estimated for each deposit and category are shown inTable **8.3.8.** and, with more detail, in the sheet "CARBON" of "FREL TOOL CR v.1".

Additional remarks on the data and methods used to estimate carbon stocks

- **Forest categories and sub-categories**. At the beginning, it was forecasted to include in the reference level all the REDD+ activities, and for that reason – in the "FREL TOOL CR v.1" – calculation sheets there are more forest sub-categories than those finally considered in the construction of the reference level. For instance, in the sheet "CARBON" there are carbon contents for primary forests without "sustainable management of forest" (divided in the sub-categories of "intact", "degraded" and "highly degraded") and for primary forests with "sustainable management of forest" (also divided into three sub-categories, one of which is called "intervened"). At the end, for the "primary forest" categories, only the estimated values for "primary forests" + "without sustainable management of forest" + "intact" were taken into account, since the land use change matrixes only show activity data for this sub-category. Additionally, in the case of "secondary forests", a sub-division is shown the sub-categories "with sustainable management of forest" and "without sustainable management of forest", but lastly all secondary forests were considered "without sustainable management of forest", which also corresponds to the historical reality for the period under analysis (1986-2013), since except for some research tests, secondary forests are not subject to sustainable management of forest in Costa Rica. The matrixes in the tool also have space for three types of "Tree plantations", but – as explained before – since it was not possible to produce reliable activity data for Tree plantations, they were considered under the "New forests" category (whose activity data and carbon values appear under the label "Secondary forests" in the calculation sheets of "FREL TOOL CR v.1").

  With regards to the carbon pool values estimated for each forest category and sub-category, more details are provided in a separate report[71].

- **Primary forests.** Most of the data on carbon stocks in primary forests corresponds to data that are supposed were obtained from an "intact" forest (or supposedly "intact"). That is why at the end, it was decided to calculate a single static average value (that does not change with time) for each carbon deposit and to apply it consistently.

- **New forests**. For Tree plantations and secondary forests (= new forests) no static values on carbon stocks were searched since they would have not served to construct a reference level for the activity "forest carbon stocks increase". In fact, new forests are dynamic land use categories in which carbon densities vary a lot in time. For that reason, instead of defining "static" carbon contents, the models have been selected based on time.

  In the case of Tree plantations, after the bibliographic revision, it was possible to evidence the existence of multiple data on plantations. The existence of growth models for the main species (*Tectona grandis*, *Gmelina arborea*, *Bombacopsis quinatum*, *Vochysia ferruginea*, etc.), combined with biomass expansion factors ("BEF") and specific densities could lead to fairly accurate models calibered with data of the

[71] CDI, 2015.b. Reference level of emissions and forest absorptions in Costa Rica and methodology used to construct it. Repor prepared for the Government of Costa Rica under the Carbon Fund of the Corest Carbon Partnership (FCPF). 223 p.

country or at least from the region. However, as mentioned above, during the quality analysis of the activity data it was possible to evidence that the data for Tree plantations was not reliable, for there were multiple inconsistencies with other sources. Therefore, it was decided to add the plantations within the secondary forests creating the new "New forests" category and assume that the plantations have emission and removal factors identical to those of secondary forests. Notwithstanding the foregoing, the data compiled are available to be used within the framework of a possible update of the reference level.

In the case of secondary forests, "Very wet and pluvial forests", "Rain forests" and "Dry forests", the carbon densities by annual age class were estimated by using modified versions of Cienfuentes' models[72]. This doctoral thesis provides temporary carbon density models for six life zones: Very wet/pluvial montane forest; Tropical very wet forest; Pre-montane very wet forest with basal-Pacific transition; Pre-montane very wet forest with basal Atlantic transition; Tropical wet forest; and Dry forest. These models were calibered with local data obtained from 54 sample parcels set for that purposes in a chrono-sequence of parcels with different ages. The models are calibered as follows:

$$B_t = B_{max} \times [1 - \exp(-b_1 \times t)]^{b_2} \quad (8)$$

Where:

Bt Aboveground biomass, dead wood and litter during *t* year, expressed in tons of dry matter ha^{-1}

B_{max} Aboveground biomass, dead wood and maximum litter in the life zone that asymptote with that in the model

b_1, b_2 Parameters of curve b_1 is the shape of the curve, i.e. the rate at which the aboveground biomass approaches the maximum aboveground biomass, while b_2 is the inflection or retardation parameter until growth begins

t Secondary forest age, i.e. years since abandonment

These models were applied by doing the following modifications:

- *Assignment of models to life zones*: Considering that the six models were developed for specific life zones, a consultation to experts was made[73] in order to know which of the six models could be applied, conservatively in each of the existing life zones in Costa Rica, obtaining the responses found in **Figure 8.3.2** This caused an assignment of each model to all life zones.
- *Bmax Change*: In the equation above, the *Bmax* parameter is the asymptote in the model, while the second term of the model shows values of 0 and 1 and are in reality an accumulation factor, so the longer the period the more the model approaches 1. The *Bmax* parameter used by Cifuentes (2008) comes from the data in Kauffman & Hughes (not published) of measurements in intact forests. Said measurements covered a total 16 sample parcels distributed in six different life zones. Therefore said values cannot be considered representative of all intact forests in Costa Rica for the different life zones. As it can be seen in the following table, the values in Kauffman & Hughes for intact forests exceed the mean values used in the calculations. Therefore, it was decided to use Cienfuentes' models (2008) but using as asymptote the aboveground biomass estimated for intact primary forests, meaning that it was assumed that the growth curve for secondary forests required the Cienfuentes model (same parameters) but with different asymptotes.

[72] Cifuentes,M., 2008. Aboveground Biomass and Ecosystem Carbon stocks in Tropical Secondary Forests Growing in Six Life Zones of Costa Rica. Oregon State University. School of Environmental Sciences. 2008. 195 p.

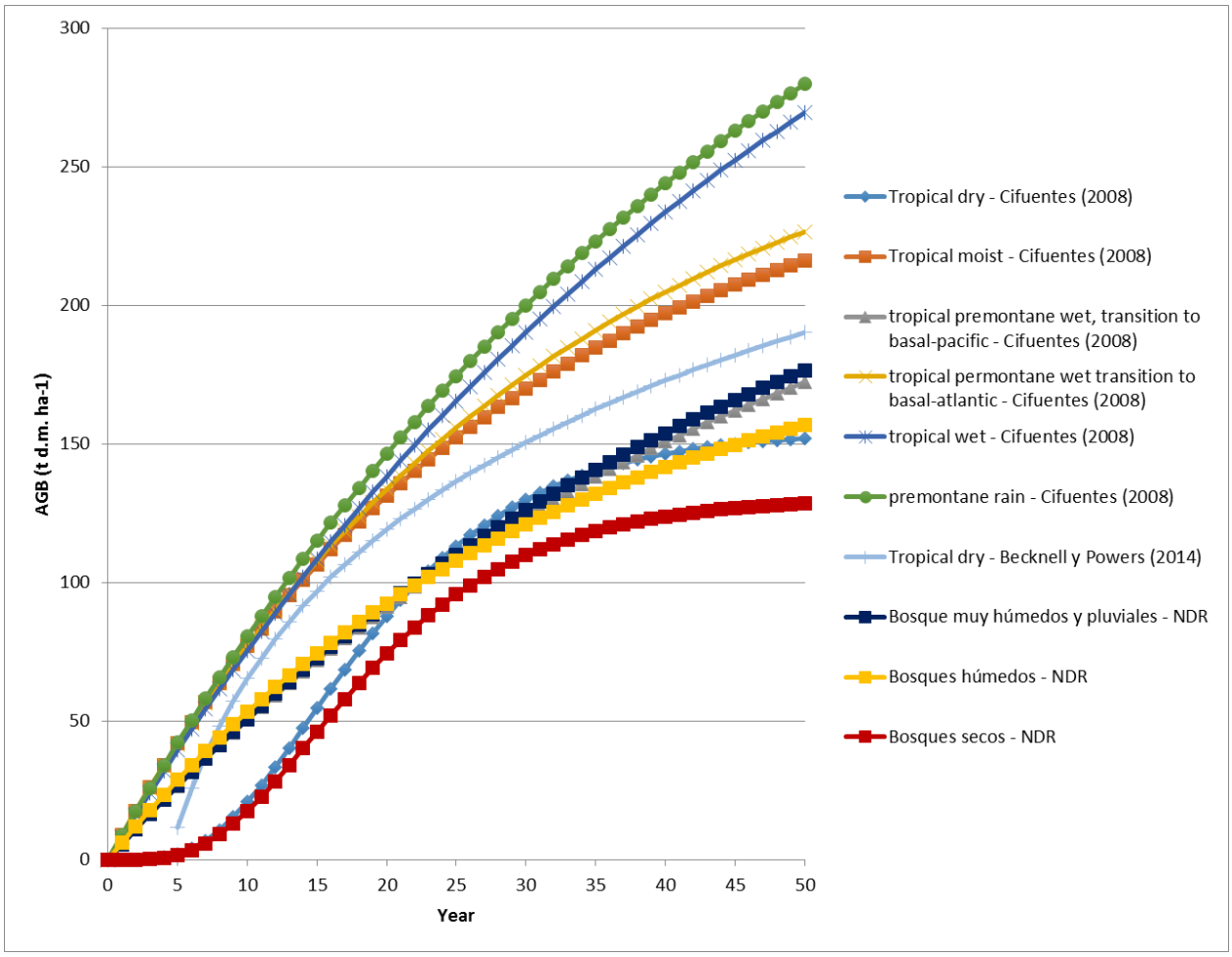
[73] File 01 – Consultation to Experts Cienfuentes Modelos, Miguel Cifuentes_Rev.01 in the Secondary Model file.

Chart 8.3.6. Comparison of BARA values used in the calculations and estimates by Kauffman & Hughes (not published).

Level 2	Mean value (t C/ha)	Kauffman & Hughes mean value (t C/ha)
Very wet and pluvial forests	131.21	182.9
Rain forests	92.65	112.2
Dry forests	61.52	64.2

- *Reduction of models*: Once analyzed the parameters of the different models and resulting curves (see **Figure 8.3.6**) it was possible to see that the shape of some curves did not differ amongst them in shape, indicating that the parameters might not be significantly different; the same would not apply to the maximum arboreal biomass. The only curve that showed very divergent values was the one for the "pluvial pre-montane tropical forest, transition to basal-Pacific" that shows a characteristic not typical from a transition area to low rainfall areas.

Figure 8.3.6. Curves with the different aerial biomass growth models for secondary forests according to Cienfuentes(2008), Becknell and Powers (2014) and the modified models used by the NDR. As it can be seen, the models used in the NDR provide lower values. .



- *Application of models*. Finally, after reducing the models as explained above, they were applied as follows:

    a. To "Very wet and pluvial forests", the model developed for "Very wet/montane pluvial forest" was applied;

    b. To "Wet forests", the model developed for "Very wet pre-montane forest transition to basal-Atlantic" was applied;

- In the case of "Dry forests", the model developed for "Dry forest" was applied. It was possible to prove that this model is very conservative in comparison to other secondary forest models such as the one in Becknell and Powers (2014).This last model was not used in any case and was used for comparative purposes.

    c. In the case of new forests under the categories of "Mangroves" and "Palm forests (Yolillales)", since there was not data or models available, a lineal model was assumed in which the maximum is the density of carbon in a primary forest and the minimum is zero. The time to obtain the maximum is a parameter of the "FREL TOOL CR v.1"tool that can be modified in the sheet "CARBON" (cells C6198 y C6200, respectively). For the reference level under the FCPF Carbon Fund a value of 100 years was defined, which is very conservative.

- Non-forest categories and sub-categories

- *Permanent crops*: In the case of permanent crops, highly variable values were found on the type of permanent cultivation (i.e. banana, coffee, cocoa, etc). For that reason, an average mean was made on the different carbon densities in relation to the area planted in 2000/2008 per data of the Ministry of National Planning and Economic Policy (MIDELPLAN) (2009) reported in GFA, 2010[74]. Said data was used in lieu of the agricultural census of 2014 because they represent two points in time (2000 and 2008) that match with the reference historical period (while the data in the agricultural census represent the condition in 2014).As a comparison, the following table can be seen, in which the values for coffee and cocoa do not differ, while there are differences for banana and annual crops. However, it must be noted that since there are no carbon densities available for all the different cultivation classes (there are only data on the four classes in the table) the use is not as relevant in one or another source since the data are being extrapolated from 50% of the cultivated area into the remaining areas. Since at the beginning it was planned to use the values by defect of IPCC, the matrixes on land use changes with the values of carbon stockss in the calculation sheets for "FREL TOOL CR v.1" show activity data and carbon values in two sub-categories of permanent crops corresponding to the rank of annual average precipitation(1000-2000 mm $year^{-1}$ y > 2000 mm $year^{-1}$). However, at the end, both sub-categories were assigned the same values for carbon stockss since there were not data available to determine the densities for both classes and the few data available did not indicate significant discrepancies.

Chart 8.3.7. Comparison of proportion values of area planted over the total given by MIDELPLAN (2009) and obtained from GFA (2010) and the values given by the last agricultural census.

Level 2	Cultivation	Proportion of mean cultivated area 2000 and 2008 (MIDEPLAN, 2009)	Proportion of cultivated area 2014 (Agricultural census 2014)
Annual	Sugar cane	12%	18%
Permanent	Coffee	23%	24%
	Banana	10%	15%
	Cocoa	1%	1%

- *Grasslands*. Carbon values found for grasslands include estimates relatively high for the deposit "aboveground biomass" due to the presence of trees in many pastures in Costa Rica.

- *Settlements*. No data were obtained for settlements, although it can be assumed that the carbon densities in these areas are non-existent or almost non-existent.

- *Artificial and natural wetlands*. No references were obtained to distinguish amongst these two types of wetlands, so they were assigned the same carbon densities.

- *Other lands*. Only data for moors was obtained. No values were found for bare lands, although it is expected that the carbon densities in these areas be non-existent or almost non-existent.

[74]GFA Consultinggroup (2010). Estudio del estado de la producción sostenible y propuesta de mecanismos permanentes para el fomento de la producción sostenible. Consultoría SP-12-2009. 417 p.

- **Soil organic carbon (COS).**Highly variable data was obtained, and for this reason it was considered it should not be used, since there is not much information available that would be necessary to determine reliable carbon densities (i.e. management, inputs, etc). Considering that there are estimates on carbon density in SOC for forests, a possibility would be to use those values in combination with the factors of Level 1 of IPCC in non-forest categories. However, by the end of the study, it was decided to exclude the SOC from the reference level, assuming that the exclusion of this deposit is conservative. In fact, as seen in the sheet "CARBON" of the "FREL TOOL CR v.1" tool, in general there are no significant differences between the values of SOC for forests and the values of SOC in non-forest categories, or those differences are on behalf of forests. In the case of grasslands, they can have higher SOC values than forests in some cases, although (2008) concluded there were no significant differences.

- **Harvested Wood products:** Two wood product sources were considered:

    - Harvested Wood products originated from the conversion of forest lands: In this case, Harvested Wood products have been considered in order to reduce estimates of emissions for deforestation, since if part of the carbon in the forest is transferred to mid and long term duration Harvested Wood products, the amount of oxidized carbon during the use change events (i.e. deforestation) is lower.

      However, there are no statistics on the amounts of products cultivated originated in deforestation and therefore it has been assumed that in all cases there is a prior use to a forest conversion. In order to determine the biomass extracted, it has been assumed that 35% of the biomass is trees with a diameter wider than 60 cm. This value has been obtained from Eguiguren-Velepucha (2013)[75]for a very wet primary forest and the 60cm is the minimum limit for trees to be extracted in Costa Rica. For secondary forests, it has been assumed that said value is 50% and the minimum diameter has been reduced to 40 cm.Said value has also been obtained from Eguiguren-Velepucha (2013) for a very wet secondary forest. The same proportion has been assumed for all types of forests except for "Palm forests (Yolillales)", since this type of forest do not contain many woody timber trees.

      The calculations have been implemented in the sheet "CARBON" of the "FREL TOOL CR v.1", in cells Q15: T6053 as follows:

      1. The amount of aboveground biomass currently cultivated was estimated by applying the factors estimated by Eguiguren-Velepucha (2013) as mentioned above.
      2. In order to translate aboveground biomass into merchantable volume, the estimated cultivated aboveground biomass was divided by the conservative biomass expansion factor of 2, which is the lower value in the Rank given in 2003 by LULUCF GPG for thick tropical forests.
      3. Since the biomass values in merchantable volume are at zero wetness, the transformation yields of 0.7 have been applied to primary forests and 0.5 to plantations and secondary forests. These values were obtained from FONAFIFO (2015)[76]with a clarification on a consultation to expert Oscar Santamaría.
      4. Assignment to types of product: The following step was assigning the wooden products to different fractions of wooden products according to their mid-life (Table 19). For them, a proportion of each type of product was estimated with regards to the total by using wood flow data for year 2014 obtained from FINAFIFO study (2015).This study provides data on wood volumes from their origin and up to their final use, so it was possible to determine the proportion

[75]Eguiguren-Velepucha, P. A. 2013. The effects of forest interventions and the climate variability on the long term dynamics of tropical forests in the North-East of Costa Rica.Turrialba (Costa Rica) : CATIE , 2013

[76]FONAFIFO, 2015. – Final Report – Increasing carbon stockss in wood and derived products in Costa Rica.

of the total volume that becomes a second transformation product, etc. This way, the amount of carbon per type of product was calculated by type of product per the 4 fractions of Harvested Wood products cultivated in the IPCC. The values are integrated into the "CARBON" sheet of the "FREL TOOL CR v.1", tool, in cells Q15: T6053.

- Products extracted from forests under sustainable management of forest: In this case, they are Harvested Wood products coming from primary forests managed and from Tree plantations, since secondary forests are not managed yet in Costa Rica.

  Due to the lack of data spatially explicit to estimate the activity data, it was decided to estimate the absorptions apart due to products originated in forests under sustainable management of forest. For this purpose, the statistics on wood commercialized in Costa Rica for the period 1998-2013 were analyzed, as published by the Forestry National Office. These statistics include data of commercialized wood coming from Tree plantations and forests managed (primary). It was intended to access the original data on statistics and to broader series, but the only option was to obtain them directly from the graphs of a technical report available through the Forestry National Office. There is other information from the National System of Conservation Areas, but these are volume estimates made in the field, while those of ONF use values of products consumed, and therefore are considered more accurate.

  In order to estimate the allocation to the different fractions of Harvested Wood products, the same steps 3 and 4 of the previous case were applied. Once these values were obtained, the variations on carbon stockss in Harvested Wood products cultivated were estimated in relation to input and decay. For that, the mean equations described in Chapter 12, Volume 3 of IPCC 2006 were used.

  The calculations are integrated in the sheet "PRODUCTS" of the "FREL TOOL CR v.1" tool, but at the end it was decided to exclude them from the reference level due to the impossibility of linking the carbon flow estimates associated to harvested Harvested Wood products products in sustainable management of forest forest areas with the spatially explicit scope used to calculate all the carbon flows included in the reference level and also due to the fact that the "sustainable management of forest" activity was excluded from the reference level as well as the Tree plantations included under the "new forests" category.

Non CO_2gas emissions

As mentioned above, the emission factors include non-CO_2gas emissions (methane and nitrous oxide) only for the case of biomass burn associated to conversions from forest categories to non-forest categories.

The methods used to estimate non-CO_2gas emissions are similar to the case of carbon emissions coming from deforestation and degradation, when estimated through the combination of activity data (DA) by an emission factor (FE). The activity data are expressed in terms of burnt areas (A) while the other emission factors are estimated by multiplying the available fuel mass for (M_B), a combustion factor that sets the amount of available biomass amount that would burn (C_f), and an emission factor to turn burnt dry matter values into GI amount values (G_{ef}). The two last factors come from the IPCC tables since no local values were found for these parameters.

The equation used to do the calculations is the following:

$$L_{fire} = A \cdot M_B \cdot C_f \cdot G_{ef} \cdot 10^{-3}) \quad (7)$$

Where:

L_{fire} Non-CO_2gas emissions for biomass burning; t C ha^{-1}

A Surface burnt; ha

M_B Fuel mass available for combustion;ton ha^{-1}.
Includes biomass, litter and dead wood. When Level 1 methods are applied, it is then supposed that the litter and dead wood deposits are equivalent to zero, with the exception of those cases in which land use changes take place.

C_f Combustion factor; no dimension.

G_{ef} Emission factor; g kg^{-1}burnt dry matter.

In the case of "Mangroves" and of "Palm forests (Yolillales)", it was assumed that there are no biomass burns when those types of forest become non-forest categories. This, considering the high contents of water in this type of forest.

The parameter of area burnt (A) used in the estimates of non-CO_2emissions, is equivalent to the activity data used to estimate the deforestation emissions multiplied by a conservative factor estimated by the IMN experts. This conservative factor was included, considering that after the adoption of Forestry law 7575 the practice of burning biomass in land use change gradually decreased. The supposed values for these conservative factors were estimated for each historical period and reported in the preceding section and can also be seen in the sheet "DECISIONS" of the "FREL TOOL CR v1.0".

Finally, and always in order to obtain conservative estimates of non-CO_2gas emissions for biomass burns, it was assumed that in all cases there is use prior to the burn, with which the fuel available was calculated as the remnant biomass after use. The methods used to estimate the volume of wood cultivated in conversions from forests to non-forest categories is described in a separate report[77].

Emissions per hectare of non-CO_2gas for biomass burns (without multiplying by the conservative factor estimated by the IMN) are reported inTable **8.3.8.** and in the sheet "CARBON" of the "FREL TOOL CR v.1"tool.The multiplication with the conservative factors estimated by the IMN is done in columns L and M of sheets "FE AAAA" of the "FREL TOOL CR v.1".

Forest fires

Due to the insufficiency of good quality data to estimate non-CO_2gas emissions associated to forest fires in forests that remained forests for all the years of the historical series (1986-2013), or only for the years of the historical period considered for the construction of the reference level (1996-2009), non-CO_2gas emissions associated to forest fires in forests that remained forests were excluded from the reference level. This also allows keeping consistency with the decision of excluding the degradation and the increase of carbon stockss in primary forests that remain primary forests.

[77]CDI, 2015.b. Reference level of forest emissions and absorptions of Costa Rica and methodology used to construct it. Consultancy report prepared for the Government of Costa Rica under the Carbon Fund of the Forest Carbon Partnership (FCPF). 223 p.

Chart 8.3.8. Average values of carbon stockss estimated for each category, deposit and gas.

Notes: **TF & TFC** = Forest Lands and Lands Converted into Forest Lands; **C** = Crops: **P** = Grasslands; **H** = Wetlands; **AU** = Settlements; **OT** = Other Lands; **SI** = Without Information. **Bhp** = Very wet and pluvial forests; **Bh** = Rain forests; **Bs** = Dry forests; **Man** = Mangroves; **Bp-Y** = Palm forests – Yolillales; **bp** = Primary forests; **bn** = new forests; **smf** = without sustainable management of forest; **cmf** = with sustainable management of forest; **i** = intact; **d** = degraded; **md** = very degraded; **int** = intervened**1 ... 400** = age in years; **an** = annual; **per** = permanent; **zll** = rainy zone (> 2000 mm $year^{-1}$); **zh** = wet zone (1000-2000 mm $year^{-1}$); **para** = Moors; **sd** = bare lands; **nat**= natural; **art** = artificial; **BARA** = Aboveground biomass; **BNAA** = Aerial Non-Arboreal Biomass; **BARS** = Underground Arboreal Biomass;**BNAS** = Underground Non-Arboreal Biomass; **MMA** = Underground Aerial Dead Wood; **MMS** = Underground Dead Wood; **H** = Litter; SOC = Soil organic carbon; **PM.F1** = Harvested Wood products, Fraction 1 (paper products);**PM.F2** = Harvested Wood products, Fraction 2 (non-structural panels); **PM.F3** = Harvested Wood products, Fraction 3 (structural panels, veneer, plywood); **PM.F4** = Harvested Wood products , Fraction 4 (sawmill wood);**CO_2**= carbon dioxide; **CH_4** = Methane; **N_2O** = Nitrous oxide.

					CO_2												Non-CO_2 Gas		Total
					Aboveground Biomass		Belowground biomass		Deadwood		Litter	Soil C	Harvested Wood products: use change crops				Biomass burning		
					BARA	BNAA	BARS	BNAS	MMA	MMS	H	COS	PM.F1	PM.F2	PM.F3	PM.F4	CH_4	N_2O	
					Include	Include	Include	Include	Include	Exclude	Include	Exclude	Include	Include	Include	Include	Include	Include	
					tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}
TF & TCF	Bhp	BP	smf	i	481.10	-	106.92	-	49.50	-	10.05	399.39	-	4.65	36.65	21.61	11.10	4.82	647.57
				d	384.88	-	86.97	-	49.50	-	10.05	399.39	-	3.72	29.32	17.28	9.24	4.01	531.40
				md	240.55	-	56.29	-	49.50	-	10.05	399.39	-	2.32	18.32	10.80	6.44	2.80	356.39
			cmf	int	376.83	-	85.28	-	40.89	-	3.89	399.39	-	3.64	28.70	16.92	8.64	3.75	506.89
		BN	smf	1	9.62	-	2.86	-	1.04	-	0.10	399.39	-	0.09	0.75	0.44	0.27	0.12	13.62
				2	19.05	-	5.38	-	2.07	-	0.20	399.39	-	0.19	1.48	0.87	0.54	0.23	26.70
				399	480.95	-	106.89	-	52.19	-	4.96	399.39	-	4.74	37.38	22.04	13.56	5.89	645.00
				400	480.96	-	106.89	-	52.19	-	4.96	399.39	-	4.74	37.38	22.04	13.56	5.89	645.00
	Bh	BP	smf	i	339.71	-	77.48	-	48.27	-	8.01	249.26	-	3.28	25.88	15.26	8.27	3.59	473.46
				d	271.77	-	63.02	-	48.27	-	8.01	249.26	-	2.63	20.70	12.20	6.95	3.02	391.06
				md	169.85	-	40.79	-	48.27	-	8.01	249.26	-	1.64	12.94	7.63	4.97	2.16	266.91
			cmf	int	266.08	-	61.80	-	30.74	-	5.14	249.26	-	2.57	20.27	11.95	6.23	2.70	363.76
		BS	smf	1	10.57	-	3.12	-	1.22	-	0.20	249.26	-	0.10	0.82	0.48	0.31	0.13	15.11

					CO_2												Non-CO_2 Gas		Total
					Aboveground Biomass		Belowground biomass		Deadwood		Litter	Soil C	Harvested Wood products: use change crops				Biomass burning		
					BARA	BNAA	BARS	BNAS	MMA	MMS	H	COS	PM.F1	PM.F2	PM.F3	PM.F4	CH_4	N_2O	
					Include	Include	Include	Include	Include	Exclude	Include	Exclude	Include	Include	Include	Include	Include	Include	
					tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}
				2	20.81	-	5.84	-	2.40	-	0.40	249.26	-	0.21	1.62	0.95	0.60	0.26	29.45
				399	339.71	-	77.48	-	39.25	-	6.56	249.26	-	3.35	26.40	15.57	9.83	4.27	462.99
				400	339.71	-	77.48	-	39.25	-	6.56	249.26	-	3.35	26.40	15.57	9.83	4.27	462.99
	Bs	bp	smf	i	225.58	-	53.04	-	28.23	-	11.37	245.12	-	2.18	17.18	10.13	5.56	2.41	318.22
				d	180.46	-	43.14	-	28.23	-	11.37	245.12	-	1.74	13.75	8.10	4.68	2.03	263.21
				md	112.79	-	27.92	-	28.23	-	11.37	245.12	-	1.09	8.59	5.07	3.37	1.46	180.31
			cmf	int	176.69	-	42.31	-	21.19	-	8.53	245.12	-	1.71	13.46	7.93	4.31	1.87	248.72
		bn	smf	1	0.00	-	0.00	-	0.00	-	0.00	245.12	-	0.00	0.00	0.00	0.00	0.00	0.00
				2	0.06	-	0.03	-	0.01	-	0.00	245.12	-	0.00	0.00	0.00	0.00	0.00	0.10
				399	225.58	-	53.04	-	27.06	-	10.89	245.12	-	2.22	17.53	10.34	6.87	2.98	316.57
				400	225.58	-	53.04	-	27.06	-	10.89	245.12	-	2.22	17.53	10.34	6.87	2.98	316.57
	Man	bp	smf	i	264.78	-	61.52	-	6.95	-	0.65	341.00	-	2.56	20.17	11.89	-	-	333.89
				d	211.83	-	50.04	-	6.95	-	0.65	341.00	-	2.05	16.14	9.51	-	-	269.46
				md	132.39	-	32.39	-	6.95	-	0.65	341.00	-	1.28	10.08	5.95	-	-	172.37
			cmf	int	207.39	-	49.07	-	5.30	-	0.49	341.00	-	2.00	15.80	9.31	-	-	262.26
		bn	smf	1	2.65	-	0.87	-	0.07	-	0.01	341.00	-	0.03	0.21	0.12	-	-	3.59
				2	5.30	-	1.65	-	0.14	-	0.01	341.00	-	0.05	0.41	0.24	-	-	7.09
				399	264.78	-	61.52	-	6.77	-	0.63	341.00	-	2.61	20.58	12.13	-	-	333.70
				400	264.78	-	61.52	-	6.77	-	0.63	341.00	-	2.61	20.58	12.13	-	-	333.70
	Bp-Y	bp	smf	i	189.57	-	45.15	-	5.97	-	-	260.53	-	-	-	-	-	-	240.69
				d	151.66	-	36.73	-	5.97	-	-	260.53	-	-	-	-	-	-	194.35
				md	94.79	-	23.77	-	5.97	-	-	260.53	-	-	-	-	-	-	124.52
			cmf	int	148.49	-	36.02	-	4.67	-	-	260.53	-	-	-	-	-	-	189.17

					CO_2												Non-CO_2 Gas		Total
					Aboveground Biomass		Belowground biomass		Deadwood		Litter	Soil C	Harvested Wood products: use change crops				Biomass burning		
					BARA	BNAA	BARS	BNAS	MMA	MMS	H	COS	PM.F1	PM.F2	PM.F3	PM.F4	CH_4	N_2O	
					Include	Include	Include	Include	Include	Exclude	Include	Exclude	Include	Include	Include	Include	Include	Include	
					tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}
		bn	smf	1	1.90	-	0.64	-	0.06	-	-	260.53	-	-	-	-	-	-	2.59
				2	3.79	-	1.21	-	0.12	-	-	260.53	-	-	-	-	-	-	5.12
				399	189.57	-	45.15	-	5.97	-	-	260.53	-	-	-	-	-	-	240.69
				400	189.57	-	45.15	-	5.97	-	-	260.53	-	-	-	-	-	-	240.69
C	an				-	83.57[78]	-	21.16	-			-							
	per	zll		1	2.89	1.30	0.94	0.45	0.06			0.38							
				2	5.78	2.60	1.79	0.85	0.12			0.76							
				399	57.81	26.03	15.04	7.19	1.22			7.59							
				400	57.81	26.03	15.04	7.19	1.22			7.59							
		zh		1	2.89	1.30	0.94	0.45	0.06			0.38							
				2	5.78	2.60	1.79	0.85	0.12			0.76							
				399	57.81	26.03	15.04	7.19	1.22			7.59							
				400	57.81	26.03	15.04	7.19	1.22			7.59							
P					28.48	14.23	7.81	4.11	8.28			-							
AU					-	-	-	-	-			-							
H				nat	-	-	-	-	-			-							
				art	-	-	-	-	-			-							
OT		para			-	126.87	-	31.13	-			-							

[78] Note: the reason for this very high value for non-arboreal biomass is that it corresponds to biomass measured in sugar cane plantations by Jobse (2008). It is then assumed that the anual crops are sugar cane plantations, which is conservative within the context of a REDD+ reference level.(Source: Jobse, J.2008. Impacts of Forest-to-Agriculture Conversion on Aboveground and Soil Carbon and Nitrogen Stocks along a Bioclimatic Gradient in Costa Rica, Dissertation (PhD in Wildlife Sciences).208 p.).

					CO_2												Non-CO_2 Gas		Total
					Aboveground Biomass		Belowground biomass		Deadwood		Litter	Soil C	Harvested Wood products: use change crops				Biomass burning		
					BARA	BNAA	BARS	BNAS	MMA	MMS	H	COS	PM.F1	PM.F2	PM.F3	PM.F4	CH_4	N_2O	
					Include	Include	Include	Include	Include	Exclude	Include	Exclude	Include	Include	Include	Include	Include	Include	
					tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}
		sd		nat	-		-	-											
				art	-		-	-											
SI					-		-	-											

All of the technical elements presented and discussed above are summarized in the following table:

Description of the parameter including the forest class if applicable:	Average carbon contents per hectare in each category of land use represented in the land use change matrixes.
Data unit (e.g. t CO_2/ha):	t CO_2/ha
Value for the parameter:	See**Table 8.3.8.** and the sheet "CARBON" of "FREL TOOL CR v.1"
Source of data (e.g. official statistics, IPCC, scientific literature) or description of the assumptions, methods and results of any underlying studies that have been used to determine the parameter:	Forestry National Inventory and other studies published, prepared at the national level. More details can be seen in the database in Excel "CARBON DATABASE".
Spatial level (local, regional, national or international):	National, considering the six categories of land use in IPCC, divided in the sub-categories shown in land use change matrixes.
Discussion of key uncertainties for this parameter:	See section 12.
Estimation of accuracy, precision, and/or confidence level, as applicable and an explanation of assumptions/methodology in the estimation:	See section 12.

Calculation of the average annual historical emissions over the Reference Period

The reference level was estimated, for all the activities included in the reference level, as the historical average annual emissions and absorptions related to forests for the period 1996-2009 using the methods and equations presented above.

All the data and calculations related to the reference level constructed can be reviewed in the "FREL TOOL CR v.1" toll and described in higher detail in the separate technical documents mentioned in the preceding sections of this ERDP version.

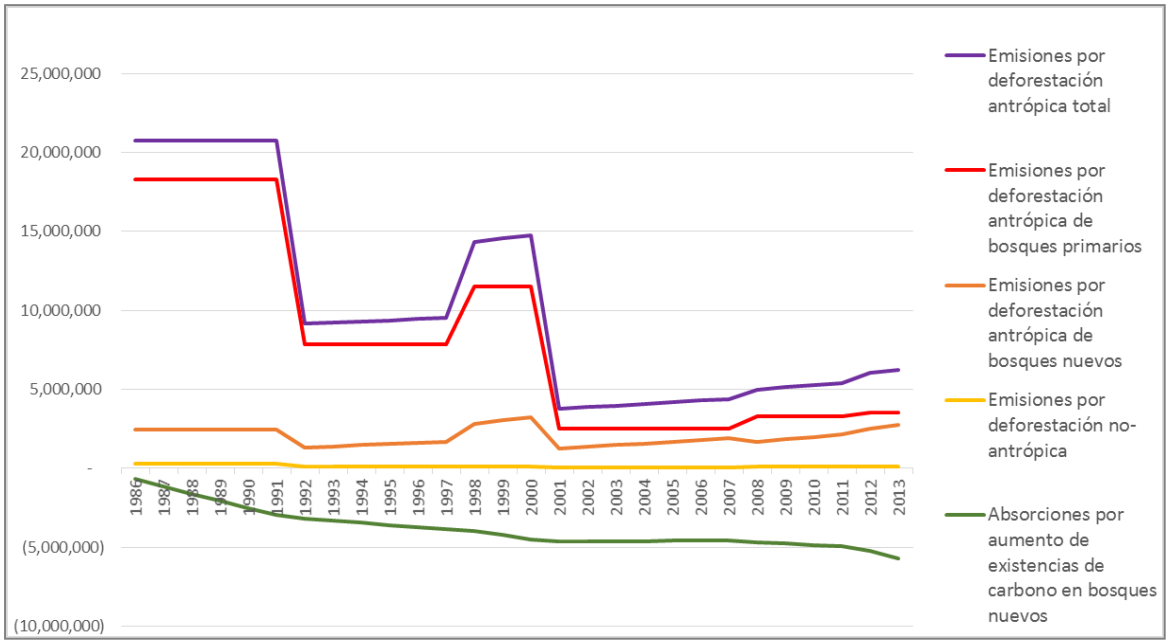
Figure 8.3.7graphically shows the emissions and absorptions related to forests estimated for the historical series analyzed (1986-2013). As seen in that figure, the emissions for deforestation have considerable decreased if compared with the annual emission average for the period prior to adopting Forestry Law No. 7575 with the average of the previous period. However, just after adopting the Forestry Law (1996), there is an increase that is yet to be revised, but it is assumed it is related to the transition of the legal framework

while passing from a lax one to a more restrictive one and to the need of respecting further effects of the preceding legal framework.

It must be mentioned that the activity data reported by Agresta e*t al.*(2015.a) do not show an increase of deforestation for the period 1998-2000 due to a calculation error of the annual activity data (see CDI, 2015.d[79]for a detailed discussion on this topic).

As it can also be seen in Figure 8.3.7, since 2001 there is a light trend on the increase of emissions for deforestation. This trend has remained as of now and shows that the country needs to maintain and strengthen its forest conservation and reduction programs through different instruments, amongst them, payment for results

Figure 8.3.7. Historical emissions and absorptions related to forests in Costa Rica between 1986 and 2013, in annual equivalent tons of carbon dioxide (tCO_2-e $year^{-1}$).



8.4. Upward or downward adjustments to the average annual historical emissions over the Reference Period (if applicable)

No adjustments were applied to the average annual historical emissions over the reference period.

[79]CDI, 2015.d. Comparison of activity data of the historical series obtained by Agresta and the activity data used by the NREF of the CR Report prepared for the Government of Costa Rica under the Carbon Fund of the Forest Carbon Partnership (FCPF). 8 p.

8.5. Estimated Reference Level (preliminary)

ERPA term year *t*	Average annual historical emissions from deforestation over the Reference Period (tCO_{2-e}/yr)	If applicable, average annual historical absorptions by sinks over the Reference Period (tCO_{2-e}/yr)	Reference level for GHG fluxes (tCO_{2-e}/yr)
2010	7,217,881	-4,422,008	2,795,873
2011	7,217,881	-4,422,008	2,795,873
2012	7,217,881	-4,422,008	2,795,873
2013	7,217,881	-4,422,008	2,795,873
2014	7,217,881	-4,422,008	2,795,873
2015	7,217,881	-4,422,008	2,795,873
2016	7,217,881	-4,422,008	2,795,873
2017	7,217,881	-4,422,008	2,795,873
2018	7,217,881	-4,422,008	2,795,873
2019	7,217,881	-4,422,008	2,795,873
2020	7,217,881	-4,422,008	2,795,873
2021	7,217,881	-4,422,008	2,795,873
2022	7,217,881	-4,422,008	2,795,873
2023	7,217,881	-4,422,008	2,795,873
2024	7,217,881	-4,422,008	2,795,873
2025	7,217,881	-4,422,008	2,795,873

8.6. Relation between the Reference Level, the development of a FREL/FRL for the UNFCCC and the country's existing or emerging GHG inventory

Consistency of the reference level with the GHG national inventory

As explained in Section 8.1., Costa Rica will update the reference level included in the ER-P according to the 2012 national GHG inventory to be presented at COP21 in Paris. This work is important to mantain consistency with the information reported by the country to the COP under the UNFCCC. Costa Rica anticipates certain changes in the reference level, especially in terms of EF and C pools. These changes will be reflected in an updated report on the reference level to be sent to the FMT in January 2016 (Costa Rica will submit its FREL/FRL to the UNFCCC Secretariat for technical review in January 4th, 2016). Updated information on the reference level will be sent to the Carbon Fund soon afterwards.

Reference level consistency before the Convention

Costa Rica has not sbmitted a FREL/FRL to the UNFCCC Secretariat yet. The official submission will be done before January 4th, 2016. After this date, Costa Rica will inform the Carbon Fund of the level of consistency with the reference level presented in the ER-P.

9. Approach for Measurement, Monitoring and Reporting

9.1. Measurement, monitoring and reporting approach for estimating emissions occurring under the ER Program within the Accounting Area

Measurement and report general scope

The monitoring of emissions in the forest sector will take placein a manner consistent with the reference level.

Historical activity data generated for the construction of the reference levels were produced by applying a processing protocol, classifying LANDSAT satellite images and implementing quality control procedures ("quality control and quality assurance") as described in Agresta *et al* (2015.a)[80] and making map edits as described in section 4 of CDI (2015.b).

This protocol for analyzing thesatellite images and editing maps will be applied biennially to measure and report future activity data and in fact was already applied for 2011/12 and 2013/14 for the Biennial UpdateReports and the monitoring reports required within the framework of a potential Payment for Emission Reduction Agreement with the Carbon Fund.

The emission factors to be applied during the period of the Payment for Emission Reduction Agreement were calculated through 2023 and will not need to be recalculated unless the country decides to update them and therefore update the reference level during the period of the Agreement. If no changes take place in the data used to estimate the emission factors before 2023, the emission factors for the years 2024 and 2025 will be calculated using the same data that is currently available by adding the required calculation sheets to the calculation tool created to construct the reference level ("FREL TOOL CRv.1").

The "FREL TOOL CR v.1" tool was created to serve many purposes, in particular to guarantee transparency and consistency throughout time. In addition to having been designed as a tool to support decision making for the selection of REDD+ activities (among others) and as a tool to calculate and report annual emissions and absorptions for the full historical series (1986-2013) and to construct reference levels, it was also used beforehand to calculate the different emission factors applicable up to the year 2023.The tool also includes the land use change matrixes that must be completed during the validity period of the Payment for Emission Reductions Agreement of the FCPF Carbon Fund and a sheet ("RESULTS") where the results of the program and their associated uncertainties are calculated using the Montecarlo method. By integrating all the data and calculations, the tool will enable the program results to be reported in manner that is 100% consistent with the reference level.

As explained above, the calculation methods, equations and data used to measure and report the results of the emission reductions program will be exactly the same as those used to construct the reference level, except, of course, the activity data which are the only variable that must be measured and reported until a decision is made to adjust the reference level as part of the process for continued improvement of

[80]Agresta, Dimap, Universidad de Costa Rica, Universidad Politécnica de Madrid, 2015.a. Final Report: Generating a consistent historical time series of activity data from land use change for the development of Costa Rica's REDD plus reference level:Methodological Protocol. Report prepared for the Government of Costa Rica under the Carbon Fund of the Forest Carbon Partnership (FCPF). 44p.

data and methods. More details about the methods, equations and data can be found in CDI2015.b.

Parameter:	$DA_{AAAA\text{-}AA}$
Description:	Activity data ($DA_{AAAA\text{-}AA}$) of each category represented in the landuse change matrixes "MC AAAA-AA" of the "FREL TOOL CRv.1" tool.
Data unit:	hectares
Source of data or measurement/calculation methods and procedures to be applied (e.g. field measurements, remote sensing data, national data, official statistics, IPCC Guidelines, commercial and scientific literature), including the spatial level of the data (local, regional, national, international) and if and how the data or methods will be approved during the Term of the ERPA	• Land-cover maps to be created on a biennial basis for all of the accounting area • Land Use Change Matrixes ("MC AAAA-AA") that must be completed every 2 years in the "FREL TOOL CR v.1"tool, starting in the year 2014/15.
Frequency of monitoring/recording:	Every two years.
Monitoring equipment:	Computers of the entityin charge of the MRV according to the National Forest Monitoring System which is currently in devlopment.
Quality Assurance/Quality Control procedures to be applied:	According to the protocol described in Agresta *et al.* (2015.a)[81]that will be reviewed, improved and formalized within the framework of the National ForestMonitoring System that is currently in development.
Identification of sources of uncertainty for this parameter	Evaluations on the accuracy of the land-cover maps will be performed, as was done for the most recent maps of the historical series. The activity data are the largest source of uncertainty in the reference level and will also be so in the program results report. However, it will not be possible to reduce the uncertainty associated with the activity data until a better method becomes available to quantify them.
Process for managing and reducing uncertainty associated with this parameter	In preparation.

The "FREL TOOL CR v.1" tool contains, on the "CARBON" sheet, a listing of all the variable values and

[81]Agresta, Dimap, Universidad de Costa Rica, Universidad Politécnica de Madrid, 2015.a. Final Report: Generating a consistent historical time series of activity data from land use change for the development of Costa Rica's REDD plus reference level: Methodological Protocol.Report prepared for the Government of Costa Rica under the Carbon Fund of the Forest Carbon Partnership (FCPF). 44 p.

parameters (including their source and associated level of uncertaint) that were used to calculate the reference level. These values will not change during the term of the emission reductions program since any change to any of them would imply changing the reference level (which the "FREL TOOL CR v.1" tool would automatically calculate, and for this reason it is recommended that the Carbon Fund block all sheets of the tool with passwords, except for those sheets where future activity data will be entered: from "MC 2015-16" to "MC 2022-23"). If a change to the values of any of the parameters and variables that are not future activity data becomes necessary, as part of the continued improvement process, it will be necessary to submit the changed reference level to the Carbon Fund for consideration.

9.2. Organizational structure for measurement, monitoring andreporting

Organizational structure, responsibilities and competencies

There are roles and responsibilities defined in the State Forest Administration (National System of Conservation Areas) and in the Ministry of the Environment and Energy for monitoring land use changes, the emission factors and estimating and reporting emissions by sector (**Chart 9.2.1.**). The institutional arrangements goberning the processes and forms of information management and estimate reporting have not been formalized by the Government of Costa Rica. It is expected that these arrangements will be put in place in the coming months and incorporated into a more advanced version of the Emission Reductions Program document.

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Chart 9.2.1. Institutional competencies and responsibilities for the measurement and reporting of national forest resources and of the corresponding emissions.

Institution	Responsibility for measurement and sector reporting	Foreseen role for REDD+ measurement and reporting
State Forestry Administration	Perform the inventory and the assessment of forest resources in country (paragraph h, Art. 6, Forestry Law)	Identical
National Fund for Forest Financing	Establish the surveillance and control of the resources assigned to the Payment for Environmental Services program (paragraph c, Art. 56 of the Regulations to the Forestry Law)	Identical
National System of Conservation Areas	Plan processes to achieve sustainability in the management of the natural resources of the country (Art. 22, Biodiversity Law)	Implement the national forest inventory and ensure the of the Natural Heritageof the State, as well as monitoring the control strategies for illegal logging and managing forest fires
National Center of Geo-environmentalInformation	Produce the official environmental and geo-spatial information for the Ministry of the Environment and Energy (Ministry Guideline DM-417-2015)	Identical
National Meteorological Institute	Official reporting entity before the Convention and coordinator of the national GHG inventory	Identical

9.3. Relation and consistency with the National ForestryMonitoring System

Consistency with the national forest monitoring system

The forest monitoring system is in design and must be aligned with a larger effort that the Government initiated, to establish a National Sytem to Monitor the Dynamics of LandCover and Land Use Change, in such a manner as to define a consistent and robust technical-political framework for monitoring land use change, including forests. This design process is lead by the National System of Conservation Areas under the technical coordination of the National Center forGeo-environmental Information.

For the definition of the system, there is an institutional work plan that includes the following steps:

1. Identification of the needs for reporting and national and international consistency on the subject of forest resources and other land uses.
2. Analysis f specific measurement and reporting variables based on national and international needs and the development of applicable protocols for each modality of the information system.
3. Definition of the measurement and reporting priorities for the system taking into account existing capacities.
4. Proposal for a forest monitoring system that satisfies multiple measurement and reporting priorities and requirements that is consistent with the national GHG inventory and the specifics of REDD+
5. Institutional agreement for the forest monitoring system, including the roles and responsibilities of the entities involved.

It is expected that this process will be finished during the first quarter of 2016.

9.4. Participation of other players in a variety of actions related to forest control and monitoring

- The national forest monitoring system, conceived as an official information system, must adhere in its design and function to the current standards applicable to the processes of generating official information, which are regulated by several corresponding entities: the National Geographic Institute (IGN) and its national territorial information systems, the National Institute of Statistics and Census (INEC) regarding data usage, etc. That is why in principle, community participation is not expected in these systems, unless it becomes necessary at some points to fill gaps in the generation of data that may involve these forms of participation.

- However, the Emission Reduction Program envisions supporting measures that lead to robust participation by communities and organizations in control actions related to forest resources. For example, actions to strengthne the participation of communities in fire fighting have been incorporated, through the so-called "Forest fire brigades" that are mainly composed of volunteers in zones with high susceptibility to these phenomena. Efforts will also be made to strengthen the "Natural Resources Monitoring Committees" (COVIRENAS) and the activities of the Volunteers Association (ASVO), non-government entities that contribute through different activities coordinated with the appropriate government agencies, monitoring compliance with government legislation, in the first case, and in supporting the management of protected areas in the second.

- In addition to this, the Colegio de Ingenieros Agrónomos (Agronomists Association) as the governing entity of the "Certified Foresters" who are responsible for preparing and following-up on the management plans of the different modalities of payment for environmental services agreements, have an essential task in monitoring the beneficiaries´compliance with their respective commitments or actions they have agreed to take with regard to conservation, restoration, reforestation or management. In that same sense, there are many local and regional forestry producer organizations that provide regency services to interested parties, and that have their capacities strengthened

through PES. It is envisioned to strengthen these capacities through different lines of work incorporated in policies, actions and tasks of the PRE.

10. Displacement

10.1. Identification of risk of Displacement

No displacement risks were identified in the Emission Reduction Program, since the reference level, and the measurement, report and verification are at the national scale. Any non-planned source of emission taking place product of a policy, action or activity proposed in the Program will be accounted and incorporated as part of the result in tCO_2-e $year^{-1}$. It is important to remember that the interventions proposed for the Program have a global impact on emission reductions, internalizing any displacement.

Considering that degradation is not included in the reference level, there is a theoretical risk that the activities designed to reduce deforestation may stimulate a change in the conduct of some deforestation agents that might result in a higher level of emission for degradation of forests. This risk is considered minimum in Costa Rica, considering that the activities of the emission reduction program are based mainly on a strengthening of incentives instead than on coercive measurements. On the other hand, considering that the use change is illegal in Costa Rica, it is unlikely that the deforestation agents of one reference historical period might reach their goals by starting a degradation process. In fact, it is unlikely that the productive activities that require open space to be implemented might be implemented under the shade of trees.

However, Costa Rica acknowledges that the degradation of its forests is a topic that must be addressed, and if possible, measured as part of the process of continued improvements.

10.2. ER Program design features to prevent and minimize potential Displacement

Considering that the displacement risk is considered low (see **Section 10.1**), the emission reduction program does not include activities to prevent or minimize this type of risk.

11. Reversals

11.1. Identification of risk of Reversals

Definition of "reversal"

A "reversal" takes place when the following circumstances take place:

- At the end of a measurement and report period annual emissions higher than the reference level are reported;

- In a prior measurement and report period emission reductions were verified and paid. In this case, it would be considered that the emission reductions paid were reversed.

According to this definition, it is not possible consider a "reversal" the case of a measurement and report period with annual emissions exceeding the reference level if in prior periods the country has not received payment for results.

"Reversal" risk factors

There are two risk factor groups that can cause reversal:

- Natural factors: Costa Rica is exposed to several types of natural disturbances that may cause loss in forest areas of higher or lower importance. For that reason, the country does not want the results of its emission reduction program be affected by high-scale natural event that no program could control.

- Less intense natural disturbances are more frequent and cause small and diffuse impacts that cannot be easily differentiated from the impacts caused by anthropogenic factors. Amongst them, the most frequent are landslides and collapses that often take place in mountain areas of the country and maybe some cases of forest fires caused by lightning. The emissions caused by this type of natural disturbance were included in the reference level and will also be included in future measurement reports of the program results.

- On the other hand, there are larger natural disturbances that might occasionally cause significant impact although their frequency is lower. Amongst them we can find: volcanic eruptions, earthquakes, tsunamis and extreme climate events. Most of the impacts of this type of disturbance are easily identifiable in the Landsat images and can be clearly separated from the impacts caused by anthropogenic activities. For this reason, the impacts on forests caused by these natural disturbances have been excluded from the reference level, following the steps described in section 4 of the CDI, 2015.b[82], although they are transparently reported. The same will be done in future reports on the measurement of the program results. Therefore, emissions clearly attributable to natural disturbances are not considered a reversal risk, since they are excluded from the reference level and from the calculation of future emissions of the program, in a transparent and verifiable way.

[82]CDI, 2015.b. Reference level of forest emissions and absorptions in Costa Rica before the FCPF Carbon Fund: methodology and results. Report prepared for the Costa Rican Government under the Carbon Fund of the Forest Carbon Partnership (FCPF). 223 p.

- Anthropogenic factors: The evolution of national and international circumstances in a way that the country forest cover might suffer negative impacts generating GHG emissions that could not be stopped by the emission reduction program cannot be discarded. These factors include the increase of population dependent on agricultural activities for their income, a significant increase of agricultural product prices, an important reduction of the ability of the State to control and enforce the law, etc.

11.2. ER Program design features to prevent and mitigate Reversals

Costa Rica's Forestry Law in force contains a prohibition of changing land use. Article 19 of the Law reads: "In lands covered by forest, land use change will not be allowed, nor to establish Tree plantations…". Due to its nature, this is the main measurement to prevent reversals in those forests conserved and regenerated in country. In order to strengthen the implementation of the law, the National System of Conservation Areas has control mechanisms such as the illegal clearing control strategy, as well as regular operations in roads and the functioning of multiple geographical information systems[83]. This is the strongest measurement against reversals; however, recognizing that the country still experiences deforestation, the policies, actions and activities constitute a strong component on illegal clearing control, as well as community control through the participative volunteer committees.

11.3. Reversal management mechanism

Selection of Reversal management mechanism

Costa Rica proposes the mechanism to handle reversals described as follows.

Reversal management mechanism	**Selected (Yes/No)**
Option 1: The ER Program has in place a Reversal management mechanism that is substantially equivalent to the Reversal risk mitigation assurance provided by the ER Program CF Buffer approach	SI
Option 2: ERs from the ER Program are deposited in an ER Program -specific buffer, managed by the Carbon Fund (ER Program CF Buffer), based on a Reversal risk assessment.	No

For option 1, explanation of Reversal management mechanism

In case of a reversal (per the definition given in **Section 11.1**), Costa Rica proposes compensating the t of CO_2-e reversed by overruling an equivalent number of tons of CO_2-e in its unpaid emission reduction reserve ("buffer"), while the supplies last. If this was not enough to compensate the reversals, Costa Rica proposes not to receive any additional payments until non-compensated reversals are voided with emission reductions of subsequent periods.

Costa Rica can start its emission reduction program under the FCPF Carbon Fund with a positive balance in its emission reductions reserve or "buffer". In fact, its emission reduction program started on January 01, 2010 and by the end of 2013, the program had already produced 8,889,739 tons of CO_2-e in emission

[83] www.sirefor.go.cr

reductions (see **Section 2.2**), out of which 8,534,150 t CO_2-e would be available after the discounts for uncertainty per the criteria of the Methodological Framework of the FCPF Carbon Fund (see **Section 13.1**).

Taking into account that the FCPF Carbon Fund may not allow payments for results for emission reductions produced before the signature of the ERPA, it is proposed that the emission reductions that the country generated in its public lands between 01.01.2010 and 12.31.2012 (i.e. 32% of the total emission reductions, equaling 2,044,137 t CO_2-e, after the discount of uncertainty) be used as a "buffer" reserve to compensate eventual future reversals of emission reductions compensated under the FCPF Carbon Fund. This amount of emission reductions corresponds to 20% of the emission reductions forecasted in public lands until 2025 (see **Section 13.1**, showing a table with calculated values). The reserve to compensate future eventual reversals could be directly managed by the country or be deposited in the "buffer" of the Carbon Fund (ER Program CF Buffer), as agreed in the ERPA.

It must be highlighted that between 01.2013 and 12.31.2016 some 2,519,826 t CO_2-e of emission reductions would be produced in public lands (already adjusted by the deduction for uncertainty). These emission reductions – out of which 27.25% correspond to emission reductions of year 2013, have been achieved – would be available for the country to dispose of them as it may consider it appropriate, including their possible inclusion in a payment for results agreement, either with the FCPF Carbon Fund or another entity.

For option 2, explanation of Reversal management mechanism

N/A.

11.4. Monitoring and reporting of major emissions that could lead to Reversals of ERs

Per the definition in **Section 11.1**, reversals will be detected by comparing the annual average emissions in a measurement and report period with the reference level. The interpretation of results in this comparison will be done as follows:

- If the annual average emissions reported for a measurement and report period are lower than the reference level, it will considered that no reversals took place and the country might receive payment for results, unless it is necessary to still compensate for reversals of prior periods, in which case the payment will only be made for the difference between the emission reductions achieved in the period and the reversions to compensate from prior periods.

- If the annual average emissions reported for a measurement and report period exceed the reference level and the country did not receive any payment for results in prior periods, it will also be considered that no reversals took place but the country will receive no payment for results.

- If the annual average emissions reported for a measurement and report period exceed the reference level and the country received payments for results in prior years, it will then be considered that the emissions exceeding the reference level reversed a number of CO_2-e tons equivalent to the number of tons paid. In this case:

- If the emissions over the reference level exceed the tons paid, only the tons paid will be considered reversals and the country will have to compensate, by applying the mechanisms explained in **Section 11.3**, only for the tons issued exceeding the reference level that are equivalent to the number of tons

paid in prior years. Subsequently, the country may again have access to payments for results if it reports annual average emissions below the reference level.

- If the emissions over the reference level are lower than the tons paid, only the tons over the reference level will be considered reversals and the country will compensate them by applying the mechanisms explained in **Section 11.3**, all the tons emitted over the reference level. Subsequently, the country may again have access to payments for results if it reports annual average emissions lower than the reference levels.

12. Uncertainties of the calculation of emission reductions

12.1. Identification and assessment of sources of uncertainty

Considering that the historical and future emissions are calculated by combining activity data and emission factors, the two big sources of uncertainty are in fact those related to activity data and to emission factors:

1. **Activity Data**: The uncertainties of the activity data come from the uncertainties associated to the land use maps production process from which the activity data are obtained. Per GOFC-GOLD REDD Sourcebook[84] the possible sources of uncertainty would be the quality of satellite data, interoperability of the different sensors, image processing, cartographic and thematic standards, location and co-registration, the interpreting procedure, and the post-processing. All these sources can generate systematic and random errors, being controlled by standard operation procedures (as required by indicator 8.1 of the methodological framework of the FCPF) and the second ones being partially compensated. The aggregate of all these uncertainty sources can be directly estimated in the final product through an accuracy analysis by suing reference data.

   In the case of the reference level, as indicated in **Section 12.2**, an analysis of accuracy was made on several land use maps and an analysis of the land-cover change map 2001/02 – 2011/12. The analysis of accuracy showed an underestimate of the deforested area and of the new forest area (26% and 51% respectively), which was determined with an accuracy of 22% and 20% respectively, even though the estimated deforestation area was not far from being significantly different, not in the case of new forests, for which the overestimation is clear. Therefore, the activities of carbon stocks increases in new forests and of deforestation show a relative uncertainty of 20-22% due to the activity data, while the forest conservation activity will present an uncertainty of 4%.

2. **Emission factors:** Considering that the emission factors are calculated as the difference between two estimates of average carbon stockss per hectare, what determines the uncertainty of the emission factors is, mainly, the uncertainty associated to the carbon stocks estimates in each deposit. This, on the other hand, depends on several factors, including (Cunia 1987)[85]: the measurement errors (biometric or estimate variables of basic density, for instance), the prediction error of the allometric model (uncertainty of the model parameters), and the sampling error. The uncertainties of different parameters used to estimate the emissions a fraction of carbon should be added as well. As indicated in **Section 8**, to estimate carbon stockss, because there were not gross data from different sources available, it was only possible to consider the statistical uncertainty reported for each source. Said statistical uncertainty only takes into consideration the sampling error. Therefore, the current version of the reference level only considers said error source along to the uncertainty of the parameters (constant) used to determine the emissions. As it can be seen inTable **12.2.15**, the uncertainties (error relative to 90% of trust) of carbon stockss vary from 1% to

[84] GOFC-GOLD. 2014. REDD Sourcebook COP 20. Page 118.

[85]Cunia, T. 1987. Error of forest inventory estimates: its main components. *In* E.H. Whraton & T. Cunia, eds., *Estimating tree biomass regressions and their error. Proceedings of the workshop on tree biomass regression functions and their contribution to the error of forest inventory estimates, May 26–30, 1986, Syracuse, N.Y. – Part E*. Broomall, PA, USA, USDA Forest Service, Northeastern Forest Experiment Station, General Technical Report no. NE-117, pp. 1–14. 34, 39, 46, 184

148%. The uncertainty on the BARA reservoir (main reservoir) in forests does not exceed 22% being applicable to forests other than Mangrove and Yolillal, and 8% to 90% trust level. However, in case of deforestation activity, this high precision is diluted when combining it with very inaccurate values for the categories of crops, which present values of 71% in the case of permanent crops.

Considering the foregoing, it can be proved that the conservation activity of forest has a final positive effect since the uncertainty of the activity data (4%) and of the stocks (8-22%) at 90% trust level is too low. In contrast, the activities of carbon stocks increases in new forests and deforestation show high uncertainties because of the uncertainties of the activity data (22% and 20% respectively) and the very high uncertainties of non-forest classes (BARA of 71% in the case of permanent crops).

To improve the accuracy of future estimates, the following areas can be already identified as priority for the process of continued process:

- **Priority 1**: Sources with a larger impact n global uncertainty.
    - New forests activity data: This class shows a very high uncertainty as it can be seen in the preceding results. As indicated in **Section 8.3**, Tree plantations and secondary forests were merged because the maps produced for said categories were not reliable. This is an indication of the lack of accuracy in these categories.
    - Carbon stockss in non-forest categories. The uncertainties of non-forest categories for the BARA and BARS reservoirs are very high (>50%). It will be necessary to complete the data available at this moment with more data in order to reduce the uncertainties.
- **Priority 2**: Sources with lower impact on the global uncertainty.
    - Dead wood: Dead wood presents very high uncertainties in all cases, being Yolillales the highest with 100% and over 50% in dry forests and grasslands. Even though the global uncertainty impact is lower since it is a reservoir that proportionally has little carbon, it will be necessary to collect more data to reduce associated uncertainties.
    - Non-CO_2 – N_2O gases: The uncertainties on N_2O emissions are higher than 100% practically in all cases. In comparison, this source of emissions is lower, but a reduction of associated uncertainties should be sought, basically passing by the taking of data for the production of specific emission factors for the country or the region.

12.2. Quantification of uncertainty in Reference Level setting

Uncertainty of land-cover maps and of the activity data

To assess the uncertainty for activity data, the accuracy of land-cover maps was estimated as well as the accuracy of land use change matrixes. Due to the limited availability of control data to assess the uncertainties, the accuracy analysis of land-cover maps was limited to the maps of years 1985/86, 2001/02 and 2012/13 and to the accuracy analysis of the activity data to the matrix for period 2002-2012, which is a combination of the maps for 2001/02 and 2012/13.

The methods used to perform the uncertainty analysis and the results obtained are fully described in section 7 of the CDI report (2015.b)[86]. The data used for assessing the accuracy are shown inTable **12.2.1**.and in **Figure 12.2.1**.

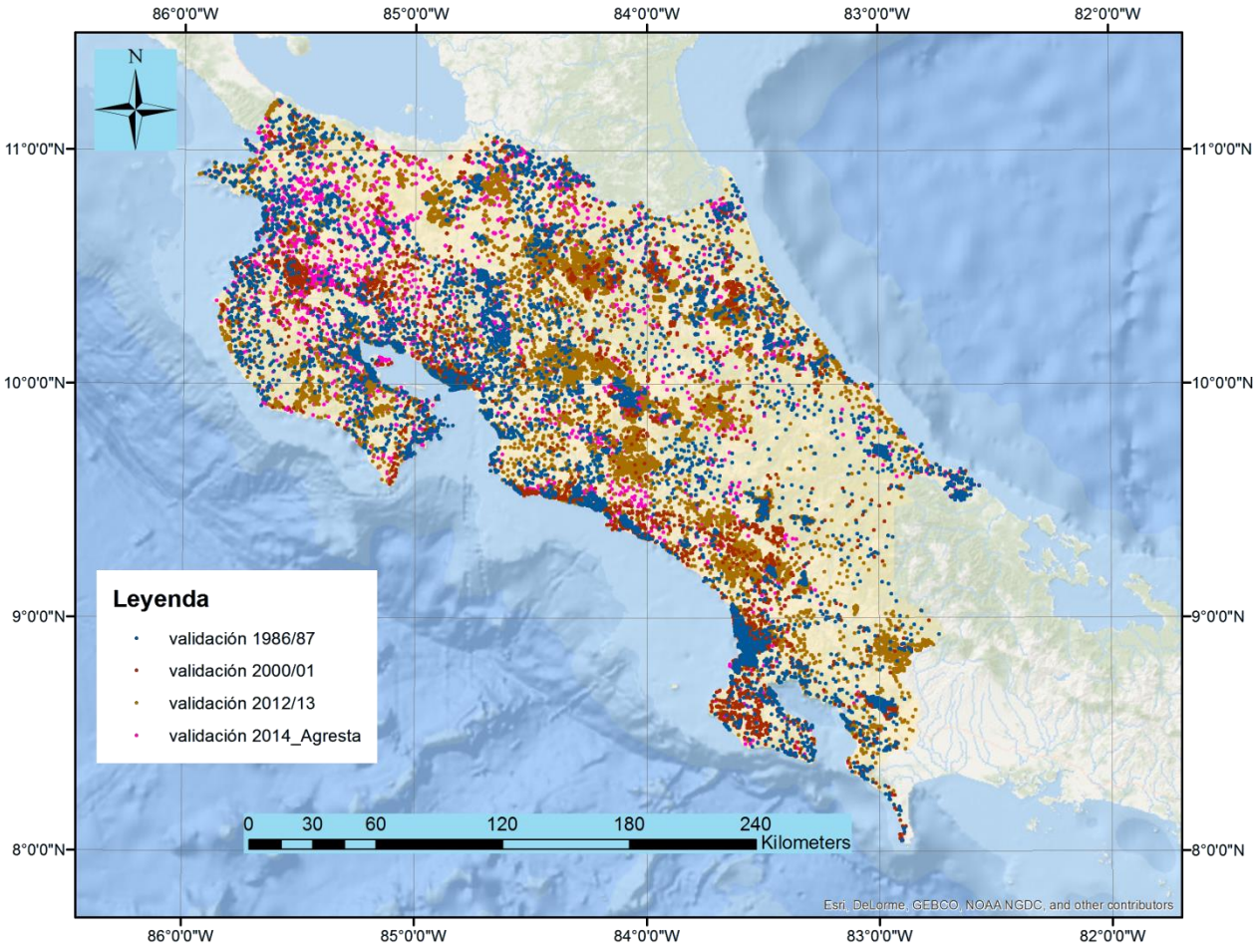
[86] CDI, 2015.b. Reference level of forest emissions and absorptions in Costa Rica and methodology used to construct it. Report prepared for the Government of Costa Rica under the Carbon Fund of the Forest Carbon Partnership (FCPF). 223p.

Chart 12.2.1. Sampling design applied to the assessment of the MCS uncertainty for years 1985/86, 2000/01 and 2012/13.

Land-cover maps	Sampling design	Explanation
1985/86	NO	5,396 control points. Said control points were developed by INBIO for the elaboration and verification of the maps generated within the framework of the project "Lessons learned and development of capacities to apply REDD+ initiatives, Costa Rica's experience." CATIE gave Agresta these points and the meth-data were not complete; therefore, there is no evidence that a statistically robust sampling design was applied.
2000/01	NO	7,463 control points. Said control points were developed by INBIO for the elaboration and verification of the maps generated within the framework of the project "Lessons learned and development of capacities to apply REDD+ initiatives, Costa Rica's experience." CATIE gave Agresta these points and the meth-data were not complete; therefore, there is no evidence that a statistically robust sampling design was applied.
2012/13	NO	8,536 control points compiled by Agresta as part of the consultancy "Generating a consistent historical time series of activity data from land use change for the development of Costa Rica's REDD plus reference level". These control points were compiled by uniting the control points developed by INBio and the control points for year 2012/13, validated in the field, developed by SINAC within the framework of the preparation of the forest type maps of Costa Rica. There is no evidence that a statistically robust sampling design was applied since two different sources were combined that would have used different designs in its case.
2012/13bis *	YES	The map for 2012/13 marks some 9,208 control points obtained from a compilation made by the National Meteorological Institute in 2013 and 2014. The sampling design applied was a stratified random sampling using a land use map for the stratification criteria, generated by the Institute for 2013.

Note: There are two analyses for the land-cover map 2012/13 with two independent databases; the second of these analyses is identified as 2012/13bis.

Figure 12.2.1. Spatial distribution of control points used for the analyses of uncertainty of MCS and activity data.



The assessment of land-cover maps accuracy was only performed for the "forest" and "non-forest" categories, with the exception of year 2013bis in which uncertainty values were also reported for six categories of the IPCC. The results are shown in the following tables.

Chart 12.2.2. Accuracy indicators of the land-cover map 1985/86

Class	User Accuracy (#)	Trust interval at 90% (#)	Producer accuracy (#)	Trust level at 90% (#)
Bosque	0.87	0.87 - 0.88	0.94	0.94 - 0.95
No Bosque	0.90	0.89 - 0.91	0.80	0.79 - 0.82

Total Accuracy (#)	Trust interval at 90% (#)
0.89	0.88 - 0.89

Chart 12.2.3. Adjusted areas and their trust intervals for land-cover map 1985/86.

Class	Estimated area (ha)	Adjusted area (ha)	Error relative to the 90% of significance level (ha)	Error relative to the 90% of significance level (%)	Trust interval at 90% (ha)	Does it contain the estimated area?
Forest	3,187,714	2,963,325	35,274	1%	2,928,051 – 2,998,600	NO
Non-forest	1,810,861	2,035,250	35,277	2%	1,999,973 – 2,070,527	NO

Chart 12.2.4. Accuracy indicators of land cover map 2001/02.

Class	User Accuracy (#)	Trust level at 90% (#)	Producer Accuracy (#)	Trust interval at 90% (#)
Forest	0.86	0.85 - 0.86	0.96	0.96 - 0.97
Non-forest	0.95	0.94 - 0.95	0.80	0.79 - 0.81

Total Accuracy (#)	Trust level at 90% (#)
0.89	0.89 - 0.9

Chart 12.2.5. Adjusted areas and their trust intervals for land-cover map 2001/02.

Class	Estimated area (ha)	Adjusted area (ha)	Error relative to 90% of the significance level (ha)	Error relative to 90% of the significance level (%)	Trust interval at 90% (ha)	Does it contain the estimated area?
Forest	3,071,471	2,727,788	29,895	1%	2,697,893 – 2,757,683	NO
Non-forest	1,927,105	2,270,788	29,894	1%	2,240,894 – 2,300,681	NO

Chart 12.2.6. Accuracy indicators of land-cover map 2012/13.

Class	User Accuracy (#)	Trust interval at 90% (#)	Producer Accuracy	Trust interval at 90% (#)
Bosque	0.88	0.87 - 0.89	0.97	0.97 - 0.98
No Bosque	0.96	0.96 - 0.97	0.83	0.82 - 0.84

Total accuracy (#)	Trust interval at 90% (#)
0.91	0.91 - 0.92

Chart 12.2.7. Adjusted areas and their trust intervals for land-cover map 2012/13

Class	Estimated area (ha)	Adjusted area (ha)	Error relative to 90% of the significance level (ha)	Error relative to 90% of the significance level (%)	Trust interval at 90% (ha)	Does it contain the estimated area?
Forest	3,134,027	2,838,197	27,142	1%	2,811,055 – 2,865,340	NO
Non-forest	1,864,549	2,160,378	27,141	1%	2,133,237 – 2,187,519	NO

The results of the accuracy analysis for land-cover map 2012/13 by using the control points of the National Meteorological Institute (i.e. land-cover maps 2012/2013bis) are shown in the following tables.

Chart 12.2.8. Accuracy indicators of land-cover map2012/13.

Class	User Accuracy (#)	Trust interval at 90% (#)	Producer accuracy (#)	Trust interval at 90% (#)
Forest	0.76	0.75 - 0.77	0.95	0.95 - 0.96
Non-forest	0.94	0.93 - 0.94	0.70	0.69 - 0.71

Total Accuracy (#)	Trust level at 90% (#)
0.82	0.82 - 0.83

Chart 12.2.9. Adjusted areas and their trust intervals for land-cover map 2012/13.

Class	Estimated area (ha)	Adjusted area (ha)	Error relative to 90% of the significance level (ha)	Error relative to 90% of the significance level (%)	Trust interval at 90% (ha)	Does it contain the estimated area?
Forest	3134027	2494173	37409	1%	2456765 - 2531582	NO
Non-forest	1864549	2504402	37404	1%	2466998 - 2541806	NO

Considering the errors matrix with the six categories of IPCC, it is observed that the total accuracy is lower, due to the fact that the grassland user accuracy is reduced, which have led to confusion with the Crops class.

Chart 12.2.10. Accuracy indicators of land-cover map2012/13 considering the land use IPCC categories.

Class	User Accuracy (#)	Trust level at 90% (#)	Producer Accuracy (#)	Trust level at 90% (#)
Forest	0.76	0.75 - 0.77	0.90	0.9 - 0.91
Crops	0.97	0.97 - 0.98	0.31	0.3 - 0.32
Grasslands	0.36	0.34 - 0.39	0.88	0.86 - 0.9
Settlements	0.94	0.9 - 0.99	0.91	0.85 - 0.96
Wetlands	0.81	0.71 - 0.91	0.19	0.17 - 0.22
Other lands	0.45	0.41 - 0.49	0.48	0.41 - 0.55

Total Accuracy (#)	Trust interval at 90% (#)
0.69	0.68 - 0.69

With regards to the areas, the conclusions are similar to the preceding, even though there are very significant differences with the cultivation classes and grassland classes. While the Cultivation class has been underestimated, the grassland class has been overestimated.

Chart 12.2.11. Adjusted areas and their trust intervals for land-cover map 2012/13 considering the land use IPCC categories.

Class	Estimated areas (ha)	Adjusted area (ha)	Error relative to 90% at the significance level (ha)	Error relative to 90% at the significance level (%)	Trust level at 90% (ha)	Does it contain the estimated area?
Forest	3,134,027	2,631,342	41,812	2%	2,589,530 – 2,673,153	NO
Crops	529,136	1,651,142	42,851	3%	1,608,291 – 1,693,993	NO
Grasslands	1,190,835	494,132	28,839	6%	465,292 – 522,971	NO
Settlements	46,999	48,970	37,88	8%	45,181 – 52,758	YES
Wetlands	24,867	104,641	13,508	13%	91,133 – 118,149	NO
Other lands	72,712	68,350	9,701	14%	58,649 – 780,50	YES
Total	4,998,575	4,998,575				

It must be stated that the Methodological Framework of the FCPF Carbon Fund or the IPCC specify minimum thresholds of accuracy to be reached in the land-cover maps and activity data. To obtain an indication on the acceptability of the accuracy levels found per recognized international standards, the estimated accuracy values were compared to the minimum accuracy values required for jurisdictional and Nested REDD+ procedures of the Verified Carbon Standard. In conclusion, the maps of all the assessed periods would be in accordance with the JNR requirements of the VCS since the full accuracy in forest/non-forest classification was always higher than at least 75%.

Regarding the accuracy of activity data in the land use change matrixes, the results of the assessment show quite high total accuracy values (0.85) although this is due mainly to the high accuracy in the stable categories. The categories that changed show reduced accuracies, under 0.6, which indicates a pretty high uncertainty of the activity data (**Chart 12.2.12**).

Chart 12.2.12.Accuracy statistics for cover changes in land-cover map2001/02 and land-cover map 2011/12.

Class	User Accuracy (#)	Trust level at 90% (#)	Producer Accuracy (#)	Trust level at 90% (#)
Deforestation (*Forest to Non-Forest*)	0.62	0.49 - 0.75	0.49	0.38 - 0.6
New forests (*Non-Forest to Forest*)	0.75	0.64 - 0.86	0.50	0.4 - 0.6
Stable forest (*Forest remaining Forest*)	0.88	0.84 - 0.91	0.94	0.92 - 0.96
Stable non-forest (*Non-Forest remaining Non-Forest*)	0.85	0.81 - 0.89	0.84	0.8 - 0.87

Total Accuracy (#)	Trust interval at 90% (#)
0.85	0.83 - 0.87

Regarding the adjusted areas, the results are similar. While there is an underestimation of the stable forest area and of the consistency of non-stable forest areas, the deforestation areas and the new forests show new biases and significant uncertainties. The deforestation during the period analyzed has been underestimated in 26% (with a relative error of 22% at the 90% trust level) mean while new forests have been underestimated in 51% (with a relative error of 20% at the 90% trust level). Keeping the relative errors in mind, it is very feasible that the deforestation bias could have been substantially reduced with an increase of the sample numbers, while new forests have been underestimated in at least 31%, which is very significant.

Chart 12.2.13. Adjusted areas and their trust intervals for the cover change between land-cover map 2001/02 and land-cover map2011/12 considering the forest and non-forest change categories.

Class	Estimated area (ha)	Adjusted area (ha)	Bias (%)	Error relative at 90% of the significance level (ha)	Error relative at 90% of the significance level (%)	Trust confidence at 90% (ha)	Does it contain the estimated area?
Deforestation (*Forest to Non-Forest*)	222,418	280,602	26%	63,086	22%	217,516 – 343,688	SI
New forests (*Non-Forest to Forest*)	208,162	314,796	51%	64,028	20%	250,768 – 378,824	NO
Stable forest (*Forest remaining Forest*)	2,848,954	2,661,103	-7%	101,885	4%	2,559,218 – 2,762,989	NO
Non-stable forest (*Non-Forest remaining Non-Forest*)	1,718,880	1,741,912	1%	99,201	6%	1,642,710 – 1,841,113	SI

The uncertainty analyses of land-cover maps and of the activity data presented above are valid as well for the activities "forest carbon stocks increase" and "forest carbon stocks conservation" so they will not be repeated in the following sections, with regards to the reference level for those two activities.

Uncertainty of emission factors

Considering that the emission factors are calculated as the difference between two average carbon stockss estimates per hectare, what determines the uncertainty of the emission factors is, in essence, the uncertainty associated to the carbon stocks estimates in each deposit. It depends on several factors, including the following (Cunia 1987)[87]:

- Measurement error: The measurement error differs from statistical errors in that measurement error is the difference between the actual value and the computed value for a sampling unit. Said error has a random component and a systematic one. While the first one will tend to zero as the sampling units are measured (i.e. errors are compensated), the second one is more important and is hard to quantify. The only way of reducing it, as indicated by 2006 IPCC [88], is establishing a quality assurance/quality control plan (QA/QC). In the case of the establishment of sufficient controls, it can be assumed that said systematic part is also zero although some studies such as Chave *et al*. (2004)[89]state that the measurement error can be equal to 16% considering the error of heights, diameters and measurement of basic densities.

[87]Cunia, T., 1987. Error of forest inventory estimates: its main components. *In* E.H. Whraton & T. Cunia, eds., *Estimating tree biomass regressions and their error. Proceedings of the workshop on tree biomass regression functions and their contribution to the error of forest inventory estimates, May 26–30, 1986, Syracuse, N.Y. – Part E*. Broomall, PA, USA, USDA Forest Service, Northeastern Forest Experiment Station, General Technical Report no. NE-117, pp. 1–14. 34, 39, 46, 184

[88] Capítulo 3, Volumen 1, 2006 IPCC.

[89] Chave, J., Condit, R., Aguilar, S., Hernandez, A., Lao, S. & Perez, R., 2004. Error propagation and scaling for tropical forest biomass estimates. *Philos. Trans. R. Soc. Lond., B Biol. Sci.*, 359(1443): 409–420. 40, 46, 50

- Allometric model error: In general, biomass above the land is not measured directly; variable biometrics on the vegetation that serve as the entry in a model that estimates biomass are measured. In this case, there are also two possible errors: the error associated to the selection of the model; the error associated to the prediction of said model. The first type of error consists in the fact that there are several models available to estimate the biomass which contributes with estimates that can have wide differences. This error may have very high values as indicated by Van Breugel *et al*. (2011)[90] who obtained associated errors between 5 and 35% depending on the model selected to do the estimate. The second class of errors is the uncertainty associated to the prediction of the model that according to Picard *et al*. (2013)[91] depends on two factors: the sampling plan and the estimator. This way, two sampling plans or two different estimators will throw different estimates keeping identical the rest of the factors.
- Sampling error: The sampling error must be added to the measurement and prediction errors mentioned above; this one is used to perform the inference to estimate the biomass/carbon at the level of the area of interest. This error depends[92]of: a) the sampling design; b) the size of the sampling; c) the type of estimator used; d) the variability inherent between the sampling units. This sampling error is the only error that is usually reported in the studies.

The Methodological Framework of the FCPF Carbon Fund does not clearly indicate what errors must be considered in the assessment of the accuracy of the emission factors. IPCC 2006 guidelines, on the other hand, contain a description of good practices in the calculation and consideration of the uncertainties, but do not include either a clear requirement of what sources of uncertainties should be considered.

As stated above, for the estimate of carbon stockss the IFN values were used as well as other sources with quantified uncertainties. Said uncertainties, in all cases, were statistical uncertainties associated to the sampling and did not consider the measurement uncertainties or the uncertainties of the allometric models applied.

With these premises, the uncertainty analysis was made as follows:

1. Uncertainty estimate of entry parameters: First of all, the entry parameters in the calculation sheet were estimated; these are the values obtained from the bibliography that serve as entry parameters for the equations used to estimate the carbon contents. In this case, the estimate of uncertainties was made by following the IPCC guidelines (Chapter 2, Volume 1 of IPCC GL 2006). The uncertainties described in the different publications or determined from the forest inventory data were identified, and in case of the combination of values from different sources, the error spread was made following Method 1 of the IPCC guidelines for the spreading of uncertainties. This means, in the case of a sum of two parameters$x$and$y$, it was considered that their uncertainties σ_x y $\sigma_y$would be combined with the root of the sum of the squares:

   Uncertainty $(x + y) = \sqrt{\sigma_x + \sigma_y}$. (8)

[90] Van Breugel, M., Ransijn, J., Craven, D., Bongers, F. & Hall, J.S., 2011. Estimating carbon stocks in secondary forests: Decisions and uncertainties associated with allometric biomass models. For. Ecol. Manag., 262(8): 1648–1657. 40, 43, 46, 50

[91] Picard N., Saint-André L., Henry M., 2012. Manual for building tree volume and biomass allometric equations: from field measurement to prediction. Food and Agricultural Organization of the United Nations, Rome, and Centre de Coopération Internationale en Recherche Agronomique pour le Développement, Montpellier, 215 pp.

[92] Introducción - Cunia, T. 1987.

In case of a multiplication of parameters x and y, it was considered that their uncertainties σ_x y σ_y, would be combined with the following equation:

$$\text{Uncertainty } (x * y) = \sqrt{\left[\frac{\partial f}{\partial x}\sigma_x\right] + \left[\frac{\partial f}{\partial y}\sigma_y\right]}. \quad (9)$$

These equations are equivalent to those indicated in Chapter 2 of Volume 1 of IPCC GL 2006.

The uncertainties of said parameters are shown in sheet "4.Parameters Table" of Excel file "CARBON DATABASE". These uncertainties refer to the calculations of uncertainties performed in sheet "3.Carbon Densities" of the same file.

2. Estimate of the uncertainty of carbon stockss: The same equations from above (8 and 9) were applied to calculate all the parameters used in the equations used to estimate carbon stockss. This allowed estimates for each category estimated for each land use category. The aggregate or propagation of uncertainties was done by following Method 1 of the IPCC guidelines mentioned above.

   The uncertainties spread for each category and carbon deposit are reported at the end of the sheet "CARBON" of the "FREL TOOL CR v.1" tool between cells Y15: AN6053.

3. Correction of carbon stocks estimates with high level of uncertainty: According to the requirements of JNR of VCS[93], carbon stocks estimates must be adjusted in a conservative sense[94]when the estimate of the relative error exceeds 20% of the estimate average at the 90% trust level or the 30% to 95% of the trust level.

   The tool "FREL TOOL CR v.1" allows applying the corrections required by the VCS when the relative error exceeds 20% of the estimated average value at 90% of the trust level. These corrections are automatically done in the sheet "CARBON" (between cells AP15: BD6053)**when the option "VCS" is selected in the cell "B49" in the sheet "DECISIONS"; while they do not take place if the option "IPCC" is selected (this is the option selected in the context of the construction of the reference level under the FCPF Carbon Fund).**

   The equations to be applied to correct carbon stocks estimates with an uncertainty level higher than 20% to 90% of the trust level differ in case the carbon stocks estimates are used for the reference level or for the calculation and report of results of the emission reduction program.

- In the case of emission factors estimated for the reference level, the correction required by VCS is calculated as follows:

$$\text{Si: } {CIC_k(CS)}/{C_k(CS)} > 0.10 \rightarrow C'_k(CS) = \left(1 - \frac{CIC_k(CS)}{C_k(CS)} + 0.10\right) \times C_k(CS) \quad (10)$$

[93] Section 3.14.12 (4) of VCS-JNR, v3.2 of October 20, 2014.

[94]In the context of the reference level, the adjustments must be made downwards in the case of carbon stocks values estimated for the forest categories, and upwards in case of carbon stocks values for non-forest categories, with the exception of the case of harvested Harvested Wood products products, in which the sense of adjustment is upwards. In the context of results of the emission reduction program, the sign of the adjustment is opposite to the sign used in the context of the reference level.

- In the case of emission factors estimated to report the result of the emission reduction program, the correction required by VCS is calculated as follows:

If: $\left.CIC_k(CS)\right/_{C_k(CS)} > 0.10 \rightarrow C'_k(CS) = (1 + \frac{CIC_k(CS)}{C_k(CS)} - 0.10) \times C_k(CS)$ (11)

If: $\left.CIC_k(CS)\right/_{C_k(CS)} \leq 0.10 \rightarrow C'_k(CS) = C_k(CS)$ (12)

Where:

$CIC_k(CS)$	Half of the trust interval at 90a% of the level trust of the carbon density of the *k* deposit or source for a land use category/stratum (CS), $tCO_2\ ha^{-1}$
$C_k(CS)$	Carbon density of the *k* deposit or source for a land use category/stratum(CS), $tCO_2\ ha^{-1}$
$C'_k(CS)$	Carbon density adjusted according to the VCS JNR of the *k* deposit or source for a land use category/stratum (CS), $tCO_2\ ha^{-1}$
k	*k* deposit or emission source.

The application of said correction is shown in tool "FREL TOOL CR v.1", in the sheet "CARBON", between cells AP15: BD6053.

The results are reported in**Table 8.3.22. and** T**8.3.22.Chart 8.3.22.** presents the uncertainty values at 90% of trust in $tCO_2\ ha^{-1}$for each deposit and category.Table **8.3.23.** presents the relative uncertainties (%) at 90% of the trust level.

Chart 12.2.14. Average uncertainty at 90% trust level of carbon stockss estimated for each category, deposit and gas by using Method 1 of IPCC.

Notes: **TF & TFC** = Forest Lands and Lands turned into Forest Lands; **C** = Crops: **P** = Grasslands; **H** = Wetlands; **AU** = Settlements; **OT** = Other Lands; **SI** = Without Information. **Bhp** = Very wet and pluvial forests; **Bh** = Rain forests; **Bs** = Dry forests; **Man** = Mangroves; **Bp-Y** = Palm forests – Yolillales; **bp** = primary forests; **bn** = new forests; **smf** = without sustainable management of forest; **cmf** = with sustainable management of forest; **i** = intact; **d** = degraded; **md** = very degraded; **int** = intervened; **1 ... 400** = age in years; **an** = annual; **per** = permanent; **zll** = rainy zone (> 2000 mm $year^{-1}$); **zh** = wet zone (1000-2000 mm $year^{-1}$); **para** = Moors; **sd** = Bare lands;; **nat** = natural; **art** = artificial; **BARA** = Aboveground biomass; **BNAA** = Aerial Non-Arboreal Biomass; **BARS** = Underground Arboreal Biomass; **BNAS** = Underground Non-Arboreal Biomass; **MMA** = Aerial Dead Wood; **MMS** = Underground Dead Wood; **H** = Litter; SOC = Soil organic carbon; **PM.F1** = Harvested Wood products, Fraction 1 (paper products); **PM.F2** = Harvested Wood products, Fraction 2 (non-structural panels); **PM.F3** = Harvested Wood products, Fraction 3 (structural panels, veneer, plywood); **PM.F4** = Harvested Wood products, Fraction 4 (sawmill wood);**CO_2**= carbon dioxide; **CH_4** = Methane; **N_2O** = Nitrose Oxide.

					CO_2												Non-CO_2 Gas		Total
					Aerial Biomass		Underground Biomass		Dead Wood		Litter	C Land	Harvested Wood products: Use change crops				Biomass burn		
					BARA	BNAA	BARS	BNAS	MMA	MMS	H	COS	PM.F 1	PM.F 2	PM.F 3	PM.F 4	CH_4	N_2O	
					Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	
					tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}
TF & TCF	Bhp	BP	smf	i	37.46		8.32	-	8.75			0.94	23.57	-	0.55	4.34	2.56	6.60	
				d	29.36		6.64	-	8.75			0.94	23.57	-	0.43	3.40	2.01	5.40	
				md	18.22		4.27	-	8.75			0.94	23.57	-	0.27	2.11	1.25	3.75	
			cmf	int	29.34		6.64	-	9.47			0.92	23.57	-	0.43	3.40	2.01	5.14	
		BN	smf	1	0.75		0.22	-	0.08			0.02	23.57	-	0.01	0.10	0.06	0.14	
				2	1.48		0.42	-	0.16			0.05	23.57	-	0.02	0.19	0.11	0.27	
				399	37.44		8.32	-	4.06			1.17	23.57	-	0.61	4.82	2.84	6.82	
				400	37.45		8.32	-	4.06			1.17	23.57	-	0.61	4.82	2.84	6.82	
	Bh	BP	smf	i	28.20		6.43	-	23.25			1.04	57.93	-	0.40	3.16	1.86	4.96	
				d	22.10		5.13	-	23.25			1.04	57.93	-	0.31	2.47	1.46	4.12	
				md	13.72		3.30	-	23.25			1.04	57.93	-	0.19	1.54	0.91	2.98	
			cmf	int	22.09		5.13	-	14.66			0.82	57.93	-	0.31	2.47	1.46	3.73	
		BS	smf	1	0.88		0.26	-	0.58			0.03	57.93	-	0.01	0.11	0.06	0.16	
				2	1.73		0.48	-	1.15			0.06	57.93	-	0.03	0.21	0.12	0.31	

					CO_2												Non-CO_2 Gas		Total
					Aerial Biomass		Underground Biomass		Dead Wood		Litter	C Land	Harvested Wood products: Use change crops				Biomass burn		
					BARA	BNAA	BARS	BNAS	MMA	MMS	H	COS	PM.F 1	PM.F 2	PM.F 3	PM.F 4	CH_4	N_2O	
					Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	
					tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}
				399	28.20		6.43	-	18.72			1.04	57.93	-	0.44	3.45	2.03	5.02	
				400	28.20		6.43	-	18.72			1.04	57.93	-	0.44	3.45	2.03	5.02	
	Bs	bp	smf	i	17.96		4.22	-	21.92			0.61	168.55	-	0.26	2.06	1.21	4.05	
				d	14.08		3.37	-	21.92			0.61	168.55	-	0.20	1.61	0.95	3.49	
				md	8.74		2.17	-	21.92			0.61	168.55	-	0.13	1.00	0.59	2.74	
			cmf	int	14.07		3.37	-	6.06			1.45	168.55	-	0.20	1.61	0.95	2.72	
		bn	smf	1	0.00		0.00	-	0.00			0.00	168.55	-	0.00	0.00	0.00	0.00	
				2	0.00		0.00	-	0.00			0.00	168.55	-	0.00	0.00	0.00	0.00	
				399	17.96		4.22	-	7.74			1.85	168.55	-	0.29	2.27	1.34	3.72	
				400	17.96		4.22	-	7.74			1.85	168.55	-	0.29	2.27	1.34	3.72	
	Ma n	bp	smf	i	31.21		7.25	-	2.05			0.24	-	-	0.38	2.98	1.76		
				d	24.47		5.79	-	2.05			0.24	-	-	0.30	2.34	1.38		
				md	15.19		3.72	-	2.05			0.24	-	-	0.18	1.45	0.86		
			cmf	int	24.45		5.78	-	1.97			0.57	-	-	0.30	2.34	1.38		
		bn	smf	1	0.31		0.10	-	0.03			0.01	-	-	0.00	0.03	0.02		
				2	0.62		0.19	-	0.05			0.01	-	-	0.01	0.06	0.03		
				399	31.21		7.25	-	2.51			0.72	-	-	0.37	2.94	1.74		
				400	31.21		7.25	-	2.51			0.72	-	-	0.37	2.94	1.74		
	Bp-Y	bp	smf	i	40.89		9.74	-	7.02			1.13	225.49						
				d	32.05		7.77	-	7.02			1.13	225.49						
				md	19.89		5.00	-	7.02			1.13	225.49						
			cmf	int	32.03		7.77	-	5.68			0.90	225.49						
		bn	smf	1	0.41		0.14	-	0.08			0.01	225.49						
				2	0.82		0.26	-	0.17			0.02	225.49						
				399	40.89		9.74	-	8.40			1.14	225.49						

					CO_2												Non-CO_2 Gas		Total
					Aerial Biomass		Underground Biomass		Dead Wood		Litter	C Land	Harvested Wood products: Use change crops				Biomass burn		
					BARA	BNAA	BARS	BNAS	MMA	MMS	H	COS	PM.F 1	PM.F 2	PM.F 3	PM.F 4	CH_4	N_2O	
					Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	Include	
					tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}	tCO_2-e ha^{-1}
				400	40.89		9.74	-	8.40			1.14	225.49						
C	an				-	9.69	-	2.45	-			-							
	per	zll		1	2.04	0.89	0.66	0.31	0.02			0.18							
				2	4.08	1.77	1.26	0.58	0.04			0.36							
				399	40.80	17.72	10.62	4.89	0.43			3.61							
				400	40.80	17.72	10.62	4.89	0.43			3.61							
		zh		1	2.04	0.89	0.66	0.31	0.02			0.18							
				2	4.08	1.77	1.26	0.58	0.04			0.36							
				399	40.80	17.72	10.62	4.89	0.43			3.61							
				400	40.80	17.72	10.62	4.89	0.43			3.61							
P					-	-	-	-	6.29			-							
AU					-	-	-	-	-			-							
H				nat	-	-	-	-	-			-							
				art	-	-	-	-	-			-							
OT		para			-	2.16	-	0.53	-			-							
		sd		nat	-		-	-											
				art	-		-	-											
SI					-		-	-											

Chart 12.2.15. Average relative uncertainties (%) at 90% trust level of estimated carbon stockss for each category, deposit and gas by using Method 1 of the IPCC.

Notes: **TF & TFC** = Forest Lands and Lands turned into Forest Lands; **C** = Crops: **P** = Grasslands; **H** = Wetlands; **AU** = Settlements; **OT** = Other Lands; **SI** = Without Information. **Bhp** = Very wet and pluvial forests; **Bh** = Rain forests; **Bs** = Dry forests; **Man** = Mangroves; **Bp-Y** = Palm forests – Yolillales; **bp** = primary forests; **bn** = new forests; **smf** = without sustainable management of forest; **cmf** = with sustainable management of forest; **i** = intact; **d** = degraded; **md** = very degraded; **int** = intervened; **1 ... 400** = age in years; **an** = annual; **per** = permanent; **zll** = rainy zone (> 2000 mm $year^{-1}$); **zh** = wet zone (1000-2000 mm $year^{-1}$); **para** = Moors; **sd** = Bare lands;; **nat** = natural; **art** = artificial; **BARA** = Aboveground biomass; **BNAA** = Aerial Non-Arboreal Biomass; **BARS** = Underground Arboreal Biomass; **BNAS** = Underground Non-Arboreal Biomass; **MMA** = Aerial Dead Wood; **MMS** = Underground Dead Wood; **H** = Litter; SOC = Soil organic carbon; **PM.F1** = Harvested Wood products, Fraction 1 (paper products); **PM.F2** = Harvested Wood products, Fraction 2 (non-structural panels); **PM.F3** = Harvested Wood products, Fraction 3 (structural panels, veneer, plywood); **PM.F4** = Harvested Wood products, Fraction 4 (sawmill wood);**CO_2**= carbon dioxide; **CH_4** = Methane; **N_2O** = Nitrose Oxide.

					CO_2												Non-CO_2 Gas		Total
					Aerial biomass		Underground biomass		Dead wood		Litter	C Land	Harvested Wood products: use change crops				Biomass burn		
					BARA	BNAA	BARS	BNAS	MMA	MMS	H	COS	PM.F1	PM.F 2	PM.F3	PM.F 4	CH_4	N_2O	
					Include	Include	Include	Include	Include	Exclude	Include	Exclude	Include	Include	Include	Include	Include	Include	
					%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
TF & TCF	Bhp	BP	Smf	i	8%		8%		18%		0%	0%			2%	20%	23%	137%	0%
				d	8%		8%		18%		0%	0%			1%	20%	22%	135%	0%
				md	8%		8%		18%		0%	0%			1%	20%	19%	134%	0%
			Cmf	int	8%		8%		23%		0%	0%			1%	20%	23%	137%	0%

				CO_2												Non-CO_2 Gas		Total
				Aerial biomass		Underground biomass		Dead wood		Litter	C Land	Harvested Wood products: use change crops				Biomass burn		
				BARA	BNAA	BARS	BNAS	MMA	MMS	H	COS	PM.F1	PM.F2	PM.F3	PM.F4	CH_4	N_2O	
				Include	Include	Include	Include	Include	Exclude	Include	Exclude	Include	Include	Include	Include	Include	Include	
				%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
		BN	Smf	1	8%		8%		8%		0%	0%			1%	23%	22%	117%	0%
				2	8%		8%		8%		0%	0%			1%	22%	20%	117%	0%
				399	8%		8%		8%		0%	0%			2%	22%	21%	116%	0%
				400	8%		8%		8%		0%	0%			2%	22%	21%	116%	0%
	Bh	BP	Smf	i	8%		8%		48%		0%	0%			2%	21%	22%	138%	0%
				d	8%		8%		48%		0%	0%			1%	20%	21%	136%	0%
				md	8%		8%		48%		0%	0%			1%	20%	18%	138%	0%
			Cmf	int	8%		8%		48%		0%	0%			2%	21%	23%	138%	0%
		BS	Smf	1	8%		8%		48%		0%	0%			1%	23%	19%	123%	0%
				2	8%		8%		48%		0%	0%			2%	22%	20%	119%	0%
				399	8%		8%		48%		0%	0%			2%	22%	21%	118%	0%
				400	8%		8%		48%		0%	0%			2%	22%	21%	118%	0%
	Bs	bp	Smf	i	8%		8%		78%		0%	0%			2%	20%	22%	168%	0%

				CO_2												Non-CO_2 Gas		Total
				Aerial biomass		Underground biomass		Dead wood		Litter	C Land	Harvested Wood products: use change crops				Biomass burn		
				BARA	BNAA	BARS	BNAS	MMA	MMS	H	COS	PM.F1	PM.F2	PM.F3	PM.F4	CH_4	N_2O	
				Include	Include	Include	Include	Include	Exclude	Include	Exclude	Include	Include	Include	Include	Include	Include	
				%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
			d	8%		8%		78%		0%	0%			1%	20%	20%	172%	0%
			md	8%		8%		78%		0%	0%			2%	20%	18%	188%	0%
		Cmf	int	8%		8%		29%		0%	1%			1%	20%	22%	145%	0%
	bn	Smf	1								0%							
			2	0%		0%		0%			0%							0%
			399	8%		8%		29%		0%	1%			2%	22%	20%	125%	0%
			400	8%		8%		29%		0%	1%			2%	22%	20%	125%	0%
Man	bp	Smf	i	12%		12%		29%		0%	0%			2%	25%			0%
			d	12%		12%		29%		0%	0%			2%	25%			0%
			md	11%		11%		29%		0%	0%			2%	24%			0%
		Cmf	int	12%		12%		37%		0%	0%			2%	25%			0%
	bn	Smf	1	12%		11%		43%		0%	0%			0%	25%			0%
			2	12%		12%		36%		0%	0%			2%	25%			0%

					CO_2												Non-CO_2 Gas		Total
					Aerial biomass		Underground biomass		Dead wood		Litter	C Land	Harvested Wood products: use change crops				Biomass burn		
					BARA	BNAA	BARS	BNAS	MMA	MMS	H	COS	PM.F1	PM.F2	PM.F3	PM.F4	CH_4	N_2O	
					Include	Include	Include	Include	Include	Exclude	Include	Exclude	Include	Include	Include	Include	Include	Include	
					%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
				399	12%		12%		37%		0%	0%			2%	24%			0%
				400	12%		12%		37%		0%	0%			2%	24%			0%
	Bp-Y	bp	Smf	i	22%		22%		118%			0%							0%
				d	21%		21%		118%			0%							0%
				md	21%		21%		118%			0%							0%
			Cmf	int	22%		22%		122%			0%							0%
		bn	Smf	1	22%		22%		133%			0%							0%
				2	22%		21%		142%			0%							0%
				399	22%		22%		141%			0%							0%
				400	22%		22%		141%			0%							0%
C	an					12%		12%											
	per	zll		1	71%	68%	70%	69%	33%			47%							
				2	71%	68%	70%	68%	33%			47%							

				CO_2												Non-CO_2 Gas		Total
				Aerial biomass		Underground biomass		Dead wood		Litter	C Land	Harvested Wood products: use change crops				Biomass burn		
				BARA	BNAA	BARS	BNAS	MMA	MMS	H	COS	PM.F1	PM.F2	PM.F3	PM.F4	CH_4	N_2O	
				Include	Include	Include	Include	Include	Exclude	Include	Exclude	Include	Include	Include	Include	Include	Include	
				%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
			399	71%	68%	71%	68%	35%			48%							
			400	71%	68%	71%	68%	35%			48%							
		zh	1	71%	68%	70%	69%	33%			47%							
		zh	2	71%	68%	70%	68%	33%			47%							
		zh	399	71%	68%	71%	68%	35%			48%							
		zh	400	71%	68%	71%	68%	35%			48%							
P								76%										
AU																		
H			nat															
H			art															
OT		para			2%		2%											
OT		sd	nat															
OT		sd	art															

	CO_2												Non-CO_2 Gas		Total
	Aerial biomass		Underground biomass		Dead wood		Litter	C Land	Harvested Wood products: use change crops				Biomass burn		
	BARA	BNAA	BARS	BNAS	MMA	MMS	H	COS	PM.F1	PM.F2	PM.F3	PM.F4	CH_4	N_2O	
	Include	Include	Include	Include	Include	Exclude	Include	Exclude	Include	Include	Include	Include	Include	Include	
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
SI															

Uncertainty of the reference level

The total uncertainty of the reference level was estimated with the Montecarlo method by considering the combined uncertainty of the activity data and of the emission factors. For this purpose, two macros of the "FREL TOOL CR v.1" tool were incorporated. The first one calculates the uncertainty level in the "FREL&FRL" sheet (see line 469) and the second one calculates the uncertainties of the emission reduction program results in the "RESULTS" sheet (see line 132).

Chart 12.2.16. shows the parameters defined in one of the Montecarlo simulations performed, with 10,000 iterations. Table **12.2.19.** shows the results of the Montecarlo simulations for each REDD+ activity by using the setting of Table **12.2.16**. The results are shown at 90% trust.

Chart 12.2.20. shows the final relative uncertainties of the reference level considering all the activities included.

Chart 12.2.16. Configuration of the Montecarlo simulation performed.

Date	9/17/2015 15:35	
Iterations	10,000	
Trust level	0.9	
Include activity data uncertainty	Yes	
Include emission factor data uncertainty	Yes	

In order to determine the relative contribution of the activity data to the total uncertainty of the reference level, 10,000 Montecarlo simulations were performed with the configuration shown inTable **12.2.17** (i.e. ignoring the uncertainty of the emission factors).Table **12.2.21** shows the results of the Montecarlo simulations using these settings. Likewise, Montecarlo simulations were performed with the configuration shown inTable **12.2.18** (i.e. ignoring the uncertainty of the activity data).Table **12.2.22** shows the results of the Montecarlo simulations using these settings.

Chart 12.2.17. Configuration of the Montecarlo simulation performed to determine the relative contribution of the activity data to the total uncertainty of the reference level.

Date	10/20/2015 4:55:37 PM	
Iterations	10,000	
Trust level	0.9	
Include activity data uncertainty	Yes	
Include emission factor data uncertainty	No	

Chart 12.2.18. Configuration of the Montecarlo simulation performed to determine the relative contribution of the activity data to the total uncertainty of the reference level.

Date	10/31/2015 7:05:01 AM	
Iterations	10,000	
Trust level	0.9	
Include activity data uncertainty	No	
Include emission factor data uncertainty	Yes	

Chart 12.2.19. Uncertainty of the reference level. Mean and percentiles for each REDD+ activity according to the 10,000 Montecarlo simulations performed with the settings shown inTable 12.2.16.

Activity		Statistical	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
DF.an	**Total anthropogenic deforestation**	Mean	7,212,197	7,212,197	7,212,197	7,212,197	7,212,197	7,212,197	7,212,197	7,212,197	7,212,197	7,212,197	7,212,197	7,212,197	7,212,197	7,212,197
		Percentile 95%	8,953,035	8,953,035	8,953,035	8,953,035	8,953,035	8,953,035	8,953,035	8,953,035	8,953,035	8,953,035	8,953,035	8,953,035	8,953,035	8,953,035
		Percentile 5%	5,541,494	5,541,494	5,541,494	5,541,494	5,541,494	5,541,494	5,541,494	5,541,494	5,541,494	5,541,494	5,541,494	5,541,494	5,541,494	5,541,494
	Anthropogenic deforestation of primary forests	Mean	5,289,882	5,289,882	5,289,882	5,289,882	5,289,882	5,289,882	5,289,882	5,289,882	5,289,882	5,289,882	5,289,882	5,289,882	5,289,882	5,289,882
		Percentile 95%	6,548,580	6,548,580	6,548,580	6,548,580	6,548,580	6,548,580	6,548,580	6,548,580	6,548,580	6,548,580	6,548,580	6,548,580	6,548,580	6,548,580
		Percentile 5%	4,060,428	4,060,428	4,060,428	4,060,428	4,060,428	4,060,428	4,060,428	4,060,428	4,060,428	4,060,428	4,060,428	4,060,428	4,060,428	4,060,428
	Anthropogenic deforestation of new forests	Mean	1,922,315	1,922,315	1,922,315	1,922,315	1,922,315	1,922,315	1,922,315	1,922,315	1,922,315	1,922,315	1,922,315	1,922,315	1,922,315	1,922,315
		Percentile 95%	2,421,850	2,421,850	2,421,850	2,421,850	2,421,850	2,421,850	2,421,850	2,421,850	2,421,850	2,421,850	2,421,850	2,421,850	2,421,850	2,421,850
		Percentile 5%	1,450,398	1,450,398	1,450,398	1,450,398	1,450,398	1,450,398	1,450,398	1,450,398	1,450,398	1,450,398	1,450,398	1,450,398	1,450,398	1,450,398
AE.bs	**Carbon stocks increase in new forests**	Mean	(4,419,941)	(4,419,941)	(4,419,941)	(4,419,941)	(4,419,941)	(4,419,941)	(4,419,941)	(4,419,941)	(4,419,941)	(4,419,941)	(4,419,941)	(4,419,941)	(4,419,941)	(4,419,941)
		Percentile 95%	(3,983,346)	(3,983,346)	(3,983,346)	(3,983,346)	(3,983,346)	(3,983,346)	(3,983,346)	(3,983,346)	(3,983,346)	(3,983,346)	(3,983,346)	(3,983,346)	(3,983,346)	(3,983,346)
		Percentile 5%	(4,885,601)	(4,885,601)	(4,885,601)	(4,885,601)	(4,885,601)	(4,885,601)	(4,885,601)	(4,885,601)	(4,885,601)	(4,885,601)	(4,885,601)	(4,885,601)	(4,885,601)	(4,885,601)
CO	**Forests conservation**	Mean	1,258,696,796	1,251,542,408	1,244,442,359	1,237,396,141	1,230,403,248	1,223,463,183	1,216,575,450	1,209,739,563	1,202,955,037	1,196,221,394	1,189,538,161	1,182,904,868	1,176,321,052	1,169,786,254
		Percentile 95%	1,342,540,737	1,334,837,280	1,327,327,134	1,319,899,695	1,312,399,076	1,305,055,812	1,297,825,884	1,290,568,060	1,283,393,761	1,276,358,170	1,269,262,058	1,262,194,945	1,255,180,549	1,248,142,803
		Percentile 5%	1,175,666,956	1,169,027,346	1,162,329,815	1,155,689,658	1,149,116,031	1,142,577,551	1,136,100,291	1,129,683,954	1,123,309,074	1,116,982,217	1,110,691,470	1,104,470,790	1,098,285,340	1,092,145,175
FREL	**Total reference level (only flows)**	Mean	2,792,256	2,792,256	2,792,256	2,792,256	2,792,256	2,792,256	2,792,256	2,792,256	2,792,256	2,792,256	2,792,256	2,792,256	2,792,256	2,792,256
		Percentile 95%	4,399,996	4,399,996	4,399,996	4,399,996	4,399,996	4,399,996	4,399,996	4,399,996	4,399,996	4,399,996	4,399,996	4,399,996	4,399,996	4,399,996

Activity		Statistical	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
		Percentile 5%	1,198,082	1,198,082	1,198,082	1,198,082	1,198,082	1,198,082	1,198,082	1,198,082	1,198,082	1,198,082	1,198,082	1,198,082	1,198,082	1,198,082

Chart 12.2.20. Relative uncertainty at 90% trust of the reference level considering the combined uncertainty of the activity data and of the emission factors, per the configuration of the Montecarlo simulations shown inTable **12.2.16**.

Statistical	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Higher level to 90% significance	57.58%	57.58%	57.58%	57.58%	57.58%	57.58%	57.58%	57.58%	57.58%	57.58%	57.58%	57.58%	57.58%	57.58%
Lower level to 90% significance	57.09 %	57.09 %	57.09 %	57.09 %	57.09 %	57.09 %	57.09 %	57.09 %	57.09 %	57.09 %	57.09 %	57.09 %	57.09 %	57.09 %

Chart 12.2.21. Relative uncertainties at 90% of the trust level of the reference level only considering the activity data per the configuration of the Montecarlo simulations shown inTable **12.2.17**.

Statistical	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Higher level to 90% significance	57.45%	57.45%	57.45%	57.45%	57.45%	57.45%	57.45%	57.45%	57.45%	57.45%	57.45%	57.45%	57.45%	57.45%
Lower level to 90% significance	55.56 %	55.56 %	55.56 %	55.56 %	55.56 %	55.56 %	55.56 %	55.56 %	55.56 %	55.56 %	55.56 %	55.56 %	55.56 %	55.56 %

Chart 12.2.22. Relative uncertainties at 90% of the trust level of the reference level only considering the emission factors, per the configuration of the Montecarlo simulations shown in Table **12.2.18**.

Statistical	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Higher level to 90% significance	14.12%	14.12%	14.12%	14.12%	14.12%	14.12%	14.12%	14.12%	14.12%	14.12%	14.12%	14.12%	14.12%	14.12%
Lower level to 90% significance	14.16 %	14.16 %	14.16 %	14.16 %	14.16 %	14.16 %	14.16 %	14.16 %	14.16 %	14.16 %	14.16 %	14.16 %	14.16 %	14.16 %

As shown inTable**s 12.2.20., 12.2.21. y 12.2.22.**, the most important proportion of the estimated total uncertainty for the reference level at a trust level of 90% (57.09% - 57.58%) is attributable to the uncertainty of the activity data, since by ignoring the uncertainties of the emission factors, the total uncertainty of the reference level is at a trust level of 90%, within the rank of 57.45% - 57.56%, while by ignoring the uncertainties of the activity data, the total uncertainty of the reference level is at a trust level of 90%, within the rank of 14.12% - 14.16%. From this analysis, it is concluded that improving the accuracy of the land use change maps is the most appropriate strategy to increase the accuracy on determining estimated emissions and absorptions.

13. Calculation of Emission Reductions

13.1. Ex-ante estimation of the Emission Reductions

As stated in **Section 2.2,** the emission reduction program in Costa Rica reports an emission reduction for period 2010-2013 of -8,889,739 t CO_2-e (-2,222,435 t CO_2-e $year^{-1}$).

Due to the total uncertainty of this emission reduction (between 17.46% and 26.10%, depending of the year), estimated by performing 10,000 iterations with the Montecarlo procedure (see "RESULTS" sheet in the "FREL TOOL CR v.1" sheet), it is necessary to make a discount of the 4% per Criteria 22 of the Methodological Framework of the FCPF Carbon Fund. Said discount is equivalent to 355,590 t CO_2-e (88,897 t CO_2-e $year^{-1}$). As shown inTable **13.1.1,** the result obtained is then 8,534,150 t CO_2-e (2,133,537 t CO_2-e $year^{-1}$.

Chart 13.1.1. Calculation of results obtained for period 2010-2013 (seeTable **2.2.2** in **Section 2.2**)

		Year				Period 2010-2013	
		2010	**2011**	**2012**	**2013**	**Total**	**Annual average**
		$tCCO_2$-e $año^{-1}$	$tCCO_2$-e $año^{-1}$	$tCCO_2$-e $año^{-1}$	$tCCO_2$-e $año^{-1}$	$tCCO_2$-e	$tCCO_2$-e $año^{-1}$
Reference level 1996-2009		2,795,873	2,795,873	2,795,873	2,795,873	11,183,492	2,795,873
Emissions 2010-2013		425,744	469,280	838,504	560,225	2,293,753	573,438
Emission reductions 2010-2013		(2,370,129)	(2,326,594)	(1,957,369)	(2,235,648)	(8,889,739)	(2,222,435)
Uncertainty(1)		19.04%	17.46%	26.10%	22.03%		21.16%
Discount for uncertainty(2)	%	4%	4%	4%	4%		4%
	tCO_2-e	(94,805.17)	(93,063.74)	(78,294.75)	(89,425.92)	(355,590)	(88,897)
Results 2010-2013		(2,387,159)	(2,275,324)	(2,233,530)	(1,879,074)	(8,534,150)	(2,133,537)
Reserve for compensation of future reversals	%	100%	100%	100%	100%		100%
	tCO_2-e	(2,275,324)	(2,233,530)	(1,879,074)	(2,146,222)	(8,534,150)	(2,133,537)
Tons payable		0.00	0.00	0.00	0.00	0.00	0.00
Price per ton	USD tCO_2-e^{-1}	tbd	tbd	tbd	tbd	tbd	tbd
Payment expected:	USD	0.00	0.00	0.00	0.00	0.00	0.00

Notes: (1) Total uncertainties calculated with 10,000 Montecarlo simulations, "FREL TOOL CR v.1", sheet "RESULTS".

- (2) Per criteria 22 of the Methodological framework of the FCPF Carbon Fund.

As shown in the followingTable, the emission reductions generated between 01.01.2010 and 12.31.2013 represent 27.14% of the emission reductions forecasted until 12.31.2015. This amount exceeds what could be considered a cautious reserve (20%) to compensate a mid-level risk of future reversals. Therefore, as explained in **Section 11.3,** Costa Rica considers that through early actions in its emission reduction program it has already generated an amount of emission reductions that is more than enough as to compensate the risk of future reversals.

ERPA term year t	Reference level (tCO_2-e/yr)	Estimation of expected forest-related emissions and absorptions under the ER Program (tCO_2-e/yr)			Estimation of expected set-aside to reflect the level of uncertainty associated with the estimation of ERs during the Term of the ERPA (tCO_2-e/yr)			Estimated emission reductions (tCO_2-e/yr)			Estimated results of the program under the FCPF Carbon Fund (tCO_2-e/yr)			
		Public lands (32%)	Other lands (68%)	All lands (100%)	Public lands (32%)	Other lands (68%)	All lands (100%)l	Public lands (32%)	Other lands (68%)	All lands (100%)	Emission reductions for result-based payments	Emission reductions to be negotiated-ted	Reserve to compensate possible future reversals	Total estimated results on public lands
2010	2,795,873	136,238	289,506	425,744	30,338	64,468	94,805	728,104	1,547,220	2,275,324			728,104	728,104
2011	2,795,873	150,169	319,110	469,280	29,780	63,283	93,064	714,730	1,518,800	2,233,530			714,730	714,730
2012	2,795,873	268,321	570,183	838,504	25,054	53,240	78,295	601,304	1,277,770	1,879,074			601,304	601,304
2013	2,795,873	179,272	380,953	560,225	28,616	60,810	89,426	686,791	1,459,431	2,146,222		686,791		686,791
2014	2,795,873	244,667	519,917	764,584	39,001	82,877	121,877	611,012	1,298,400	1,909,411		611,012		611,012
2015	2,795,873	244,667	519,917	764,584	39,001	82,877	121,877	611,012	1,298,400	1,909,411		611,012		611,012
2016	2,795,873	244,667	519,917	764,584	39,001	82,877	121,877	611,012	1,298,400	1,909,411		611,012		611,012
2017	2,795,873	244,667	519,917	764,584	39,001	82,877	121,877	611,012	1,298,400	1,909,411	611,012			611,012
2018	2,795,873	244,667	519,917	764,584	39,001	82,877	121,877	611,012	1,298,400	1,909,411	611,012			611,012
2019	2,795,873	244,667	519,917	764,584	39,001	82,877	121,877	611,012	1,298,400	1,909,411	611,012			611,012
2020	2,795,873	244,667	519,917	764,584	39,001	82,877	121,877	611,012	1,298,400	1,909,411	611,012			611,012
2021	2,795,873	244,667	519,917	764,584	39,001	82,877	121,877	611,012	1,298,400	1,909,411	611,012			611,012
2022	2,795,873	244,667	519,917	764,584	39,001	82,877	121,877	611,012	1,298,400	1,909,411	611,012			611,012
2023	2,795,873	244,667	519,917	764,584	39,001	82,877	121,877	611,012	1,298,400	1,909,411	611,012			611,012
2023	2,795,873	244,667	519,917	764,584	39,001	82,877	121,877	611,012	1,298,400	1,909,411	611,012			611,012
2025	2,795,873	244,667	519,917	764,584	39,001	82,877	121,877	611,012	1,298,400	1,909,411	611,012			611,012
Total (tCO_2-e)	44,733,970	3,670,005	7,798,761	11,468,766	581,798	1,236,320	1,818,117	**10,063,068**	21,384,019	31,447,086	5,499,105	2,519,826	2,044,137	**10,063,068**
Total (%)	100%	32%	68%	100%	32%	68%	100%	32%	68%	100%	55%	25%	20%	100%

During the 2010-2013 period, the emissions for deforestation in primary forests decreased in 35.61% with regards to the reference level for this type of forest, but increased in 21.51% in the case of new forests, which resulted in a reduction of 20.38% of the deforestation emissions for all types of forests. On the other hand, the absorptions for new forests increased in 17% in comparison with the reference level. Changes in emissions and absorptions are very different, depending on the type of forest and REDD+ activity, which makes it difficult to forecast future results. .

Considering that the 2010-2013 only includes 4 years and that the national circumstances could evolve and result in contexts very different from current tones, it is hard to know whether the emission reductions and the absorption increases obtained int he first years of the program are representative for the results to be obtained in the future. For this reason, and in order to achieve a conservative forecast of the emission reductions forecasted, for years following 2013, emissions higher than 25% of those reported for the 2010-2013 period are forecasted, although the country's ambition is to reduce emissions for deforestation to zero in primary forests.

Assuming that the same protocols will always be applied to estimate the activity data and that the carbon stocks data currently available will be kept to calculate emission factors, it is reasonable to suppose that the uncertainty level will remain at a similar level at that calculated for the 2010-2013 period. In order to obtain a conservative forecast, an average discount for uncertainty forecasted in 6% is applied, assuming that in some years it will correspond to do a 4% discount (such as the case of years 2010-2013) and in some others a discount of 8%.

Finally, considering that Costa Rica proposes using its early emission reductions (2010 – 2012) as reserves to compensate eventual future reversals, the results expected do not include a deduction forecast for the concept of non-permanence reserves or "buffers".

14. Safeguards

14.1. Description of how the ER Program meets the World Bank social and environmental safeguards and promotes and supports the safeguards included in UNFCCC guidance related to REDD+

Compliance of World Bank's operational policies

For the design and execution of the Emission Reduction Program, there is full compliance of the World Bank's Operational Policies applicable in country, as well as of the Cancun Safeguards of the CMNUCC, Decision 1/CP.16 and its appendix 1. The World Bank's Operational Policies activated in the Integrated Safeguard Data Sheet (ISDS) for the case of Costa Rica are the following:

- Environmental Assessment (OP 4.01)
- Forests (OP 4.36)
- Natural Habitats (OP 4.04)
- Involuntary relocation (OP 4.12)
- Indigenous peoples (OP 4.10).
- Pest Control (OP 4.09)

On the other hand the following operational policies were not activated:

- Physical cultural resources (OP 4.11): Because the team has found no evidence that the activities of REDD+ National Strategy will be implemented in forestry lands declared physical cultural resources by the Government of Costa Rica.
- Hydroelectric Dams' Safety (OP 4.37): Because the REDD+ Strategy will not fund the construction or rehabilitation of hydroelectric dams nor depends on the performance of existing ones.
- International Navigational Waters (OP 7.50): REDD+ Strategy will not prerform activities to affect the amount or quality of international navigational waters.
- Projects in Areas in Dispute (7.60): The REDD+ National Strategy will not fund activities in areas in dispute as defined in the World Bank's policy.

The way in which the environmental and social safeguards of the World Bank are complied with is set forth in the Environmental and Social Management Framework (MGAS), an instrument where an analysis is performed and the procedures to follow are set in the case of applicable operational policies. For the implementation and approach to these operational policies, the natural legal framework is used in the first instance, and as a complement, the guidelines, rules and principles set in the operational policies mentioned were considered. Below, there is a brief explanation of each operational policy and a summary

or how these policies are complied with within the Framework of the Emission Reduction Program. For more details, the MGAS can be consulted.

OP 4.01 Environmental Assessment

This operational policy is approached through the application of national legislation for being too comprehensive: Environment Organic Law N° 7554 of 1995; Executive Decree N° 31849-MINAE-SALUD-MOPT-MAG-MEIC; General Regulations on the Environmental Impact Assessment Procedures (EIA).

OP 4.01, sets four categories; for the case of Costa Rica, Category B is applicable, whose possible environmental repercussions on human populations or zones with ecologic importance are less adverse than those of category A.

This is because the nature of the activities defined in the Emission Reduction Program and in the REDD+ National Strategy could have adverse repercussions in the population. Due to the foregoing, and as part of the actions to implement this safeguard, Costa Rica performed a Social and Environmental Strategic Assessment (SESA) for which prpose a series of workshops took place with the Relevant Interested Parties (RIPs) to obtain feedback in the preparation of the REDD+ National Strategy and as part of the SESA process and the Social and Environmental Management Framework (MGAS in Spanish). The SESA process has been performed consistently with the World Bank's (safeguards) social and environmental operational policies.

The MGAS was developed during 2014-2015; it is the instrument under which the social and environmental impacts identified in the SESA were examined and their management was proposed through implementation procedures of safeguard and monitoring plans to mitigate them, as well as the different frameworks developed such as the Involuntary Relocation and Process Framework and the Plannig Framework for Indigenous Peoples. In addition to that, a series of studies on the historic and current environmental situation have been performed such as the causes of deforestation, which have contributed to improve the proposals for the Emission Reduction Program and the REDD+ National Strategy.

OP 4.04: Natural Habitats

The operational Natural Habitats Policy is complied through the application of the national legislation that is comprehensive: Environment Organic Law N. 7554 de 1995; Forestry Law N. 7575, de 1996; Biodiversity Law N° 7788 de 1998.

It is expected that the REDD+ National Strategy positively influence on the maintenance and increase of natural habitats in Costa Rica, defining actions for the maintenance and broadening of the Payment for Environmental Services program (PSA in Spanish), the efforts to improve the protected areas system and the State natural heritage, along with the reinforcement of national strategies on fire management and illegal clearing control, as well as the incorporation of the natural regeneration and of Tree plantations within the framework of the policies and actions to be promoted, supposes an improvement of the natural capital of the country. This means a positive affectation on carbon stockss and other environmental co-benefits. In the specific case of the Emission Reduction Program for Costa Rica, through the application of this operational policy and the application of the national legislation, the aim is to assure the maximization of protection activities and the broadening of natural habitats as well as the services they provide to the population. This criterion is compatible with the provisions in Article 11 of the Biodiversity Law.

In this sense, the SESA's participatory and analytical process did not highlight any potential risk associated to the policies and actions of the REDD+ National Strategy in Protected Wildlife Areas (ASP in Spanish) forest habitats, besides other sensitive forest habitats under private or communal control. During the implementation of the Emission Reduction Program the relevant stakeholders will be consulted (PIRs), in order to identify possible negative and positive implications of the policies and actions on natural habitats, including monitoring activities to assure that critical natural habitats are not affected. Indicators have been included in the follow-up and assessment process proposed in MGAS to assess possible impacts prior to the execution of any action performed in sensitive sites. The way this operational policy is complied with is set forth in the MGAS.

OP 4.09: Pest control

This safeguard is implemented by applying the national legislation which is very comprehensive: Law for the Development, Promotion and Enhancement of Agricultural Activities N° 8591 of 2007; Phytosanitary Protection Law N°7664 of 1997; Regulations on the Registration, use and control of agricultural plaguicides and adjuvants, Decree No. 24337-MAG-SALUD de 1995.

The World Bank promotes the biological management of plagues in order to reduce dependency on synthetic pesticides. In the projects approved by the Bank, the management of pests must be attended within the context of the environmental assessment. The Bank assesses the capacity of the regulatory and institutional frameworks of the beneficiaries in order to define their capacity to manage pests in an environmentally "friendly" way and promotes the integrated pest management (IPM).

This operational policy is activiated because it is considered that the establishment of tree plantations, agri-forestry systems and other silvi-cultural activities are considered forecasted as part of Emission Reduction Program could suppose in specific cases, the need of dealing with pests, an element that must be approached in a specific manner during the implementation and cannot be predetermined. Currently, there are no plans to promote actions to explicitly cause an increase on the use of pesticides or other chemicals. However, it is possible that some sustainable management of forest practices used in plantations may be used in silvi-cultural practices with pesticides. The impacts and risks associated to the possible use of any chemical product in forestry management, if necessary, will be analyzed and mitigated through actions contained in the forestry management plans.

OP 4.10: Indigenous peoples

OP 4.10, is complied with the development of the organization and consultation process, in compliance with OIL Convention 169 described in section 5.1.

All projects proposed for funding by the World Bank affecting Indigenous peoples must execute a prior consultation procedure, free and informed, aiming to obtain broad support from the indigenous community potentially affected.

With the SESA results, the Social and Environmental Management Framework (MGAS in Spanish) ws prepared and filed before the World Bank; it serves as a guiding instrument for the implementation of the REDD+ National Strategy and for future investments in activities for land demonstration. The MGAS includes the Planning Framework for Indigenous Peoples (MPPI in Spanish) and its prupose is to address the problems that might arise from specific investments during the implementation of the Emission Reduction Program. Under this policy, the indigenous peoples affected by the REDD+ National Strategy must be

consulted in an appropriate cultural manner and must provide wide community support. Costa Rica is also committed to comply with its duties under ILO Convention 169 regarding tribal and indigenous peoples.

OP 4.12: Involuntary Relocation Instruments

This policy covers the direct economic and social effects resulting from the investment projects that may derive in involuntary land deprivation and the involuntary restriction of access to zones qualified by the Law as parks or protected zones, with the subsequent adverse effects for the subsistence of the people displaced.

To comply with the involuntary relocation policy, a Framework of the Process (PF) will be prepared as part of the MGAS in order to manage the potential access restriction of local communities to rural resources. Additionally, an Involuntary Relocation Framework (MRI in Spanish) was prepared face the potential relocation of private land owners currently living in protected areas and the possible relocation and compensation of private land owners in indigenous territories.

Legal studies have also been performed on the issue of land tenure as well as regarding the cadastre, which have represented a significant contribution to identify the problems and possible necessary actions to mitigate their adverse effects.

OP 4.36: Forests

The purpose of OP 4. 36 is assisting the beneficiaries in using the potential of forests in the fight to reduce poverty in a sustainable manner, to integrate them into the sustainable economic development and to protect their values and environmental services, at the local and global levels. This policy applies to projects that might affect eh quality or life of forests; that affect populations depending on forest resources; and whose goal is to generate change in the management, protection or use of natural forests or plantations, public, private or communal. In this sense, the Bank does not fund projects implying forest degradation, disappearance or exploitation. In order to determine the possible negative environmental impacts on forest ecosystems, the Bank sets the assessment and mitigation guidelines through OP 4.01.

The Emission Reduction Program and the REDD+ National Strategy will be based on FONAFIFO's experience with the PSA program and the principles, criteria and national indicators applicable to sustainable sustainable management of forest. During the preparation stage, these and other forest and rural development initiatives have been assessed by incorporating lessons learned in the design of the REDD+ National Strategy and the potential social and environmental risks associated to REDD+ in the MGAS. For this purpose, the contributions of participants of the different sectors in the participatory workshops were feedback of the highest importance. In the case of the Emission Reduction Program, being an initiative actively involving forests, these OP is of particular significance. Due to the foregoing, operational policy 4.36 serves as the parameter to assess all the forest management activities implying poverty reduction.

Approach to the safeguards of the United Nations Framework Convention on Climate Change

Costa Rica has broad institutional and legislative experience in the development and implementation of environmental and social safeguard mechanisms. Many of the principles set in the environmental and forest legislation of the country were issued almost 20 years ago to operationalize compliance of the constitutional obligation of granting the inhabitants of the country the enjoyment of a healthy and

ecologically balanced environment, compatible with the safeguards of REDD+ under the Convention[95]. The policies and actions incorporated into the Emission Reduction program will support the respect of the aforementioned safeguards and the full functioning of a transparent and robust information system according to COP's requirements. Specifically, policy 6 contains a series of actions towards reinforcing the foregoing. This policy is related to participation, transparency and accountability (**Section 4.3.**).

As mentioned above, the Emission Reduction Program is part of a political prioritizing initiative led by the Ministry of the Environment and Energy, seeking to prioritize efforts in the implementation of some strategies set in the Forestry National Development Plan in force, therefore guaranteeing the compatibility of both instruments. Additionally, the PRE sets clear work guidelines to improve the synergies between the objects of the main global environmental conventions of which the country is a party. National legislation sets the explicit prohibition of forest land change, guaranteeing an effective action against reversals. Finally, the PRE is envisioned as an additional effort that the country will start to strengthen its actions towards improving life quality of its population and the reduction of poverty, emphasizing in rural areas. This way, a proposal consistent with the general framework of safeguards application is presented.

From the perspective of forest governance and participation mechanisms of relevant stakeholders, it is important to recognize that the legal framework in force in the country is extremely rich in establishing mechanisms to facilitate dialogue between government entities and civil society. For instance, the Forest Law establishes the creation of the Forestry National Office as the entity to facilitate dialogue around forest policies in the country. This office is comprised by representatives of small and medium producers, private sector, industrial sector and non-government organizations. Likewise, the relevant stakeholders will be represented before the Board of Directors of the National Forest Financing Fund, through democratic nomination mechanisms internally in each sector. Besides, in a broader scenario, representatives of the civil society participate in the Conservation Areas Regional Councils and in the Conservation Areas National Council, which is one of the entities for decision making on the national policies on natural resource conservation, including the topics related to forest ecosystems.

The institutional framework of participation mentioned above has been specifically strengthened to promote a higher participation of the PIRs in all of REDD+ efforts, including the Emission Reduction Program, through the creation of an Executive Committee by means of a decree that broadens the participation of small and medium sized peasants and strengthens the participation of indigenous peoples. The Committee has been the main referent for the dialogues between the Government and the relevant stakeholders and is a mechanism intended to remain valid during the implementation of the PRE in a constant manner.

The scope of the Emission Reduction Program, in fact, is oriented towards safeguarding the Convention, since it contains specific actions that: a) complement the implementation of the Forestry National Development Plan and the main global environmental conventions, b) starts by recognizing forest governance formal and transparent structures set forth in the Forestry Law in force, c) starts by recognizing the rights and cultural scopes of indigenous peoples and assists the needs of local communities, d) strengthens participation mechanisms of the relevant stakeholders, particularly indigenous peoples, e) reinforces actions to guarantee the conservation of forests and avoid their conversion into other uses

[95]Anex I of decision 1/CP.16.

consistently with the legislation in force and promotes environmental and social goals beyond emission reductions, and f) contains specific actions to prevent reversals and leaks. The table below describes the application of the Cancun Safeguards in the MGAS.

REDD+ (CMNUCC)SAFEGUARDS	Application in the MGAS
Safeguard a: the complementarity or compatibility of the measurements with the goals of national forestry programs and of the international conventions and agreements on the subject matter.	The analysis of the national and international Legal Framework applied this safeguard, setting its compatibility with national forestry programs and the international conventions on the subject matter.
Safeguard b: The transparency and efficacy of national forestry governance structures, considering national legislation and sovereignty.	This safeguard is considered one of the follow-up indicators.
Safeguard c: Respect of knowledge and of the rights of indigenous peoples and of the members of their local communities, taking into account pertinent international obligations and circumstances, and the national and international legislation.	The application of the national and international regulations is set for the indigenous topic. Additionally, the procedures for applying the Indigenous peoples OP and the BM and safeguard plans are set.
Safeguard d: The full and effective participation of the interested parties, particularly indigenous peoples and local communities.	The application of the national and international regulations is set for the indigenous topic. Additionally, the procedures for applying the Indigenous peoples OP and the BM and safeguard plans are set.

Figure 14.1.1. Application of mitigation measures of the Environmental and Social Management Framework and its relationship with the safeguards defined for REDD+ under the CMNUCC.

14.2. Description of arrangements to provide information on safeguards during ER Program implementation

Safeguard plans and their implementation during the Program

The safeguard plans cover social and environmental issues and include the mitigation measures of adverse environmental and social impacts identified during the national preparation process in SESA and MGAS, derived from the implementation of the REDD+ National Strategy and the Emission Reduction Program taking into consideration the institutional and regulatory frameworks in force. These safeguard plans have been prepared simultaneous to the preparation of the Emission Reduction Program and are reflected in the MGAS supporting the REDD+ National Strategy incorporating the environmental and social safeguards World Bank´s ISDS international activities.

In the MGAS, the topics identified as risky to produce environmental or social impacts pertinent to the specific context of the Emission Reduction Program are described below with their corresponding mitigation measurements, and are the product of a systematization of the consultation processes that started with the SESA workshop in 2011 and the subsequent participation processes. For each risk axis the specific actions and tasks proposed as part of the Emission Reduction Program are mentioned. .

Risk axis 1. Governance, operational management, administrative and silvicultural capacities, and coherence of policies in the public and private sector.

Actions that can generate environmental and/or social impact: 1.2 Strengthen the deforestation control, degradation, clearing control, processing and illegal commercialization of forest products program both operationally and financially. 1.3 Strengthen the National Forest Monitoring System. 1.5 Contribute to the consolidation of the Protected Areas National System. 1.7 Develop and execute implementation plans for actions addressing direct and subjacent causes for deforestation and degradation. 2.1 Prepare the Forestry Development Plan in Indigenous Lands. 2.2 Develop and strengthen mechanisms for the solution of controversies in the implementation of REDD+. 3.1Assist in the implementation of the PNDF policies related to the improvement of management capacities in support to the implementation of REDD+. 3.2 Strengthen promotion and recognition policies on sustainable agricultural and agro-forestry practices.

Mitigation measurements proposed in the MGAS:

- **Application of the following legislation:**Forestry Law N° 7575; Environment Organic Law N°7554; Regulation Decree N° 25721-MINAE; Decree N° 27998-MINAE (Principles, Criteria and Indicators for the Sustainable Management of Secondary Forests and Forestry Certification in Costa Rica); Executive Decree N° 27388-MINAE (Criteria and Indicators for the Use and Management of Forests and Certification); Executive Decree N° 34559- MINAE, (Sustainability Standards for the Management of Natural Forests); Regulations of Forestry Regencies; Decree N° 38444-MINAE; Executive Decree N° 25700-MINAE (ban for endangered tree species); Decree N° 38444-MINAE of 2014 (forestry regents); Biodiversity Law N° 7788 (creation of SINAC and establishment of its functions and organic structure, Article 22); Indigenous Law No. 6172; Law N° 7316 Approval of ILO Convention 169; Convention on Biologic Diversity (CDB) ratified byLaw N°7416; Application of Expropriations Law N° 9286.
- **Safeguard plans:** a) Prepare a Procedural Framework for Resources Restriction per OP 4.12 of the BM. b) Prepare a Social Assessment Plan. c) Prepare a Plan for Indigenous peoples as applicable. d) Prepare an Involuntary Relocation Framework according to OP 4.12 of the BM. In case of voluntary submission to the forestry regime, the owner does not lose his right of ownership over the land; he just submits it voluntarily to regulations that guarantee the protection of forests, and for that purpose it must be recorded at the Registrar kept by SINAC. e) Prepare a Plan for Indigenous peoples.

Risk axis 2. Absence of legal security, recognition and regularization of land tenure and carbon in TI rights, ABRE zones, other private zones and public lands.

Actions that can generate environmental and/or social impact: 4.1 Address land tenure and the rights of emission reduction in indigenous lands. 4.3 Address land tenure and rights of emission reduction in the Public Sector. 4.4 Promote consistency of delimitation and demarcation rules in ABRE (Areas under Special Regimes) zones.

Mitigation measurements proposed in the MGAS:

- **Application of the following legislation:** Environment Organic N°7554; Forestry Law N° 7575; Biodiversity Law N° 7788; Indigenous Law N 6172; Expropriations Law N° 9286; Law N° 7316 ratification of Convention 169.

- **Safeguard plans:** a) Prepare an Involuntary Relocation Framework according to OP 4.12 of the BM. b) Prepare a Procedural Framework for access restriction. c) Prepare a land donation protocol. d) Prepare a Social Assessment. e) Prepare a Plan for Indigenous peoples according to OP 4.10 Indigenous peoples of the BM.

Risk axis 3. Limitations in the modalities, amounts and scope of the existing financing mechanisms, in particular the PSA and need of improving competitiveness of the sector. Distribution of benefits to guarantee REDD+ social and environmental goals.

Actions that can generate environmental and/or social impact: 5.1 Forest ordering in all national territory according to their contributions to the REDD+ goals. 5.2 Improve competitiveness of financing mechanisms for forest and agro-forestry ecosystems in relation to other land uses.

Mitigation measurements proposed in the MGAS:

- **Application of the following legislation: :** Environment Organic N°7554; Forestry Law N° 7575; Biodiversity Law N° 7788; Indigenous Law N 6172; Expropriations Law N° 9286; Law N° 7316 ratification of Convention 169; Convention on Biologic Diversity (CDB) ratified by Law N°7416.
- **Safeguard plans:** a) Prepare a Social Assessment. b) Prepare a Planning Framework for Indigenous peoples. C) Prepare a Plan for Indigenous peoples per OP 4.10Indigenous peoples of the BM.

Risk axis 5. Transparency, accountability, follow-up and consistency with the REDD+ implementation framework.

Actions that can generate environmental and/or social impact: 6.2 Implementation and follow-up of the Environmental and Social Management Framework. 6.4 Incorporate the scope of gender, youth participation and other relevant groups into the REDD+ strategy.

Mitigation measurements proposed in the MGAS:

- **Application of the following legislation:** Biodiversity Law N° 7788; LawIndígena N° 6172; Law N° 7316 ratification of Convention 169; Biologic Diversity Convention (CDB) ratified by Law N°7416; Law N°7416. Service Comptroller Offices Law.
- **Safeguard plans:** a) Perform a Social Assessment. b) Develop a Plan for Indigenous peoples per the OP 4.10Indigenous peoples of BM.

As described above, the MGAS sets the modalities and procedures to manage possible substantial environmental and social risks in the implementation of activities of the REDD+ National Strategy, by associating them with their corresponding mitigation measures that use better practices. The MGAS also included procedures for (i) the permanent consultation with the pertinent interested groups; (ii) the measures for capacity strengthening; and (iii) the selection, assessment and institutional responsibility criteria to manage environmental and social impact among others.

In addition to that, a series of self-assessment workshops have been developed with multiple interested parties, including the preparation of the results report included in the R-Package. Other significant progress achieved regarding social issues and the consultation plan of indigenous peoples of the REDD+ National process include the following: (1) Setting a Participatory Focus; (2) Performance of analytical studies; (3)

Definition of a Consulation Plan for Indigenous Peoples; (4) Preparation of an Information, Feedback and Disconformities Mechanism (MIRI in Spanish).

14.3. Description of the Feedback and Grievance Redress Mechanism (FGRM) in place and possible actions to improve it

Existing mechanisms to receive claims and provide information

After analyzing the existing mechanisms in Costa Rica to solve claims of the population related to the quality of service provided by the institutions of the Executive Branch, it is concluded that since 1992, Costa Rica has an Ombudsman Office, institution in charge of caring for the conformity of the population with regards to the public institutions and their duties assigned by law. The Ombudsman Office is entitled to address non-compliance and non-conformity issues and to provide responses to the persons affected, by asking the corresponding actions to the respective entity.

The Ombudsman Office of the Republic of Costa Rica has the National Services Comptroller's Office System, comprised by the service comptroller offices as ordered by Law in all public institutions to receive claims and complaints and their processing as appropriate. Currently, the service comptrollers of the Executive Branch are coordinated by the Ministry of Planning, which must submit a reporton the performance and a summary of the claims filed by the users.

Complementary to the Ombudsman Office of the Republic and the National Services Comptroller's Office, the National Fund for Forest Financing is the pilot of an Information, Feedback and Disconformities Mechanism (MIRI), a mechanism specifically designed for the REDD+ National Strategy and the Emission Reduction Program. The MIRI responds to a participative process performed with the relevant stakeholders, so its implementation responds to the conditions proper of each group. In this sense, its contribution was important to set the reception and spread channels, prepare different use friendly channels, and to prepare informational and promotional material in a language appropriate to each group. This way, legitimacy, accessibility, transparency and capacity to address the claims are guaranteed.

Additionally, to guarantee better access, and upon request of the PIRS, an institutional link with the Ministry of Agriculture and Cattle Farming was open so their offices act as a point to receive the forms i addition to those of FONAFIFO. The response procedure and the resolution of disconformities is a proceeding that is handled by the Services Comptroller of the Institution and it is done, according to Law, within a term of 5-15 work days at a maximum, as the case may be, starting with the reception of the form at the Comptroller Office. The relevant stakeholders are entitled of watching for its compliance at any time they might consider it appropriate before that same instance and may have access to the reports issued twice a year through the REDD+ Costa Rica web site[96].

Functioning of the Information, Feedback and Concerns Mechanism

The MIRI intends to implement an accessible and transparent information, feedback and disconformities mechanism for the relevant stakeholders to favor the participation and dialogue to implement the REDD+ Costa Rica Strategy, respecting the existing legislation. The following figure shows a summary of the MIRI operation process. .

[96] www.reddcr.go.cr

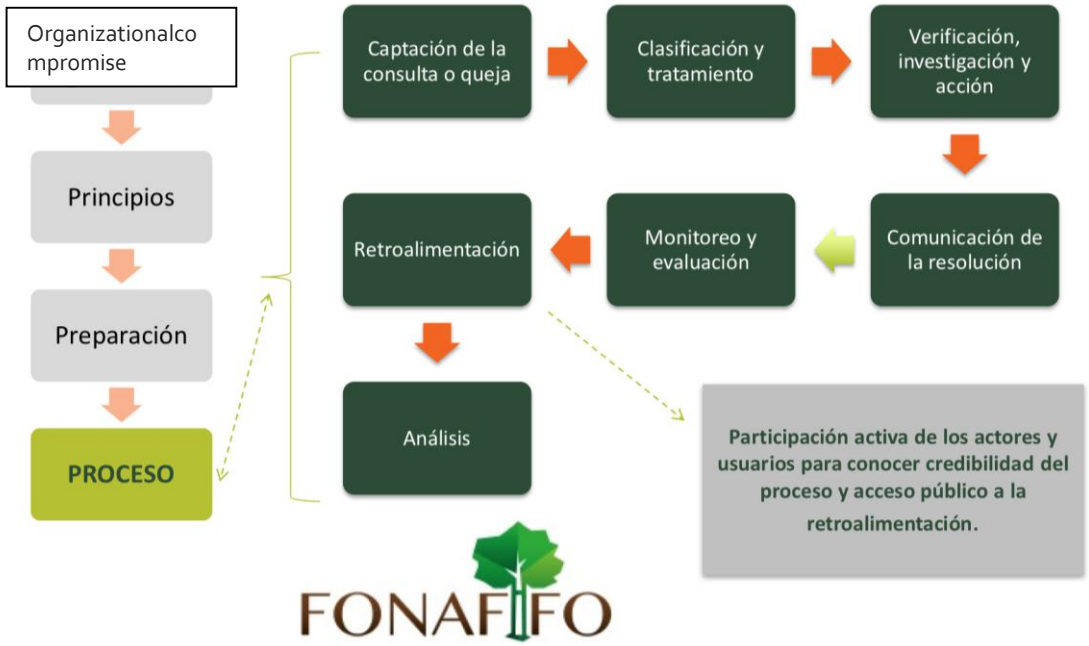


Figure 14.1.2. Macro process of the implementation of the Information, Feedback and Concerns Mechanism.

To guarantee accessibility to the mechanism, it has the following channels:

1. **Telephone line**: a telephone line will be open at the headquarters of FONAFIFO to receive actions. Staff in charge of receiving the telephone requests will comprehensive the form electronically, available at the REDD+ web site, or will receive the information in an electronic form that will be forwarded to the Service Comptroller.
2. **Online form:**the REDD+ web site has a section for the relevant stakeholders to obtain a form and file their questions, feedback or disconformity regarding the REDD+ process. This is a generic form to be used by all relevant stakeholders. The platform designed is friendly and simple for the use of the relevant stakeholders. Additionally, it has an option to consult about the situation of the processes through the web site in the platform. Regarding transparency of the processes, the platform automatically issues statistics that will support the preparation of reports by the Service Comptroller regarding processes filed by that means. As an annex, the user manual of the platform is facilitated, exclusive for Comptroller staff and FONAFIFO. The user of this platform will have a full copy of the form he/she sends with the action, as well as single number assigned for follow-up.
3. **Reception at sub-regional offices of MAG and FONAFIFO:** FONAFIFO has nine regional offices available for the use of MIRI, and MAG ahs 22, for a total of 32 offices throughout the country. Additionally, the Indigenous Development Associations of the different indigenous lands have also been authorized to receive claims and have the forms to facilitate access of the population to indigenous peoples, who can have the assistance of the cultural mediators for due completion of the forms.
4. **E-mail:**The person that performs the action can send it directly to the Secretariat of REDD+ and the Service Comptroller of FONAFIFO or use this means for follow-up of their actions filed.

Page 38 of thedocument Information, Feedback and Concerns Mechanism shows in detail the implementation of this mechanism.

Reference to the Safeguard Information System

One of the potential applications of the Information, Feedback and Disconformities Mechanism is contributing with information and feedback to the Safeguard Information System. The system design contemplates keeping this information platform to receive feedback on how safeguards are being addressed and respected during the implementation stage of the REDD+ National Strategy and the Emission Reduction Program, as well as for the socialization of the drafts to be submitted.

Actions to improve the Information, Feedback and Grievance Mechanism

The Mechanism incorporates regular activities to assess the improvements that can be incorporated in its design or functioning, and to facilitate a better access of the interested parties by broadening the institutional cover to other central and regional offices of the Ministry of the Environment or through the systematization of the most frequent actions filed. As of this date, there has been no active use of the mechanism, so it is expected that the next stage will be to address the issue of better communication and disclosure with the relevant stakeholders so that there are better elements for its subsequent improvement.

15. Benefit sharing arrangements

15.1. Description of benefit-sharing arrangements

Costa Rica is currently preparing the political and conceptual framework, as well as the legal elements required to guarantee an appropriate development and functioning of a Benefit Sharing Mechanism that complies with the principles of equity, justice and participation of the relevant stakeholders. The Mechanism will include potential investments in policies, actions and activities of the REDD+ National Strategy, including those of the Emission Reduction Program. .

The Mechanism recognizes two main criteria for its functioning: 1) result-based payments received, from the compliance of requirements set forth in the COP of the United Nations Framework Convention on Climate Change and of the FCPF, and 2) the distribution of benefits, responding to the sovereign decisions of the country, according to its legislation and national circumstances. For the reception of result-based payments, in the case of the FCPF and other similar mechanisms, it is necessary to have legal capacity for the transfer of titles of the emission reductions. For the purposes of the FCPF, it will be negotiated and agreed as part of the Commercial Conditions of the Emission Reduction Payments with the World Bank.

On the distribution of benefits, the country has defined that it should be addressed to public and private owners, including indigenous peoples as communal owners, with property or possession rights that can be verified and developing actions directly linked to the measurements to generate emission reductions. Taking this into consideration, the Mechanism would fund the actions that directly or indirectly support national efforts on reducing emissions coming from:

Public owners of Protected Wildlife Areas or areas which are part of the State Natural Heritage managed by the Ministry of the Environment and Energy.

Other government institutions that own forested lands.

Private owners or possessors of lands with agreements previously signed.

Communal land owners (i.e. indigenous lands)

Costa Rica has not defined yet the monitoring type, scale, criteria, processes, terms and mechanisms for the distribution of benefits, although it is expected that a significant amount of the resources will be distributed among private and communal owners, particularly through strengthening the Environmental Services Payment program, in which case the regulations are applied according to the national legal framework, in special the Procedural Manual of the program. Before the signing of the Emission Reduction Payment Agreement, the country will submit to the FCPF Carbon Fund a Benefit Sharing Plan.

Considering this, it is possible to anticipate that a significant proportion of the resources to be received as REDD+ result-based payments will be managed by public institutions. It will be aligned with the applicable legal framework for resource management by public entities, including the principles of transparency, accountability to competent comptroller entities, in particular the Ministry of Finance and the Comptroller's

Office of the Republic. Likewise, these provisions would be applicable to those non-government institutions that receive public funds.

Some considerations been considered in the early design of the Mechanism have identified the intention of financing the beneficiaries who directly contribute with the implementation of the policies, actions and activities that address the drivers of deforestation and degradation.

In the case of the Emission Reduction Program, the Benefit Sharing Mechanism would work by using the following financing programs, based on the valid legal framework and on the recommendations from actors and sectors involved in the information and pre-consultation process of the REDD+ strategy:

Strengthening the Payment for Environmental Services Program in all its modalities, including possible new modalities (i.e. payment for specialized environmental service for indigenous and peasant lands and a payment for environmental services to public institutions[97]). Currently, the Payment for Environmental Services program includes the modalities of forest conservation, sustainable sustainable management of forest and carbon stockss enhancements through reforestation and the planting of trees in agro-forestry systems that can obtain any of the 16 specific modalities set in the respective operation regulations of the program. From the technical and political perspective of the program, the Payment for Environmental Services program is based on the identification of criteria that allow the prioritization of investments, following both ecological and socio-economical criteria. From the ecological point of view, the priorities are defined mainly by the need of protecting lands located in biological corridors and in sites where conservation gaps have been identified by studies that are updated on a regular basis. Other criteria consist on the importance of water conservation in the properties and of priority basins. From the socio-economical point of view, small and medium owners are privileged, in particular those located in the cantons with lower Human Development. The program will continue supporting the achievement of other environmental benefits such as water conservation, the protection of biodiversity and the maintenance of landscape beauty.

Design of new modalities or financial schemes[98] to address the needs and particular characteristics of population segments showing difficulty to comply with the requirements of the Payment for Environmental Services program. In particular, the new modalities or schemes are addressed to small producers and peasants, so that entrepreneurship is promoted as well as the silvicultural and business efficiency of all the production value-chain in the forest sector.

Identification of monetary and non-monetary investment opportunities to promote and increase the participation of other relevant stakeholders in the implementation of policies, actions and activities of REDD+. This includes communal actions, participative mechanisms to address

[97] Still under analysis process in Costa Rica.

[98] These new modalities or schemes will be designed as necessary, and considering their political and financial feasibility.

deforestation drivers and the strengthening of organization capacities of local communities and indigenous lands.

Strengthening of investments in public lands and identification of financing mechanisms to promote or broaden the participation of competent entities in the implementation of a variety of investments, both monetary and non-monetary. The foregoing, to contribute with achieving the goals and purposes of the REDD+ National Strategy and including the strengthening of the existing mechanisms such as the Forestry Fund, the Fund for Sustainable Biodiversity of the Ministry of the Environment and Energy or the program of Environmental Benefits Recognition of the Ministry of Agriculture and Cattle Farming.

15.2. Summary of the process of designing the benefit-sharing arrangements

Benefit Sharing is one of the more relevant elements derived from the information and pre-consultation process of the National REDD+ Strategy. The initial proposals of the Emission Reduction Program (ER-PIN) were in a large extent centered in broadening the cover of the Payment for Environmental Services program. Many representatives of the relevant stakeholders were concerned for the possible exclusion of some segments of the population, which are unable to comply with the legal and technical requirements of the program. These population segments include the poorest persons and those without consolidated tenure rights over lands, as well as small owners with less than two forest hectares (i.e. minimum area required to enter into the program). Another limitation of the Payment for Environmental Services program is the recognition of only four environmental services in the Forestry Law in force. It excludes other benefits such as sustainable land management and environmentally sound productive practices and/or oriented to emission reductions.

Indigenous peoples stated their concerns related to the lack of clarification of ownership rights and the presence of non-indigenous population in their lands. Other restrictions identified were the impossibility of exercising their cultural practices in the management of forest resources and biodiversity. These restrictions are originated on the Forestry Law and in the contracts of the Payment for Environmental Services program.

Participative process to define additional needs in the distribution of benefits

During the initial consultation stages, small forest producers and the indigenous peoples started dialogues with the Government to explore the possibility of new financing modalities. These new modalities would be adapted to the specific needs and concerns of both population groups and would be aimed to defeating the current restrictions posed by the Payment for Environmental Services Program. The proposal of the indigenous lands highlights the need of defining investment plans of the resources to be obtained for their contributions to REDD+ policies and actions according to investment priorities previously identified in several areas including environmental, infrastructure, telecommunications, health, culture, etc. However, not any financing proposal responding to new modalities will necessarily comply with the basic requirements of quality and control consistent with the applicable legislation on public resource management.

Payment for environmental services to small forestry producers

Its conception started during the Social and Environmental Strategic Assessment and would consider the socio-economic and environmental conditions of the sector, in order to reduce poverty, and to present an

additional option to rural development. Facilitated by a consultant selected by the sector representatives, a series of regional workshops was organized to identify the main elements of the new financing mechanism. A total of 202 participants, in 5 different regions of the country were part of the process (134 males and 68 females). This sample represents a wide variety of relevant stakeholders (i.e. local associations for water management, local development associations, producers associations and agricultural cooperatives, assistance centers, unions, private foundations, government institutions and other technical assistance entities). As a result, a proposal was received that will be subject of feasibility, political and technical analysis, as well as the assessment of financial and operational implications. Through the Emission Reduction Program, the design activities of the mechanism proposal will receive follow-up and political dialogue will be promoted in order to design a mechanism that results satisfactory to the sector.

Payment for environmental services to indigenous lands

Its conception starts with the early REDD+ dialogue with the indigenous peoples and has continues up to date. The representatives of indigenous territories and the Indigenous Development Associations, with the facilitation of an indigenous consultant, participate in a permanent dialogue to identify the main characteristics of the new financing mechanism. The process has been widely promoted by the representatives of indigenous peoples. The REDD+ Secretariat will assess the necessary steps to identify the potential legal, operational and financial implications of the mechanism, and of the need of increasing the currently dialogues with the goal of integrating the results into the Benefit Sharing Mechanism of the Emission Reduction Program. A specific proposal of Payments for Environmental Services has been developed for the indigenous lands that results from the internal process in the lands, and therefore it is culturally appropriate. During the second stage of dialogue, the technical, administrative, financial and legal implications of the mechanism proposal must be analyzed, in order to guarantee consistency with the current legal framework.

Payment for environmental services to public institutions

Beyond the current of REDD+ readiness process, it is necessary to develop an assessment to determine its feasibility. A first analysis stage is the inventory and cadastre of public lands in the State Natural Heritage, but also of those lands managed by public institutions not yet transferred to the Heritage. A specific modality of payment for environmental services to institutions could be an option.

15.3. Description of the legal context of the benefit-sharing arrangements

Compliance of applicable laws, including the international conventions and agreements and customary law

The investments of results-based payments from the Emission Reduction Payment Agreement with the Carbon Fund of the World Bank will take place according to the legislation in force, including international rules and customary rights formally recognized by the national legal system. The Payment for Environmental Services program is an instrument covered by the Forestry Law, with 18 years of effective application and has received public and private investments. The program covers private and communal owners of lands, but excludes public lands. Additionally, the Forest Fund and the Fund for Sustainable Biodiversity and institutions covered by the legislation in force that could include a wide variety of investments related to the implementation of the Emission Reduction Program

It is forecasted that additional arrangements will be needed to incorporate new financing modalities into the legal framework in force. However, such considerations will depend on the results of the analysis and dialogues pending development during the continuation of the readiness stage.

16. Non Carbon Benefits

16.1. Outline of potential Non-Carbon Benefits and identification of Priority Non-Carbon Benefits

Prioritization of the Program's non-carbon benefits

The primary co-benefits of the Emission Reduction Program have been defined by the current legal framework in Costa Rica and they correspond to those generated in the Protected Wildlife Areas System, in forest lands part of the State Natural Heritage and in the Payment for Environmental Services program. Specifically for the Payment for Environmental Services Program, there are three main co-beneficiaries: landscape beauty, conservation of biodiversity and water protection; however, the environmental service of land conservation derived from the Land Conservation Law and the social and environmental benefits derived from implementing the Payment for Environmental Services program in indigenous lands and local communities are recognized also.

One of the best recognized co-benefits is related to the organizational capacity and improved participation due to the implementation of the programs and public policies. For instance, the Payment for Environmental Services program serves for forest organizations to actively participate. Additionally, they promote productive activities in the sector chain, such as forest nurseries and the genetic improvement of species for reforestation or induced regeneration, both with commercial and native species. In many cases, these programs are linked to communal programs on environmental education and cantonal tree planting projects along roads in country.

The environmental services recognized by the Payment for Environmental Services program, as the provisions of the Forestry Law, are:

1. GHG mitigation (benefit)
2. Water protection (co-benefit)
3. Biodiversity conservation (co-benefit)
4. Landscape beauty (co-benefit)

There are multiple environmental benefits at a series of scales in Protected Wildlife Areas. For instance, the conservation of biodiversity, the protection of water resources, the contribution to biological connectivity, the protection of volcanic areas, the prevention of fires, the conservation of lands in marine-coastal areas. All these co-benefits contribute to increase resilience before climate change, both of ecosystems and of communities. These same environmental services are promoted through the Payments for Environmental Services program in private lands.

In the case of PES investments in indigenous territories, due to the communal nature of land tenure, the social and economic impact of non-carbon benefits is easily identifiable, since organized communities decide in a meeting the destiny given to the resources received, and in many cases they are invested in education, health, infrastructure improvements such as roads and bridges, etc. It is not the same case with private owners, who individually decide the destiny of the payments received.

Improvement of co-beneficiaries during the implementation of the Program

The conservation of primary forests and the increase of forest cover in country will have a positive effect in other environmental, social and economic co-benefits of the populations linked to the Emission Reduction Program activities and the country in general. As a whole, the Program looks to promote co-benefits to improve resilience of the ecosystems and of the populations dependent on forests before climate change. The prioritization criteria of investments in the Payment for Environmental Services program are still centered on two main pillars: a) the protection of the forest zones in areas where biodiversity conservation gaps have been identified, and b) in areas where it is necessary to improve the biological connectivity between Protected Wildlife Areas. Additionally, the program privileges water resource protection zones, fundamental for biodiversity and communities.

Description of how non-carbon benefits are culturally appropriate, take the gender scope into account and are inclusive in intergenerational terms

During the pre-consultation stage, the relevant stakeholders identified potential positive impacts or co-benefits that can derive from the implementation of REDD+. Most of the positive impacts highlight the improvement that broadening sustainable management activities of forest resources resulting from REDD+ might mean in the maintenance and improvement of the country natural heritage in a wide sense, addressing different dimensions of the national environmental policies, including the conservation of biodiversity and of water resources, stop land erosion, improve the integrity of Protected Wildlife Areas, the restoration of landscapes, etc. The co-benefits related to the potential broadening of the financing mechanisms beyond PES were also mentioned, that can play a significant role for the better distribution of richness and contribute to the improvement of life quality in rural populations such as indigenous peoples and small peasants. The participation of the population in general in actions towards a better recognition of the virtues of sustainable environmental practices, including the possibility to increase their participation in control and protection actions of natural resources and fire management, the generation of additional work sources in rural areas and improved access to resources according to their traditional use, particularly in indigenous lands.

Additionally, the relevant stakeholders highlighted the potential that REDD+ has to contribute in solving or mitigate problems derived from lack of land tenure right regularization in several areas of the country, in particular in indigenous lands and in lands under special regimes, without ignoring the need of strengthening institutional capacities in several areas, both governmental and non-governmental, allowing the State to provide better services to citizenship and to accompany them in their efforts, and to assist in the generation of capacities in social sectors, control organizations and communal and private groups that will be key players in the broadening of the REDD+ activities, so the national goals are achieved.

The better valuation of the forest and the creation of new or more inclusive compensation mechanisms through the recognition of environmental services and similar may have a positive impact in the reduction of migratory processes, especially of young populations, towards urban centers, most of the times looking for better work and income conditions, which weakens the traditional peasant family structure and that promotes abandonment of the production culture. The improvement of socio-economic benefits of the rural producers contributes to maintaining peasant family integration and the intergenerational transfer of rights and of productive culture, which is also applicable to indigenous communities.

Regarding gender inclusiveness in the co-benefits of the program, some pilot experiences have been developed, especially in indigenous communities that will be used as referent to broaden efforts in other socio-economic realities in country. In this sense, the development of a gender strategy is conceived for the second stage of the readiness phase, in order to guarantee that the strategy and the Emissions Reduction Program incorporate this dimension as a transversal axis.

16.2. Approach for providing information on Priority Non-Carbon Benefits

The National System for Conservation Areas has promoted since May, 2004 a Proposal for Territorial Planning for the Conservation of Biodiversity in Costa Rica[99]; the initiative has had the support and cooperation of prestigious national and international organizations and projects.[100]. This initiative has produced two fundamental products for the definition of biodiversity conservation national strategies and to define investment prioritization criteria through the payment for environmental services program: analysis of conservation gaps and need for connectivity trails. The gaps are areas considered important for the conservation of biophysical environments and that are not under any effective conservation initiative yet, either public or private. The identification of the areas with gaps is associated to the need of maintaining representative samples of the natural environments biodiversity in the country and the conservation goals defined for each case, which is specified in the methodology of the Proposal. In addition to the conservation gaps, the Proposal analyses the connectivity at the national level in which lower cost trails are suggested to establish biological corridors, considering that the alteration of the surface and the presence of human activity impose different difficulty levels for the displacement of plants or animals species or species groups from one place to another, depending on the type of alteration or human intervention in each place.

Based on the analyses derived from the Proposal, the parameters are set to determine the investment priorities of the Payment for Environmental Services program, given that the resources available are not sufficient as to attend all the demand. The main goal of the Payment for Environmental Services Program is investing in areas where diversity conservation gaps have been identified and attend the biological connectivity requirements amongst Protected Wildlife Areas in country, and to privilege the assignment of Payments for Environmental Services to those lands in Protected Wildlife Areas that have not been paid by the State and that are subject to use restrictions. In summary, the criteria are not exclusively carbon; there is a special emphasis given to social and environmental co-benefits.

Since in the case of Payment for Environmental Services three environmental services are incorporated in addition to the carbon benefits and that this mechanism will be used as the main axis of the Emission Reduction Program, Costa Rica will provide regular information on the generation or improvement of non-carbon benefits through the mechanisms agreed, as produced with the existing monitoring information systems of the Payments for Environmental Services program.

The development of a specific monitoring system of non-carbon benefits has not been completed as of this date; however, it must be mentioned that at the moment, the National Fund for Forest Financing will

[99] Also called Project GRUAS II.

[100] *i.e.* National Biodiversity Institute, The Nature Conservancy, Conservation International, the National Fund of Forest Financing and the project Forest Conservation and Sustainable Development in Buffer Zones in the North Caribbean of Costa Rica.

continue applying its management systems of the Payment for Environmental Services program for those purposes. With resources of the Ecomercados II project, the identification of more specific indicators was begun by the National Biodiversity Institute, but its application costs at the level of property are extremely high. It is expected that in the following stages some indicators will be developed to be incorporated into the monitoring system (**Section 9**) that are appropriate and that may be used as part of the national system of environmental indicators. Other relevant elements to non-carbon benefits will be derived from the follow-up system of the policies and actions contemplated.

17. Title to emission reductions

17.1. Authorization of the ER Program

Name of entity	Ministry of the Environment and Energy
Main contact person	Dr. Édgar Gutierrez-Espeleta
Title	Minister
Address	Vista Palace building, Street 25. Avenues 8 and 10, San José, Costa Rica
Telephone	+506-22334533
Email	ministrominae@minaet.go.cr
Website	www.minae.go.cr
Reference to the decree, law or other type of decision that identified this entity as the national authority on REDD+ that can approve ER Programs	The appointment of Dr.Edgar Gutiérrez Espeleta was issued by agreement N° 001-P, of May 8, 2014, issued by the Presidency of the Republic. The Minister of Environment and Energy is entitled to contracts or agreements on behalf of his Ministry, per the Political Constitution and the General Law of Public Administration of 5/2/78.

17.2. Transfer of Title to ERs

Legal considerations for the transfer of titles to emission reductions

Emission reduction from deforestation and the regeneration of forests is done by the forest owners, either a natural or a legal person, and this is based on the Costa Rican legislation, the Constitutional principle on private property reflected in article 45, developed in the common and special legislation related to the payment for environmental services set forth in articles 3 paragraph k) and 46 and 47 of the Forestry Law in force. Under this condition as owners, and in the exercise of their dominion competencies, they will transfer the Ministry of Environment and Energy the capacity to claim or negotiate over their rights to emission reductions.

Therefore, the competent entity to exercise the claim and transfer of titles for emission reduction will be, according to the Forestry Law and the Biodiversity Law, the State Forestry Administration. As set forth in article 5 of the Forestry Law, the institution in charge is the Ministry of the Environment and Energy and its two competent offices per the Regulations to Forestry Law, Executive Decree 25721-MINAE are the National Fund for Forest Financing and the National System of Conservation Areas.

This way, the State Forestry Administration will be entitled to transfer titles of emission reductions, in the following cases: a) as owner of the emission reductions produced in Protected Wildlife Areas; b) in private lands by virtue of titles derived from the assignment of rights on environmental services agreements[101]

[101] Like the rights assignment that takes place through an agreement between the land owner and the National Fund of Forest Financing, in order to transfer the rights on environmental services during the duration of the agreement. For instance, clause sixth of the forest protection agreement for the Payment for Environmental Services program waives

either in PSA agreements or other similar; c) in lands owned by the State institutions and national reserves; and d) in indigenous lands that have granted right assignments through payment for environmental services agreements.

Plan for transferring titles to the Carbon Fund and implications of land tenure regimes and resources

Considering that in Costa Rica the Emission Reduction Program is country-wide, the Entity of the Program can only transfer the titles of emission reductions taking place in public lands and in the case of private lands (owners inside or outside of indigenous lands) are those that though an agreement or any other legal instrument have legally assigned the title to emission reductions. For this reason, the Entity of the Program will not be able to show the capacity of transferring the title on the total accounting area[102].

In principle, the percentage of national territory in which a transfer of title of emission reductions would be possible is 32,2%(1.645.173 hectares). This includes 1.332.677 (26%) hectares in Protected Wildlife Areas, 299.720 hectares (6%) under forest conservation of the Payment for Environmental Services program and 12.776 hectares (0,2%) under forest regeneration of the same program. Without prejudice of the foregoing, the executing entity of this project reserves the right of including in the program area other areas outside of the ones described, as long as they are incorporated by means of an agreement of payment for environmental services and another similar to that with its legitimate owners.

Identified conflicts on tenure regarding the transfer of title

Regarding land tenure and non-recorded rights, there are some problems related to lands under the administration of State institutions, as the case of lands managed by the Port Management and Economic Development Board of the Atlantic Coast, the border zone, the title projects of the Rural Development Institute[103] and the possession rights of lands considered State Natural Heritage such as the Maritime-Terrestrial Zone. In these cases, the legislation in force is uncertain regarding the right of title on behalf of their possessors. These situations have taken place because specific heritage has been attributed to some institutions without previously analyzing land tenure, those lands have been occupied by private parties or there has been tolerance of the State and lack of knowledge of the civil society on the legislation in force.

The potential solution of these conflicts will depend on the nature of the negotiations set for the payment of results verified within the National REDD+ Strategy and the Emission Reduction Program (i.e. flexibility level set in the general and commercial terms of the Payment for Emission Reduction Agreement within the framework of the FCPF Carbon Fund). The experience in country through the Payment for Environmental Services program has shown that most of these tenure conflicts cannot be solved at the administrative level and it has been necessary to go to the judiciary. Other conflicts require solution at the legislative level.

Related to the foregoing, there are two implications. In the first one, the properties show no legal conflict, in which case the assessment of their condition will lead to the approval of their participation in the program, with no obstacles for the transfer of title, which are the most. In the second case, the properties do show conflicts related to land tenure, which will also have implications, since in these cases the owners

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that the National Fund for Forest Financing be expressly entitled to commercialize in any way and with any person, natural or legal, national or international, regarding the rights assigned.

[102] See indicator 36.3 of the Carbon Fund Methodological Framework

[103] Previously Agrarian Development Institute

do not have sufficient support accrediting their right and therefore it is not possible to legally execute the transfer of title, and for that reason they will not be included in the Program.

Measurements that would be defined to enable the transfer of titles on areas with difficulties

For private areas outside of the Payment for Environmental Services program, Costa Rica will develop legal mechanisms for the assignment of rights, if so decided by private owners. The ongoing legal study will determine the options for this effect, which will be operational prior to a transfer to the FCPF Carbon Fund. In case of lands under legal dispute, the Emission Reduction Program will support the measurement as possible.

Environmental integrity of emission reductions

Due to the fact that the Carbon Fund requires of the transfer of title of emission reductions, and in case Costa Rica incurs in a transfer to the World Bank, it will only be for single emission reductions not used for other purposes, such as the recognition of payments resulting from REDD+ through bilateral or multilateral agreements, the Costa Rican Carbon Domestic Market or other mitigation initiative, such as the nationally appropriate mitigation actions in course. However, the emission reductions will be reflected in the GHG national inventory and might be considered for the proposal of the national determined international contributions.

18. Data management and registry systems

18.1. Participation under other GHG initiatives

Other transfers or transfer plans of emission reductions and other GHG mitigation initiatives

Costa Rica has the project "Carbon Sequestration in Small and Medium Farms in the Brunca Region, Costa Rica", recorded in the United Nations Framework Convention on Climate Change within the Clean Development Mechanism, which is producing emission reductions with aforestation/reforestation activities. This project is expected to generate a total emission reductions of 176.050 t CO_2e in a 20 year term, o 8.803 t CO_2e per year, in an area of 892,42 hectares during period 2006-2026.

In relation to the aforementioned project, Costa Rica has transferred to the Clean Development Mechanism of the CER in serial rank CR-6-961312-1-1-1-7572 al CR-6-984395-1-1-1-7572, according to the monitoring report of August 2006 through December 2012.

This is the only project formally recorded under the Convention or other official entity. At this time, the Emission Reduction Program does not contemplate the 892,42 hectares included in the project nor the 176.050 t CO_2e produced up to 2012. Due to the scope of the reference level presented to the Carbon Fund, this is a double-accounting, which will be solved once the reference level is recalculated based on the results of the GHG national inventory presented in the framework of the first Updated Biannual Report before the Convention. As mentioned in **Section 8**, the gas inventory will be complete by October 31, 2015.

18.2. Data management and Registry systems to avoid multiple claims to ERs

Existing records applicable to REDD+

Currently, the Payment for Environmental Services program keeps full record of all properties that have formalized an agreement with FONAFIFO. The information maintained in this registry complies with the requirements set forth in Indicator 37.2, i, ii, not including aspects related to carbon reservoirs and the reference level, however, said records can be adjusted including the information missing in order to record the REDD+ projects.

Another important registrar for REDD+ is the State National Heritage registrar. The National System of Conservation Areas attends and guarantees that the legal provisions issued in the Environment Organic Law, the Forestry Law, the Biodiversity Law on acquisitions, management and administration of lands of the State Natural Heritage within Protected Wildlife Areas be executed under technical, administrative and legal principles and procedures in force.

As of this date there is no Registry of Transactions; however, it is completely necessary to develop it, since it has been defined it will be a country registry centralized in the Climate Change Office, that will comply with all the requirements of transparency and traceability necessary and that must be designed including all the sectors that take part in emission reductions such as energy, industry and forestry.

However, it must be mentioned that in relation to the Domestic Carbon Market, there is an ongoing successful experience operated by FONAFIFO and in coordination with the Climate Change Office, Costa Rica is in the process of designing a national registry of emission reductions to comply with the registration requirements of the Domestic Carbon Market. The registry is expected to be applicable to REDD+ as well.

Arrangements to avoid multiple claims to emission reduction titles

The country reports its emission reductions and mitigation impacts in the Biennial Update Report before the Convention. Both emissions and absorptions in the GHG inventory are reported there transparently and complete, as well as the progress made by the country in reducing emissions in all sectors. This includes the AFOLU sector and the results obtained in the implementation of REDD+. Since the Update Biennial Report is presented every 2 years, it will be possible to report before the Carbon Fund with the same periodicity until 2050 or upon the conclusion of the Payment for Emission Reduction Agreement.

Program Management System and Project Data

Costa Rica does not have an integrated program and project management system; each institution involved in the REDD+ program must construct the registrar for its own programs and projects. In this sense, the forestry sector already has a registrar for the Payment for Environmental Services Program kept by FONAFIFO and that includes information on all the properties that have formalized an agreement with the institution. This registrar includes the registration data of the property, cadastral plan officially recorded at the national cadastre, owner´s name that can be a natural or legal person, the political-administrative location, the property total area and the effective area on which the agreement as executed; there is also a geo-referenced digital file of the property based on FONAFIFO's geo-spatial database. Since 1997, the program has registered over 14.713 agreements with an area of 1.052.867 hectares, in addition to the payment for the establishment of over 6.015.710 trees in agro-forestry systems. There is also the registrar of the State Natural Heritage, related to the management and protection of Protected Wildlife Areas. In addition to those, as part of the management of the National System of Conservation Areas (SINAC), all actions responding to the different forest protection and management programs are registered and receive follow-up; these include the actions related to fire prevention and control and illegal clearing.

According to indicator 37.1. of the Methodological Framework of the Carbon Fund and the national circumstances, Costa Rica will use the Biennial Update Report as a program and data management system of the project, as defined above. The transparency and formality with which the Convention is informed is sufficient to assure the Carbon Fund on the emission reductions transferred or managed and of the ongoing projects and programs in country. It is important to highlight the commitment the country has to guarantee environmental integrity and to avoid double-accounting.

The Biennial Update Report provides information on the entity producing the emission reductions, the geographical field of these emission reductions, the methods and assumptions of accounting and the reference level used, in compliance with indicator 37.2. Likewise, the Biennial Update Report is a public document and follows indicator 37.3. Finally, since the Biennial Update Report is subject to revision processes by the Secretariat through International Consultation and Analysis within the framework of the Convention, there is compliance of indicator 37.4.

These considerations are both to comply with the requirements of a program and data management system of the project, and for the registration of emission reductions, in compliance with criterion 38.

Annex 1: Financial Projections Table for ER-PD

This Annex provides the financial projections for Costa Rica's REDD+ Program using the inputs detailed in the "Costa Rica REDD+ Financial Plan Methods and Detailed Inputs" document which has sensitive information and has provided confidentially to the government of Costa Rica and Carbon Fund/World Bank. The budgets prior to 2015 are incomplete.

Chart A1.Financial projections of the Emission Reduction Program.

SUMMARY FINANCIALS (USD)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
PROGRAM	**1 Yr**	**2 Yr**	**3 Yr**	**4 Yr**	**5 Yr**	**6 Yr**	**7 Yr**	**8 Yr**	**9 Yr**	**10 Yr**	**11 Yr**	**12 Yr**	**13 Yr**	**14 Yr**	**15 Yr**	**16 Yr**
Tons Available for Sale (Net*) - by Vintage	-	-	-	-	-	-	-	9,535,189	-	2,522,896	-	2,522,896	-	2,522,896	-	2,522,896
Verification Years	-	-	-	-	-	-	-	V	-	V	-	V	-	V	-	V
Tons Available for Sale (Net*) - per Verification	-	-	-	-	-	-	-	9,535,189	-	2,522,896	-	2,522,896	-	2,522,896	-	2,522,896
OPENING CASH BALANCE	$0	$0	$0	$0	$0	$0	($5,036,310)	($9,418,478)	$43,980,909	$35,839,575	$39,475,241	$21,463,930	$22,505,856	$7,823,359	$10,443,304	($6,088,505)
ER PROGRAM CASH FLOW OUT																
REDD+ Program Management Costs																
Staffing Costs	$59,841	$59,841	$119,682	$179,523	$299,205	$396,307	$416,122	$436,928	$458,775	$481,714	$505,799	$531,089	$557,644	$585,526	$614,802	$645,542
Key Consultancies and Studies						$233,333	$233,333	$153,333								
Travel for Program Management	$0	$0	$0	$0	$0	$30,880	$30,240	$30,220	$29,560	$29,560	$29,560	$29,560	$29,560	$29,560	$29,560	$29,560
Stakeholder Engagement				$755,512	$1,498,541	$867,385	$279,149	$231,164	$292,474	$292,584	$293,994	$294,004	$294,904	$294,004	$543,404	$543,404
Safeguards Monitoring and Redress						$477,240	$111,090	$116,645	$122,477	$128,601	$135,031	$141,782	$148,871	$156,315	$164,131	$172,337
Benefits Management	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Emission Reduction Quantification, Verifica	$0	$0	$0	$0	$0	$861,400	$230,000	$1,473,759	$230,000	$1,148,145	$861,400	$1,123,145	$230,000	$1,123,145	$230,000	$1,754,545
Total REDD+ Program Management	$59,841	$59,841	$119,682	$935,035	$1,797,746	$2,866,545	$1,299,935	$2,442,050	$1,133,286	$2,080,603	$1,825,784	$2,119,580	$1,260,979	$2,188,550	$1,581,897	$3,145,388
REDD+ Program Measures																
FINAFIFO Payment of Environmental Servic	$27,573,537	$28,108,704	$28,544,629	$29,444,282	$27,875,450	$33,051,038	$33,129,045	$34,583,292	$46,329,976	$37,665,482	$40,222,923	$40,132,581	$40,445,272	$42,444,415	$44,543,516	$46,747,571
SINAC Increased Governance/Size of Protec	$43,692,435	$39,203,842	$46,944,040	$50,918,734	$65,418,209	$71,960,029	$79,156,032	$87,071,636	$95,778,799	$105,356,679	$115,892,347	$119,369,117	$122,950,191	$126,638,697	$130,437,858	$134,350,993
TOTAL ER PROGRAM CASH FLOW OUT	$71,325,813	$67,372,387	$75,608,351	$81,298,051	$95,091,405	$108,739,012	$113,815,012	$125,570,737	$143,472,060	$146,250,908	$158,802,454	$162,744,423	$164,886,442	$172,394,806	$176,793,270	$185,998,498
PROGRAM FUNDING SOURCES CASH IN	($59,841)	($59,841)	$2,845,354	$2,948,350	($1,797,746)	($5,036,310)	($4,382,169)	$53,399,388	($8,141,334)	$3,635,666	($18,011,312)	$1,041,926	($14,682,497)	$2,619,945	($16,531,809)	$1,033,971
Reference Price per ton	$ 6.50	$ 6.50	$ 6.50	$ 6.50	$ 6.50	$ 6.50	$ 6.50	$ 6.50	$ 6.50	$ 6.50	$ 7.00	$ 7.28	$ 7.57	$ 7.87	$ 8.19	$ 8.52
ER Sales Cash In	$0	$0	$0	$0	$0	$0	$0	$61,978,730	$0	$16,398,821	$0	$18,366,680	$0	$19,865,401	$0	$21,486,417
Sources of Funds to FINAFIFO	$27,573,537	$28,108,704	$28,544,629	$29,444,282	$27,875,450	$33,051,038	$33,129,045	$34,583,292	$46,329,976	$37,366,943	$36,980,666	$38,494,880	$40,071,412	$41,712,841	$43,421,857	$45,201,258
Sources of Funds to SINAC	$43,692,435	$39,203,842	$49,909,076	$54,802,119	$65,418,209	$70,651,665	$76,303,798	$82,408,102	$89,000,751	$96,120,811	$103,810,475	$106,924,790	$110,132,533	$113,436,509	$116,839,605	$120,344,793
TOTAL PROGRAM CASH FLOW IN	$71,265,972	$67,312,546	$78,453,705	$84,246,402	$93,293,659	$103,702,703	$109,432,843	$178,970,124	$135,330,726	$149,886,575	$140,791,142	$163,786,349	$150,203,945	$175,014,751	$160,261,461	$187,032,468
NET PROGRAM CASH FLOW (NPCF)	($59,841)	($59,841)	$2,845,354	$2,948,350	($1,797,746)	($5,036,310)	($4,382,169)	$53,399,388	($8,141,334)	$3,635,666	($18,011,312)	$1,041,926	($14,682,497)	$2,619,945	($16,531,809)	$1,033,971
CASH BALANCE (CUMULATIVE NPCF LESS PAYOUTS)						($5,036,310)	($9,418,478)	$43,980,909	$35,839,575	$39,475,241	$21,463,930	$22,505,856	$7,823,359	$10,443,304	($6,088,505)	($5,054,534)

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Auto-evaluación de las Relevant stakeholders

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Reporte sobre la etapa de pre-consulta

Reporte sobre la planeación y estimación financiera de REDD+