

***Annex 1: Optional Guideline and Questionnaire***

***To Assist with Preparation of an FCPF Readiness Plan Information Note (R-PIN) 3/8/08***

The guidelines and questions below are designed to assist a country in preparing its R-PIN submission to the Forest Carbon Partnership Facility (FCPF):

1. Following this guideline and answering these questions is optional. We hope this Annex may assist some countries in organizing their information for filling out some questions in the R-PIN, or elaborate further on some information
2. The data-related questions are intended to establish what data are currently available for use in land use/land cover change and biomass/carbon emissions analyses.
3. Analysis-related questions are focused on determining the in-country capacity for analysis that would be required to monitor carbon emissions and identify pertinent REDD policies.
4. Institutional questions are geared toward determining the current capacity of the country's governmental system to successfully implement a carbon emissions reduction strategy.
5. Only selected template questions are included below.

**Template question 2. Which institutions are responsible in your country for:**

**a) forest monitoring and forest inventories:**

- (1) Which government institutions, NGOs, or other organizations will be responsible for monitoring and verifying land use/land cover change? How do you plan to manage collaborations between/among these institutions?**

**(This question is intended to establish the benchmark for current capacity, and help you design a work plan for improvement. Please describe the capacity of major governmental and non-governmental institutions involved.)**

The Military Geographic Institute (IGM) provides physical and administrative maps at a scale of 1 : 25000 for the whole country.

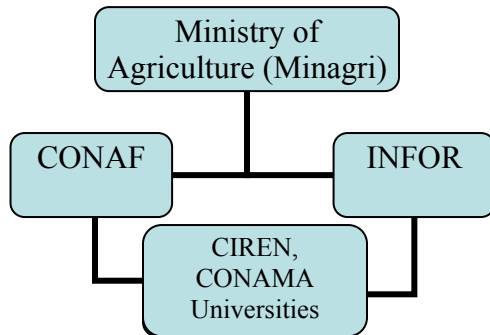
The National Institute of Natural Resource Information (CIREN) is responsible for recopilation, centralization and actualization of the natural and productivity resources information and complementary information of its use. It delivers maps at a scale of 1 : 20000 and for some regions at 1: 10000.

One of the objectives of the National Forest Service (CONAF) is to monitor and actualize the basic information of land use and vegetation which was originated in 1994 and 1997 by a project of CONAF/CONAMA with financing of the world bank. The related cartography has a scale of 1 : 50000 and is available in a shape format. Since the year 1998 is found installed the change monitoring capacity and information updating. It have been monitored and up to date 10 of the administrative regions of the country with a surface of approximately 35.000.000 has since 1998 to 2008. The information is available as thematic maps in the web CONAF <http://conaf.siigsa.cl> and statistical information of changes in [www.conaf.cl](http://www.conaf.cl). In 1997, was also carry out a forest inventory which was the first extensive forest inventory in the country.

The Forest Research Institute (INFOR) is responsible for the ecosystemic inventory of the native forests and the inventory of forest plantations. INFOR offer maps containing the inventory data at a scale of 1 : 50000 and 1 : 250000.

Additional to the governmental organizations, universities are assessing the monitoring of land use change.

As CIREN, CONAF and INFOR are institutions which depend on the Ministry of agriculture, the monitoring of land use changes would be led by this Ministry and executed by CONAF and INFOR in collaboration with other institutions like CIREN, CONAMA and Universities.



**Template question 3. Current country situation (e.g., Where do forest deforestation and forest degradation occur in your country, etc.):**

**ANALYTICAL CAPACITY**

- (1) Briefly summarize the most important studies, data bases or other information related to deforestation and/or land use/land cover change in your country. (This will provide an overview of what information is available today for policy makers. Provide background and details of the research available, and briefly review the relevant literature under the headings of: biophysical; social; economic)**

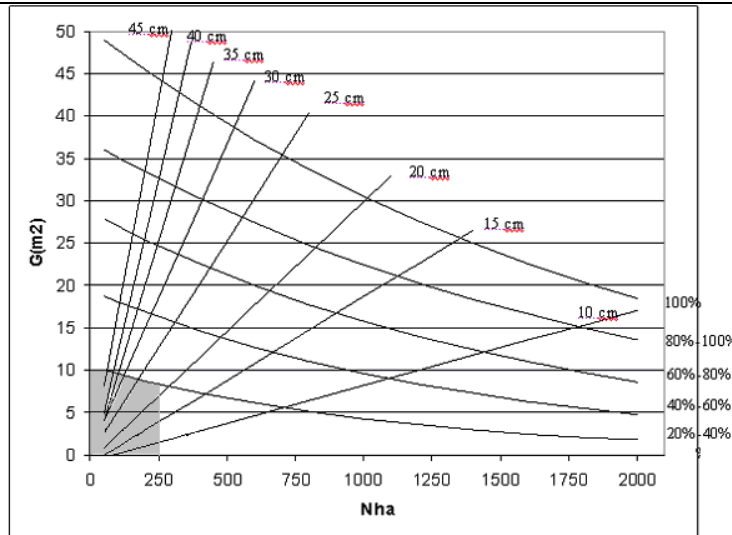
Several studies have been carried out on land use change and deforestation. Some of them are regional or at a species level but others include the whole temperate forest in southern Chile. Additionally there are the data bases of forest inventory (INFOR) and the Forest Survey (CONAF) that support studies on this topic. The monitoring of this survey permit evaluate deforestation between to periods of time.

Some reports have been published on the sustentability of native forests in Chile. They include environmental, social and economic parameters and shows an tendency on ongoing degradation. There are also some case studies about reasons of land use change, variation of carbon stock because of forest management and clasifying degradation.

**Biophysical**

The available studies demonstrates that progressive fragmentation by logging and clearance is associated with dramatic changes in the structure and composition of the temperate forests in southern Chile. Predictions were made of where native forest conversion is likely to occur in the future. When the predictions of native forest conversion were recalculated only accounting for the construction of a highway, it was found that approximately 27000 ha of native forest had an increased probability of conversion.

On the other hand, numerous studies demonstrate that between 37% and 63% of forest management interventions conduce to severe degradation. The main causes are over-exploitation, burning and unmanaged firewood extraction from forests, cattle grazing and unsuccessful regeneration. In this regards, analysis from the data of the continuous forest inventory from INFOR highlight that 77000 ha of forest are incorporated to degraded forests classification every year, this classification is defined according to strictly observation of stock degradation definition (FAO definition FRA 2000-2005), according to the following graph estimated from existent permanent sample plots (Continuous Forest Inventory, INFOR 2001):



INFOR's State Variables Rules for classifying natural forest as degraded according to FAO definition of degraded Forest (stock based definition FRA 2000-2005)  
 state variables : %canopy cover/ha, Basal Area/ha (G) Number of trees/ha (Nha)  
 Gray color indicates stock degradation.

**Social**

Social analysis have been carried out mainly by NGO's. The AIFBN (Forest Engineers for the Native Forest Organization) has the objective of an adecuate management of the native forest in the area of most firewood demand (IX, X, XI, XVI regions). They identified needs of land owners to elevate their organization level and formalizing the firewood sector is key function in forest conservation. TNC in collaboration with WWF deliver an analisis of the human factor on conservation activities.

**Economic**

Several studies revealed the economic aspect of forest management. There are a large number of university thesis on this topic and also CONAF had analized management costs and benefits for diferent forest formations.

**(2) Are there any studies or projects on forest governance issues (i.e., forest concession policies, decision-making processes, transparency of forest operations and management), or legal frameworks that might be pertinent to REDD?**

There are several projects an prosesses that contribute important experiences in forest govence issues. The Origenes program of CONADI for example is contributing, in coloboration with CONAF, to increase environmental services and social function of the forest by taking care of species y recuperate forests and plantations the origin people count with in the past. They work with an participatory metodology.

The project CMSBN (Conservation and Sustainable Management of the Native Forest) by CONAF - KfW - GTZ – DED (1992 - 2006) persued the maintenance and sustainable management of threatened natural forests. It was undertaken jointly with the Chilean forest administration, forest owners and the timber-processing industry. To this end the framework conditions (political conditions, legal basis, local know-how) were adapted appropriately in concert with the partners. At the same time, private owners of forests and the timber industry weree being supported in putting management of natural forests on a sustainable basis. Nearly 20 publications are available that resume the experiences in diferent areas of this project.

Forest certification was a step in the development to sustainable forest management. Faced with the success and rapid development of international certification programs, and because of the technical and economic difficulties associated with implementing these programs, Chile has developed its own national certification standards. Three organizations developed certification standards for the national forestry companies, but these projects are principally focused on the

needs of large plantations and rarely address the needs of the small and medium-sized forest Certification process.

Finally the Chilean parliament has unanimously approved a law to preserve the country's forests, promote their sustainable use and foster related scientific research. The Native Forest Law has been in negotiation for 15 years — the longest any law has taken to pass in Chile — and members of the scientific community, environmental organisations and government authorities have expressed great satisfaction with its approval. The law would provide US\$8 million annually for 30 years to be shared by small landowners and big business to provide incentives for better native forest management. Experts say this funding is desperately needed to encourage small landowners to protect their native forests.

**(3) Describe the known and perceived gaps in analytic work to date. What kind of information is still needed?**

There are four main topics that have to be consolidated and amplified. (a) Degradation must be defined and classified on a national level, (b) the inventory must be carried out in the regions which doesn't have been considered till today, (c) management options for small land owners must be developed and provided and (d) Indicators for vulnerability of forests must be identified or consensus (currently an INFOR's proposal for sustainability assessment methodology is under evaluation by the Ministry of Agriculture and by the National Environmental Agency (CONAMA) "Primer Reporte de Sustentabilidad de los Bosques Nativos", INFOR 2007), (e) and it should continue with updating the Forest survey and strengthen institutional capacities.

**(4) How much of this analysis was conducted by in-country experts, as opposed to international experts or organizations?**

**(The objective here is to identify the current level of independent in-country capacity for REDD analysis. REDD work in most countries is likely to combine national and international teams.)**

The main of analysis has been conducted by in-country experts (mainly INFOR, CONAF, Universities and the Climate Change Ministerial Committee (Ministry of Agriculture)). Nevertheless international recognized methodologies were applied. Some activities of foreign NGO's and CMSBN-project were leaded by foreign experts that dedicates to build national capacities. Recently INFOR developed two MDL-metodologies for forest plantations with assessment of Japanese experts from Jica. Also this project focused in create national capacities.

**Template question 8. Implementing REDD strategies:**

**b) Would performance-based payments through REDD be a major incentive for implementing a more coherent strategy to tackle deforestation? Please, explain why. (i.e., performance-based payments would occur *after* REDD activities reduce deforestation, and monitoring has occurred):**

REDD would not be the only one incentive for reduction of deforestation/degradation, the recently approved law to protect natural Chilean forests, consider different categories for incentive payments. In particular they are called Forest for preservation, Forests for conservation and Forests for multiple use. The participation on the new incentive program is voluntary. CONAF is responsible for administrating and monitoring transactions. It would be easy to amplify the existing categories for a 4<sup>th</sup> one, that could be Degraded forests. The same channels that distribute national incentive payments could be used to redistribute REDD funds. Also, INDAP has an ongoing incentive payment system. One of the funds that INDAP administrates are focused on the assistance for recuperation of degraded soils.

Is important to highlight Chile has embraced the Nested Approach proposal for implementing the REDD. In that respect the mechanism of redistribution and implementation is coherent with such a proposal. See <http://www-personal.umich.edu/~thoumi/Research/Carbon/Forests/Forests,ADCritiques/NestedApproachtoREDD.pdf>

**(1) Has the government already begun thinking about how to use future revenues from REDD and how it would redistribute income from carbon emissions reductions/avoidance? Or should this be elaborated**

**during the Readiness Process?**

Given the current state of art on REDD in the country it is recommended to consider this point as part of the R process.

**(Outline major distribution channels for funds to be distributed by government agencies. Identify any voluntary markets within the country and the means by which these transactions are monitored.)**

**Template question 9. REDD strategy monitoring and implementation:**

**Physical Data Capacity:**

**(1) Does your country have a forest inventory?**

**(Forest inventories typically provide very accurate, on-the-ground estimates of timber volume, biomass, etc. Together with statistics on forest-area change, access to forest inventory data is critical to quantify carbon emissions resulting from land conversion.)**

YES, the Forest Research Institute (INFOR) is the responsible agency for developing the Continuous National Forest Inventory, Based on the data of this forest inventory rules for degraded forest classification has been provided, and monitoring methods based in combination of field plots and medium resolution satellite imagery are currently being studied to approach REDD monitoring. CONAF has information of deforestation between two periods.

- **Is it a national or regional forest inventory? Or an inventory only for protected areas? (It is important to know how representative the inventory is of existing forest conditions)**

An extensive national forest inventory exist for the country which delivered national stock. This was developed in the year 1997 by CONAF.

It is a National Forest Inventory. It is starting to be implemented covering nowadays 4 (IX, X,XI, and XIV administrative regions) of the 9 main Forest Regions (excluding arid zones).

- **When was it implemented?**

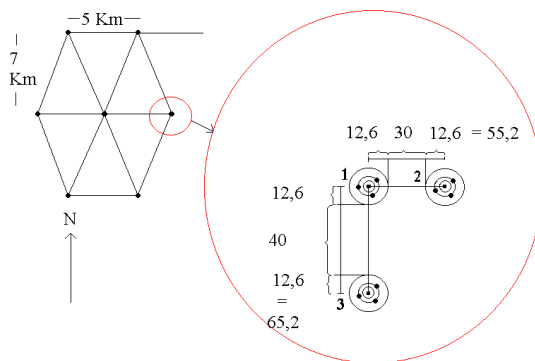
**(If an inventory was conducted only once in the distant past it will not be representative of current conditions but may be useful for establishing historical baselines)**

CONAF developed a forest inventory in 1997 and INFOR started on 2001, adding a new region on 2007 and 2008.

- **What is the spatial intensity (i.e., plot density) and temporal frequency (i.e., time between inventories) of data collection?**

**(The higher the spatial and temporal frequency, the greater the capacity to monitor forest change)**

The Inventory design consists of a regular grid of 5 x 7 Km. Due to natural geography and geomorphology of Chile, longitudinal spatial variation is larger than latitudinal variation. Specific distances of the grid were decided after a preliminary geostatistical study in order to avoid spatial autocorrelation between sample plots. Also the sample plot is a cluster of 3 nested circular size-variable plots. It is planned to have a cycle of 8 year period of remeasurement. Results are expanded by using geostatistical methods in combination with satellite imagery and quality estimators are provided..



- **Are sample plots permanent, i.e., revisited and re-measured during subsequent inventories? (Permanent plots are more useful for monitoring forest carbon uptake/emissions)**

The inventory is designed as a partial replacement inventory. Even the grid is permanent, not all the point were measure the first time, some point will be re-measured in the next cycle, allowing growth and mortality calculation, and some new points for measurements will be incorporated

- **Which vegetation attributes (stem diameter, canopy cover, etc.) are measured? (This information is essential to understanding what the inventory can be used for, e.g., monitoring, modeling, etc.)**

Collection of field measurements related to vegetation attributes are classified as:

- Environmental level (flora vegetation type, presence of wild and domestic animals, antropogenic artificialization, among others that are observations of the crew taken according the training and manual instructions.
- Plot level information: Slope (shape and magnitude), aspect, altitude and utm-coordinates,accessibility. Management activities (thinning, pruning, soil preparation), type of establishment (natural from seeds, natural vegetative, artificial), Development stage. Erosion is also observed, as well as grazing (type and intensity). Understore composition, density and spatial distribution (general classes as regular, random, aggregated).
- Soil plots: Deep of soil, litter, and humus. Acidity. Crown cover. Color according to Munsell's Table. Texture structure and moisture content (field method estimation).
- Regeneration Plot. Identifying frequency by species under 4 heights strata (0 – 0.5 meter; 0.51 – 1.0 meter; 1.01 -<1.3 meter and larger than 1,3 m height but less than 4 cm diameter)
- Individual Tree variables: Specie, DBH (diameter at breast height), stump Diameter (at 0.3 m height), Diameter at one third of total height, Diameter at initial crown level, Diameter of the crown, Commercial height (at 10 cm diameter), Total height,, Shape, Crown Position, tree health condition (damage intensity).Individual trees are measured depending on their size in different plot size of the nested circle sample plot.
- On dead material (standing dead trees and coarse and fine debris) different diameter are measured (lower and upper portion) as well as total length (in case of a positive identification, the specie is also registered), line intersection method is applied for estimation by using lines for dead wood material (coarse woody debris as small pieces) in lines as longer as sides of the clusters, see cluster plots design..
- Lichens identification and frequency is also collected in transect between cluster plots..

- **What size classes/species (all species, commercial only, etc.) are measured? (Measurements of most/all species and size classes provide for a more representative inventory)**

All species area measured, special regeneration plot of 1 m<sup>2</sup>, vegetation plot for all kind of vegetation, Regeneration and vegetation plot circular plot of radii=0.56 m.

Trees with DBH under 8 cm (larger than 4 cm.) are measured in a circular plot of radii=2.00 m

Trees with DBH larger than 8 cm are measured in a circular plot of radii=6.25 m

Trees with DBH larger than 25 cm are measured in a circular plot of radii=12.65 m

- **Can you provide accuracy estimates for the inventory? (Accuracy estimates are useful for determining the utility of an inventory for a particular application.)**

Yes, using two stages variance estimator for, total volume regional estimates errors reached 12%.

Expectation of the whole 9 forest regions are 5%

Estimates of quality are also provided to interpolated data by using geostatistical methods, errors are provided by pixels of one ha or collection of pixels (polygons or larger areas).

**(2) Are locally-derived, species-specific allometric biomass equations available?**

**(Allometric equations are needed for computing biomass estimates from forest inventory data. Local allometric equations provide more accurate estimates of biomass than regional equations do.)**

Yes, Biomass calculation are based on locally derived equation, species-specific as well as specie-class specific.

If yes, please provide specific information on the source(s) of these equations.

Gayoso, J.; Guerra, J. Carbon content in the above-ground biomass of evergreen forest in Chile. Bosque, Vol. 26 N° 2, agosto 2005, pp. 33-38

[http://www.uach.cl/procarbono/pdf/docs\\_publicaciones/gayoso\\_2001\\_venezuela.pdf](http://www.uach.cl/procarbono/pdf/docs_publicaciones/gayoso_2001_venezuela.pdf)

**(3) Do you have access to the following remotely sensed data?**

**(Remotely sensed data can be useful in determining *where* changes are taking place, a question that may not be answered well with traditional inventory data)**

- **Satellite imagery**
- **Aerial photography**

**(It is helpful to know how extensive a country's spatial data archive is. It is also useful to understand the extent to which data access is a limiting factor by itself.)**

Yes,

Satellite imagery:

LANDSAT year (1991, 2008) covering regions V, to XI INFOR own a library of this material since 1991 to date

MODIS covering IX, X, XIV administrative region

SPOT very few of this due to cost, two scene at IX region 1990

Quickbird very few and specific area X region Ancud.

Aerial photography: 1979,1980 (1:20.000), 1992, 1995 (1:70.000) covering the whole country

High resolution : IX, X, XIV regions Orthofotos

Region	Scale	Date	Image Format Latitude x Longitude	N° Orthophotos Regional Cover	N° Orthophoto s Digital Formatl
Tarapacá (valles)	1:10.000	Pancromatic 1994	3' 45" x 3' 45"	101	
Antofagasta	-	-	-	-	-
Atacama	1:10.000	Color 2004-2005	3' 45" x 3' 45"	125	-
Coquimbo	1:10.000	Pancromatic 1996-1999 Color: 2001-2002	4' x 4'	321	71
Valparaíso	1:20.000	Pancromatic 1983	6' x 7' 30"	174	
RM Santiago	1:20.000	Pancromatic 1983	6' x 7' 30"	146	
O'Higgins	1:20.000	Pancromatic 1978	6' 30" x 7' 30"	115	7
VII	1:20.000	1978 1993-1994	6' 45" x 6' 45" 7' 30" x 7' 30"	87 90 <sup>(1)</sup>	102
VIII	1:20.000	1978 1983 1998	6' 30" x 7' 30" 6' x 7' 30" 7' 30" x 7' 30"	122 235 2 <sup>(1)</sup>	7
IX	1:20.000	1987	8' x 9'	154	70
X	1:20.000	1992-1993 1994-1995	7' 30" x 7' 30"	527 <sup>(1)</sup>	527
XI	1:20.000	1992-93-94-1995 1995-1998	7' 30" x 7' 30" 7' 30" x 11' 15"	13 <sup>(1)</sup> 133 <sup>(1)(2)</sup>	6 133

If yes, please specify coverage and spatial resolution (e.g., 30m, 1 km<sup>2</sup>) and temporal resolution (e.g., 1997 and 2001, biannual)

The most important material is LANDSAT at 25 m resolution (resampled to 25 m) for every year since 1990 to date, some gaps are observable in areas where small portions of image were of interest.

**(4) What other spatial data do you have access to?**

**(The following spatial data are needed for more advanced (i.e., IPCC GPG Tier 3) model-based predictions of carbon emissions)**

- Land cover (CONAF- INFOR)
- Vegetation properties / biomass living and dead material (INFOR)
- Carbon sinks estimates from forest inventory in above ground pools in forests.(INFOR)
- Soil types / properties : Soil series IV Region: Scale 1:10.000 ; V to IX ,RM, X, Valdivia and Osorno Provinces: Scale 1:20.000 (INFOR-CIREN)
- Climate / meteorology 2005. CIREN Evapotranspiration National Cartography. CIREN Agroclimatic District (1983, 1994)
- Whole series of historical an future (IPCC A2, B2 and BL) climatic variables for feeding ecophysiological tree growth models (INFOR).
- Hydrology / river gauges
- Transportation network
- Demography / population density

For each category important to you, you could provide: source, resolution, date, and coverage.

**Template question 12. Please state donors and other international partners that are already cooperating with you on the preparation of relevant analytical work on REDD:**



**(1) How will you work in conjunction with independent national or international consulting teams?**

**(This question will allow the country to establish plans for improving capacity and service delivery. Describe which ones and their roles.)**

There are already several cooperation initiatives in relevant research topics. A network of german universities with collaboration of several chilean institutions and forest land owners presented an research project titled deforestation and globalization. The project pretend to increase comprensión of the relation between globalization and deforestation especially that ones generated by the competition between agricultural and forest land use. An other aspect of the study will be to identify and evaluate sustainable silvicultural systems for natural forest. Finally the project partners plan to elaborate and communicate an institucional benchmark that allows a sustaineble ressource management within a globalized forestry and agriculture.

In topics related to MDL, several institutions like INFOR and INDAP has established cooperation with Japanese institutions. This work will go on in the future.

Trough this kind of research cooperation Chilean governmental institutions get continues assessment of international experts.

Finally, funds for the MIA Project have been solicited to develop methodological aspects of REDD in temperate forests.

[end]