In this Edition

Identification and prioritization of causes for deforestation, devegetation and degradation of vegetation resources and related issues for increasing their cover and quality as foundations for the design of the action measures of the National Strategy on Climate Change and Vegetation Resources (ENCCRV).
National Strategy on Climate Change and Vegetation Resources

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Identification and prioritization of causes for deforestation, devegetation and degradation of vegetation resources and related issues for increasing their cover and quality as foundations for the design of the action measures of the National Strategy on Climate Change and Vegetation Resources (ENCCRV)

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1. Introduction

Since 2010, the National Forestry Corporation (CONAF) within the Ministry of Agriculture designs and implements the 2017-2025 National Strategy on Climate Change and Vegetation Resources – approved by the Council of Ministers for Sustainability on November 14th, 2016 – therefore becoming a fundamental policy instrument for fulfilling the commitments assumed by Chile at an international level with regard to climate change, desertification, land degradation and drought.

The ENCCRV’s general objective is:

“To reduce the social, environmental and economic vulnerability generated by climate change, desertification, land degradation and drought on vegetation resources and human communities that depend on these for increasing ecosystem resilience and contributing towards mitigating climate change, thus promoting the reduction and capture of greenhouse gas emissions in Chile.” (CONAF, 2016)

To achieve this, the following specific objectives have been defined:

01.
Contribute to the fulfillment of the commitments assumed by Chile in terms of vegetation resources before the United Nations Framework Convention on Climate Change (UNFCCC), the United Nation’s Convention to Combat Desertification (UNCCD), the Convention on Biological Diversity (CBD) and other national and international agreements.

02.
Influence in technical, political and financial decision-making that allows positioning the role of vegetation resources with regard to mitigation and adaptation to climate change and the struggle against desertification, land degradation and drought as priority axes within the sectoral development policies.

03.
Manage the valuation and valorization mechanisms of the environmental services provided by native vegetation resources, including performance-based payment systems that respect benefit sharing arrangements and environmental and social safeguards.

In the formulation and implementation of the ENCCRV, we have included three major Phases (Figure 1), the first one being the Preparation Phase, where all of the Strategy’s technical and management elements are conceptually designed; secondly, we have the Implementation Phase, where the action measures related to management, restoration and formation of forests and other vegetation resources are materialized; and finally, the Results-based Payments phase, which seeks to compensate -monetarily and non-monetarily- verifiable actions in terms of enhancing practices related to the sustainable management of vegetation resources and the maintenance or increase of the ecosystem services that these provide to society -including carbon capture, water regime regulation, soil protection, biodiversity conservation, among others- attributable to the execution of the action measures established by the ENCCRV.

1 Available at: http://www.enccrv-chile.cl/index.php/descargas/publicaciones/87-enccrv-2017-2025-v2/file
From the methodological point of view, the formulation of the ENCCRV is based on the results of multiple technical studies and a participative process conducted in each one of the fifteen regions of Chile, which has generated the necessary inputs for designing integral actions that respond to the perspective and demands from different society stakeholders.

Table 1 shows the main studies developed for the formulation of the ENCCRV.
<table>
<thead>
<tr>
<th>Name of the Study</th>
<th>Supporting Consultant Team</th>
<th>Source of Financing</th>
<th>Implementing Entity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest Reference Emission Levels, Forest Reference Levels (FREL/FRL)²</td>
<td>Winrock, UACH and Chilean Forestry Institute (INFOR)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plan for the Implementation of the Social and Environmental Safeguards of Public and Indigenous Consultation and Self-assessment of Chile's ENCCRV³</td>
<td>Developed by CONAF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support in the generation and analysis of the causes of deforestation, forest degradation and no enhancement of forest carbon stocks, identifying strategic options for addressing them within the framework of the ENCCRV⁴</td>
<td>Universidad Mayor; AIFBN; EBP Chile and CIREN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creation of an analysis of the elements and technical and legal procedures required for the creation and future implementation of a Carbon Reduction Rights Transfer and Benefit-Sharing System associated to payment for environmental services (PES) -with a focus on carbon- within the ENCCRV⁵</td>
<td>TECO Natural Resources Group Chile; Climate Focus and SudAustral Consulting</td>
<td>Forest Carbon Partnership Facility (FCPF)</td>
<td>The World Bank</td>
</tr>
<tr>
<td>Support in the creation of technical, political and strategic inputs for incorporating key elements on management and compensation schemes for environmental services developed within the ENCCRV. This is headed by CONAF in the Project for the new Forestry Development Law and other regulatory and sectoral promotion instruments⁶</td>
<td>SudAustral Consulting; Winrock International; CERTFOR and Ugarte y Hernández Abogados</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

² Process that has received the approval of the independent international expert panel established by the UNFCCC Secretariat and is published as Chile’s official document in the UNFCCC website. It is worth noting that this reference level document positions Chile as one of the first countries to make progress towards the analysis of four of the five REDD+ activities with regard to deforestation, forest degradation, conservation and sustainable management, and carbon stock enhancement for the regions from Maule to Los Lagos. Available at: http://redd.unfccc.int/submissions.html?country=CL
³ Available at: http://www.enccrv-chile.cl/index.php/descargas/enccrv/7-plan-salvaguardas-enccrv/file
⁴ Tender No. 842990–1–LP15
⁵ Tender No. 842990–11–LP15
⁶ Tender No. 842990–3–LP15
The positive policies and incentives approach towards Greenhouse Gas (GHG) Emission Reductions caused by Deforestation and Land Degradation, in addition to the promotion (+) of conservation, sustainable management of forests and enhancement in forest carbon stocks – also known as REDD++ – is a climate change mitigation mechanism adopted by the UNFCCC that aims to recognize the importance of adequate and predictable financial resources, including results-based payments for developing countries to protect their forest resources, improve their management and use them in a sustainable manner, thus contributing to the global battle against climate change and its effects. Currently, the REDD+ mechanism includes 5 activities, pursuant to Decision 1/CoP 16:

01. Emission Reductions due to Deforestation
02. Emission Reductions due to Forest Degradation
03. Conservation of Forest Carbon Stocks
04. Sustainable Management of Forests
05. Enhancement of Carbon Forest Stocks

With the results obtained from these studies, we generated the fundamentals needed to propose the activities and action measures contemplated within the ENCCRV, which are based on a technical-scientific analysis and a participative process of regional and national scale.

The development of these studies has been coordinated by CONAF’s UCCSA unit within the GEDEFF Department and is focused on linking and aligning the results obtained in the cause identification and prioritization process with the aims of the ENCCRV. This coordination management allowed to collect -in a rigorous and synergetic manner- all of the identified and prioritized elements that make up the Strategy, especially the results of the technical and participatory workshops, expert meetings, and national-level cross-referencing of reports and existing information with regard to the subject.
Factors that cause deforestation, devegetation, degradation of forests and xerophytic formations, as well as the reasons that prevent or negatively interfere in the execution of restoration, conservation, sustainable management, enhancement and regeneration activities of native forests and xerophytic formations. The Decisions adopted by the UNFCCC’s Conference of Parties (CoP) mention the causes and thus request developing countries to identify and characterize them with the aim of addressing them in their national strategies or action plans and to ensure that the answer to those causes adapts to national circumstances.

Relevant national and international stakeholders participated in each one of these instances, along with representatives from every Focus Group (FG) or interested party. All of them were key in strengthening and validating the results of each one of the previously-described studies and processes, allowing the integration of different perspectives to the fulfillment of the objectives established by these studies.

This Informative Note is an overview of the results of the studies and participatory processes for defining the main causes for deforestation, devegetation, and degradation of vegetation resources and related issues for increasing their cover and quality and -as a result- the activities and action measures contemplated by the ENCCRV for addressing them.
2. Main Causes of Deforestation, Devegetation, Degradation of Vegetation Resources and related issues for increasing their cover and quality

2.1. Addressing causes within the context of the UNFCCC’s REDD+ Approach

CONAF – as a National Focal Point for the REDD+ approach before the UNFCCC Secretariat – conducted an in-depth analysis of the decisions adopted in the Conference of Parties (CoP) where the subject of deforestation and forest degradation is mentioned, constituting the conceptual basis to be applied and adapted to national circumstances when formulating the ENCCRV. These decisions require developing countries to identify the causes (Decision 4/CoP15), address them in their national strategies or action plans (Decision 1/CoP16) and to ensure that the answer to these causes adapts to national circumstances (Decision 15/CoP19). Particularly, these decisions state:
2.1.1. Decision 4/CoP.15:

It requests the (developing country) Parties to determine the causes of deforestation and forest degradation that generate emissions, as well as the means to eradicate them.\textsuperscript{7}

2.1.2. Decision 1/CoP.16:

It requests developing countries -when developing and applying their national strategies or action plans- to address, among other things, the causes for deforestation and forest degradation, land tenure issues, forest governance, gender considerations and safeguards, ensuring the full and effective participation of the interested parties, such as indigenous peoples and local communities.\textsuperscript{8}

2.1.3. Decisión 15/CoP.19:

Notes that while there may be means of life that depend on activities related to the factors that cause deforestation and forest degradation, and while the fight against these may involve an economic cost and have consequences for national resources, the decision establishes the following:

a. Reaffirms the importance of addressing drivers of deforestation and forest degradation in the context of the development and implementation of national strategies and action plans.

b. Recognizes that drivers of deforestation and forest degradation have many causes, and that actions aimed at addressing these drivers are unique to each country’s national circumstances, capacities and capabilities.

c. Encourages Parties, organizations and the private sector to take action to reduce the drivers of deforestation and forest degradation.

d. Also encourages all Parties, relevant organizations, and the private sector and other stakeholders, to continue their work to address drivers of deforestation and forest degradation and to share the results of their work on this matter, including via the web platform on the UNFCCC website.

e. Further encourages developing country Parties to take note of the information from ongoing and existing work on addressing the drivers of deforestation and forest degradation by developing country Parties and relevant organizations and stakeholders.\textsuperscript{9}

While for REDD+ it is explicitly requested that developing countries identify the causes of deforestation and land degradation, in addition to the issues that halt the enhancement of forest carbon stocks, within the ENCCRV formulation framework we decided to include this logic to other vegetation resources such as xerophytic formations, wetlands and high Andean wetlands, based on the national scope that this initiative has and on the social and environmental relevance that was assigned to them in several dialogue instances conducted throughout Chile.

2.2. Methodological Approach

Based on the results obtained from workshops with experts and with focus group representatives, in addition to the bibliographical revision and revision of official country data, analytical work was conducted by a multi-disciplinary team of specialists comprised of academics from the public sector, civil society, and private consultants, among others. The methodology that was developed for the study is comprised of 5 consecutive stages of development, depicted in Figure 2.

Subsequently, this process was assessed and validated by relevant stakeholders, as shown in Figure 3.
Methodological Scheme for the definition of causes and activities

1. Technical and participative identification of the main causes

2. Homologation and prioritization of the causes by Chile's Macro zones

3. Qualitative and quantitative characterization of the prioritized causes

4. Definition of Activities and Action Measures for addressing causes

5. Identification of priority areas communes for the implementation of the activities and action measures

Figure 2. Methodological Scheme for defining causes and activities.
2.2.1. Technical and participatory identification of the main causes

For the development of this first stage, the country was divided into three macro zones that account for similar ecological conditions, especially climatic conditions, under the assumption that there are differences among them in terms of the causes to be identified. The macro zones that were defined are:

**Central macro zone:** Valparaiso Region, Metropolitan Region and Region of Libertador Bernardo O’Higgins.

**South macro zone:** Regions of Maule, Biobio, La Araucania, Los Rios, Los Lagos, Aysen del General Carlos Ibanez del Campo and Magallanes and the Chilean Antarctica.

**North Macro zone:** Regions of Arica and Parinacota, Tarapaca, Antofagasta, Atacama and Coquimbo.

For each one of these macro zones, we worked with the following information sources (Figure 3):

- **Written Studies and References**
  - Review of Official Documentation of International Guidelines
  - State-of-the-art of causes in Chile
  - State-of-the-art in Chile in terms of opportunity costs
  - Previous projects and publications headed by CONAF for the formulation of ENCCRV

- **Regional ENCCRV Formulation Workshops**
  - Fifteen (15) regional workshops were conducted within the framework of the Strategic Environmental and Social Assessment (SESA) of the ENCCRV. The participation process included different focus groups with the participation of more than one thousand key stakeholders at a national level.
  - In these workshops, the participants were explicitly consulted with regard to the direct and indirect causes that they considered to be a priority and the possible measures that they considered the most relevant in order to address them.

- **Macro zone validation workshops**
  - Participative consultation process that considered regional technical stakeholders, including professionals from public services, academics and consultants.
    - **North Macro zone Workshop:** Regions XV, I, II, III and IV; held in the city of La Serena.
    - **Central Macro Zone Workshop:** Regions V, VI, VII and Metropolitan; held in the city of Santiago.
    - **South Macro Zone Workshop:** VIII, IX, X, XI and XIV and XII Regions, held in the city of Temuco.
  - The main objective of these three workshops was to gather the cause prioritization proposal of local stakeholders, the geographic distribution of the issue and the alternatives for mitigation.

- **Expert workshop**
  - A national-level expert workshop was held with different specialists from the climate change area and/or with experience on vegetation resource assessment. The results of this workshop allowed us to gather perspectives with regard to the different causes with a greater degree of knowledge in the subject matter and a better systematization of the information generated in the previous stages.

*Figure 3. Main sources of information for the identification, selection and prioritization of causes.*
The result of this stage was a systematized database where the document revision findings and participative process answers were recorded, exceeding 1,000 records associated to causes of deforestation, devegetation and degradation of native vegetation resources.

2.2.2. Homologation and prioritization of causes by Chile’s macro zones

The second step consisted in the homologation of the results obtained in the previous stage, which basically translates into identifying records with the same or similar meaning and intention, in addition to clarifying those inputs that presented confusing or inaccurate information. All of the above was conducted with the safeguard of intervening the least possible with the original idea provided by the participants, thus minimizing the interpretations of the group responsible for homologating and prioritizing.

The result of the process was a total of 26 homologated causes, out of which 22 were identified for the north macro zone, and 26 for the central and south macro zones. This difference accounts for the heterogeneity of the territories. The prioritization of these causes was primarily made based on the allocation and integration of three attributes: importance, uncertainty, and activity and passivity relation between causes.

**Importance**

The level of importance was determined by a simple function, based on three variables:

- Relative frequency of mentions for each of the causes in the consultation and background revision

\[
FRT = \frac{\text{Number of cause records}}{\text{Total number of records}}
\]
The relative frequency of mentions by geographic distribution was generated based on an innovative participatory methodology developed in the macro zone workshops, where local experts were asked to identify the main causes of degradation, devegetation and deforestation for their macro zone. Subsequent to this, they were asked to mark on deforestation and degradation macro zone maps, the areas where each cause has the highest incidence (Figure 4). This was named a “cause map”.

- Relative frequency of mentions for each one of the causes in the consultation by focus groups

\[
FRGF = \frac{\text{Number of focus groups in which a cause was recorded}}{\text{Total number of records in the cause map}}
\]

- Relative frequency of mentions by geographic distribution

\[
FRDG = \frac{\text{Number of spatial records in the cause map}}{\text{Total number of records in the cause map}}
\]

Figure 4. Example of mentions by geographic distribution.
The final equation used is:

\[
\text{Importance} = \left( \frac{\text{FRT}}{\text{Total of Causes}} + \frac{\text{FRGF}}{\text{Total of answers by focus group}} + \frac{\text{FRDG}}{\text{Total of points in the cause map}} \right) \times 100
\]

**Uncertainty**

Defined as the probability of occurrence of validated information that allows characterizing the cause in relation to its magnitude and associated GHG emissions. It is classified into four levels (Figure 5):

- **Very High**: here is no direct metric, nor is it possible to estimate it directly with the available information.
- **High**: there is no direct metric, but it is possible to estimate the effects indirectly, as in the case of degradation due to informal firewood extraction.
- **Average**: there are sources that allow quantifying the cause; however they are not official, such as the case of university studies, publications, among others.
- **Low**: in case there is an official metric, such as the case of deforestation due to land use change, which is registered in the change analyses of the regional updates of Chile’s Vegetation Resource Cadaster, operated by CONAF.

*Figure 5. Classification of uncertainty*
Relation of activity or passivity between causes

There are interrelationships, interactions or synergies between causes; therefore one cause may induce and/or drive other causes (called active causes). Another way of formulating these interactions is by assuring that "cause A is active over cause B" given it defines or drives it.

Based on this definition, a contingency matrix was structured for each one of the homologated causes, where the relation of dependency of the cause in the column was assigned to the cause in the row using dichotomous "Active" or "Not Active" option, as shown in Figure 6. The total count on each "Active" row determined the level of activity of its corresponding cause; this number is a measure of the causes it depends on. The determination value of the level of activity or influence of one cause over other causes lies in the fact that managing one very active cause means reducing the potential effects of all those causes that depend on it.

Similarly, a second product provided by the contingency matrix is the total number of "Active" causes for causes indicated in the matrix column, which indicates their level of passivity, i.e. the level of dependency of other causes, which—in terms of planning—means the possibility of reducing the effects of a passive causes when managing those active causes that determine it.

This contingency matrix was conducted during a workshop, with the participation of a multi-disciplinary team that included public officials, NGOs, academics, trade union representatives and international specialists.

Once the three attributes: Importance, Uncertainty, and Relation of activity or passivity were determined for each homologated cause, they were ranked according to their form of action, and the two following categories were defined:

**Direct Cause**

Human activities or actions that have a direct impact on vegetation resources.

**Indirect Cause**

Processes of social, economic, political and/or cultural nature that generate or drive a direct cause.

The results by macro zone in terms of direct or indirect causes are detailed in Figure 7.
### North Macro zone Causes

<table>
<thead>
<tr>
<th>Cause</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effects of climate change, desertification, land degradation and drought</td>
<td>High</td>
</tr>
<tr>
<td>Unsustainable use of vegetation resources for livestock farming</td>
<td>High</td>
</tr>
<tr>
<td>Expansion of agricultural and livestock activities</td>
<td>High</td>
</tr>
<tr>
<td>Urban and industrial expansion</td>
<td>High</td>
</tr>
<tr>
<td>Unsustainable use of vegetation resources for production</td>
<td>Average</td>
</tr>
<tr>
<td>Over-exploitation of water</td>
<td>Average</td>
</tr>
<tr>
<td>Effects of pollution</td>
<td>Average</td>
</tr>
<tr>
<td>Forest fires</td>
<td>Low</td>
</tr>
<tr>
<td>Pests and diseases</td>
<td>Low</td>
</tr>
<tr>
<td>Unsustainable use of forestry crops</td>
<td>Low</td>
</tr>
<tr>
<td>Soil erosion</td>
<td>Low</td>
</tr>
<tr>
<td>Deficiency in forest institutionality</td>
<td>Low</td>
</tr>
<tr>
<td>Over-exploitation of water</td>
<td>Low</td>
</tr>
<tr>
<td>Effects of pollution</td>
<td>Low</td>
</tr>
<tr>
<td>Forest fires</td>
<td>Low</td>
</tr>
<tr>
<td>Pests and diseases</td>
<td>Low</td>
</tr>
<tr>
<td>Unsustainable use of forestry crops</td>
<td>Low</td>
</tr>
<tr>
<td>Soil erosion</td>
<td>Low</td>
</tr>
</tbody>
</table>

**Figure 7.** Main causes by each macro zone.
### Central Macro zone Causes

<table>
<thead>
<tr>
<th>Type of Cause</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effects of climate change, desertification, land degradation and drought</td>
<td>High</td>
</tr>
<tr>
<td>Expansion of agricultural and livestock activities</td>
<td>High</td>
</tr>
<tr>
<td>Forest fires</td>
<td>High</td>
</tr>
<tr>
<td>Unsustainable use of vegetation resources for production</td>
<td>High</td>
</tr>
<tr>
<td>Unsustainable use of vegetation resources for livestock farming</td>
<td>High</td>
</tr>
<tr>
<td>Urban and industrial expansion</td>
<td>Average</td>
</tr>
<tr>
<td>Unsustainable use of forestry crops</td>
<td>Low</td>
</tr>
<tr>
<td>Advancement of sand dunes</td>
<td>Low</td>
</tr>
<tr>
<td>Soil erosion</td>
<td>Low</td>
</tr>
<tr>
<td>Pests and diseases</td>
<td>Low</td>
</tr>
<tr>
<td>Over-exploitation of water</td>
<td>Low</td>
</tr>
<tr>
<td>Deficiencies in public policies of regulation, promotion and supervision</td>
<td>High</td>
</tr>
<tr>
<td>Low level of knowledge and cultural valuation of vegetation resources</td>
<td>High</td>
</tr>
<tr>
<td>Low profitability in opportunity costs</td>
<td>Average</td>
</tr>
<tr>
<td>Rural poverty with its consequent lack of opportunities</td>
<td>Average</td>
</tr>
<tr>
<td>Deficiency of the economic model for the use of native forests</td>
<td>Average</td>
</tr>
<tr>
<td>Conflicts or issues due to property ownership and fragmentation</td>
<td>Low</td>
</tr>
<tr>
<td>Deficiency in forest institutionality</td>
<td>Low</td>
</tr>
<tr>
<td>Stigmatization of forest plantations</td>
<td>Low</td>
</tr>
</tbody>
</table>

### South Macro zone Causes

<table>
<thead>
<tr>
<th>Type of Cause</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest fires</td>
<td>High</td>
</tr>
<tr>
<td>Unsustainable use of vegetation resources for production</td>
<td>High</td>
</tr>
<tr>
<td>Unsustainable use of vegetation resources for livestock farming</td>
<td>Average</td>
</tr>
<tr>
<td>Unsustainable use of forestry crops</td>
<td>Average</td>
</tr>
<tr>
<td>Effects of climate change, desertification, land degradation and drought</td>
<td>Low</td>
</tr>
<tr>
<td>Expansion of agricultural and livestock activities</td>
<td>Low</td>
</tr>
<tr>
<td>Urban and industrial expansion</td>
<td>Low</td>
</tr>
<tr>
<td>Effects of pollution</td>
<td>Low</td>
</tr>
<tr>
<td>Pests and diseases</td>
<td>Low</td>
</tr>
<tr>
<td>Over-exploitation of water</td>
<td>Low</td>
</tr>
<tr>
<td>Soil erosion</td>
<td>Low</td>
</tr>
<tr>
<td>Deficiencies in public policies of regulation, promotion and supervision</td>
<td>High</td>
</tr>
<tr>
<td>Low level of knowledge and cultural valuation of vegetation resources</td>
<td>High</td>
</tr>
<tr>
<td>Informality in the firewood market</td>
<td>Average</td>
</tr>
<tr>
<td>Rural poverty with its consequent lack of opportunities</td>
<td>Average</td>
</tr>
<tr>
<td>Low profitability in opportunity costs</td>
<td>Low</td>
</tr>
<tr>
<td>Deficiency of the economic model for the use of native forests</td>
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<tr>
<td>Conflicts or issues due to property ownership and fragmentation</td>
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<tr>
<td>Stigmatization of forest plantations</td>
<td>Low</td>
</tr>
</tbody>
</table>
2.2.3. Qualitative and quantitative characterization of the prioritized causes

Information systematization was conducted with the obtained results, with the aim of working in the qualitative and quantitative characterization of each of the direct prioritized causes and their respective related indirect causes.

**Quantitative characterization**

For quantitative characterization, we estimated the annual affected areas for each direct cause and associated GHG emissions; this was only possible due to the presence of carbon emissions and removals of vegetation resources for those areas. This estimation was fairly simple for those causes of low uncertainty such as land use change due to expansion of agricultural or industrial activities; nevertheless, for other causes of higher uncertainty, the quantitative estimation could not be conducted or was estimated through indirect methods as shown in Tables 3 and 4.

### Table 2. Quantitative estimation procedure based on uncertainty.

#### Activity: Deforestation and Devegetation

**Estimation of area and emissions**

Analysis of land use-change according to the Vegetation Resource Cadaster; and estimation of GHG emissions for each type of land use-change according to Chile’s FREL/FRLs.

#### Activity: Degradation

**Estimation of area and emissions**

The figures for each cause were estimations that used as a base the total area and emissions due to degradation obtained from the FREL/FRLs, integrating emissions from forest fires and the substitution of native forests for monospecific forest plantations of industrial nature. A percentage (%) of the total emissions from degradation was assigned to each cause, considering the adjusted value of Importance of each one of them, as explained in the previous chapter.

#### Activity: Trouble with increasing the quality and quantity (areal) of vegetation resources

**Estimation of area and emissions**

This estimate does not apply.

As an example, and only for Regions between Maule and Los Lagos that have a FREL/FRL, the quantitative characterization of the direct causes was conducted, estimating the affected area and the subsequent emissions associated to deforestation and forest degradation for 2001–2010 (Table 3 and 4).
Qualitative characterization

We worked on the qualitative description of each cause based on the previous information, adding bibliographic information, quantitative historical information and the professional experience of each one of the experts that participated in this instance. In addition, the information generated throughout the entire process was graphed in "relation trees", associating each direct cause with the indirect causes acting over them, each one with their attributes accounted for graphically (see Figures 7, 8, 9, 10, 11, 12, 13 and 14).

<table>
<thead>
<tr>
<th>Deforestation Causes</th>
<th>Area (ha/year)</th>
<th>tCo Emissions 2e/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unsustainable use of vegetation resources for production</td>
<td>3,041</td>
<td>1,622,855</td>
</tr>
<tr>
<td>Expansion of agricultural and livestock activities</td>
<td>1,165</td>
<td>621,519</td>
</tr>
<tr>
<td>Unsustainable use of vegetation resources for livestock farming</td>
<td>1,165</td>
<td>621,519</td>
</tr>
<tr>
<td>Urban and industrial expansion</td>
<td>324</td>
<td>172,644</td>
</tr>
<tr>
<td>Others</td>
<td>776</td>
<td>414,346</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6,471</strong></td>
<td><strong>3,452,883</strong></td>
</tr>
</tbody>
</table>

Table 3. Quantitative estimation of emissions due to deforestation causes.

<table>
<thead>
<tr>
<th>Causes of Forest Degradation</th>
<th>Area (ha/year)</th>
<th>tCo Emissions 2e/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unsustainable use of forestry crops</td>
<td>11,921</td>
<td>4,076,040</td>
</tr>
<tr>
<td>Unsustainable use of vegetation resources for production</td>
<td>indefinite</td>
<td>2,302,763</td>
</tr>
<tr>
<td>Forest Fires</td>
<td>4,884</td>
<td>1,127,745</td>
</tr>
<tr>
<td>Unsustainable use of vegetation resources for livestock farming</td>
<td>indefinite</td>
<td>1,001,201</td>
</tr>
<tr>
<td>Effects of climate change, desertification, land degradation and drought</td>
<td>indefinite</td>
<td>800,961</td>
</tr>
<tr>
<td>Effects of pollution</td>
<td>indefinite</td>
<td>200,240</td>
</tr>
<tr>
<td>Others</td>
<td>indefinite</td>
<td>500,601</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>396,091</strong></td>
<td><strong>10,009,551</strong></td>
</tr>
</tbody>
</table>

Table 4. Quantitative estimation of emissions due to deforestation causes.
As shown in the figure above, forest fires are a direct cause of high importance and low uncertainty that generates deforestation and degradation of forests and other vegetation resources. In addition, seven causes are active over them; with the most important being the deficiencies in public policies due to regulation and supervision and the effects of climate change.

**Figure 8.** "Forest Fires" Cause and its relation tree.
Figure 9. "Unsustainable Use of Vegetation Resources for Production" Cause and its relation tree.
Figure 10. "Unsustainable Use of Vegetation Resources for Livestock Farming" Cause and its relation tree.
Figure 11. Cause of “Unsustainable Management of Forestry Crops” and its relationship chart.
Figure 12. Cause of “Expansion of Agricultural and Livestock Activity” and its relationship chart.
Figure 13. Cause of “Effects of Climate Change, Desertification, Land Degradation and Drought” and its relationship chart.
Relation Tree of Direct Causes
PESTS AND DISEASES
(Average Importance / Low Uncertainty)

Active Causes
PESTS AND DISEASES

Deficiency in public policies due to regulation

Deficiency in public policies due to promotion

Degradation

No Stock Enhancement

Unsustainable use of vegetation resources for production

Unsustainable management of forestry crops

Pests and Diseases

Figure 14. Cause of “Pests and Diseases” and its relationship chart.
2.2.4. Definition of activities and action measures for addressing causes

Based on the previously described cause analysis and following the methodological scheme in Figure 2, a series of Activities have been proposed within the framework of the ENCCRV with their respective mitigation and adaptation Action Measures, shaping the technical and operational base for fulfilling the related objectives and goals for tackling the main direct and indirect causes.

The main concepts that shape the operational structure of the ENCCRV shall be clearly understood, therefore they are defined as follows:

**ENCCRV Activities**

Set of action measures, consistent with vegetation diversity and the different local realities of the country, aimed at addressing the causes of deforestation, devegetation, degradation of forests and xerophytic formations, as well as the motives that prevent or negatively interfere in the execution of activities of restoration, conservation, sustainable management, enhancement and regeneration of vegetation resources.

**Action Measures**

Specific definition of the actions that make up an activity. These action measures may have a specific impact on one of the causes or may be of cross-cutting nature; they are those that simultaneously address two or more causes. Action measures may also be:

- **Direct**
  Those that generate environmental, social and economic benefits directly over the territory given their operational nature.

- **Facilitating**
  Those that facilitate or drive the implementation of the direct measures.

The following categories were considered for defining action measures:

**Institutional management:**
Institutional arrangements for coordinating public services in order to facilitate the implementation of the action measure.

**Operational:**
Execution of on site actions under established practices and schemes.

**Regulatory:**
Improvements, modifications and inclusions in the current and developing legislation.

**Supervision:**
Improvements, modifications and inclusions in forest and environmental supervision instruments.

**Promotion:**
Improvements, modifications and inclusions in public promotion instruments.

**Territorial Planning:**
Management improvements at a landscape and territory level.

**Formation and/or transfer of capabilities:**
Reducing gaps in technical and technological capabilities.

**Environmental education and awareness-raising:**
Reduction of information and uncertainty gaps; change of attitudes and perceptions.

**Research:**
Generation of knowledge and reduction of information and uncertainty gaps.

Within this context, the ENCCRV has proposed conducting seven (7) activities associated to the prioritized direct causes, along with one (1) cross-cutting activity that addresses all causes. These activities involve the implementation of 26 action measures, out of which 7 are direct and 19 are facilitating measures developed in several fields of action (Figure 15).
Causes
Drivers that generate GHG emissions and increase the vulnerability of terrestrial ecosystems, and communities dependent on them.

Activities

**Direct**
- **MT. 4.** Program for Reforestation and revegetation in prioritized communes/areas
- **MT. 5.** Strengthening of ecological restoration program in prioritized communes/areas

**Facilitating**
- **MT. 1.** Inclusion of climate change, DDL and issues in new Forestry Development Law
- **MT. 2.** Amendment and strengthening of Law No. 20,283 on Native Forest Recovery and Forest Promotion and its regulations
- **MT. 3.** Adjustments for the inclusion of landowners with poor legal certainty of land tenure
- **MT. 6.** Environmental education and diffusion program
- **MT. 7.** Strengthening of forest and environmental supervision programs
- **MT. 8.** Strengthening and updating Management Plans of SNASPE areas within the context of the ENCCRV

**IF.**
- **IF. 1.** Estimation of greenhouse gas emissions and fire severity analysis
- **IF. 2.** Program for the restoration of ecosystems affected by forest fires
- **IF. 3.** Program for Preventive Silviculture with emphasis on the rural-urban interface
- **IF. 4.** Strengthening of “Communities Prepared Against Forest Fires” Program
- **IF. 5.** Inclusion of preventive management elements and post fire restoration in Law No. 20,283 and its regulations
- **IF. 6.** Program on technological transfer of alternatives for the use and management of agroforestry and livestock wastes

**US.**
- **US. 1.** Program for institutional forest management with emphasis on public and private lands
- **US. 2.** Strengthening of wood energy program and the country’s energy matrix
- **US. 3.** Integrated regulatory and tax exemption system for promotion of chain of production

**MG.**
- **MG. 1.** Buffer strips for livestock activity
- **MG. 2.** Strengthening and extension of Summer Pasture Management Committees
- **MG. 3.** Agricultural Research Program

**Figure 15.** Graph of causes, activities and action measures.
2. Main Causes of Deforestation, Devegetation, Degradation of Vegetation Resources and related issues for increasing their cover and quality

* While no specific action measures are established for the Urban and Industrial Expansion cause, several measures of cross-cutting nature were graphed as elements that will allow to reduce its effect on vegetation resources.
Each one of these action measures are described with their respective fields of action, annual goals, responsible departments within CONAF and budget\textsuperscript{10}.

2.2.5. Identification of priority areas/communes for the implementation of the action measures

As a last methodological stage, we are working on the development of a multivariable algorithm that allows prioritizing areas for the implementation of the proposed action measures, with the aim of making their impact more efficient and effective, in addition to fulfilling the objective set out in the ENCCRV, addressing social, environmental and economic criteria.

In this regard, we have progressed in the creation of thematic cartographic covers (Figure 16) that will identify environmental, economic and social variables, including e.g. FREL/FRLs, territorial incidence of causes, social vulnerability index, intervention costs, among others.

\textbf{Figure 16.} Cover; example of prioritization of areas for the implementation of action measures.

\textsuperscript{10} Available at: http://www.enccrv-chile.cl/index.php/actividades
3. Conclusions

01. We identified and analyzed 26 causes of deforestation, devegetation, degradation of vegetation resources and related issues for increasing their cover and quality, through the participation of more than 1,266 local stakeholders consulted in the framework of the Strategic Environmental and Social Assessment (SESA). Twelve of these causes were defined as direct and fourteen as indirect causes.

02. The methodology used to rank causes by order of importance accounted for the use of variables such as the frequency of mentions in workshops, the uncertainty of the information and their relation of influence over other causes. Based on this methodology, it was determined that the main direct causes of deforestation and devegetation, degradation of vegetation resources and related issues for increasing their cover and quality were the unsustainable use of vegetation resources for production, unsustainable management of forestry crops and forest fires, followed by the unsustainable use of vegetation resources for livestock farming, the expansion of the agricultural and livestock activity and the effects of climate change, desertification, land degradation and drought.

03. Seven activities shall be implemented for addressing the main causes of deforestation, devegetation, degradation of vegetation resources and related issues for increasing their cover and quality in Chile; these are: 1) Strengthening of management in forest fire prevention and restoration of burnt areas. 2) Sustainable management model for vegetation resources. 3) Model Areas of public–private management that reconcile the use of vegetation resources with livestock farming. 4) Strengthening of phytosanitary protection in native vegetation resources. 5) Adaptive management of vegetation resources to climate change, desertification, land degradation and drought. 6) Regulatory adjustment and agro pasture development compatible with native vegetation resources and 7) Supporting the forest sector by promoting forest management sustainability.

04. Twenty-six action measures have been defined for mitigating the main causes, out of which 7 account for direct and 19 for facilitating action measures.

05. With regard to the indirect causes of deforestation, devegetation, degradation of vegetation resources and related issues for increasing the cover and quality of forests, the deficiencies in national policies are the most relevant, as indicated by workshop participants, particularly those related to regulation policies and forest promotion policies. Despite high uncertainty and difficulties for defining its quantitative contribution, social aspects related to rural poverty and lack of opportunities are relevant in terms of the frequency with which they were mentioned in the participative formulation and validation instances of the ENCCRV.
4. Bibliography

- CONAF, 2016a. Support in the generation and analysis of the causes of deforestation, forest degradation and no enhancement of forest carbon stocks, identifying strategic options for addressing them within the framework of Chile's ENCCRV. Universidad Mayor Consulting Service, Oterra, EBP Chile, AIFBN and CIREN.


5. Acronyms and Abbreviations

- CDB: Convention on Biological Diversity.
- CIREN: Natural Resources Information Center.
- CNULD: United Nation's Convention to Combat Desertification.
- COP: Conference of Parties.
- ENCCRV: National Strategy on Climate Change and Vegetation Resources.
- GEDEFF: Forest Development and Promotion Management Department.
- GEI: Greenhouse gases.
- NREF/NRF: Forest Reference Emission Levels/Forest Reference Levels (FREL/FRL).
- ONG: Non-governmental Organization.
- SESA: Strategic Environmental and Social Assessment.
- UCCSA: CONAF’s Climate Change and Environmental Services Unit.