CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA

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Seventy-fifth meeting of the Standing Committee
Panama City (Panama), 13 November 2022

Interpretation and implementation matters

General compliance and enforcement

# REVIEW OF SIGNIFICANT TRADE IN SPECIMENS OF APPENDIX-II SPECIES

1. This document has been prepared by the Secretariat.

## Background

2. The role and responsibilities of the Standing Committee in conducting the Review of Significant Trade (RST) in specimens of Appendix-II species are described in paragraph 1 k) to p) and paragraph 2 of Resolution Conf. 12.8 (Rev. CoP17) on *Review of Significant Trade in specimens of Appendix-II species*.

3. In the present document, the Secretariat reports to the Standing Committee on actions which have taken place under the RST since the Committee considered this matter at its 74th meeting (SC74, Lyon, March 2022). At SC74, the Committee agreed to receive reports on the implementation of recommendations for a number of species/country combinations at the present meeting: *Ara ararauna* (blue and gold macaw), *Anguilla anguilla* (European eel) from Algeria, Morocco and Tunisia; *Pterocarpus santalinus* (red sandalwood) from India; *Nardostachys grandiflora* (spikenard) from Nepal; and *Bulnesia sarmientoi* (holy wood) from Paraguay. These can be found below in Section A for fauna and Section B for flora. The Secretariat also reports on action undertaken by the Plants Committee in relation to trade in *Pterocarpus erinaceus* (African rosewood).

## Section A -FAUNA

4. In accordance with paragraph 1 k) of the Resolution Conf. 12.8 (Rev. CoP18), on 9 September 2022, the Secretariat consulted intersessionally with the members of the Animals Committee through its Chair concerning the implementation of the recommendations of the four fauna species/country combinations agreed for reporting at the present meeting. The views of the Animals Committee are included in Annex 2 to the present document (in the language in which they were received); and have been taken into consideration by the Secretariat in formulating its recommendations for each of these four ongoing cases.

5. Guyana/ *Ara ararauna*

*Background to the case*

a) The Animals Committee selected *Ara ararauna* from Guyana for review under RST at the 29th meeting of the Animals Committee (AC29, Geneva, July 2017). Guyana provided a response to the consultation by the Secretariat, but at its 30th meeting (AC30, Geneva, July 2018), the Animals Committee retained the species/country combination in RST based on concerns over high quotas and the basis for non-detriment findings. At AC29, the Animals Committee determined that “Action is needed” concerning trade in *A. ararauna* from Guyana and formulated recommendations, which can be found in Section A of Annex 1 of this document.

b) At SC74, the Standing Committee requested Guyana to share the results of its population study of psittacines and agreed that, in relation to the Animals Committee recommendations a) and b), the Standing Committee at the present meeting would consider the increase in the export quota proposed by Guyana for this species, from 660 to 760, following its review by the Animals Committee. Also, at SC74, the Standing Committee urged Guyana to provide information on the implementation of the outstanding recommendations c) to k) no later than three months before the documentation deadline for SC77. On 12 April 2022, the Secretariat wrote to Guyana to inform it on the outcome of SC74.

*Response from the range State*

c) Guyana's response is presented in Annex 3 to this document in the language and format as received and its content is summarized and assessed against the recommendations of the Animals Committee in Section A of Annex 1 to the present document.

*Determination of implementation*

d) In compliance with recommendation a) and b), Guyana communicated its proposed increase in quota to the Secretariat, along with supporting information. However, following consultation with the Animals Committee, the Secretariat does not consider that Guyana has provided sufficient information to justify the proposed increase.

*Recommendations of the Secretariat following consultation with the Animals Committee*

e) The Standing Committee is invited to:

i) welcome the progress made by Guyana in undertaking this study;

ii) invite Guyana to clarify how the data from the survey was used to determine the sustainable level of offtake and the proposed export quota; and address the concerns by the Animals Committee in its review of the study (see Annex 2 to this document); and

iii) invite Guyana to submit a new non-detriment finding, based on survey data, for review by the Animals Committee.

Algeria, Morocco, Tunisia/ *Anguilla anguilla*

*Background to the cases*

6. Trade in *A. anguilla* from Algeria, Morocco and Tunisia was selected for review at AC29 under Resolution Conf. 12.8 (Rev. CoP17) on RST which was the relevant version of the Resolution in force at the time of selection (see documents AC29 Doc. 13.3 and AC29 Com 5 (Rev. by Sec.)).

7. At its 30th meeting (AC30, Geneva, July 2018), the Animals Committee reviewed the available information on these taxa, including responses from the range States in accordance with paragraph f) of Resolution Conf. 12.8 (Rev. CoP18). The Committee recommended the retention of the three range States for *A. anguilla* at AC30 and formulated recommendations for each species/country combination in order to address problems with the implementation of the non-detriment finding referred to in Article IV of the Convention, as presented in AC30 Com. 11 (Rev. by Sec.).

8. The status of the implementation of the Animals Committee recommendations was reported by the Secretariat at SC74 in document SC74 Doc. 30.1 and its addendum. Based on these documents, the Committee made recommendations that can be found in the summary record from SC74, including the following concerning *A. anguilla*:

a) For trade in *A. anguilla* from Algeria, the Committee noted that recommendations a) and b) have been complied with; invited Algeria to submit the scientific justification for the proposed increase in the quota; and commended Algeria for the progress made to date in implementing the remaining recommendations c) to l).

b) For trade in *A. anguilla* from Morocco, the Committee acknowledged that the situation for production of specimens of the species in Morocco is different from that of Algeria and Tunisia; and commended

Morocco for the detailed response it has provided and the measures it has put in place to manage the species and ensure a strong traceability system is in place.

C) For trade in *A. anguilla* from Tunisia, the Committee noted that recommendations a) and b) have been complied with; and commended Tunisia for the progress made to date in implementing the remaining recommendations c) to l).

9. At SC74, the Standing Committee also requested the Secretariat to produce a detailed summary of the information provided by Algeria, Morocco and Tunisia for review by the Animals Committee and the anguillid specialist group of the International Union for Conservation of Nature (IUCN), to be further considered by the present meeting.

10. On 20 April 2022, the Secretariat wrote to the three Parties concerned inviting them to examine document SC74 Doc. 30.1 and their responses in Annex 4 to that document to ensure that they are complete and to provide any supplementary information or updates regarding implementation of relevant recommendations of the Animals Committee, in particular any supplementary information concerning proposed increases in their export quotas. Additional information was provided by Algeria and Morocco. These are included in Annex 3 to the present document (in the language in which they were received).

11. The Secretariat prepared a summary of each case, based on all of the documentation available, that was circulated to the members of the Animals Committee and the IUCN anguillid specialist group. The views of the Animals Committee can be found in Annex 2 to the present document (in the language in which they were received). The IUCN anguillid specialist group will provide an oral account of its views at the present meeting.

Algeria/ *Anguilla anguilla*

12. The content of Algeria's response is summarized and assessed against the recommendations of the Animals and Standing Committees in Section A of Annex 1 to the present document.

13. Algeria has submitted supporting information for a proposed export quota increase from 8 tonnes to 20 tonnes under recommendation c) but the Secretariat and the Animals Committee deem it to be insufficient. Algeria has also made some progress towards the implementation of the remaining recommendations. Recommendations e) and f) have been implemented and some progress has been made towards the implementation of recommendations d) and g) to l), but they have yet to be implemented fully.

14. It remains the view of the Secretariat that Algeria has not provided sufficient justification or data to demonstrate that the proposed increase in the export quota from 8,000 kg to 20,000 kg is sustainable.

*Recommendations of the Secretariat following consultation with the Animals Committee*

15. The Standing Committee is invited to:

a) instruct Algeria to maintain its current annual export quota for *A. anguilla* of 8,000 kg wild-taken adult eels and 0 glass eels, until it provides a justification for any revised quota, demonstrating how the change is conservative, based on estimates of sustainable off-take that make use of best available scientific information, to the Secretariat and the Chair of the Animals Committee, for their agreement;

b) agree that recommendations e) and f) have been implemented;

c) commend Algeria for the progress made to date in implementing the remaining recommendations d) and g) to l); and

d) invite Algeria to provide an update on the implementation of the outstanding recommendations three months before the documentation deadline for SC77.

Morocco/ *Anguilla anguilla*

16. The content of Morocco's response is summarized and assessed against the recommendations of the Animals and Standing Committees in Section A of Annex 1 to the present document.

17. Morocco has submitted supporting information for a proposed quota increase under recommendation c) from 500,000 kg to 600,000 kg of live adult eels, but the Secretariat and the Animals Committee do not deem it to be sufficient. It is the view of the Secretariat that it is currently not possible to determine if the increase in the export quota requested is conservative and if it is based on estimates of sustainable off-take that make use of best available scientific information. However, Morocco has indicated that it will be possible to obtain the first estimates of eel stocks from the eel monitoring study it has initiated, the first results of which are expected in December 2022. The Secretariat suggests awaiting the first results of this study before coming to a conclusion on the proposed quota increase.

*Recommendations of the Secretariat following consultation with the Animals Committee*

18. The Standing Committee is invited to:

    a) commend Morocco for the considerable progress it has made and the measures it has put in place to manage the species and ensure a strong traceability system is in place;

    b) instruct Morocco to maintain its current quotas of 500,000 kg of live adult eels [raised in aquaculture based on a harvest of 2t of glass eels], 5,500 kg of wild-taken adult eels and 0 live glass eel [fingerlings] of *A. anguilla* until it provides a justification for any increased quota, demonstrating how the change is conservative, based on estimates of sustainable off-take that make use of best available scientific information, to the Secretariat and the Chair of the Animals Committee, for their agreement. In this regard, Morocco should clarify how the proposed increase in the harvest quota for glass eels of 2 tonnes to 4 tonnes will only yield an additional 100 tonnes of adult eels from the farms and share the results of its stock assessment studies when they become available; and

    c) invite Morocco to provide an update on the implementation of the outstanding recommendations three months before the documentation deadline for SC77.

Tunisia/ *Anguilla anguilla*

19. The content of Tunisia's response is summarized and assessed against the recommendations of the Animals and Standing Committees in Section A of Annex 1 to the present document.

20. Tunisia has not requested an increase in its interim export quota under recommendation c). The remaining recommendations d) to l) have been partially complied with.

*Recommendations of the Secretariat following consultation with the Animals Committee*

21. The Standing Committee is invited to:

    a) commend Tunisia for the considerable progress made to date in implementing recommendations c) to l);

    b) instruct Tunisia to maintain its current quota for *A. anguilla* of 90,000 kg of eels, where export is restricted to specimens greater than 30cm in length and 0 glass eels, until it provides a justification for any increased quota, demonstrating how the change is conservative, based on estimates of sustainable off-take that make use of best available scientific information, to the Secretariat and the Chair of the Animals Committee, for their agreement; and

    c) invite Tunisia to provide an update on the implementation of the outstanding recommendations three months before the documentation deadline for SC77.

## Section B -FLORA

22. In the context of paragraph 1 k) of the Resolution Conf. 12.8 (Rev. CoP18), on 9 September 2022, the Secretariat consulted intersessionally with the members of the Plants Committee concerning the implementation of the recommendations of the three flora species/country combinations agreed for reporting at the present meeting. The responses from the Plants Committee in the language in which they were received, are included in Annex 4 to the present document; and have been considered by the Secretariat in formulating its recommendations for each of these three ongoing cases.

23. India/ *Pterocarpus santalinus*

*Background to the case*

a) Trade in *Pterocarpus santalinus* from India was selected for review under the RST at the 22nd meeting of the Plants Committee (PC22, Tbilisi, October 2015). At its 23rd meeting (PC23, Geneva, July 2017), the Committee decided to retain this species/country combination in the review process and formulated recommendations in order to address problems with the implementation of the non-detriment finding referred to in Article IV of the Convention.

b) The status of the implementation of the Plants Committee recommendations for this case was reported in detail by the Secretariat to the Standing Committee at SC70, SC71 and SC74 in documents SC70 Doc. 29.1, SC71 Doc. 12, SC74 Doc. 30.1 and its addendum, respectively. The agreements of the Standing Committee at SC70, SC71 and SC74 are summarized in Section B of Annex 1 to the present document.

c) The Committee requested the Secretariat to review the additional information provided by India in consultation with the Plants Committee, through its Chair, and to provide an update to the present meeting. On 12 April 2022, the Secretariat wrote to India to inform it of the outcome of SC74. The response and follow-up from India since SC74 are summarized below.

*Response from range State*

d) India replied to the Secretariat's communication regarding *Pterocarpus santalinus* on 20 April and 16 June 2022, and also provided further clarifications by email throughout March and August 2022.

e) The content of India's responses and email communications are summarized and assessed against the Plants and Standing Committees' recommendations in Section B of Annex 1 to the present document.

*Determination of implementation*

f) Recommendations a) and b) of the Plants Committee, and associated recommendations c) to h) of the Standing Committee, have been complied with.

g) Recommendations i) to k) of the Standing Committee remain ongoing, pending upcoming updates by India in the implementation of the remaining credit of the one-time export of confiscated specimens, as well as that of any quotas to be established for non-wild specimens in the run up to SC77.

*Recommendations of the Secretariat following consultation with the Plants Committee*

h) As required by paragraph 1 k) of Resolution Conf. 12.8 (Rev. CoP17), the Secretariat consulted the members of the Plants Committee through their Chair concerning the above determination and recommends the Standing Committee to:

   i) commend India on the completion of the implementation of recommendations a) and b) of the Plants Committee; and,

   ii) encourage India to provide an update on the remaining credit of the one-time export of *Pterocarpus santalinus* from confiscated specimens (source code "I"), as well of that of any additional exports of confiscated specimens, in time for the matter to be considered at SC77.

24. Nepal/ *Nardostachys grandiflora*

*Background to the case*

a) At its 21st meeting (Veracruz, May 2014) the Plants Committee selected *Nardostachys grandiflora* for RST. At PC22, the Committee agreed to retain the species/country combination *Nardostachys grandiflora*/Nepal in the RST and formulated recommendations in order to address problems with the implementation of the non-detriment finding referred to in Article IV of the Convention.

b) The status of the implementation of the Plants Committee recommendations for this case was reported in detail by the Secretariat to the Standing Committee at SC70, SC71 and SC74 in documents SC70

Doc. 29.1, SC71 Doc. 12, SC74 Doc. 30.1 and its addendum, respectively. The agreements of the Standing Committee at SC70, SC71 and SC74 are summarized in Section B of Annex 1 to the present document.

c) At SC74, the Standing Committee commended Nepal in its commitment to establish precautionary export quotas for *Nardostachys grandiflora* and requested Nepal to continue to consult with the Secretariat and the Chair of the Plants Committee on any quota for 2022 onwards and requested the Secretariat to report progress on this case to the present meeting, including recommendations regarding its potential removal from the RST process. On 12 April 2022, the Secretariat wrote to Nepal to inform it of the outcome of SC74.

*Response from range State*

d) Through a letter dated 16 September 2022, Nepal submitted a quota request for *N. grandiflora* for the year 2022. The content of Nepal's request, and assessment thereof by the Secretariat and the Chair of the Plants Committee is summarized and assessed against the Plants and Standing Committees' recommendations in Section B of Annex 1 to the present document.

*Determination of implementation*

e) The Plants Committee's recommendations and associated recommendations of the Standing Committee have been complied with.

*Recommendations of the Secretariat following consultation with the Plants Committee*

f) As required by paragraph 1 k) of Resolution Conf. 12.8 (Rev. CoP17), the Secretariat has consulted with the members of the Plants Committee through their Chair concerning the above determination and recommends that the Standing Committee agree that Nepal has complied with all recommendations for *Nardostachys grandiflora* and can be removed from the RST process.

25. Paraguay/ *Bulnesia sarmientoi*

*Background to the case*

a) At PC21, the Plants Committee selected *Bulnesia sarmientoi* for the RST. At PC22, the Plants Committee agreed to retain the species/country combination *Bulnesia sarmientoi*/Paraguay in the RST. At PC23, the Plants Committee agreed to retain this species/country combination in the review process and formulated recommendations in order to address problems with the implementation the non-detriment finding referred to in Article IV of the Convention.

b) The status of the implementation of the Plants Committee recommendations for this case was last reported in detail by the Secretariat to the Standing at SC70, SC71 and SC74 in documents SC70 Doc. 29.1, SC71 Doc. 12, SC74 Doc. 30.1 and its addendum respectively. The agreements of the Standing Committee at SC70, SC71 and SC74 are summarized in Section B of Annex 1 to the present document.

c) At SC74, the Standing Committee commended Paraguay for its commitment to formulate NDFs and precautionary export quotas for *Bulnesia sarmientoi*; requested Paraguay to continue to consult with the Secretariat and the Chair of the Plants Committee about any quota for 2022 onwards; and requested the Secretariat to report progress on this case to the present meeting, including recommendations regarding its potential removal from the RST process. On 12 April 2022, the Secretariat wrote to Paraguay to inform it of the outcome of SC74.

*Response from range State*

d) Paraguay replied to the Secretariat's communication regarding *Bulnesia sarmientoi* on 11 July 2022.

e) The content of Paraguay's response is summarized and assessed against the Plants and Standing Committees' recommendations in Section B of Annex 1 to the present document.

*Determination of implementation*

f) Recommendations a) to f) of the Plants Committee and associated recommendations g) to n) of the Standing Committee have been implemented.

*Recommendations of the Secretariat following consultation with the Plants Committee*

g) As required by paragraph 1 k) of Resolution Conf. 12.8 (Rev. CoP17), the Secretariat has consulted with the members of the Plants Committee through their Chair concerning the above determination and recommends the Standing Committee to:

i) commend Paraguay in its commitment to formulate NDFs and precautionary export quotas for *Bulnesia sarmientoi*;

ii) agree that Paraguay has complied with all recommendations for *Bulnesia sarmientoi* and can be removed from the RST process.

Intersessional decision-making of the Plants Committee: Review of Significant Trade of *Pterocarpus erinaceus*.

26. At SC74, the Standing Committee called upon the Plants Committee to expedite its Review of Significant Trade of *Pterocarpus erinaceus* in order for the Committee to receive a progress report from the Plants Committee at the present meeting. Paragraphs 27 to 31 have been prepared with the agreement of the Chair of the Plants Committee.

27. On 6 April 2022, the Plants Committee began a procedure for intersessional decision-making under Rule 19 of its Rules of Procedure in relation to this matter. Whilst not formally objecting to the adoption of the proposal, the Plants Committee's representative for North America emphasized that under recommendation c) (for all eight countries), she would have preferred to have replaced the words "regional and other expertise and experience" with "regional experience and forestry expertise".

28. The outcome of this procedure was that on 24 June 2022, the Plants Committee agreed, in the context of paragraph 1 g) of Resolution Conf. 12.8 (Rev. CoP18), that 'action is needed' concerning the implementation of Article IV, paragraph 2 (a) and 3 for *Pterocarpus erinaceus* in Benin, Burkina Faso, the Gambia, Ghana, Guinea Bissau, Mali, Nigeria, and Sierra Leone. The Committee further agreed the time-bound, feasible, measurable, proportionate, and transparent recommendations directed to each of these range States. On 19 July 2022, and in accordance with Resolution conf. 12.8 (Rev. CoP18) paragraph 1 h), the Secretariat wrote to the eight range States to transmit these recommendations.

29. The outcomes of the Plants Committee's intersessional decision-making, including the recommendations of the Plants Committee were also communicated by the Secretariat to the Parties on 29 June 2022 through Notification No. 2022/050. The recommendations are in Annex 6 to the present document.

30. In accordance with paragraph 1 j) of Resolution Conf. 12.8 (Rev. CoP18), the Secretariat will monitor progress against the recommendations.

31. The Secretariat will ensure that the implementation of the Plants Committee's recommendations will be cross-referenced with the Article XIII compliance procedures established in relation to all range States based on the exceptional circumstances due to pervasive documented illegal trade (document SC75 Doc. 7.2.1); Guinea (document SC75 Doc. 7.2.4) and Nigeria (document SC75 Doc. 7.2.5).

Recommendations

32. In accordance with paragraph 1 m) of Resolution Conf. 12. (Rev. CoP18) and based on the present report, the Standing Committee is invited to agree with the recommendations in paragraphs 5 e), 15, 18, 21, 23 h), 24 f) and 25 g) of the present document and is further invited to take note of paragraphs 26 to 31 of the present document.

**Section A – Fauna species/country combinations under the Review of Significant Trade process agreed for consideration at SC75**

| Recommendations of the AC and of the SC where they exist | Update of implementation of recommendations (including Range State responses) | Determination of implementation and actions recommended |
|---|---|---|
| ***Ara ararauna* (Blue and Yellow Macaw)** | | |
| **Guyana (GY)**<br><br>Short term actions<br><br><u>Within 60 days (by 13 January 2020):</u><br><br>a) Established a reduced quota for 2019 to average trade levels 660 specimens; these quotas should not be amended until a new non-detriment finding, based on survey data (to be provided within one year), is submitted and reviewed by the AC.<br><br>b) Before making any increases to the interim quota, the planned changes should be communicated by the Management Authority of Guyana to the Secretariat and Chair of the Animals Committee along with a justification of how the change is conservative, based on estimates of sustainable off-take that make use of best available scientific information, for their agreement.<br><br>Long term actions<br><br><u>Within two years (14 November 2020):</u> | The report entitled *"Status of the Blue and Gold Macaw (*Ara *ararauna) in Guyana"* was prepared by the Guyana Wildlife Conservation and Management Commission, a newly established management body for wildlife in GY, which has a monitoring and compliance division. It was submitted by GY as justification for its proposed increase in the annual export quota for this species from 600 to a proposed 760 birds, under recommendation b).<br><br>The report presents the results of a recent survey of *A. ararauna*, which was conducted between October to June, but it does not state the year that the survey was actually carried out. It is presumed that the survey took place in 2019 but Guyana should be asked to clarify this.<br><br>The report states that population size and densities in four survey sites (Berbice, North Wet District, Corentyne, and South Rupununi) were estimated using the distance sampling (version 6.1) survey software and the point count method to record data. Based on this methodology, GY presents densities of *A. ararauna* in Table 1 of the report, but it does not explain how the total average density figures presented have been used to determine a total national population size and thereby the harvest quota. The report does state that to facilitate the collection of data on the frequency of transport from the most popular harvesting areas and mortality rates, a removal and transport permit system will be introduced and that "at the end of the open season in 2020, the total number of blue-and-gold macaws will be analyzed by harvesting areas, followed by a stakeholder consultation to decide on the approach to be used to determine harvest limits."<br><br>The report does not indicate the source of the trade data that it presents in Table 2 That data differs considerably from the data found in the CITES trade database. For example, data on live direct exports of *A. ararauna* from GY | <u>The Secretariat's determination regarding implementation of the recommendations</u><br><br>In compliance with recommendation b) Guyana communicated its proposed increase in quota to the Secretariat along with supporting information. However, the Secretariat, following consultation with the Animals Committee does not consider that Guyana has not provided sufficient information to justify the proposed increase.<br><br><u>Actions recommended by the Secretariat</u><br><br>**The Standing Committee is invited to:**<br><br>**i) welcome the progress made by Guyana in undertaking this study;**<br><br>**ii) invite Guyana to clarify how the data from the survey was used to determine the sustainable level of offtake and the proposed export quota; and address the concerns** |

<table>
<tr><th>Recommendations of the AC and of the SC where they exist</th><th>Update of implementation of recommendations (including Range State responses)</th><th>Determination of implementation and actions recommended</th></tr>
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<td>c) Initiate appropriate harvest measures to ensure sustainability (for example): - size/selective harvest - open/closed seasons - harvest seasons - harvest maximums - restrictions to harvest frequency, sites or time of day - control of number of harvesters - types and methods of harvest<br><br>d) Undertake science-based studies on status of the species (e.g. population size/density, trends, distribution) including an evaluation of the threats to the species for use as the basis for NDFs<br><br>e) Develop/Implement an ongoing science-based population monitoring programme that is used in conjunction with an adaptive management programme for the species (see harvest management measures and trade controls, below), for use in making NDFs<br><br>f) Undertake qualitative monitoring of the scale and trends of all harvest (increasing, stable or decreasing) for use in making NDFs -Develop and implement harvest guidelines (or “best practices”) describing accepted practices<br><br>g) Develop and implement local management with clearly defined harvest management measures (e.g., harvest seasons, harvest maximums, restrictions to harvest frequency, sites</td>
<td>extracted by the Secretariat from the CITES trade database for 2014 to 2020 (extracted on 2 September 2022 and presented in the table below) shows significantly higher levels of trade than the export data presented in the report.<br><br>
<table>
<tr><th>Trade reported by</th><th>2014</th><th>2015</th><th>2016</th><th>2017</th><th>2018</th><th>2019</th><th>2020</th><th>Totals</th></tr>
<tr><td>Importer</td><td>818</td><td>674</td><td>968</td><td>385</td><td>811</td><td>194</td><td>404</td><td>4254</td></tr>
<tr><td>Exporter</td><td>860</td><td>742</td><td>741</td><td>319</td><td>530</td><td>452</td><td>499</td><td>4143</td></tr>
</table>
<br>Conclusion:<br><br>Based on the above, the Secretariat welcomes the progress made by GY but suggests that it may be premature to increase the quota from the current 660 specimens proposed under recommendation a) until GY clarifies how the data from the survey is used to estimate the total national population and the results of the monitoring programme of the current harvest practices, transport conditions and mortality rates are available.</td>
<td>by the Animals Committee in its review of the study (see Annex 2 of this document); and<br><br>iii) invite Guyana to submit a new non-detriment finding, based on survey data, for review by the Animals Committee.</td>
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| Recommendations of the AC and of the SC where they exist | Update of implementation of recommendations (including Range State responses) | Determination of implementation and actions recommended |
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| or time of day, control of number of harvesters, types and methods of harvest)<br><br>h) Provide information and guidance to persons and organizations involved in the production and export of specimens of the species concerned<br><br>i) Undertake qualitative monitoring of the scale and trends of all export (increasing, stable or decreasing) for use in making NDFs<br><br>j) Encourage information sharing with Suriname in order to collaborate on making NDFs.<br><br><u>Final recommendation</u><br><br>k) Upon completion of other recommendations, the Management Authority of Guyana should provide the scientific basis by which it has established that exports from their country are not detrimental to the survival of the species and are compliant with Article IV, paragraphs 2(a), 3 and 6(a) of the Convention. Particular focus should be given to how the actions Guyana has taken or will take address the concerns/problems identified in the Review of Significant Trade process. | | |
| ***Anguilla anguilla* (European eel)** | | |

| Recommendations of the AC and of the SC where they exist | Update of implementation of recommendations (including Range State responses) | Determination of implementation and actions recommended |
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| **Algeria (DZ)**<br><br>Short term actions<br><br>Within 90 days (12 February 2019):<br><br>a) Establish interim conservative export quotas (suggested to be reduced to 67 percent of present trade and a zero quota for live glass eels) within 60 days for each category of specimens in trade (such as fingerlings/elvers, live, and meat), and communicate the quotas to the Secretariat for publication on the website.<br><br>b) No exports should occur until the quota has been published on the Secretariat's website.<br><br>c) Before making any increases to the interim quota, the planned changes should be communicated by the Management Authority of Algeria, Morocco or Tunisia to the Secretariat and Chair of the Animals Committee along with a justification of how the change is conservative, based on estimates of sustainable off-take that make use of best available scientific information, for their agreement.<br><br>Long term actions<br><br>Within 2 years (14 November 2020):<br><br>d) Evaluate current harvest management measures and implement harvest measures to ensure sustainability | ***Documentation reviewed:***<br><br>• Annex 4 (pages 1 to 15) of document SC74 Doc. 30.1 and its addendum<br><br>• AC30 Inf. 29, Exploitation of eel in Algeria (submitted by Algeria).<br><br>• National report (dated May 2022) – provided in original language (French)<br><br>A summary of the implementation of the long term recommendations of the Animals Committee is presented in Section B to Annex 2 of the addendum to document SC74 Doc. 30.1. That summary should be read in conjunction with the summary below, which focuses on the update provided by DZ in the National report from May 2022, which seeks to justify a proposed increase in the export quota from 8 tonnes to 20 tonnes.<br><br>***Summary:***<br><br>In the report dated May 2022, DZ states that it submits preliminary technical elements, justifying its request submitted in August 2021, for an increase to 20 tonnes of the annual export quota for European eel, currently set at 8 tonnes. DZ states that, in view of the measures outlined in the report and the existing natural potential in the country, the increase is justified.<br><br>In this context, DZ indicated that in December 2015, it established a provisional system for the exploitation and export of *Anguilla anguilla*, through transitional measures, in particular the establishment of an authorized export quota per concession, of which there are four. Each concession (of which there are 4) has a fixed annual quota of 3 tonnes. DZ states that no concession has been issued since 2015 and the current exploitation of eel is done exclusively at five sites with "high potential": 4 sites in the El Tarf province (Lake Mellah, Tonga, Lake Oubeira and Oued Mafragh) and 1 site in the Skikda province (Oued El Kébir west). considering the exportation demand received in 2021 and in order to preserve the species in high exportation areas, exportation permit temporarily granted only to dealers. This is a temporary provision, introduced by the administration responsible for fisheries and aquaculture, in order to prepare for the resumption of the external market for European eel. The Secretariat notes that prior to the EU | The Secretariat's determination regarding implementation of the recommendations<br><br>Algeria has submitted supporting information for a proposed quota increase under recommendation c) but this is not deemed to be sufficient. It has also made some progress towards the implementation of the remaining recommendations, but they have yet to be implemented fully. Recommendations e) and f) have been implemented and some progress has been made towards the implementation of recommendations d) and g) to l) but they are not implemented fully.<br><br>Actions recommended by the Secretariat<br><br>**The Standing Committee is invited to:**<br><br>**i) instruct Algeria to maintain its current annual export quota for *A. anguilla* of 8,000 kg wild-taken adult eels and 0 glass eels, until it provides a justification for any revised quota, demonstrating how the change is conservative, based on estimates of sustainable off-take that making use of best available scientific information, to the Secretariat and the Chair of the** |

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| (for example:<br>- size/selective harvest<br>- open/closed seasons<br>- harvest seasons<br>- harvest maximums<br>- restrictions to harvest frequency, sites or time of day<br>- control of number of harvesters<br>- types and methods of harvest)<br><br>e) Clarify and standardize the terms and units used in reporting trade. Ensure that appropriate terms and units are recorded on permits for trade. Standardized terms and appropriate units are found in the most recent version of the Guidelines for the preparation and submission of CITES annual reports, which is referenced in Resolution Conf. 11.17 (Rev. CoP17) on *national reports*, and distributed by the Secretariat by notification.<br><br>f) Ensure that permits issued for the species clearly and accurately indicate the source of the specimens.<br><br>g) Undertake science-based studies on status of the species (e.g. population size/density, trends, distribution) including an evaluation of the threats to the species for use as the basis for NDFs<br><br>h) Develop/Implement an ongoing science-based population monitoring programme that is used in conjunction with an adaptive management programme for the species (see harvest management measures and | trade ban on imports and exports of eel and eel products in 2011, the main market for eel from DZ had been the EU.<br><br>DZ highlights that the work carried out within the framework of the FAO-GFCM (General Fisheries Commission for the Mediterranean) research programme on eel, in particular the collection and updated data on eel habitats in the Mediterranean region, have identified nearly fifty sites throughout the region. Finally, DZ states that the technical and scientific conclusions formulated in the final report of the FAO-GFCM research programme on eel, will be discussed at the level of the Scientific Advisory Committee of the GFCM, from 21 to 24 June 2022, with a view to of their adoption by all the Parties concerned by this programme. Further information on the FAO-GFCM project can be found here.<br><br>Concerning, **recommendation d),** DZ highlights the following provisions that have been put in place:<br>*D.1. Selective/size-based sampling*<br>*D.2. opening/closing seasons* - Eel fishing is open from 1 October to 30 April.<br>*D.3. Sampling seasons* - set between 1 October and 30 April. However, fishing for elvers and glass eels is prohibited except for those intended for breeding. In this case, the eel fishing season is open all year round, while that of glass eels is open between 1 December and 30 April.<br>*D.4. Maximum withdrawals* - the maximum quantity of withdrawals under inland fishing in Lake Oubeira is set at 150 tonnes/year for all species of fish combined, while the maximum quantities of samples for lagoon fishing in the El Mellah lagoon are set at 80 tonnes per year, for all species combined. The principle of these samples is (1/3) of the existing biomass. However, the Secretariat notes that there is no specific information concerning eel.<br>*D.5. Restrictions on sampling frequency, sites or time of day* - No restrictions on the frequency of withdrawals. The principle is based on compliance with the quantities of authorized withdrawals set by the regulations in force and mentioned in point D.4.<br>*D.6. Control of the number of operators*<br>*D.7. Types and methods of sampling*<br><br>Regarding, **recommendation e),** DZ reports that it ensures that the appropriate terms and units are listed on permits. Standard terms and appropriate units are recorded in the most recent version of the *Guidelines for the preparation and submission of CITES annual reports*, referred to in Resolution Conf. 11.17 (Rev. | **Animals Committee, for their agreement;**<br><br>**ii) agree that recommendations e) and f) have been implemented;**<br><br>**iii) commend Algeria for the progress made to-date in implementing the remaining recommendations d) and g) to l); and**<br><br>**iv) invite Algeria to provide an update on the implementation of the outstanding recommendations three months before the documentation deadline for SC77.** |

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| trade controls, below), for use in making NDFs<br><br>i) Develop and implement coordinated national and/or local management plans (that include harvest management considerations) with aims to achieve, within defined time limits, escapement targets as a contribution to stock recovery; clear monitoring requirements; management is adaptive (regular review of harvest records, of impact of harvesting, adjustment of harvest instructions as necessary), harvest restrictions based on monitoring results; management plans should be submitted for independent peer review by a suitable external body (e.g., WGEEL)<br><br>j) Initiate robust monitoring programs, with input from WGEEL, to provide time series population data and/or recruitment and escapement indices to support development and implementation of the management plans and to inform NDF assessments<br><br>k) Algeria / Morocco / Tunisia are encouraged to outline any capacity building needs the party may have to support the implementation of Article IV, and submit to the Secretariat, e.g., providing training for CITES authorities (e.g., CITES Virtual College, NDF workshops in a country or region)<br><br>Final recommendation | CoP16) on *National Reports*, and circulated by the Secretariat in a Notification". Follow-up is also done in coordination with the Algerian Customs Services which require in the export file, the certificate of origin of the species to be exported and an export health waiver issued by the veterinary services. All international trade transactions are recorded and archived in electronic format and the file is regularly updated. Also, the CITES/Algeria management body is responsible for ensuring the rigorous application of the guidelines for the preparation and submission of CITES annual reports.<br><br>Regarding, **recommendation f),** DZ states that the certificate of origin clearly and precisely indicates the source of the specimens to be exported, referring to it as "a perfectly mastered process". In the case of eel exported from DZ, and in the case of specimens taken from the wild, the source, represented by the letter W, is used.<br><br>Concerning **recommendation g)**", DZ recalls that 5 doctoral theses are currently devoted to the study of the eel.<br><br>Concerning **recommendation h)** and the issue of Non-Detriment Findings, DZ reports that in 2021, the Ministry of Fisheries and Fish Production set up a monitoring committee for the exploitation and export of European eel at the level of its central administration, which operates in close collaboration with the national CITES management authority. This committee coordinates with the National Fisheries and Aquaculture Research and Development Center, the National Fisheries and Aquaculture Sustainable Development Agency, the universities of the Eastern region (University of Annaba and El Tarf) as well as the direction of fishing of El Tarf.<br><br>Concerning **recommendations i) and j)**, DZ reports that it has put in place a partial management plan for the European eel. However, the outcomes of all the technical and scientific information in progress, in particular the adoption in 2022 of the recommendations of the GFCM research programme on eel, will make it possible to complete and update the regulatory provisions for eel.<br><br>Concerning **recommendation k),** DZ notes that the exchanges of expertise between the Mediterranean countries, as members of the GFCM research programme on European eel, highlighted the technical and financial needs of DZ for upgrading and achieving compliance with the recommendations of the GFCM and CITES, relating to the establishment of a multiannual management plan for | |

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| l) Upon completion of other recommendations, the Management Authority of Algeria, Morocco and Tunisia should provide the scientific basis by which it has established that exports from their country are not detrimental to the survival of the species and are compliant with Article IV, paragraphs 2(a), 3 and 6(a) of the Convention. Particular focus should be given to how the actions Algeria, Morocco or Tunisia has taken or will take address the concerns/problems identified in the Review of Significant Trade process. | the European eel. In this context, DZ formulates its request for support for the realization of a scientific study relating to "the evaluation of the state of the stock of eels in Algeria". The technical file of the project will be communicated to the CITES Secretariat after notification of the agreement to support the study. Also, the execution of this study is dependent on a certain number of specialized training courses, for the benefit of scientists, deemed necessary for the standardization of working protocols and methodologies.<br><br>***Conclusion:***<br><br>It remains the view of the Secretariat that DZ has made some good progress and recommendations e) and f) have been implemented. DZ has provided a lot of information, but it has not provided sufficient justification or data to demonstrate that the proposed increase in the export quota from 8 tonnes to 20 tonnes is sustainable. | |
| **Morocco (MA)**<br><br>Short term actions<br><br>Within 90 days (12 February 2019):<br><br>a) Establish interim conservative export quotas (suggested to be reduced to 67 percent of present trade and a zero quota for live glass eels) within 60 days for each category of specimens in trade (such as fingerlings/elvers, live, and meat), and communicate the quotas to the Secretariat for publication on the website.<br><br>b) No exports should occur until the quota has been published on the Secretariat's website.<br><br>c) Before making any increases to the interim quota, the planned changes should be communicated by the Management | ***Documentation:***<br><br>• Annex 4 (pages 37 to 405) of document SC74 Doc. 30.1 and its addendum<br><br>This response included two reports on the dynamics and evaluation of stocks of eel and elvers dated May 2012 and June 2013; and a detailed explanation of why the situation in MA is different to that in DZ and TN.<br><br>• Email providing an update on activities since SC74<br><br>A summary of the implementation of the long term recommendations of the AC is presented in Section B to Annex 2 of the addendum to document SC74 Doc. 30.1. That summary should be read in conjunction with the summary below, which focuses on the update provided by MA and the proposal to increase the current harvest quota<br><br>At SC74, the SC acknowledged that the situation for production of *A. anguilla* in MA is different from that of DZ and TN; and commended MA for the detailed response it has provided and the measures it has put in place to manage the species and ensure a strong traceability system is in place. | The Secretariat's determination regarding implementation of the recommendations<br><br>MA has submitted supporting information for a proposed quota increase under recommendation c) but this is not deemed to be sufficient. It has also made considerable progress towards the implementation of the remaining recommendations, but they have yet to be implemented fully.<br><br>Actions recommended by the Secretariat<br><br>**The Standing Committee is invited to:**<br><br>**i) commend Morocco for the considerable progress it has made** |

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<td>Authority of Algeria, Morocco or Tunisia to the Secretariat and Chair of the Animals Committee along with a justification of how the change is conservative, based on estimates of sustainable off-take that make use of best available scientific information, for their agreement.<br><br>Long term actions<br><br><u>Within 2 years (14 November 2020):</u><br><br>d) Evaluate current harvest management measures and implement harvest measures to ensure sustainability<br><br>(for example:<br><br>- size/selective harvest<br>- open/closed seasons<br>- harvest seasons<br>- harvest maximums<br>- restrictions to harvest frequency, sites or time of day<br>- control of number of harvesters<br>- types and methods of harvest)<br><br>e) Clarify and standardize the terms and units used in reporting trade. Ensure that appropriate terms and units are recorded on permits for trade. Standardized terms and appropriate units are found in the most recent version of the Guidelines for the preparation and submission of CITES annual reports, which is referenced in Resolution Conf. 11.17 (Rev. CoP17) on</td>
<td>Summary:<br><br>Under recommendation c), the Management Authority of MA has requested an increase of its current export quota of 500 tonnes of eel from aquaculture to 600 tonnes. While this does not appear to be a large increase in the quota, the increase would be based on an increase in the harvest of glass eels from 2 tonnes to 4 tonnes. It is not clear if this additional 2 tonnes would also come from the Sebou river fishery, or if it is proposed to harvest these glass eels from another site. The Secretariat also notes that it is currently possible to produce 500 tonnes of farmed eel from 2 tonnes of glass eel, but an additional 2 tonnes of glass eel will only yield an extra 100 tonnes of farmed eel. These figures require some clarification.<br><br>It should be noted that following discussions with the AC Chair, taking into consideration the different production method employed in MA, the following quotas were agreed for 2019 and have remained in place since then:<br><br>
<table>
<tr><th></th><th>Specimen</th><th>2016</th><th>2017</th><th>2018</th><th>2019</th><th>2020</th></tr>
<tr><td>Quota</td><td>Adult Wild</td><td>-</td><td>-</td><td>-</td><td>5,500</td><td>5,500</td></tr>
<tr><td></td><td>Aquaculture</td><td></td><td></td><td></td><td>500,000 *</td><td>500,000 *</td></tr>
<tr><td></td><td>Glass eel</td><td>-</td><td>-</td><td>-</td><td>0</td><td>0</td></tr>
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* = 500,000kg Adult eel [raised in aquaculture based on a harvest of 2t on glass eels]<br><br>These quotas were published for 2019 and an analysis of the CITES trade data extracted on 7 September 2022 shows that MA has not exceeded the quotas since their publication (note all figures are in kgs). Exports appear to have increased somewhat but this can be explained by changes in the production methods (e.g. lower mortality rates and outgrowing for a longer period for the eels to reach a large size).<br><br>
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<td>and the measures it has put in place to manage the species and ensure a strong traceability system is in place;<br><br>ii) instruct Morocco to maintain its current quotas of 500,000 kg of live adult eels [raised in aquaculture based on a harvest of 2t on glass eels], 5,500 kg of wild-taken adult eels and 0 live glass eel [fingerlings] of A. anguilla until it provides a justification for any increased quota, demonstrating how the change is conservative, based on estimates of sustainable off-take that makes use of best available scientific information, to the Secretariat and the Chair of the Animals Committee, for their agreement. In this regard, Morocco should clarify how the proposed increase in the harvest quota for glass eels of 2 tonnes to 4 tonnes will only yield an additional 100 tonnes of adult eels from the farms and share the results of its stock assessment studies when they become available; and<br><br>iii) invite Morocco to provide an update on the implementation of the outstanding recommendations three months before the documentation deadline for SC77.</td>
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*national reports*, and distributed by the Secretariat by notification.

f) Ensure that permits issued for the species clearly and accurately indicate the source of the specimens.

g) Undertake science-based studies on status of the species (e.g. population size/density, trends, distribution) including an evaluation of the threats to the species for use as the basis for NDFs

h) Develop/Implement an ongoing science-based population monitoring programme that is used in conjunction with an adaptive management programme for the species (see harvest management measures and trade controls, below), for use in making NDFs

i) Develop and implement coordinated national and/or local management plans (that include harvest management considerations) with aims to achieve, within defined time limits, escapement targets as a contribution to stock recovery; clear monitoring requirements; management is adaptive (regular review of harvest records, of impact of harvesting, adjustment of harvest instructions as necessary), harvest restrictions based on monitoring results; management plans should be submitted for independent peer review by a suitable external body (e.g., WGEEL)

j) Initiate robust monitoring programs, with input from WGEEL, to provide time series

| | | | | | | |
|---|---|---|---|---|---|---|
| Annual report submitted | | Yes | Yes | Yes | Yes | Yes |
| Quota (kg) | Adult Wild | - | - | - | 5,500 | 5,500 |
| | Aquaculture | | | | 500,000 | 500,000 |
| | Glass eel | - | - | - | 0 | 0 |
| Importer | Live | 233,908 | 4,960 | 171,350 | 210,519 | 241,000 |
| Exporter | live | 201,619 | 238,147 | 171,720 | 223,546 | 213,180 |
| Importer | Meat/Bodies | | - | 25,240 | 27,500 | 25,300 |
| Exporter | Meat/Bodies | | 25,240 | 25,000 | 50,000 | 50,640 |

MA requested a review of the AC recommendations as they apply to MA and now seeks to increase its harvest of glass eels for aquaculture purposes from 2 tonnes to 4 tonnes (10% will be reserved for restocking), corresponding to 600 tonnes of farmed eel to be exported, and 5.5 tonnes for wild adult eels.

On 24 May 2022, MA provided the following update by email to the Secretariat on the actions it has carried out since 2021:

1. MA has developed and adopted a standardized methodology for monitoring eel populations, carried out by the support of a team of national and international experts. This methodology, based on the protocols adopted and tested in certain countries of the European Union, focuses on:

- Study of the recruitment of eels at the first dam by counting stations
- Study of the recruitment of eels in the estuary
- Study of recruitment in lagoons

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| population data and/or recruitment and escapement indices to support development and implementation of the management plans and to inform NDF assessments<br><br>k) Algeria / Morocco / Tunisia are encouraged to outline any capacity building needs the party may have to support the implementation of Article IV, and submit to the Secretariat, e.g., providing training for CITES authorities (e.g., CITES Virtual College, NDF workshops in a country or region)<br><br>Final recommendation<br><br>l) Upon completion of other recommendations, the Management Authority of Algeria, Morocco and Tunisia should provide the scientific basis by which it has established that exports from their country are not detrimental to the survival of the species and are compliant with Article IV, paragraphs 2(a), 3 and 6(a) of the Convention. Particular focus should be given to how the actions Algeria, Morocco or Tunisia has taken or will take address the concerns/problems identified in the Review of Significant Trade process. | • Study of the stock of yellow eel by electric fishing<br>• Evaluation of the number of broodstock descending using Capture-Marking-Recapture<br>• Evaluation of the effectiveness of restocking<br><br>This methodology has been in place since the end of 2021, and the first results of this study are expected in December 2022, which would make it possible to obtain the first estimates of eel stocks in MA.<br><br>2. MA has completed a feasibility study for the installation of an eel pass at the Sebou guard dam (carried out by the French design office "Fish Pass") and whose installation was scheduled for June 2022.<br><br>***Conclusion:***<br><br>It is the view of the Secretariat that it is currently not possible to determine if the increase in the export quota requested is conservative and if it is based on estimates of sustainable off-take that make use of best available scientific information. However, MA has indicated that it will be possible to obtain the first estimates of eel stocks from the eel monitoring study it has initiated, the first results of which are expected in December 2022. The Secretariat suggests awaiting the first results of this study before coming to a conclusion on the proposed quota increase. | |
| **Tunisia (TN)**<br><br>Short term actions<br><br>Within 90 days (12 February 2019): | ***Documentation:***<br><br>• Annex 4 (pages 412 to 653) of document SC74 Doc. 30.1 and its addendum<br><br>This response dated March 2020 included details of the following: the new export quota, a management plan from 2010, a preliminary stock assessment from | The Secretariat's determination regarding implementation of the recommendations<br><br>TN has not requested an increase in its interim export quota under recommendation c). The remaining |

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| a) Establish interim conservative export quotas (suggested to be reduced to 67 percent of present trade and a zero quota for live glass eels) within 60 days for each category of specimens in trade (such as fingerlings/elvers, live, and meat), and communicate the quotas to the Secretariat for publication on the website.<br><br>b) No exports should occur until the quota has been published on the Secretariat's website.<br><br>c) Before making any increases to the interim quota, the planned changes should be communicated by the Management Authority of Algeria, Morocco or Tunisia to the Secretariat and Chair of the Animals Committee along with a justification of how the change is conservative, based on estimates of sustainable off-take that make use of best available scientific information, for their agreement.<br><br>Long term actions<br><br><u>Within 2 years (14 November 2020):</u><br><br>d) Evaluate current harvest management measures and implement harvest measures to ensure sustainability<br><br>(for example:<br>- size/selective harvest<br>- open/closed seasons<br>- harvest seasons<br>- harvest maximums | 2017; details of a 4-year research project with the GFCM; details on permit applications and its non-detriment finding for eel.<br><br>***Summary:***<br><br>A summary of the implementation of the long term recommendations of the Animals Committee is presented in Section B to Annex 2 of the addendum to document SC74 Doc. 30.1.<br><br>TN's 2010 **management plan** is included in Annex 4 of document SC74 Doc. 30.1. The main objectives of the management plan are to ensure that the escapement of silver eels represents at least 40 percent of the numbers that the system is capable of producing and management plans are to be put in place at the level of each catchment area, which implies a good knowledge of both the causes of anthropogenic mortality and the state of the resource.<br><br>The management plan concludes that in TN, the potential sites for the presence of eels are more abundant in the North and North-East and the Medjerda than in the Center-East and South zones. They generally extend over an area of 6,985,000 ha, if the entire watershed of the water systems are taken into account. However, the water surface area is estimated at around 950,000 ha. Many of these wetland areas are either protected or not exploited voluntarily, favouring silver eel escapement. The eel is mainly found in lagoons and to a lesser degree in coastal waters, "sebkhas" and dam reservoirs. Its exploitation is concentrated, through targeted fishing, to 3 main sites in northern TN: the Ichkeul-Bizerte lagoon complex, the lagoon of Ghar El Melh, the northern lagoon of Tunis. Non-targeted fishing of eels take place at dams in the North and Center and some fixed fisheries in the Gulf of Gabes (Kerkennah, El Bibane and Zarrat). In terms of area, the eel exploitation sites cover approximately 124,493 ha. They represent only a small proportion (13%) of all the potential sites where it is present at levels of abundance equivalent to the exploited sites (both coastal and continental).<br><br>The management plan identifies two priority areas for further research: a stock assessment and determination of the health of the population.<br><br>In the report on the preliminary results of the stock assessment (dated 2019), Regional eel stock assessments were carried out at the site level, taking into account specific habitat typologies (lakes, lagoons, rivers and estuaries), using a | recommendations d) to l) have been partially complied with.<br><br><u>Actions recommended by the Secretariat</u><br><br>**The Standing Committee is invited to:**<br><br>**i) commend Tunisia for the considerable progress made to-date in implementing the remaining recommendations c) to l);**<br><br>**ii) instruct Tunisia to maintain its current quota for *A. anguilla* of 90,000 kg of eels, where export is restricted to specimens greater than 30cm in length and 0 glass eels, until it provides a justification for any increased quota, demonstrating how the change is conservative, based on estimates of sustainable off-take that making use of best available scientific information, to the Secretariat and the Chair of the Animals Committee, for their agreement; and**<br><br>**iii) invite Tunisia to provide an update on the implementation of the outstanding recommendations three months before the documentation deadline for SC77.** |

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| - restrictions to harvest frequency, sites or time of day<br>- control of number of harvesters<br>- types and methods of harvest)<br><br>e) Clarify and standardize the terms and units used in reporting trade. Ensure that appropriate terms and units are recorded on permits for trade. Standardized terms and appropriate units are found in the most recent version of the Guidelines for the preparation and submission of CITES annual reports, which is referenced in Resolution Conf. 11.17 (Rev. CoP17) on *national reports*, and distributed by the Secretariat by notification.<br><br>f) Ensure that permits issued for the species clearly and accurately indicate the source of the specimens.<br><br>g) Undertake science-based studies on status of the species (e.g. population size/density, trends, distribution) including an evaluation of the threats to the species for use as the basis for NDFs<br><br>h) Develop/Implement an ongoing science-based population monitoring programme that is used in conjunction with an adaptive management programme for the species (see harvest management measures and | demographic model adjusted to the annual catch data available. The Eel Stock Assessment Model (ESAM) developed by Schiavina *et al.* (2015)[1] was selected for this purpose due to the low availability of data and was specifically designed for lagoons, which represent the largest area of suitable habitat for eels in TN. ESAM is a generalization and evolution of two stock assessment models: the DemCam model developed by Bevacqua et al. (2007)[2] from the University of Parma and Politecnico di Milano and the EMS model (Schiavina et al., 2015)[1]. The report only presents preliminary results and does not come to conclusions other than the silver eel escapement target of 40% is currently not being met and a reduction would be beneficial.<br><br>TN sent a further letter in November 2020, to inform that the Scientific Authority had taken some measures and research programmes for the sustainable management of eel in TN, in the context of the long-term recommendations of the AC, namely:<br><br>1. the GFCM European Eel Research Programme: Towards coordination of European eel stock management and recovery in the Mediterranean. This programme runs for 18 months (Oct 2020 to March 2022) and will establish data collection points throughout the Mediterranean region;<br><br>2 a reduction in fishing effort in the Tunis lagoons (North and South) and the Ghar El Mehl. This measure follows the recommendation in GFCM/42/2018/1 which stipulates “a reduction of the fishing effort or catches of European eel of at least 30 percent compared to the reference period 2006–2008 or to another three-year reference period defined by cooperating non-contracting parties. This reduction shall apply on a progressive basis of an annual 10 percent reduction over a period of three years starting from 1 January 2019 the 30% reduction in eel production over 3 years at a rate of 10% per year; and | |

[1] *Schiavina M., Bevacqua D., Melia P., Crivelli A. J., Gatto M. and De Leo G., 2015. A user-friendly tool to assess management plans for European eel fishery and conservation. Environmental Modeling & Software 64: 9-17*

[2] *Bevacqua, D., Melià, P., Crivelli, A.J., Gatto, M. and De Leo, G.A. (2007) Multi-objective assessment of conservation measures for the European eel (Anguilla anguilla): an application to the Camargue lagoons. ICES Journal of Marine Science: Journal du Conseil 64, 1483-1490.*

<table>
<tr><th>Recommendations of the AC and of the SC where they exist</th><th>Update of implementation of recommendations (including Range State responses)</th><th>Determination of implementation and actions recommended</th></tr>
<tr><td>trade controls, below), for use in making NDFs<br><br>i) Develop and implement coordinated national and/or local management plans (that include harvest management considerations) with aims to achieve, within defined time limits, escapement targets as a contribution to stock recovery; clear monitoring requirements; management is adaptive (regular review of harvest records, of impact of harvesting, adjustment of harvest instructions as necessary), harvest restrictions based on monitoring results; management plans should be submitted for independent peer review by a suitable external body (e.g., WGEEL)<br><br>j) Initiate robust monitoring programs, with input from WGEEL, to provide time series population data and/or recruitment and escapement indices to support development and implementation of the management plans and to inform NDF assessments<br><br>k) Algeria / Morocco / Tunisia are encouraged to outline any capacity building needs the party may have to support the implementation of Article IV, and submit to the Secretariat, e.g., providing training for CITES authorities (e.g., CITES Virtual College, NDF workshops in a country or region)<br><br><u>Final recommendation</u></td><td>3. the proposal to increase the minimum size requirement for eel from 30cm to 40cm in the fishing regulations.<br><br>Determination of implementation:<br><br>TN established a provisional export quota of 90 tonnes of adult wild-taken eels, which represents a reduction to 67 percent, and a zero export quota for glass eels. These quotas were published on 28 February 2019.<br><br>It is clear from the CITES trade data (note all figures in the table below are kg) that TN has consistently stayed within this quota.<br><br>
<table>
<tr><th></th><th></th><th>2016</th><th>2017</th><th>2018</th><th>2019</th><th>2020</th></tr>
<tr><td>Annual report submitted</td><td></td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td></tr>
<tr><td>Quota</td><td>Adult eel (Wild)</td><td></td><td></td><td></td><td>90,000</td><td>90,000</td></tr>
<tr><td></td><td>Glass eel</td><td></td><td></td><td></td><td>0</td><td>0</td></tr>
<tr><td>Importer</td><td>Live</td><td>41,814</td><td>-</td><td>40,242</td><td>21,092</td><td>39,616</td></tr>
<tr><td>Exporter</td><td>live</td><td>92,321</td><td>65,268</td><td>51,190</td><td>26,246</td><td>53,770</td></tr>
<tr><td>Importer</td><td>Meat/Bodies</td><td>27,000</td><td>-</td><td>140</td><td>5,000</td><td>660</td></tr>
<tr><td>Exporter</td><td>Meat/Bodies</td><td>39,795</td><td>78,547</td><td>22,139</td><td>19,645</td><td>19,733</td></tr>
</table>
<br>In light of the above, SC74 noted that recommendations a) and b) had been complied with.<br><br>SC74 also commended TN for the progress made to-date in implementing the remaining recommendations c) to l). Under recommendation c), the Management Authority of TN, would need to communicate to the Secretariat and Chair of the</td><td></td></tr>
</table>

| Recommendations of the AC and of the SC where they exist | Update of implementation of recommendations (including Range State responses) | Determination of implementation and actions recommended |
|---|---|---|
| l) Upon completion of other recommendations, the Management Authority of Algeria, Morocco and Tunisia should provide the scientific basis by which it has established that exports from their country are not detrimental to the survival of the species and are compliant with Article IV, paragraphs 2(a), 3 and 6(a) of the Convention. Particular focus should be given to how the actions Algeria, Morocco or Tunisia has taken or will take address the concerns/problems identified in the Review of Significant Trade process. | AC any proposed increases to the interim quota, along with a justification of how the change is conservative, based on estimates of sustainable off-take that make use of best available scientific information, for their agreement. TN is not currently seeking an increase in the published export quota. | |

**Section B – Flora species/country combinations under the review of significant trade process agreed for consideration at SC75**

<table>
<tr><th>Species/country combination</th><th>Recommendations of the PC and of the SC where they exist</th><th>Update of implementation of recommendations (including Range State responses)</th><th>Determination of implementation and actions recommended</th></tr>
<tr><td colspan="4">Pterocarpus santalinus (Red Sandalwood))</td></tr>
<tr>
<td>India (IN)<br><br>a) Any future amendment of the quota does not take place until the Standing Committee has an opportunity to review the situation and advice the Secretariat and the Chair of the Plants Committee on the results of their work, in particular in relation to the confiscated materials.<br><br><u>By 22 June 2018</u><br><br>b) Clarify, to the Secretariat and the Chair of the Plants Committee, the status of material exported from plantations, and provide data to support the case that these stocks meet the provisions of Resolution Conf. 11.11 (Rev. CoP17) for artificially propagated specimens and assess the possible impact on wild populations.<br><br><u>Outcome of SC70</u><br><br>The Standing Committee, at its 70th meeting:<br>c) encouraged India to continue to provide regular updates on the amount of confiscated stock that is remaining to the Secretariat; and,</td>
<td><u>Concerning recommendation a) of the Plants Committee</u><br><br>Following SC74, through a letter dated 16 June 2022 (Annex 5A), India requested the publication of a zero-export quota for wild specimens of Pterocarpus santalinus. India also requested a retroactive revision, where needed, of quotas for the period 2012-2021 to reflect a zero-export quota for wild specimens of the species.<br><br>These zero-export quotas and, where applicable, retroactive revisions thereof for the period 2021-2022 have been published in the webpage as of 22 August 2022.<br><br><u>Concerning recommendation b) of the Plants Committee</u><br><br>Following SC74, through a letter dated 16 June 2022, India requested the publication of a quota of 1,190 metric tons for artificially propagated specimens (source code ‘A’) of Pterocarpus santalinus. This quota was based on the findings of the updated 2019 NDF report (available in Annex 5A to the present document). The Secretariat, in consultation with the Chair of the Plants Committee, considered the proposed quota precautionary and found it was supported by the findings of the updated 2019 NDF report. The quota for artificially propagated specimens of P. santalinus was therefore published in the CITES website on 15 July 2022, as follows:
<table>
<tr><th>Year</th><th>Species</th><th>Quota/Unit</th><th>Specimens</th></tr>
<tr><td>2022</td><td>Pterocarpus santalinus</td><td>1,190,000 kg</td><td>Artificially propagated</td></tr>
</table>
</td>
<td><u>The Secretariat’s determination regarding implementation of the recommendations</u><br><br>Recommendations a) and b) of the Plants Committee, and associated recommendations c) to h) of the Standing Committee, have been complied with.<br><br>Recommendation i) to k) of the Standing Committee remain ongoing, pending upcoming updates by India in the implementation of the remaining credit of the one-time export of confiscated specimens, as well as that of any quotas to be established for non-wild specimens in the run up to SC77.<br><br><u>Actions recommended by the Secretariat</u><br><br>The Standing Committee is invited to:<br><br>a) commend India on the completion of the implementation of recommendations a) and b) of the Plants Committee; and,<br><br>b) encourage India to provide an update on the remaining credit of the one-time export of Pterocarpus</td>
</tr>
</table>

| | | | | |
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| d) urged India to implement recommendation b) before 1 February 2019 so that the matter can be considered at SC71.<br><br>**Outcome of SC71**<br><br>The Standing Committee, at its 71st meeting:<br>e) encouraged India to continue to provide regular annual updates to the Secretariat on the amount of confiscated *Pterocarpus santalinus* that remains in stock; and<br>f) urged India to implement recommendation b) by 31 December 2019 at the latest.<br><br>**Outcome of SC74**<br><br>The Standing Committee, at its 74th meeting:<br><br>g) noted that recommendation a) of the Plants Committee has been complied with;<br>h) requested clarification from India as to how the study submitted under recommendation b) of the Plants Committee will translate into the publication of quotas for artificially propagated specimens for 2020 onwards;<br>i) encouraged India to provide an update of the remaining stock of the one-time export of confiscated specimens from 2019 onwards, in order to complete implementation of recommendations c) and e) of the Standing Committee;<br>j) encouraged India to finalize the implementation of all outstanding recommendations in time for the matter to be considered at SC77; and<br>k) requested the Secretariat to review the additional information provided by India in | | | specimens<br><br>Concerning recommendation c) of the Standing Committee<br><br>On 10 March 2022, via email communications, India provided the Secretariat with an update of the one-time export of *Pterocarpus santalinus* from confiscated specimens (source code "I"), as found in Annex 5A to the present document.<br><br>In agreement with India's Management Authority, the Secretariat retroactively revised the credit of the one-time export of *Pterocarpus santalinus* from confiscated specimens (source code "I"), for the period 2012-2021. The initial one-time export was set at 11,806 metric tons. At the time of writing, and with the retroactive revisions now published on the website, this leaves a remaining unused credit of 2,725.522 metric tons of confiscated specimens *Pterocarpus santalinus* from the aforementioned one-time export.<br><br>Further, in its letters dated 20 April and 16 June 2022, India informed the Secretariat of an additional 13,301.692 metric tons of confiscated specimens *Pterocarpus santalinus* in custody throughout various State and Central enforcement agencies. India shared its intention, in future, to export these confiscated specimens in accordance with the provisions of Resolution Conf. 17.8 on *Disposal of illegally traded and confiscated specimens of CITES-listed species*.<br><br>In an email communication dated 22 August 2022, India further clarified that it would be "*premature to establish an export quota, let alone an annual quota, for the 13,301.692 metric tonnes. Exports will be permitted by us from this stock in accordance with the Convention and reporting of any such exports will continue in the normal course as required by the Convention*".<br><br>Concerning consultations by India on the export of *P. santalinus* specimens uprooted by the Cyclone Titli<br><br>Since its last reporting at SC74 (see SC74 Doc. 30.1 Add.) the Secretariat has received not further updates on this matter. | ***santalinus* from confiscated specimens (source code "I"), as well of that of any additional exports of confiscated specimens, in time for the matter to be considered at SC77.** |

<table>
<tr><td>consultation with the Plants Committee, through its Chair, and to provide an update to SC75.</td><td></td><td></td></tr>
<tr><td colspan="3">Nardostachys grandiflora (Spikenard)</td></tr>
<tr><td>Nepal (NP)<br><br><u>Short-term Action (by 21 December 2017)</u><br><br>a) Establish a zero export quota for wild specimens and communicate the quota to the Secretariat. No exports should occur until the quota has been published on the Secretariat's website.<br><br>b) Before making any increases to the zero export quota, the planned changes should be communicated by the Management Authority of Nepal to the Secretariat and Chair of the Plants Committee along with a justification of how the change is conservative, based on estimates of sustainable off-take that make use of available scientific information, for their agreement.<br><br>c) Clarify the current legislation with regard to trade in this Appendix II listed species.<br><br><u>Long-term Action (within 22 March 2019)</u><br><br>d) The Management Authority should report to the Secretariat and the Chair of the Plants Committee its actions to implement the provisions of Article IV, and how the Scientific Authority determines that levels of export are not detrimental to the populations concerned, including the scientific basis for allowable harvest rates, and how legal domestic harvest and</td><td><u>Concerning recommendation a) to c) of the Plants Committee</u><br><br>Since SC74, through a letter dated 16 September 2022 (Annex 5B), the Secretariat received a quota request from Nepal for Nardostachys grandiflora for the year 2022, as follows.<br><br><table><tr><th colspan="3">Nepal/Nardostachys grandiflora</th></tr><tr><td rowspan="2">2022</td><td>5,782 L</td><td>oil. wild specimen for commercial purposes.</td></tr><tr><td>376,800 kg</td><td>derivatives (root pith). wild specimen for commercial purposes.</td></tr></table><br>This quota is the same as that agreed in consultation with the Secretariat and the Chair of the Plants Committee for the year 2021, and was established on the basis of the NDF report by Nepal, which was made available at SC74 through document SC74 Doc. 30.1 A5d.<br><br>Prior consultation and agreement with the Chair of the Plants Committee, on 30 September 2022 the Secretariat published the quota as requested by Nepal, as it was deemed conservative.<br><br><u>Regarding recommendations d) and e) of the Plants Committee and associated recommendations of the Standing Committee</u><br><br>The Secretariat reiterates its observation on the implementation of these recommendations, as stated in document SC74 Doc. 30.1 Add. Namely, that the documents and subsequent clarifications submitted by Nepal are reasonably transparent and consistent. They contain a high level of detail on legislative measures with regard to trade in this species, and species management plans and monitoring processes on national and district levels. The process of making the NDF can be reasonably well understood, even though there is little dedicated</td><td><u>The Secretariat's determination regarding implementation of the recommendations</u><br><br>Recommendations a) to e) of the Plants Committee, and associated recommendations of the Standing Committee, have been complied with.<br><br><u>Actions recommended by the Secretariat</u><br><br>The Standing Committee is invited to agree that Nepal has complied with all recommendations for Nardostachys grandiflora and can be removed from the RST process.</td></tr>
</table>

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| illegal harvest are taken into account when making NDFs.<br><br>e) Develop and implement coordinated national and/or local management plans (that include harvest management considerations) with clear monitoring requirements with adaptive management (regular review of harvest records, of impact of harvesting, adjustment of harvest instructions as necessary), to ensure harvest restrictions are based on monitoring results.<br><br>**Outcome of SC70**<br><br>The Standing Committee at its 70th meeting:<br>f) urged Nepal to implement recommendation a) by 1 December 2018. If Nepal fails to meet that deadline, the Standing Committee requested the Secretariat to publish a zero export quota as an interim measure;<br><br>g) encouraged Nepal to implement recommendations b) and c) by 1 February 2019 so that the matter can be discussed again at SC71; and,<br><br>h) urged Nepal to implement all outstanding recommendations by 22 September 2019.<br><br>**Outcome of SC71**<br><br>The Standing Committee, at its 71st meeting:<br><br>i) acknowledged progress made by Nepal to implement the recommendations thus far; | discussion of harvest for national consumption and none for illegal harvest. | |

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| j) requested Nepal to communicate to the Secretariat a revised precautionary export quota for 2019, along with a scientific justification, in line with recommendation b) of the Plants Committee; and,<br><br>k) further requested Nepal to report on the implementation of recommendations d) and e), in time for the matter to be reviewed by the Plants Committee and considered at SC73.<br><br>It also requested the Secretariat to publish as soon as possible a zero quota for wild specimens and to include the Plants Committee's comments in Addendum 2 to document SC71 Doc. 12 in its letter to Nepal.<br><br>**<u>Outcome of SC74</u>**<br><br>The Standing Committee, at its 74th meeting:<br><br>l) commended Nepal in its commitment to establish precautionary export quotas for *Nardostachys grandiflora*;<br><br>m) requested Nepal to continue to consult with the Secretariat and the Chair of the Plants Committee any quota for 2022 onwards; and,<br><br>n) requested the Secretariat to report progress on this case to SC75, including recommendations regarding its potential removal from the review of significant trade process. | | |

<table>
<tr><th colspan="3">Bulnesia sarmientoi (Holy wood)</th></tr>
<tr>
<td>Paraguay (PY)<br><br><u>Short-term Action (by 22 December 2017)</u><br>a) Establish in consultation with the Secretariat and with the Chair of the Plants Committee an interim conservative quota, for the species, its products, derivatives and extracts and communicate the quota to the Secretariat. No exports should occur until this revised quota has been published on the Secretariats website.<br>b) The export quota should be justified as conservative based on estimates of sustainable offtake that make use of best available scientific information. Information should also be supplied on the management and monitoring measures that are in place and active.<br>c) Before making any future increase to the quota, the planned changes should be communicated to the Secretariat and Chair of the Plants Committee along with a justification how the updated quota is conservative, based on estimates of sustainable off-take that make use of available scientific information, for their agreement.<br><br><u>By 22 June 2018</u></td>
<td><u>Concerning recommendations a), b) c) and f) of the Plants Committee, and recommendation i) of the Standing Committee</u><br><br>In its response dated 11 July 2022 (Annex 5C), Paraguay provided the Secretariat with the following: a request for the establishment of an export quota for Bulnesia sarmientoi for the year 2022; and the updated non-detriment finding and management plans for the species for the period 2021-2025.<br><br>The NDF and management plan for the period 2021-2025 is comprehensive and gives continuity to the monitoring of the management of B. sarmientoi in Paraguay.<br><br>The report represents an expansion of four management plans, in contrast to that of 2020 (see <u>SC74 Doc. 30.1 A5f</u>); now totaling ten. These management plans cover a total of 48.232 hectares of forests where B. sarmientoi occurs in the country and will continue to inform the establishment of quotas for the species up to 2025.<br><br><u>Concerning recommendations d) and e) of the Plants Committee</u><br><br>In its response dated 11 July 2022 (Annex 5C), and based on the updated NDF report for 2021-2025, Paraguay requested a quota for 2022, which is the same as that of 2021.<br><br>Based on the findings of the updated NDF report, the Secretariat and the Plants Committee agreed to the publication of the quota requested for 2022, which was published on the website on 27 July 2022, as follows:<br><br>
<table>
<tr><th colspan="3">Export quota<br>Paraguay/Bulnesia sarmientoi</th></tr>
<tr><th>Year</th><th>Quota/Unit</th><th>Specimens</th></tr>
<tr><td rowspan="2">2022</td><td>270,000 kg</td><td>Extract</td></tr>
<tr><td>1,600,000 kg</td><td>Wood</td></tr>
</table>
</td>
<td><u>The Secretariat’s determination regarding implementation of the recommendations</u><br><br>Recommendations a) to f) of the Plants Committee have been implemented. Recommendations g) to n) of the Standing Committee have also been met.<br><br><u>Actions recommended by the Secretariat</u><br><br>The Standing Committee is invited to:<br><br>a) commend Paraguay in its commitment to formulate NDFs and precautionary export quotas for Bulnesia sarmientoi;<br><br>b) agree that Paraguay has complied with all recommendations in the framework of the RST process for Bulnesia sarmientoi and can be removed from the process.</td>
</tr>
</table>

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| d) The Secretariat and Chair of the Plants Committee will take into account results of the review of management and monitoring measures, and the revised plans to provide an effective locally appropriate system.<br>e) The Secretariat and the Chair of the Plants Committee will review this information and make their recommendations on revision of the quota.<br><br><u>Long-term action (by 22 September 2019)</u><br>f) Review management systems in place, including how population levels are calculated and sustainable off- take assessed, taking into account levels and frequency of harvest, annual growth rates for the species, and the location of harvest. Critically review monitoring measures, the reporting and assessment of same, assess their effectiveness and amend as appropriate.<br><br>**<u>Outcome of SC70</u>**<br><br>The Standing Committee, at its 70th meeting:<br>g) noted the information provided by Paraguay;<br>h) encouraged Paraguay to fully implement recommendations a) and b) by working with the Secretariat and the Chair of the Plants Committee to establish | | |

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| conservative quotas for 2018/2019;<br>i) encouraged Paraguay to share with the Secretariat and the Chair of the Plants Committee the study of 2018 mentioned in its letter to the Secretariat of 2 August 2018;<br>j) reminded Paraguay of recommendations c) to e); and,<br>k) urged Paraguay to implement all outstanding recommendations by the deadline of 22 September 2019.<br><br>**<u>Outcome of SC71</u>**<br><br>l) The Standing Committee, at its 71st meeting, emphasized the importance of implementing existing recommendations.<br><br>**<u>Outcome of SC74</u>**<br><br>The Standing Committee, at its 74th meeting:<br><br>m) commended Paraguay in its commitment to formulate NDFs and precautionary export quotas for *Bulnesia sarmientoi*;<br><br>n) requested Paraguay to continue to consult with the Secretariat and the Chair of the Plants Committee any quota for 2022 onwards; and,<br><br>o) requested the Secretariat to report progress on this case to SC75, including | | |

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| recommendations regarding its potential removal from the review of significant trade process. | | |

VIEWS OF MEMBERS OF THE ANIMALS COMMITTEE, CONSULTED THROUGH THEIR CHAIR, ON IMPLEMENTATION OF RST RECOMMENDATIONS FOR REVIEW AT SC75

## Guyana/*Ara ararauna* (Blue and Yellow Macaw)

Comments

Although the AC appreciates Guyana's response to the SC's request at SC74 to share the results of its population study of Psittacines (2019), there are still questions that remain to be answered. The rationale to increase the current quota is poorly, or not, justified, considering that the AC's recommended quota of 600 has not been approached since 2017 (based on exporter records in Secretariat's Trade database extract), and in the context of a declining international trade trend since 2014.

The North American Region, supported by the members, feel that Guyana's report could include more detailed technical information that allows it to determine if the current and suggested use is sustainable (information necessary to evaluate and issue a Non-Detriment Finding). In particular, important information justifying an increased quota is lacking, and without a complete picture of the population size/trend of the species, it is difficult to determine whether or not this level of harvest and trade is currently and will be sustainable in the future (with the proposed increase in the quota). Therefore, we agree that it is premature to support an increase in the export quota at this time, until additional information to address these concerns is provided.

The Animals Committee offers the following detailed comments on the report and suggestions to Guyana on ways that it could be improved.

**Distribution**: Comparing the survey sites in Figure 2 with the recorded distribution in Guyana on eBird and iNaturalist shows that the survey covered most significant known areas of occurrence. In other words, the survey set out to maximise the number of potential encounters; this is a logical survey objective, but means that estimates are pursued in peak location, rather than averages across the country. Biology notes for the species indicates it occurs in more open habitats than most other macaw species, and the distribution records match broken forest, savannah and swamp forest.

https://ebird.org/species/baymac
https://www.inaturalist.org/observations?taxon_id=19018

Surveys were conducted in known trapping areas.

It is noted that some survey areas (Figure 2) and extraction areas (figure 7) are along the Corentyne River, which forms the border with Suriname, and it is possible that this extraction concerns a shared / transboundary population.

**Population size**: Surveys were conducted by distance sampling, which is an appropriate technique in the circumstances. However, other than table 1, no quantitative data are provided, and table 1 expresses density per kilometer – should that be density per square kilometer? Or number of individuals observed per kilometer transect line?

Table 1 also makes one wonder how a population size (presumably that is what is meant by the 'density' middle column) is extrapolated from the 'density per km'.

In figure 1, about a quarter of observations were made in the Corentyne region, but this is not listed in Table 1.

**Quota calculation**: Assuming that the column 'density' in Table 1 means 'mean population estimate', I assume the total B&Y Macaw population in the three listed surveyed extraction areas is estimated at a mean of 12,637 animals, with minimum estimate 6,466 animals and maximum estimate 24,815 individuals. The quota is then stated to be based on the lower estimate, presumably the number of 6,466 individuals, and without any rationale a quota of 760 birds is proposed, representing nearly 12% of the minimum population.

No information is given on population dynamics parameters needed to approximate a non-detrimental offtake rate; ideally one would need information on age at first reproduction, average reproductive longevity, average number of eggs, hatchlings or fledglings per brood, periodicity of broods (annual?), and mortality rates per age class. Neither is information provided on long-distance movements and possible settlement rates in new or depleted areas. None of this is presented in the 'population structure' section, which would be better titled 'aggregating behaviour'.

**Population Trends**: While a survey done 20 years ago is referenced, its findings are not mentioned, precluding even the slightest indication of whether populations are increasing, stable or declining in the survey areas or anywhere in the country.

An aspect that is not mentioned in Guyana's report is the method of capturing macaws for international trade. Are macaws trapped with nets etc. after fledging the nest, or are nestlings extracted from nests? If extracted, are nesting cavities destroyed (which would reduce opportunities for successful nesting in subsequent years)?

The radar plot in figure 8 shows a quite substantial area, which tends to be a warning for potential detrimental offtake levels. However, looking at table 3 (whose values don't always match figure 8) it appears that the radar plot is 'pulled out' by inappropriate coding, for example item 24 notes that no information is available on the % of population protected from harvest, whereas contrasting figure 2 (and known distribution from other sources) against figure 7 of extraction areas indicates that not all known populations are exploited.

**Reported Trade**: Guyana's report in Table 2 and figure 6 discusses the *percentage* decline in realized exports versus quota, with the 2014-2018 quota presumably being 792 macaws (page 6: 'Before 2019, the national quota was 792 individuals'). Discrepancies between importer and exporter-reported numbers are modest (a few percent of the total over the years 2014-2018, though some years are concerning, specifically 2016 and 2018). Declining export volumes are blamed on a combination of animals retreating to distant areas (suggesting over-exploitation of the easily-accessible populations: page 8: "those who indicated that more effort is needed now compared to a few years' prior explained that the flocks would migrate further into the jungle") and reduced access to former importing countries (Page 8: "the close of the China import market in September 2019").

Conclusion and recommendation

The Animals Committee considers that it is premature to raise the quota based on the data presented. Besides the points and questions raised above and as a summary more precise information about the following is required to be able to allow an assessment of the proposed increase:

- How representative of the whole country are the survey sites?
- How much more suitable and populated areas exist?
- Is it possible to extrapolate from the study sites to the whole potential habitable surface and thus make an estimate of the whole population?
- How comparable are the study sites to the harvesting sites?
- Under the precautionary approach, if 12% of the estimated population are caught for international trade why is this being considered to be non-detrimental to the survival of the species in the wild?

Algeria/*Anguilla anguilla* (European eel)

Comments

The North American Region, supported by the members, supports the comments from the Secretariat. Although we appreciate Algeria's response to the SC's invitation to submit the scientific justification for the proposed increase in the quota, the report only provided details regarding general data on average size (length and weight), hydrographic units, scientific studies, and Algerian regulations. Although there is currently no international trade, it seems the main recommendation, regarding the precise information requested by the SC -- the scientific justification for their proposed increase in the export quota, has not yet been complied with. Therefore, we believe that it is premature to support an increase in the export quota at this time, until additional information (i.e. a new NDF as part of their "justification" to increase their export quota for *Anguilla anguilla*) is submitted to the Secretariat and the AC Chair for its review.

Conclusion and recommendations

The Animals Committee agrees that it is premature to allow an increase of the quota. There are several concerns on the implementation of the long-term recommendation of the AC that require clarification by Algeria:

Recommendation d, D4: the maximum allowed withdrawals are a catch-all figure that does not detail how many eels are allowed to be taken.

Recommendation g: the studies mentioned are on their way, so the necessary robust scientific data are still lacking which would allow the setting up of a scientifically based management plan based on scientific data.

Recommendation h: the AC cannot analyze the NDF as the figures to assess whether the quota is non-detrimental to the survival of the species in the wild are still not presented to the AC.

Morocco/*Anguilla anguilla* (European eel)

Comments

The North American Region, supported by the members, agrees that recommendations a) and b) of the AC have been implemented by Morocco. We are undecided regarding whether or not the remaining recommendations have been implemented or are no longer relevant given the production method used in Morocco, as we are concerned that it appears, based on information presented in document SC74 Doc. 64.1 on Eels (Anguilla spp.) REPORT OF THE SECRETARIAT, the response from Morocco to Notification to the Parties No. 2021/018 indicated that their NDF was under development. It is also unclear from the current summary provided by the Secretariat as to whether or not Morocco has since produced and submitted an NDF to the Secretariat and AC Chair for its review (the subsequent May 24, 2022, information provided by Morocco and summarized by the Secretariat does not indicate the submission of an NDF). We remain concerned that Parties be allowed to leave the RST process, without producing and submitting an NDF first to the Secretariat and the AC Chair for its review. We suggest that Morocco provide its NDF to the IUCN Anguillid Specialist Group (as was suggested by the AC and the EU has done) for their review, before a decision can be made as to whether or not remaining recommendations have been implemented or are no longer relevant given the production method used in Morocco or they can be removed from the RST process.

In addition, with regards to Morocco's request to increase their export quota, justification of how their proposed increase in the export quota is conservative, based on estimates of sustainable off-take that make use of the best available scientific information, is lacking in the information they provided. Therefore, we believe that it is premature to support an increase in the export quota at this time, until additional information (i.e. a new NDF as part of their “justification” to increase their export quota for *Anguilla anguilla*) is submitted to the Secretariat and the AC Chair for its review.

Finally, regarding a record from 2020 of the CITES trade database recorded by the importer, which shows 19.84 tons of *A. anguilla* exported by Morocco to Republic of South Korea with source code “W”, we request that Morocco please clarify this particular trade transaction to determine if it involved true "wild-sourced" live eels or aquacultured live eels.

Conclusion and recommendations

The Animals Committee considers that most of the recommendations have been complied with or are in the process of being implemented, and Morocco is to be commended for its great efforts. However, based on the information submitted an all the actions taken, the AC lacks the figures and scientifically based assessments of the population of the species in order to assess whether the measures taken really assure the sustainability of the system. The AC therefore agrees that:

- Morocco should provide an explanation for the proposed increase in the quota for glass eels with the parallel small increase in export of adult eels from the farms.

- Morocco should provide the results of its stock assessment studies in relation to its management of eels in Morocco and how this information is used in its NDF for assessing whether the system in place indeed assures sustainability of Eel harvest. In particular, the NDF should clarify how it is made sure that the offtake of the eels from nature does not threaten the survival of the species in the wild.

Tunisia/*Anguilla anguilla* (European eel)

The North American Region, supported by the members, notes that the summary provided by the Secretariat confirms that recommendations a) and b) of the AC have been implemented by Tunisia, and that Tunisia has made some progress towards the implementation of the remaining AC recommendations c) to l), but they have

yet to be fully implemented. We also note that Tunisia is not currently seeking an increase in the published export quota. However, under recommendation c) of the AC, should Tunisia want to increase the export quota for *Anguilla*, they will need to submit a new NDF as part of their "justification" to the Secretariat and the AC Chair for its review. We also would invite Tunisia to provide an update on the implementation of the outstanding recommendations by three months before the documentation deadline for SC77.

Conclusion and recommendations

Tunisia has also made considerable progress in the implementation of the long-term recommendations of the Animals Committee. However, the AC still has not seen the population estimates and results or other scientifically based data and how this information is used in its NDF in order to assess whether the current quota or any increase resolves the concerns of sustainability of the harvest.

REPUBLIQUE ALGERIENNE DEMOCRATIQUE ET POPULAIRE

# الجمهورية الجزائرية الديمقراطية الشعبية

# Rapport National

## Actualisation sur la mise en œuvre des recommandations émises par le Comité pour les animaux à sa 30ème session

## -CITES-

Mai 2022

## Contexte général

Dans le cadre du respect de la conformité des recommandations formulées par le Comité pour les animaux de la CITES lors de sa 30ème discutées lors de la tenue de la 74ème session du Comité Permanent (SC74) du 07 au 11 mars 2022 réunion, le présent rapport fournie les éléments d'informations relatifs au progrès fournis pour la mise en œuvre des autres recommandations.

L'Algérie soumet également dans le présent rapport des éléments techniques préliminaires, justifiant sa demande introduite en Aout 2021, pour un rehaussement à 20 tonnes du quota annuel d'exportation de l'anguille européenne, fixé actuellement à 08 tonnes.

De plus, il a été opportun d'identifier, les besoins techniques et financiers à l'attention du Secrétariat de la CITES afin d'accompagner les pays membres à atteindre la pleine conformité par rapport aux recommandations formulées par le Comité pour les animaux de la CITES lors de sa 30ème réunion.

## 1. Recommandations exécutées

Suite aux conclusions du Secrétariat de la CITES, il a été noté que l'Algérie a assuré la mise en œuvre des recommandations a) et b), par conséquent la pleine conformité.

## 2. Actualisation des dispositions relatives aux autres recommandations

- ***Concernant, l'action C recommandée :***

Dans ce cadre, l'Algérie a mis en place en décembre 2015, un dispositif provisoire d'exploitation et d'exportation de l'anguille *Anguilla anguilla*, à travers des mesures transitoires, notamment l'établissement d'un quota d'exportation autorisé par concession fixé à 03 tonnes par année ainsi qu'un nombre de 04 concessions à délivrer par année.

A ce titre, aucune concession n'a été délivrée depuis 2015 et l'exploitation actuelle de l'anguille se fait exclusivement au niveau des sites à forte potentialité, qui sont en nombre de cinq (05). 04 sites au niveau de la wilaya d'El Tarf (Lac Mellah, Tonga, Lac Oubeira et Oued Mafragh) et 01 site (Oued El Kébir ouest) au niveau de la wilaya de Skikda.

Aussi, dans une approche précautionnelle visant la préservation de l'espèce en vue de son rétablissement dans le temps au niveau des sites à forte exploitation, sur les différentes demandes d'exportation de l'anguille reçues en 2021, l'Algérie a jugé d'attribuer le permis d'exportation uniquement aux concessionnaires. Une disposition temporaire, instaurée par l'administration chargée de la pêche et de l'aquaculture en vue de préparer la reprise du marché extérieur de l'anguille européenne.

Il est également important de noter, que les travaux réalisés dans le cadre du programme de recherche de la FAO-CGPM sur l'anguille, notamment la collecte et la

mise à jour des données concernant les habitats de l'anguille dans la région méditerranéenne, ont permis de recenser près d'une cinquantaine de sites, qui sont les suivants :

- Wilaya d'El Tarf : Mekhada, Echatt, Souarekh, Tonga, Mafragh.
- Wilaya d'Annaba : Seybouse ;
- Wilaya de Skikda : Z'hor, Saf-Saf, Collo, El Marsa, El Kebir, Guebli,
- Wilaya de Jijel : El-Kebir Ouest, Ghedir Beni Hamza, Ghedir El Merdj, Sidi Abdelaziz, Nil, Djen Djen ;
- Wilaya de Béjaia : Agerioun, Aokas, Tamellaht, Soummam ;
- Wilaya de Boumerdes : Dellys, Djinet, Sebaou, Isser ;
- Wilaya d'Alger : El Hamiz, El Harrah, Bordj El Bahri, Reghaia ;
- Wilaya de Tipaza : Messelmoun, Damous, Douaouda, Bellah, Cherchell, Mazafran, Hachem ;
- Wilaya de Mostaganem : Aizeb, Cheliff, Macta ;
- Wilaya de Ain Temouchent : Rechgoun, Tafna, Terga, Tleta ;
- Wilaya de Tlemcen : Kiss, Marsa Ben M'Hidi, Ghazaouet.

Enfin, les conclusions techniques et scientifiques formulées dans le rapport final du programme de recherche de la FAO-CGPM sur l'anguille, seront discutées au niveau du Comité Scientifique Consultatif (SAC) de la CGPM, du 21 au 24 juin 2022, en vue de leur adoption par l'ensemble des parties concernées par ce programme.

- ***Concernant, l'action D :*** *« Evaluer les mesures actuelles de gestion des prélèvements et mettre en œuvre des mesures relatives aux prélèvements pour assurer la durabilité ».*

Dans ce cadre, les dispositions mises en place sont les suivantes :

D.1. Prélèvement sélectif/en fonction de la taille :

*Application de la règlementation en vigueur, notamment :*

- Décret exécutif n° 20-266 du 22 septembre 2020 modifiant et complétant le décret exécutif n° 04-86 du 26 Moharram 1425 correspondant au 18 mars 2004 fixant les tailles minimales marchandes des ressources biologiques.

- Décret exécutif n°04-188 du 7 juillet 2004 fixant les modalités de capture, de transport, de commercialisation et d'introduction dans les milieux aquatiques des géniteurs, larves, alevins et des naissains ainsi que les modalités de capture, de transport, d'entreposage, d'importation et de commercialisation des produits de la pêche et de l'aquaculture n'ayant pas atteint la taille minimale réglementaire destinés à l'élevage, à la culture ou à la recherche scientifique.

- Arrêté du 17 février 2008 fixant les conditions et modalités d'entreposage et de stockage des géniteurs et produits de la pêche et de l'aquaculture n'ayant pas attient la taille minimale réglementaire.

- Arrêté du 10 mars 2008 fixant les conditions et le contenu de l'autorisation de capture, de transport, de commercialisation et d'introduction dans les milieux aquatiques des géniteurs et produits de la pêche et de l'aquaculture n'ayant

pas atteint la taille minimale réglementaire, destinés à l'élevage, à la culture ou à la recherche scientifique.

D.2. saisons d'ouverture/fermeture

La pêche à l'anguille est ouverte le 1er Octobre de chaque année et la fermeture se fait le 30 Avril de l'année suivante, conformément au décret exécutif n° 06-372 du 19 octobre 2006 fixant le cahier des charges-type pour l'exploitation de l'anguille dans les sites autres que ceux du lac Oubeira et lagune d'El Mellah.

D.3. Saisons de prélèvement

La saison de prélèvement de l'anguille est fixée entre le 01er Octobre et le 30 Avril, conformément au décret exécutif n° 06-372 du 19 octobre 2006 fixant le cahier des charges-type pour l'exploitation de l'anguille dans les sites autres que ceux du lac Oubeira et lagune d'El Mellah.
Cependant, la pêche des anguillettes et des civelles est interdite sauf pour celles destinées à l'élevage. Dans ce cas, la saison de pêche des anguillettes est ouverte toute l'année alors que celle des civelles est ouverte entre le 01er décembre et le 30 avril.

D.4. Maximums de prélèvements

Conformément au décret exécutif n° 03-280 du 23 août 2003 définissant le mode de délivrance et d'établissement de la concession domaniale pour l'exploitation des lacs Oubeira et Mellah (wilaya d'El Tarf), la quantité maximale de prélèvements au titre de la pêche continentale dans le lac Oubeira est fixée à 150 tonnes/an pour toutes espèces de poissons confondues, alors que les quantités maximales de prélèvements au titre de la pêche lagunaire dans la lagune d'El Mellah sont fixées à 80 Tonnes par an, pour toutes espèces confondues.

Le principe de ces prélèvements est de (1/3) de la biomasse existante.

D.5. Restrictions sur la fréquence des prélèvements, les sites ou le moment de la journée

Pas de restrictions sur la fréquence des prélèvements. Le principe repose sur le respect des quantités de prélèvements autorisés fixées par la réglementation en vigueur et mentionnée dans le point D.4.

D.6. Contrôle du nombre d'exploitants

- Décret exécutif n° 03-280 du 23 août 2003 définissant le mode de délivrance et d'établissement de la concession domaniale pour l'exploitation des lacs Oubeira et Mellah (wilaya d'El Tarf).
- Décret exécutif n° 05-184 du 9 Rabie Ethani 1426 correspondant au 18 mai 2005 définissant les différents types d'établissements d'exploitation des ressources biologiques marines, les conditions de leur création et les règles de leur exploitation.

- Décret exécutif n° 06-372 du 26 Ramadhan 1427 correspondant au 19 octobre 2006 fixant le cahier des charges-type pour l'exploitation de l'anguille ;

- Arrêté du 6 août 2006 fixant le contenu du dossier de demande de concession pour la création d'un établissement d'exploitation des ressources biologiques marines.

- Arrêté interministériel du 30 aout 2009 fixant les modalités de fonctionnement du comité de suivi et de surveillance des activités d'exploitation des lacs Oubeira et Mellah.

D.7. Types et méthodes de prélèvement

Le type et le nombre des navires utilisés pour les prélèvements de l'anguille sont définis par le décret exécutif n° 03-280 du 23 août 2003 définissant le mode de délivrance et d'établissement de la concession domaniale pour l'exploitation des lacs Oubeira et Mellah (wilaya d'El Tarf) ainsi que le décret exécutif n° 06-372 du 19 octobre 2006 fixant le cahier des charges-type pour l'exploitation de l'anguille dans les sites autres que ceux du lac Oubeira et lagune d'El Mellah.

Les engins de pêche sont définis dans le décret exécutif n°03-481 du 13 décembre 2003 fixant les conditions et les modalités d'exercice de la pêche, notamment l'arrêté du 27 février 2011 définissant les caractéristiques techniques des établissements d'exploitation des ressources biologiques marines.

- ***Concernant, l'action E :*** « Eclaircir et normaliser les termes et les unités utilisés pour déclarer le commerce. Garantir que les termes et unités appropriés sont inscrits sur les permis. Des termes normalisés et des unités appropriées sont consignés dans la version la plus récente des Lignes directrices pour la préparation et la soumission des rapports annuels CITES, mentionnée dans la résolution Conf. 11.17 (Rev. CoP16), Rapports nationaux, et diffusés par le Secrétariat dans une notification ».

En effet, suite à la publication du décret exécutif n° 20-83 du 7 Chaâbane 1441 correspondant au 1er avril 2020 portant organisation de l'administration centrale du ministère de la pêche et des productions halieutiques, notamment à travers la création de la direction du contrôle des activités de la pêche et de l'aquaculture et de la régulation du marché, cette dernière est chargée de veiller à la mise en œuvre des dispositifs et programmes de contrôle des activités de pêche et d'aquaculture et d'en assurer le suivi.

Le suivi se fait également en coordination avec les Services des Douanes algériennes qui exigent dans le dossier d'exportation :

-Le certificat d'origine de l'espèce à exporter ;
-Une dérogation sanitaire d'exportation délivrée par les services vétérinaires.

Toutes les transactions de commerce international sont enregistrées et archivées sous format électronique et dont le fichier est régulièrement mis à jour.

Aussi, l'organe de gestion CITES/Algérie, est chargé de veiller à l'application rigoureuse des lignes directrices pour la préparation et la soumission des rapports annuels CITES.

- ***Concernant, l'action F :*** « *Veiller à ce que les permis délivrés pour l'espèce indiquent clairement et précisément la source des spécimens* ».

Le certificat d'origine indique clairement et précisément la source des spécimens à exporter. Un processus parfaitement maitrisé.

Dans le cas de l'anguille exportée de l'Algérie, et s'agissant des spécimens prélevés dans la nature, la source, représentée par la lettre W, a été mentionnée.

- ***Concernant, l'action G :*** *« Entreprendre des études scientifiques sur l'état de conservation de l'espèce (p. ex., taille de la population/densité, tendances, répartition), y compris une évaluation des menaces pour l'espèce, pour utilisation comme base d'émission des ACNP ».*

Rappelons, que 05 thèses de doctorat sont actuellement consacrées à l'étude de l'anguille. Les thématiques portent sur :

- Evaluation de la santé d'un écosystème à travers l'utilisation de l'anguille *Anguilla anguilla* : cas du lac Oubiera et la lagune El Mellah ;
- Evaluation de la santé d'un écosystème à travers l'utilisation de l'anguille *Anguilla anguilla* : cas du lac Tonga et l'estuaire du Mafragh ;
- Evaluation du stock d'anguille européenne *Anguilla anguilla* L. 1758 de quelques hydro-systèmes du Park National d'El Kala ;
- Étude génotoxique et biochimique des polluants chez l'anguille européenne, face au stress environnemental ;
- Contribution à la biologie des fractions de population d'anguille européenne *Anguilla anguilla* dans les hydro systèmes algériens.

- ***Concernant, l'action H :*** *« Elaborer/mettre en place un programme de suivi scientifique permanent de la population pour servir, conjointement avec un programme de gestion adaptative pour l'espèce (voir mesures de gestion des prélèvements et contrôle du commerce, ci-dessous), A l'émission d'ACNP »*.

En 2021, le ministère de la pêche et des productions halieutiques a mis en place un comité de suivi de l'activité d'exploitation et d'exportation de l'anguille européenne au niveau de son administration centrale qui active en étroite collaboration avec l'organe de gestion national CITES. Ce comité coordonne avec le centre national de recherche et de développement de la pêche et de l'aquaculture (CNRDPA), l'agence nationale de développement durable de la pêche et de l'aquaculture (ANDPA), les universités de la région Est (université d'Annaba et l'El Tarf) ainsi que la direction de la pêche d'El Tarf.

Aussi, conformément au décret exécutif n° 03-280 du 23 août 2003 définissant le mode de délivrance et d'établissement de la concession domaniale pour l'exploitation des lacs Oubeira et Mellah (wilaya d'El Tarf) ainsi que le décret exécutif n° 06-372 du 19 octobre 2006 fixant le cahier des charges-type pour l'exploitation de l'anguille

dans les sites autres que ceux du lac Oubeira et lagune d'El Mellah, le concessionnaire est tenu :

- d'assurer la reconstitution du patrimoine halieutique en favorisant les recrutements naturels des espèces préexistantes ;

- de ne pas entraver le droit des tiers notamment en matière de recherche scientifique, titulaires d'une autorisation de l'administration du parc national d'El Kala ;

- d'accueillir des stagiaires désignés par l'administration de la pêche au titre de leur cycle de formation.

- ***Concernant, les actions I et J :***

*« I. Elaborer et mettre en œuvre des plans de gestion coordonnés, nationaux et/ou locaux (comprenant des considérations de gestion des prélèvements) visant a atteindre, dans des délais définis, des objectifs d'échappée contribuant à la reconstitution des stocks ».*

*« J. Lancer des programmes de suivi robustes, avec la contribution de WGEEL, afin de fournir des séries chronologiques de données démographiques et/ou des indices de recrutement et d'échappées pour soutenir l'élaboration et la mise en œuvre des plans de gestion et informer les évaluations des ACNP ».*

Conformément aux conclusions de la CITES en 2021, l'Algérie a mis en place un plan de gestion partiel de l'anguille européenne. Cependant, la restitution de l'ensemble des informations technique et scientifique en cours d'exécution, notamment l'adoption en 2022 des recommandations du programme de recherche de la CGPM sur l'anguille, permettra de compléter et mettre à jour les dispositions réglementaires en vigueur.

- ***Concernant, l'action K :***

Les échanges d'expertise entre les pays de la Méditerranée membre du programme de recherche de la CGPM sur l'anguille européenne, a fait ressortir les besoins techniques et financiers de l'Algérie pour une mise à niveau et atteindre la conformité en matière des recommandations de la CGPM et de la CITES, relatives à la mise en place d'un plan de gestion pluriannuel de l'anguille européenne.

Dans ce cadre, l'Algérie formule sa demande de soutien pour la réalisation d'une étude scientifique portant sur « l'évaluation de l'état du stock des anguilles en Algérie ». La fiche technique du projet sera communiquée au secrétariat de la CITES après notification de l'accord de soutien de l'étude.

Aussi, l'exécution de cette étude est tributaire d'un certains nombre de formations spécialisées, au profit des scientifiques, jugées nécessaires pour la standardisation des protocoles et méthodologies de travail. Il s'agit des formations suivantes :

- Formation pratique sur la méthode de marquage recapture pour l'étude de l'échappement des anguilles argentées ;

- Formation pratique sur les méthodes d'étude du recrutement des civelles ;

- Formation pratique sur la lecture des otolithes des anguilles à ses différents stades (civelles, anguilles jaunes et anguilles argentées) ;
- Formation pratique sur le suivi des stocks des anguilles jaunes à l'aide de la pêche électrique dans les rivières ;
- Formation sur le modèle EDA (Eel Density Analysis) ;
- Formations sur « le Modèle de dynamique de population « lagune » (*mise en ligne sur internet en 2012: www.eelmanagement.eu*).

Tels sont les éléments d'informations, jugés pertinents, pour transmission au Secrétariat de la convention sur le commerce international des espèces de faune et de flore sauvages menacées d'extinction (CITES).

# Status of the Blue-and-Gold Macaw (*Ara ararauna*) in Guyana

## Introduction

Guyana, as a Party to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), is cognizant that "people and states are and should be the best protectors of their wildlife". We are committed to ensuring that trade is carried out within the framework of Article IV of the Convention to ensure that the trade remains sustainable. The blue and gold macaw *(Ara ararauna)*, is one of the most sought after macaw species in the international trade from Guyana. The plumage, especially if the specimen is wild-caught, consists of an array of attractive colors which blends together to create a unique color combination. Their high-pitched echo against the surfaces of the forest, creates anticipation long before they are seen. The species is utilized in the international trade to meet the demand for zoos, breeding facilities and for private collections. Domestically, the species is popular in the pet trade for its ability to retain words and for its colorful appearance.

A psittacine survey was conducted to provide information on the status of the psittacine species which are utilized in trade. Our recent survey has shown that the densities of the blue-and-gold macaw are high and the quota for the international trade is compatible with the species survival in the wild. Blue-and-gold macaws were found to be abundant in four strata of Guyana i.e. Berbice, North West District, Corentyne, and South Rupununi. The species was found in seven sites of the North West Region, three sites in the Berbice Region, five sites in the Corentyne Region and one site in the South Rupununi Region.

# General Information

### Identification during survey

Blue-and-gold macaws were identified from physical appearance, flight pattern and vocalization.

### Feeding

The species occurs in pairs, groups and in flocks. Flocks are likely to be seen in riverine areas and have a preference for perching on the tallest trees in the area. In the Canje River they feed mostly in flocks on the cochilla nut tree. They also have apparent preference for feeding on red mangrove *(Rhizophora mangle)* and waripau trees. These trees were abundant throughout the survey area.

### Distribution

*Ara ararauna*, is distributed throughout Guyana, but have a preference for forests bordering rivers. The species was recorded in the Rupununi, Berbice and the North West District, during the 2018-2019 (Figures 1 and 2) survey of the psittacine in the international trade. The species is also a prevalent feature in the Cuyuni-Mazaruni areas and is often recorded by persons conducting research for various purposes in the area.

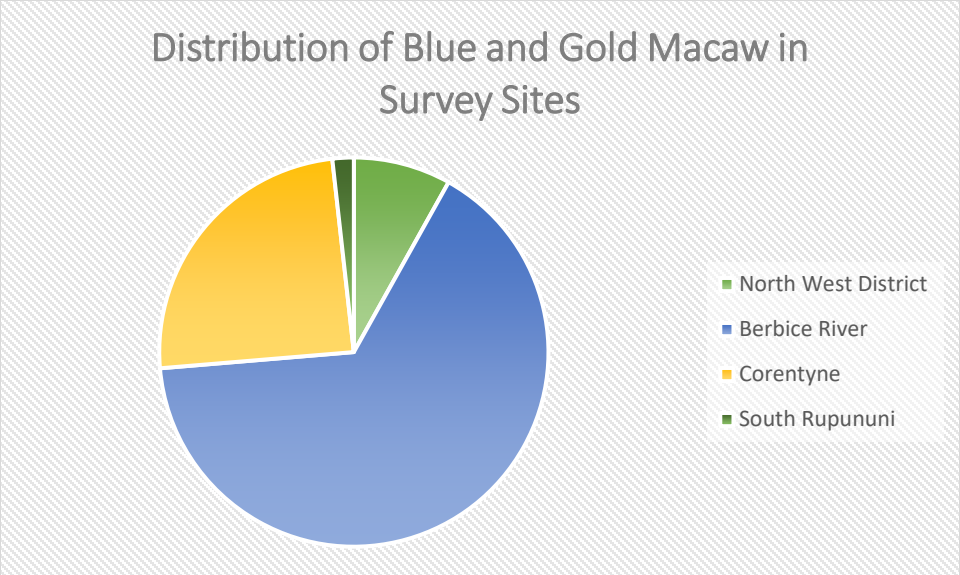


*Figure 1. Compares the recorded number of blue and gold macaws in the survey sites.*

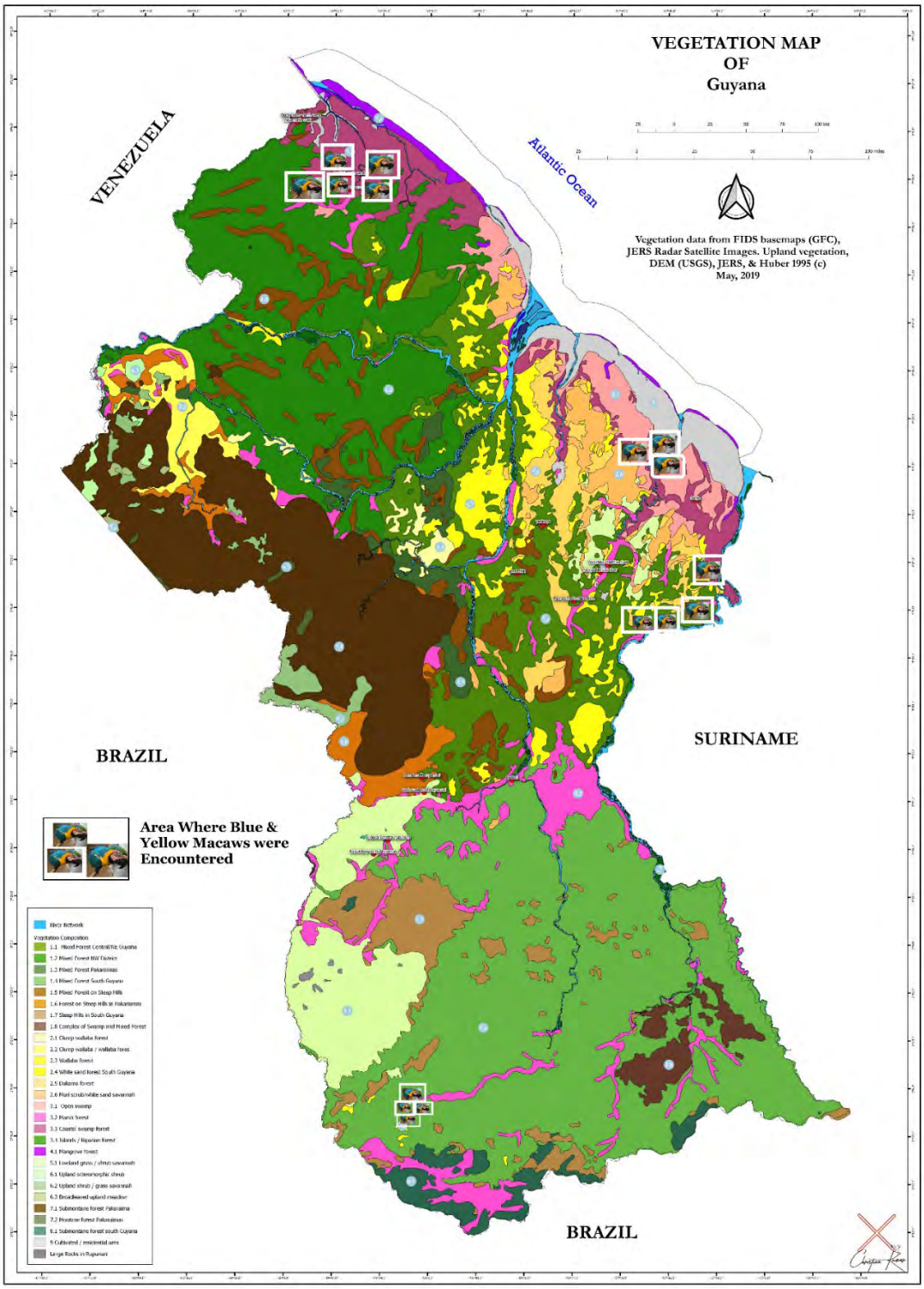


*Figure 2. Highlights the survey areas where macaws were recorded.*

# Status and Trends

## Habitat Trends

Blue-and-gold macaws occur in high forest in close proximity to rivers, large creeks, inlets and swamps. Their presence is also dictated by various palm species including cocorite *(Attalea maripa*), cabbage palm *(sabal palmetto)*, manicole palm *(Prestoea tenuiramosa)* and turu palm *(Oenocarpus bacaba)*. They are a prevalent feature in their area of occupancy and are vocal when approached. The species also occurs in areas utilized by humans for farming and other activities. When they occur in this area, their presence is synonymous with the availability of permanent fruiting trees such as cabbage palm trees. The habitat in which blue-and-gold macaws were encountered were intact and in most cases inaccessible because of the presence of lianas, moco moca trees *(Montrichardia linefera)*, water grass and other aquatic species that form a fortress-like barrier. The species prefers the quiet areas of the Essequibo, Rupununi, Rewa, Anabasi, Kumaka and Waini rivers. They also occur in areas such as Morawhanna, where they were seen flying over riverine communities. The survey was not conducted in any protected area or known areas for distribution outside of trapping areas, therefore habitat trends could not be established for those areas.

## Population Size

The estimate of population size and densities were estimated using the distance sampling (version 6.1) survey software and the point count method to record data. The software is widely used by ecologists to determine the densities of wildlife within a particular area or stratum. The survey was done under the assumption that "blue and gold macaws on the point were detected with certainty." The survey was conducted when the species is less likely to occur. Anecdotal information revealed that the species is most abundant from July to September. The surveys were conducted from October to June. Densities were calculated in the areas where the species were recorded. The reported density in Rupununi covered areas in the North Rupununi (Apoteri and the Essequibo River) and the South Rupununi (Parabara); the density for the Berbice included Corentyne river, Canje creek, Berbice River; and the density reported for the North West District, included Mara Hill, Mara Creek, Kumaka River, Barima River and the Anabasi River.

**Table 1. Showing the density of *Ara ararauna* in the survey sites**

| | **Density per km** | **Density** | **Lower Confidence Interval** | **Upper Confidence Interval** |
|---|---|---|---|---|
| **Rupununi** | 44.6 ind/km | 2261 | 1008.8 | 5070 |
| **North West District** | 27.6 ind/km | 2798.3 | 1534.4 | 5103 |
| **Berbice** | 18.3 ind/km | 7578 | 3922.3 | 14642 |
| **Combined Total** | | 12,637 | 6,466 | 24,815 |
| **Average Density** | 30.2 ind/km | | | |

## Calculation of Quota

Although the Distance software gave an estimate of the total number of species in the area, it was decided that the calculation of the quota should be based on the lower confidence limit of the combined density of the areas in which the species were found. Before 2019, the national quota was 792 wild individuals. In 2019, the quota was determined by the Animals Committee as, 600 wild individuals. This quota will remain in place until Guyana produces an estimate of the population, with strong scientific support to determine whether the quota is sustainable and that extraction would not affect the ability of the species to perform its role in the ecosystem. Having completed that survey, a proposal of 760 birds is proposed, which is closer to the estimated population density of the lower confidence interval.

Other considerations which were made in determining the quota were the abundance of the species in the targeted harvesting areas and the presence of threats in the area. To collect this additional information a workshop was held with the stakeholders to determine the areas of extraction. Although information is readily available on the most popular harvesting areas for wildlife per species, there is still need to collect on the frequency of transport from those areas and mortality rates. To facilitate this collection of data, a removal and transport permit will be introduced. At the end of the open season in 2020, the total number of blue-and-gold macaws will be analyzed by harvesting areas, followed by a stakeholder consultation to decide on the approach to be used to determine harvest limits.

## Population Structure

The species exhibits no apparent sexual dimorphism, therefore distinguishing between the sexes was not possible during the survey period. The population structure presented in this report is based on the group dynamic encountered during this survey. Three major clusters were encountered in the Berbice River, the Canje Creek and the Corentyne River. The 9 clusters (Fig. 3) were encountered in the Berbice River with an average flock size of 25 individuals, with the maximum number being 33 individuals and a minimum of 6 in a flock. It should be noted that of the total flocks recorded, 8 consisted of 20 individuals and above, with a median of 26 individuals per flock. The flocks represented 69 % of the total number encountered at that survey site. The remaining 31 % comprised groups of fours, threes, and pairs.

Comparatively, 4 clusters (Fig. 4) encountered in the Canje Creek were an average cluster size of 17 individuals. The maximum number recorded was 32 individuals and the minimum number recorded was 7 individuals. Twenty-two percent of the total recorded at this survey point represented pairs, while 74 percent represented individuals in flocks.

Similarly, 4 clusters (Fig. 5) were encountered in the Corentyne River, with a mean flock size of 15. The maximum number encountered per flock was 36 individuals while the minimum number encountered was 6 individuals. Flocks represented 58 % of the total number encountered for that survey point, while groups of four represented 24 %.

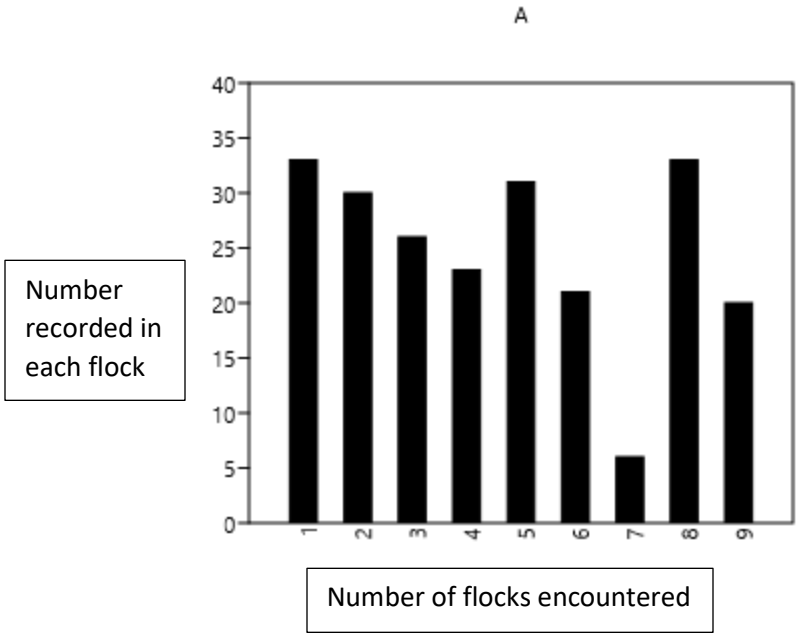


*Figure 3. Comparison of flock sizes of blue-and-gold macaw at the Mara survey point in the Berbice River*

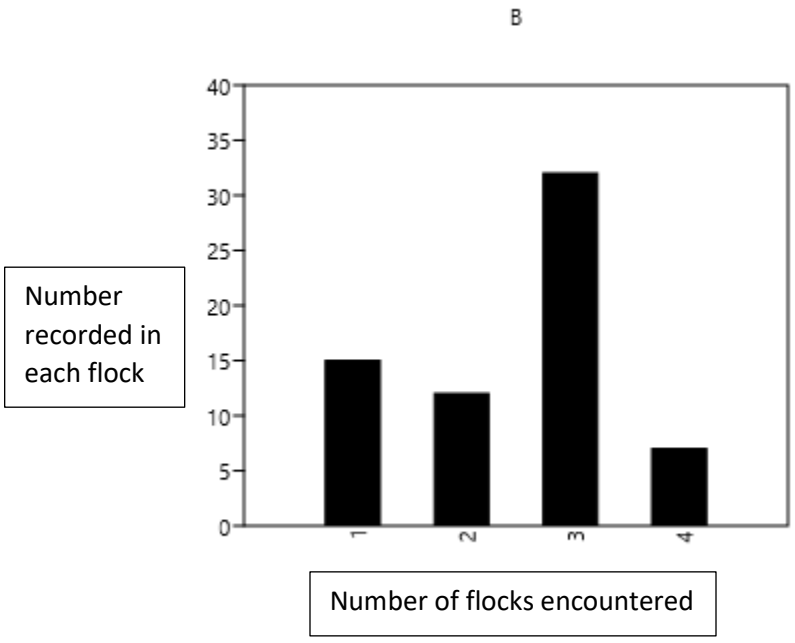


*Figure 4. Comparison of flock size of blue-and-gold macaws in the Canje Creek*

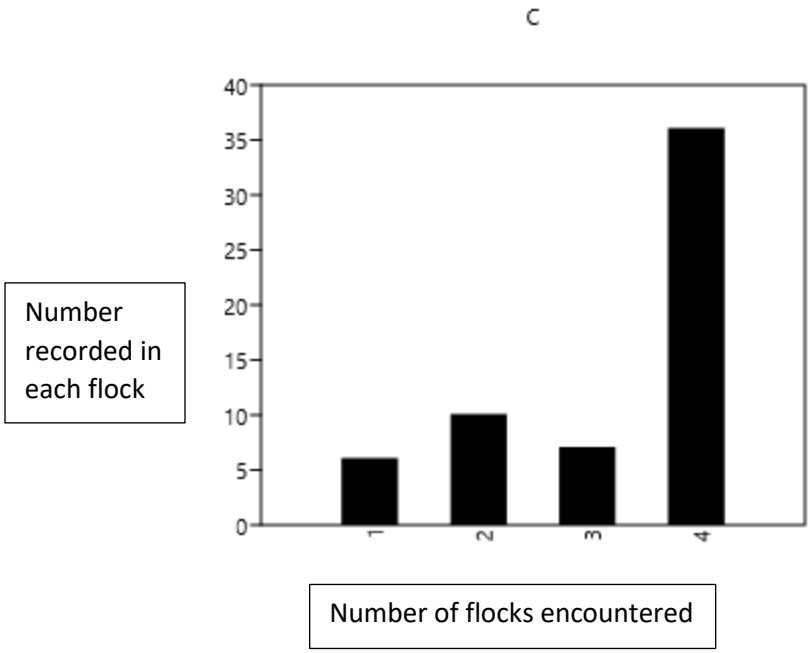


*Figure 5. Comparison of flock size of blue and gold macaws in the Corentyne River*

## Population Trends

Population trends could not be established because the survey preceding this survey was conducted 20 years ago. To address the concern of an apparent data gap, interviews were conducted to establish trends using catch per unit effort. When the question was asked about the ease of filling an order now compared to previous years, the respondents were divided on the answers. In the three strata in which the survey was conducted, fifty percent of the respondents answered yes, while the remaining answered no. The respondents were also asked to provide reasons for their answers and those who indicated that more effort is needed now compared to a few years' prior explained that the flocks would migrate further into the jungle. Extraction becomes more difficult because the risk of contracting malaria, typhoid, dengue or being bitten by venomous snakes becomes greater. On the other hand, those who answered no to the question indicated that difficulty in trapping may result from trappers being inexperienced.

## Trade Statistics

There was a steady decline (Table 2., Fig. 6) in the export of blue-and-gold macaws over the five-year period examined for this report. Although 2019 figures were not available during the period of the compilation of this report, other information suggests that the figures will be significantly lower than the previous years because of the conservative quota recommended by the Animals Committee and the close of the China import market in September 2019.

*Table 2: Blue and Gold macaw export trends 2014 - 2018*

| 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|
| **100** | 93.6 | 93.5 | 87 | 66.9 |

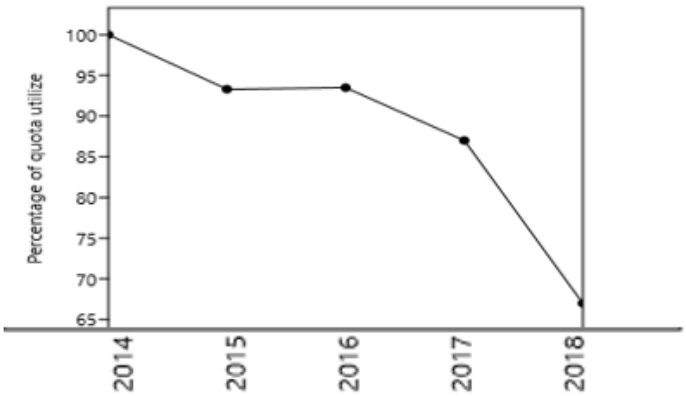


*Figure 6. Trade trend of blue and gold macaws 2014 – 2018*

## Harvesting Areas for the International Trade

A consultation with stakeholders was held to document important extraction areas. While the species is known to be distributed throughout the country, the cost versus benefit for transporting to Georgetown is not feasible to compensate trappers and middlemen. Extraction therefore only takes place from specific areas (Figure 7).

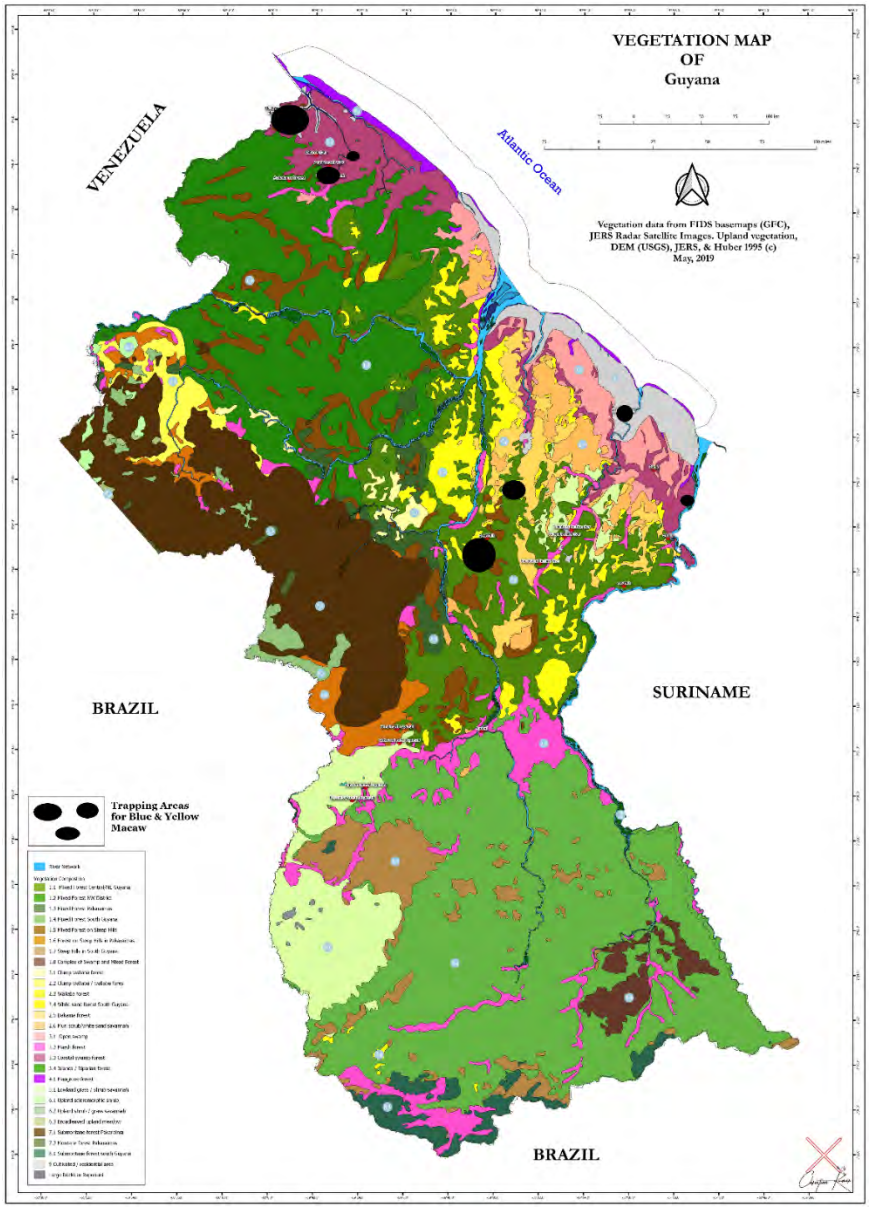


*Figure 7. Extraction areas for blue and gold macaws in Guyana for the international trade*

## Trapping and Livelihoods

The North West District is a rural interior location in the northern-most part of Guyana and it is the main area of extraction for birds to supply for international trade. It is home to the Warau, Arawak, Carib and Akawaio indigenous tribes. There are 34 indigenous villages in the North West District. Our analysis indicates that trapping is a traditional skill practiced by indigenous Guyanese. Trapping is one of the major economic activities of indigenous people, apart from hunting for subsistence and trade, logging, farming and mining. The end of the closed season for trapping birds coincides with a halt in the other activities in the area. However, the highest recorded

number of blue-and-gold macaws was found in the Berbice stratum. The Berbice stratum is an urban area and a major economic hub for various agricultural activities including rice farming, sugar production, cash crops and cattle ranching. Therefore, it is not surprising that based on the population dynamics and lack of other economic alternatives that the majority of the birds are sourced from the North West District. Data revealed that most persons involved in the wildlife trade are within the 35-50-year category. Although many trappers are unhappy with the compensation received from the sale of wildlife, it is still viewed as a dependable source of income and supports families in these remote areas.

## Radar Graph to determine status

A radar graph (Fig. 8) was used to visually represent the status of blue-and-gold macaws in Guyana using the guidance principle set out in Part IV-Guidelines to assist parties in making non-detriment findings. (Table 3). The radar plot produced several spikes in the area of proportion protected from harvest, national population trend and management plan. These spikes could be accredited to information gap on the species outside of trapping areas, and the newness of the GWCMC as a management body for wildlife in Guyana. Monitoring scored positively because there is dedicated effort by the Monitoring and Compliance Division of the GWCMC to ensure adequate monitoring through agreements with other enforcement agencies. Conservation initiatives are provided in the ex-situ conservation, which seeks to reduce offtake from the wild. Overall the life history, national distribution, national abundance and human tolerance were closer to the circle. On the other hand, management measures fell within the precautionary sections because GWCMC is documenting current practices of harvest, transport conditions and mortality of extracted specimens.

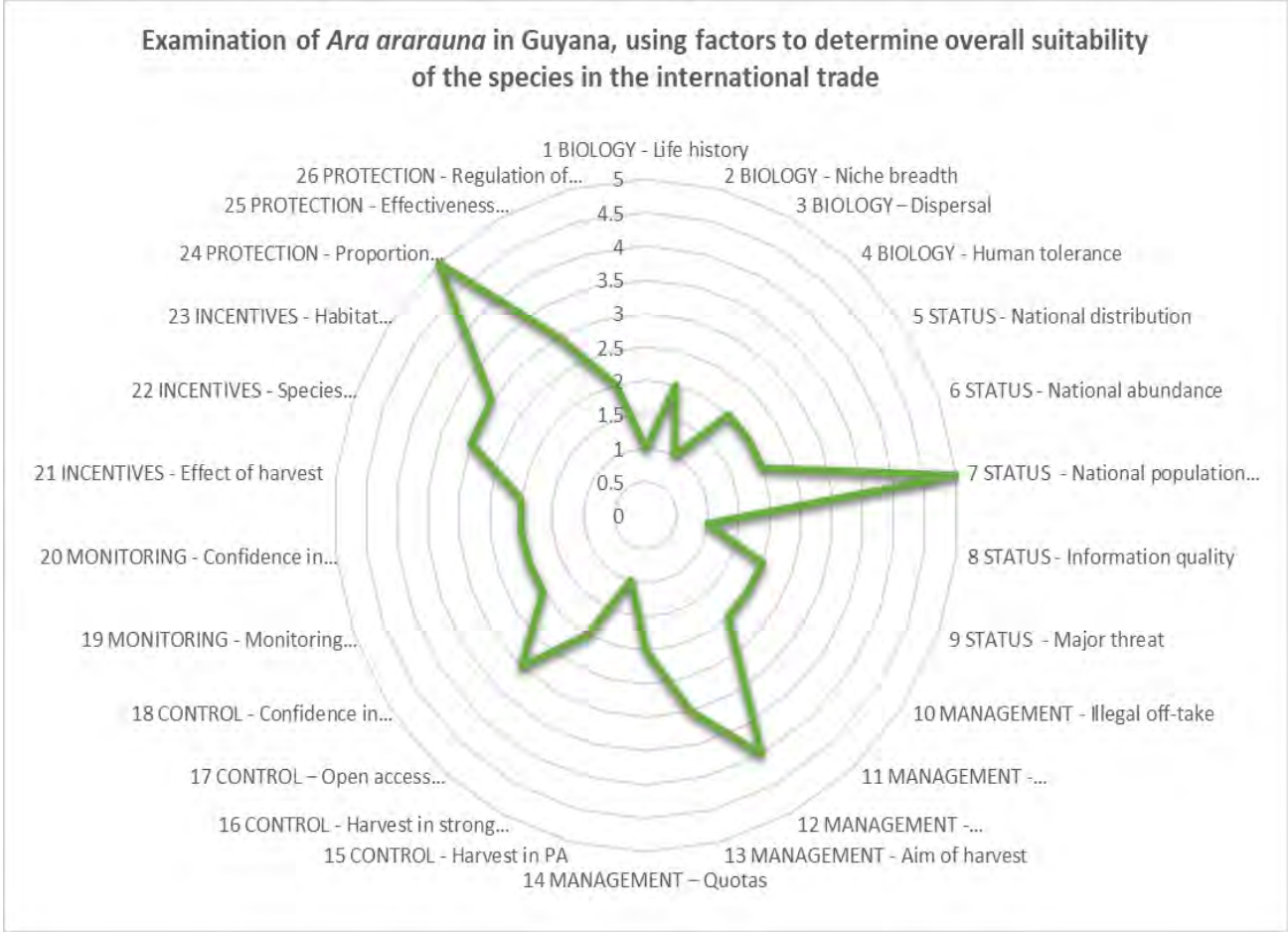


*Figure 8. Checklist to determine status of blue and gold in Guyana*

Table 3: Checklist of factors to consider in determining status of blue and gold macaws

| | | |
|---|---|---|
| 1 BIOLOGY - Life history | 1 | The species reproductive rate is high and the species lifespan in the wild is between 30-35 years |
| 2 BIOLOGY - Niche breadth | 2 | The species is a generalist feeder and has a high degree of environmental tolerance |
| 3 BIOLOGY – Dispersal | 1 | The species is able to move between nesting side, roosting sites and feeding sites. |
| 4 BIOLOGY - Human tolerance | 2 | The species can occur in close proximity to human settlements. Habitat disturbances results in migration of the species from one area to the other but very rarely results in mortality. |
| 5 STATUS - National distribution | 2 | The species is widespread and fragmented in the country. The abundance is associated with rivers, swamps and other water bodies. |
| 6 STATUS - National abundance | 2 | The species is common in Guyana a |
| 7 STATUS - National population trend | 5 | The national population trend is unknown, however there are new systems in place to monitor the population trend |
| 8 STATUS - Information quality | 1 | Quantitative data is available on the species status in Guyana |
| 9 STATUS - Major threat | 2 | While the major threat is habitat lost due to mining and logging, these threats are managed within the two subject agencies, which are the Guyana Geology and Mines Commission and the Guyana Forestry Commission |
| 10 MANAGEMENT - Illegal off-take | 2 | Illegal offtake is small and often occurs at the end of the closed season. |
| 11 MANAGEMENT - Management history | 2 | The harvesting coincides with extraction for the international trade. |
| 12 MANAGEMENT - Management plan | 3 | Species is protected from during the reproductive stages in the wild |
| 13 MANAGEMENT - Aim of harvest | 3 | The species is harvested mainly for the commercial international trade and the local pet trade |
| 14 MANAGEMENT – Quotas | 2 | The quotas are cautious and are set at the minimum end of the recommended quota usage |
| 15 CONTROL - Harvest in PA | 5 | No information is available on the species density in protected areas |
| 16 CONTROL - Harvest in strong tenure | 2 | The species is most abundant in the Berbice stratum but harvest levels are higher in the North West District |
| 17 CONTROL – Open access harvest | 3 | License trappers are not restricted in their harvesting areas |
| 18 CONTROL - Confidence in harvest management | 2 | Awareness is being conducted with enforcement agencies, monitoring of transportation routes and check points is being implemented. |
| 19 MONITORING - Monitoring method | 2 | Data on the distribution and usage is analyzed using quantitative methods |
| 20 MONITORING - Confidence in monitoring | 2 | New systems are being implemented on an experimental basis to test effectiveness before full implementation. |
| 21 INCENTIVES - Effect of harvest | 2 | Species is able to maintain its role in the ecosystem. |

| | | |
|---|---|---|
| 22 INCENTIVES - Species conservation incentive | 3 | The implementation of framework for wildlife production systems provide reduce levy cost. |
| 23 INCENTIVES - Habitat conservation incentive | 3 | There is low habitat conservation initiative |
| 24 PROTECTION - Proportion protected from harvest | 5 | No information is available |
| 25 PROTECTION - Effectiveness of protection | 3 | Species appears to be fulfilling its role in the ecosystem |
| 26 PROTECTION - Regulation of harvest | 2 | There are effective controls to discourage harvest in the closed season for harvesting this species. |

## Threats to local Population

While the population of blue-and-gold macaws is abundant in their areas of distribution in Guyana, threats to the species include the following:

- Logging which decreases the amount of food available to the species;
- Lack of survey to establish population trends;
- Information gap on the utilization in the domestic pet trade; and
- Extraction in the closed season.

## Threat Management

The Guyana Wildlife Conservation and Management Commission held a stakeholder workshop to identify threats to psittacines in Guyana. The workshop identified immediate actions and shared the long terms actions to be implemented based on the recommendations of the Animals Committee.

Short term actions to be implemented in 2020

- A reduction in the open season for trapping (June 1 – November 30, 2020);
- Identification of harvesting areas for the international wildlife trade so that information on the harvest numbers could be documented. This information gathering would be facilitated by an existing reporting document kept by the wildlife exporter and a newly implemented transport permit to identify among other things, removal date, time, location, transport conditions and life stage harvested. It is important to document the current practices to determine the effectiveness of new management measures; and
- Support captive-breeding programmes for the species.

Objet : Etude du commerce important de spécimens d'espèces inscrites à l'Annexe II [Résolution Conf. 12.8 (Rev. CoP18)]

Monsieur le Chef de l'Unité Scientifique au Secrétariat de la CITES,

En réponse à votre lettre du 20 avril 2022, concernant la résolution Conf. 12.8 (Rev. CoP17) Étude du commerce important de spécimens d'espèces inscrites à l'Annexe II, et spécifiquement concernant Anguilla anguilla en provenance du Maroc, comme une combinaison espèce/pays qui fait partie de cette étude, j'ai l'honneur de vous faire parvenir, ci-joint, un complément d'information sur la mise en œuvre de la Recommandation du Comité des animaux particulièrement relatif à l'état d'avancement de l'étude scientifique (points g, l et i).

**L'état d'avancement des actions menées depuis 2021.**

**1-** L'élaboration et l'adoption d'une méthodologie normalisée de suivi des populations d'anguille, réalisée par l'appui d'une équipe d'experts nationaux et internationaux. Cette méthodologie basée sur les protocoles adoptés et testés au niveau de certains pays de l'union européenne, porte essentiellement sur :

- Etude du recrutement des civelles au premier barrage par des stations de comptage
- Etude du recrutement des civelles dans l'estuaire
- Etude du recrutement dans les lagunes
- Etude du stock d'anguille jaune par pêche électrique
- Evaluation du nombre de géniteurs dévalant par Capture-Marquage-Recapture
- Evaluation de l'efficacité des repeuplements

Cette méthodologie a été mise en place depuis la fin de 2021, et les premiers résultats de cette étude sont prévus au mois de décembre 2022, qui permettrait d'obtenir les premières estimations des stocks d'anguille au Maroc.

**2-** L'étude de faisabilité de la mise en place d'une passe à anguille au niveau du barrage de garde de Sebou (réalisée par le bureau d'études français « Fish Pass ») et dont l'installation est prévue au mois de juin.

**En termes des besoins d'appui à solliciter au secrétariat de la CITES**

· Un appui en matière de renforcement des capacités pour le suivi scientifique des stocks d'anguille

Nous restons à votre disposition pour toute information complémentaire

Veuillez agréer, Monsieur le Chef de l'Unité Scientifique, l'expression de nos meilleures salutations

Organe de Gestion de la CITES au Maroc

## Maria Isabel Camarena Osorno

**From:** Gnam, Rosemarie <rosemarie_gnam@fws.gov>
**Sent:** 19 September 2022 18:14
**To:** Paulo Carmo; Dejana Radisavljevic; Aurélie Flore Koumba Pambo
**Cc:** MAHAMANE Ali; Ali Mahamane [YAHOO]; Ali Mahamane [YAHOO]; Ali Mahamane [GMAIL]; Tika Dewi Atikah [YAHOO]; bylee80@nie.re.kr; César Augusto Beltetón Chacón [GMAIL]; Fabiola Rocío Núñez Neyra [MINAM GOB]; Fabiola Rocío Núñez Neyra [GMAIL]; Ursula Moser [BLV ADMIN]; Damian Wrigley [AWE GOV]; Paulo J.L. Carmo [GMAIL]; Paulo J.L. Carmo [ICNF]; Ronell Renett Klopper; David Morgan; Maria Isabel Camarena Osorno; Karen Gaynor
**Subject:** NAR RESPONSE to SC75: Review of Significant Trade (Flora)

Dear Dejana and Flore:

Thank you for the opportunity to provide input from the North American Region.

Below, please find input from the North American Region as it relates to the determinations made in paragraphs 10, 11 and 12 of the draft document SC75 Doc. 7. We recommend a cautious approach.

### 10. India/*Pterocarpus santalinus*

The document reports that PC recommendations a)-b), and SC recommendations c)-h) have been complied, and that recommendations i)-k) related to export of confiscated or damaged specimens and any quotas for non-wild specimens remain ongoing. The document recommends to commend India on completing PC recommendations a)-b) and for India to provide an update on export plans for confiscated specimens (including the additional amounts) in time for consideration at in time for consideration at SC77.

- In addition to the concerns raised by our European colleagues, it is our understanding that the zero export quota will be in effect for five years. For the purposes of clarity and tracking, we recommend this be notated on the CITES export quota website.
- We are concerned at the declaration of additional stocks of confiscated specimens totaling 13,301.692 metric tons, which India intends to export in accordance with Resolution Conf. 17.8 on Disposal of illegally traded and confiscated specimens of CITES-listed species, particularly as it relates to the number of individual trees represented by that volume and what specific steps are being taken to dissuade further illegal harvest.
- There remains an outstanding item regarding the possibility of exporting an excess of 810 tons of uprooted trees that were damaged by cycle in 2019 and 2020.

### 11. Nepal/*Nardostachys grandiflora*

The document reports that all recommendations of the PC and the SC a)-e) have been complied with. The document recommends removal of this case from RST.

- It would appear that the *original* PC and SC70-SC71 recommendations a)-e) have been satisfied. Like our European colleagues, the North American Region recalls concerns raised by the Plants Committee prior to the SC74 at which time it was recommended at SC74 that the Secretariat consult further with Nepal to inform at SC75, whether domestic trade was not taken into consideration in the establishment of the precautionary quota. If no explanation was received from Nepal, it would follow that this concern by the Plants Committee was not addressed.
- We would also reiterate that the SC74 requested Nepal continue to consult with the Secretariat and the Chair of the Plants Committee any quota for 2022 onwards. Nepal has not responded in this regard and there is no published quota for 2022. We might suggest noting for the SC75 record this request that Plants Committee be consulted in this regard.

12. **Paraguay/*Bulnesia sarmientoi***

The document reports that all recommendations of the PC a)-f) and the SC g)-n) have been complied with. It further notes the publication of an export quota for 2022 and based on additional information received from the range country, including the updated NDF and 2021-2025 management plans for this species. The document recommends removal of this case from RST.

- I share the concerns noted by our European colleagues. The North American Region finds it difficult to ascertain whether the recommendations have been complied with. It seems the information from the range country has not been provided as part of the present consultation. Prior to SC74, the Sect noted that Paraguay had provided extensive information that was not shared with the PC because it was too large. This makes it difficult for the Committee to do its work.
- We are disappointed that the members of the PC were not consulted regarding the 2022 quota. As we recall, the PC members were not consulted in 2019-2021 either. This makes it difficult to ensure the RST process is effective.
- Finally, during the PC consultation prior to SC74, it was noted that the quota has been established by *weight* rather than the CITES-recommended unit of measure – cubic meters. As noted above, it will be difficult to compare an export quota by weight to trade data reported in cubic meters.

We also take the opportunity to share some related observations:

- Regarding *Pterocarpus erinaceus,* we look forward to learning of range country progress toward meeting the PC recommendations, especially as it relates to the short-term recommendation which deadline has passed. While we recognize that progress under Article XIII is treated as a distinct agenda item at the CoP, given the exceptional case and to assist with clarity and transparency, it would be helpful to include status update on the expedited Article XIII process, especially information that may relate to those range countries that have to satisfy the PC short term recommendation to publish a zero quota on the CITES website, but for which the expedited process of Article XIII has effectively addressed the underlying concern that trade in this species should not continue until the scientific basis for such trade has been made available.
- Should we expect to see progress updates on remaining species/country combinations in preparation for SC75 as well?

In closing, we note the significant progress made by range countries to address the Committees' recommendations and greatly appreciate the excellent work of the Secretariat and the PC Chair to prepare this update and keep the RST process moving forward. It is important to support our fellow CITES Parties who work diligently to address recommendations and to acknowledge these achievements in a timely manner. We are generally concerned that the PC consultation process during the present intersession has been hurried and even inadequate in some respect and suggest discussion of this matter at the next meeting of the PC.

We would also request a status update on the RST management database at the earliest possible opportunity. We are anxious for this system to be operational, to assist in effective consultation and evaluation of progress on these complex and winding species/country combinations.

Thank you again for the opportunity to provide input to this important process.

best regards,

Rose

Rosemarie Gnam, Ph.D.
Chief
Division of Scientific Authority- International Affairs
**U. S. Fish and Wildlife Service**
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**5275 LEESBURG PIKE**
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**From:** Paulo Carmo <Paulo.Carmo@icnf.pt>
**Sent:** Monday, September 19, 2022 9:24 AM
**To:** Dejana Radisavljevic <dejana.radisavljevic@cites.org>; Aurélie Flore Koumba Pambo <citespcchair.afkoumbapambo@gmail.com>
**Cc:** MAHAMANE Ali <alimahamane3@gmail.com>; Ali Mahamane [YAHOO] <ali_mahamane@yahoo.fr>; Ali Mahamane [YAHOO] <aliabagana@yahoo.fr>; Ali Mahamane [GMAIL] <aliabagana@gmail.com>; Tika Dewi Atikah [YAHOO] <tikadewi_atikah@yahoo.com>; bylee80@nie.re.kr <bylee80@nie.re.kr>; César Augusto Beltetón Chacón [GMAIL] <cesarbelte@gmail.com>; Fabiola Rocío Núñez Neyra [MINAM GOB] <fnunez@minam.gob.pe>; Fabiola Rocío Núñez Neyra [GMAIL] <fabinunez77@gmail.com>; Ursula Moser [BLV ADMIN] <ursula.moser@blv.admin.ch>; Gnam, Rosemarie <rosemarie_gnam@fws.gov>; Damian Wrigley [AWE GOV] <damian.wrigley@awe.gov.au>; Paulo J.L. Carmo [GMAIL] <pcarmo.plants@gmail.com>; João José de Bastos Loureiro <Joao.Loureiro@icnf.pt>; Ronell Renett Klopper <r.klopper@sanbi.org.za>; David Morgan <david.morgan@un.org>; Maria Isabel Camarena Osorno <isabel.camarena@cites.org>; Karen Gaynor <karen.gaynor@cites.org>
**Subject:** [EXTERNAL] RE: SC75: Review of Significant Trade (Flora)

Dear Dejana

After consultation with colleagues from the EU CITES scientific authorities for plants, I hereby send you some comments to the document you sent to the PC members.

Regarding **Nepal / *Nardostachys grandiflora***, we disagree with the Secretariat's evaluation that all recommendations stated by the PC23 meeting have been met with by Nepal, and that it can be removed from the RST process. At SC74 the Plants Committee already indicated concerns about the fulfilment, based, inter alia, on considerations from previous evaluations and analyses by the German Scientific Authority, and other EU Member State Authorities, of the documents provided in 2019 to the CITES Secretariat by Nepal, as well as follow-up consultation between Nepal and the EU. In May 2022 Germany was asked by the CITES Secretariat to share any information of relevance to this RST case, to feed it into the Secretariat's and the PC Chair's considerations towards recommendations to SC75. Germany sent that evaluation, including open questions and concerns to the Secretariat in early June.
Based on the current SC75 document by the Secretariat, we don't see that the considerations and concerns then expressed by Germany have been taken into account.
Please note that, despite all remaining concerns, we very much welcome that Nepal is giving so much consideration to that species and we believe that a lot of progress has been already achieved so far.
We also believe that a positive NDF for that species harvested in Nepal is possible, even if the level of uncertainty can't be reduced significantly (risk assessment + precautionary approach).

Regarding **Paraguay / *Bulnesia sarmientoi***, we can refer to the evaluations we have made recently in the EU Scientific Review Group and its Working Group on plants about this topic and the significant shortcomings of the management of this species in Paraguay that were **identified by their own NDF**. Recalling some points from our internal discussions, the shortcomings included:

- general issues around **large-scale deforestation** in the country (land-use changes originate high volume of unsustainable harvested wood)
- **unreliable inventories**, as sampling intensity is
  far beyond legal obligations and beyond what is scientifically required, also doubtful data for some harvest areas
- the calculated stock volumes and harvest volumes are **deemed too high**
- **low increments** not sufficiently taken into account
- the main argument might be that the NDF further indicated that (even with the presumably overestimated exploitable stocks, see above) **current harvest volumes fixed by the forest management plans would not be able to supply current annual export quotas**

It is therefore at least very doubtable whether recommendation b) *'The export quota should be justified as conservative based on estimates of sustainable offtake that make use of best available scientific information. Information should also be supplied on the management and monitoring measures that are in place and active.'* has been complied with.

Regarding **India / *Pterocarpus santalinus***, we were not able to access the provided document. However red sanders timber is the object of negative opinions to the import by the EU Member States of *Pterocarpus santalinus* from sources W, Y, I, and A, since December 2019, despite a long exchange of contacts with the Indian CITES authorities, due to the unsatisfactory explanations received regarding the management of the species in that range state. Negative opinions to the import of sources W, I and A were already into force since 2014.

I hope this comments can be useful
Best regards

Paulo

**Paulo Carmo**
**Autoridade Científica – CITES – *Scientific Authority***
**Plants Committee member for Europe**
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Avenida da República, n.º 16 a 16B
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**De:** Dejana Radisavljevic [mailto:dejana.radisavljevic@cites.org]
**Enviada:** 9 de setembro de 2022 10:00
**Para:** Aurélie Flore Koumba Pambo <citespcchair.afkoumbapambo@gmail.com>
**Cc:** MAHAMANE Ali <alimahamane3@gmail.com>; Ali Mahamane [YAHOO] <ali_mahamane@yahoo.fr>; Ali Mahamane [YAHOO] <aliabagana@yahoo.fr>; Ali Mahamane [GMAIL] <aliabagana@gmail.com>; Tika Dewi Atikah [YAHOO] <tikadewi_atikah@yahoo.com>; bylee80@nie.re.kr; César Augusto Beltetón Chacón [GMAIL] <cesarbelte@gmail.com>; Fabiola Rocío Núñez Neyra [MINAM GOB] <fnunez@minam.gob.pe>; Fabiola Rocío Núñez Neyra [GMAIL] <fabinunez77@gmail.com>; Ursula Moser [BLV ADMIN] <ursula.moser@blv.admin.ch>; Gnam, Rosemarie <rosemarie_gnam@fws.gov>; Damian Wrigley [AWE GOV] <damian.wrigley@awe.gov.au>; Paulo Carmo <Paulo.Carmo@icnf.pt>; Paulo J.L. Carmo [GMAIL] <pcarmo.plants@gmail.com>; João José de Bastos Loureiro <Joao.Loureiro@icnf.pt>; Ronell Renett Klopper <r.klopper@sanbi.org.za>; David Morgan <david.morgan@un.org>; Maria Isabel Camarena Osorno <isabel.camarena@cites.org>; Karen Gaynor <karen.gaynor@cites.org>
**Assunto:** SC75: Review of Significant Trade (Flora)
**Importância:** Alta

Dear Flore,

The Secretariat has a document to present to SC75 concerning the Review of Significant Trade. It includes our determination of whether the recommendations directed to certain countries in relation to the Review have been met – in this case for India/ *Pterocarpus santalinus*, Nepal/ *Nardostachys grandiflora* and Paraguay/ *Bulnesia sarmientoi*.

Before we finalize the document we are consulting the PC in accordance with paragraph 1 k) of Resolution Conf. 12.8 (Rev. CoP18).

We would be pleased to know if the Committee has any comments on the determinations that we make in paragraphs 10, 11 and 12 of the document. If you do, kindly send them to us by 19 September.

Thanks and best regards to all,

DEJANA RADISAVLJEVIC (she/her)
**Research Assistant/Assistante de recherche/Auxiliar de investigaciones**

Science Unit/Unité scientifique/Unidad cientifica
CITES Secretariat/Secrétariat CITES/Secretaria CITES

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## Maria Isabel Camarena Osorno

**From:** Rakesh Kumar JAGENIA <digwl-mefcc@gov.in>
**Sent:** 10 March 2022 14:23
**To:** Maria Isabel Camarena Osorno
**Cc:** igfwl-mef@nic.in [NIC]; Dr. S. P. Yadav; Tilotama Varma; Avinash Basker; Sasikumar Cherukulappurathu [NIC]; Joint Director
**Subject:** Re: meeting on P. santalinus -Tomorrow 10 am
**Attachments:** Year wise quantity of Red Sanders.pdf

Dear Isabel,
As discussed yesterday, please find attached with this email, the year-wise quantity of the red sanders specimen exported from India till December 2021 out of the quantity of 11,806MT communicated in 2012.
Thanks and regards

---

**From:** "isabel camarena" <isabel.camarena@cites.org>
**To:** "Rakesh Kumar JAGENIA" <digwl-mefcc@gov.in>
**Sent:** Tuesday, March 8, 2022 8:17:03 PM
**Subject:** meeting on P. santalinus -Tomorrow 10 am?

Dear Mr Rakesh Kumar,

Would it suit you to have our meeting on ***Pterocarpus santalinus*** tomorrow between 10 and 11 am?

I will be pending on your response.

Kind regards,

Isabel

**Ms. Isabel CAMARENA**
Scientific Support Officer/Oficial Científico/Administrateur Scientifique
Scientific Services/Servicios Científicos/Services Scientifiques
CITES Secretariat/Secretaría CITES/Secrétariat CITES

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**Street address:**
Maison Internationale de l'Environnement
15 Chemin des Anémones
1219 Châtelaine-Genève
Switzerland




**Year wise quantity of Red Sanders (*Pterocarpus marsupium*) exported from under source code " I "**

**(Quantity in Metric Ton)**

| Year | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | Total |
|---|---|---|---|---|---|---|---|---|---|
| **Quantity** | 526.0048 | 2331.103 | 588.8973 | 1916.125 | 1428.011 | 1477.071 | 277.7379 | 535.5274 | 9080.478 |

**(The figure include the quantity of Red Sanders exported under exemption category such as furniture parts)**

**Dr. S. P. Yadav**
**Additional Director General of Forests**

सत्यमेव जयते

भारत सरकार
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE
इंदिरा पर्यावरण भवन, जोर बाग रोड,
नई दिल्ली-110 003
INDIRA PARYAVARAN BHAWAN, JOR BAGH ROAD,
NEW DELHI-110 003
Website : moef.nic.in

**D.O. No. 3-1/2019WL(Part-2)(Volume-1)**

**Dated: 20th April, 2022**

Dear Ms Higuero,

In furtherance of our previous letter dated 8 July 2021 and the submission of the two NDF reports on Red Sanders by the Botanical Survey of India (the 2019 BSI NDF Report and the 2020 BSI Odisha Report), we would like to report to the Secretariat that as per our assessment, around **13,301.692 Metric Tonne** of seized/confiscated Red Sanders is in the custody of various State and Central enforcement agencies in the country. We also report that as of December 2021, export permits had been issued for 9080.47801 MT of seized Red Sanders of the amount of 11,806MT communicated in 2012. We have been reporting regularly on export of Red Sanders specimens in our Annual Reports, which are up to date.

With this update, we consider that the Standing Committee's recommendations to India regarding Red Sanders under the Review of Significant Trade process have been fulfilled.

In accordance with recommendations of the 2019 BSI NDF Report, and in accordance with paragraph 17.a) of Resolution Conf. 12.3 (Rev. CoP15) and paragraph 15 of the Annex to Resolution Conf. 14.7 (Rev. CoP15), the CITES Management Authority – India would like to inform the Secretariat of a nationally established annual (April to March) export quota of 1190 Metric Tonnes of Red Sanders (*Pterocarpus santalinus*) from artificially propagated sources. We will also be permitting the export of seized/confiscated Red Sanders in a phased manner. Please do let us know if you have any queries or clarifications in this regard.

Best regards

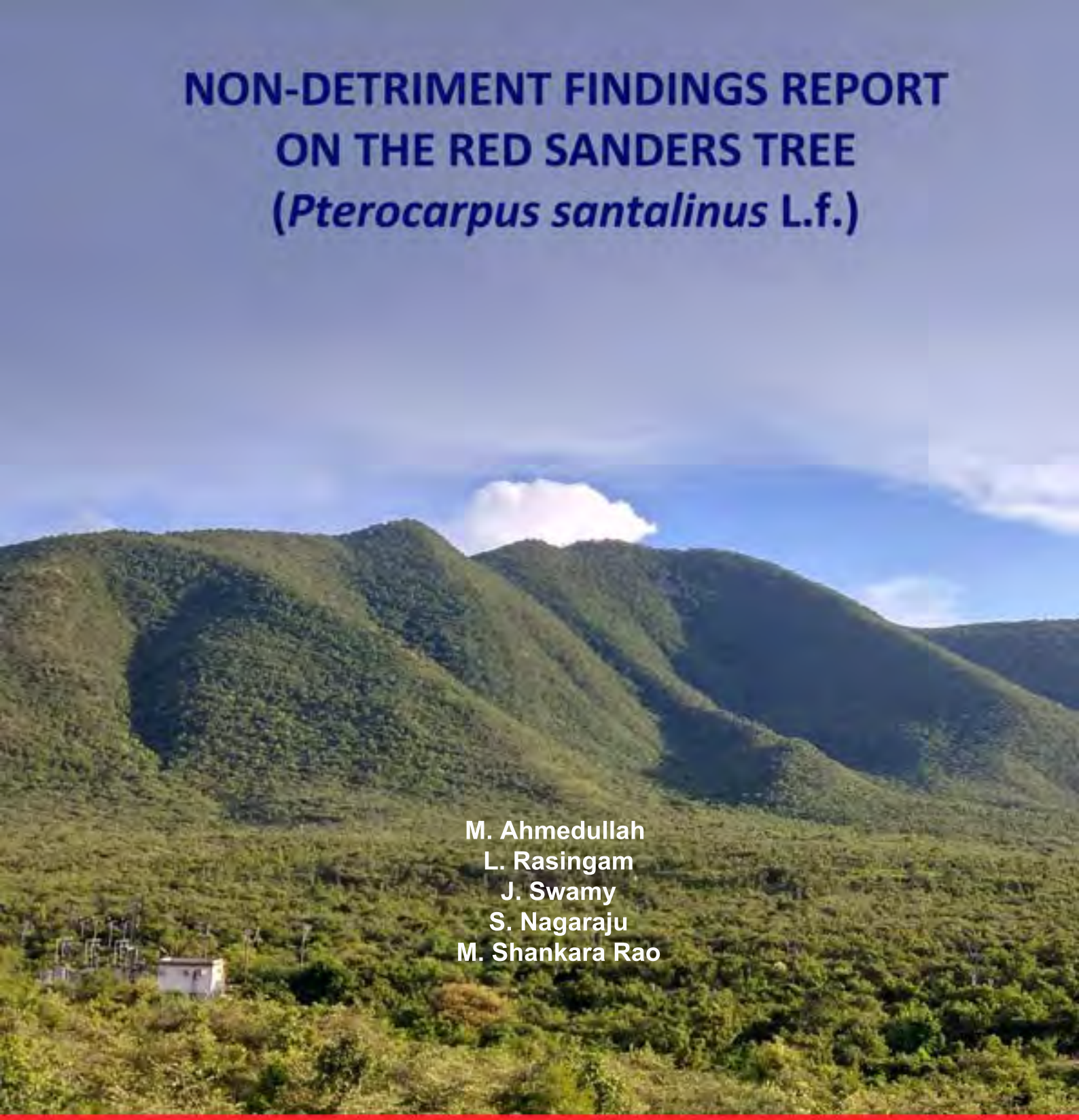
Yours sincerely,

**(Dr. S. P. Yadav)**
**Additional Director General of Forests &**
**CITES Management Authority – India**

**Ms. Ivonne Higuero**
**Secretary General**
**CITES Secretariat**
**Geneva, Switzerland**

Nature Protects if She is Protected

# NON-DETRIMENT FINDINGS REPORT ON THE RED SANDERS TREE (*Pterocarpus santalinus* L.f.)



M. Ahmedullah
L. Rasingam
J. Swamy
S. Nagaraju
M. Shankara Rao

Botanical Survey of India (Deccan Regional Centre)
Ministry of Environment, Forest & Climate Change
Hyderabad
2019

# NON-DETRIMENT FINDINGS REPORT ON THE RED SANDERS TREE (*Pterocarpus santalinus* L.f.)

**Botanical Survey of India (Deccan Regional Centre)**
**Ministry of Environment, Forests & Climate Change**
**Hyderabad**
**2019**

# Project Team

M. Ahmedullah
(Project Consultant/Coordinator)
L. Rasingam
J. Swamy
S. Nagaraju
M. Shankara Rao

with field assistance from

*Project Fellows:*
A. Swati
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K. Netaji
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Sharfa Naaz
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*Project Assistants:*
A. Narasimha
D. Ramesh
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P. Nazeer Khan
P. Ranjit Kumar

**CONTENTS**

**ACKNOWLEDGEMENTS**

A work of this scope, wherein detailed field work in interior forests is entailed, would not have been possible without the help and support of the officials of State Forest Departments in our study area. We thank Mr P.K. Sarangi and Mr. P. Mallikarjuna Rao, the former Principal Chief Conservators of Forests (PCCF), Dr M. Ilias Rizvi, the present PCCF and Mr. R.K. Suman, Additional Principal Chief Conservator of Forests (APCCF), State Forest Department, Andhra Pradesh, for facilitating the field studies for this project. Thanks are also due to Mr. Kallol Biswas and Mr. S.K. Kaushik, the former APCCFs (Production) for their help in providing the requisite information/records. The State Forest Departments of Tamil Nadu, Karnataka, Odisha and West Bengal also facilitated our field work, particularly for assessment of cultivated plants and we would like to thank them for the same.

We also acknowledge the logistic support provided by Mr. Nageswara Rao, Divisional Forest Officer (DFO), Tirupathi; Mr. Sivaprasad, DFO, Nandyal; Mr. Jagannath Singh, DFO, Chittoor East; Mr. Khadar Valli, DFO, Rajampet; Mr. Khadhar Bhasha, DFO, Giddalur; Mr. Prabhakar, DFO, Proddatur; Mr. Venkateshwaralu, DFO, Kadapa; and Mr. Ram Mohan Rao, DFO, Nellore, as well as the Range Officers, Beat Officers and field staff of Andhra Pradesh Forest Department.

This project was funded by the Ministry of Environment, Forests and Climate Change (MoEFCC), Government of India.

Thanks are due to the Dr P. Singh and Er. A.K. Pathak, former Directors, Botanical Survey of India (BSI), Kolkata, Dr A.A. Mao, present Director, BSI, and Dr. P.V. Prasanna, Scientist in-charge, BSI, Deccan Regional Centre (DRC), Hyderabad, for facilitating the project execution. Thanks are due to the Heads of BSI, Southern Regional Centre (SRC), Coimbatore and Central National Herbarium, Howrah, for providing herbarium facilities. Thanks are also due to Dr G. Swarnalatha, BSI (DRC), for helping us collate the relevant literature and information from various sources.

We thank the Directors of Institute of Forest Genetics and Tree Breeding, Coimbatore, and Institute of Wood Science and Technology, Bangalore, for facilitating herbarium and library consultation.

Mr. Satyanarayana Siripuram provided the computer support for finalisation of the report; we wish to record our appreciation for the same.

Last, but not the least, we would like to thank the young research fellows and project assistants for carrying out the strenuous field work in harsh conditions to collect the requisite field data.

# Introduction

**NON-DETRIMENT FINDINGS REPORT ON THE RED SANDERS TREE (*Pterocarpus santalinus* L.f.)**

## Background

In its review of the recommendations [ref. SC62 Doc.27.2 (Rev.1)] to suspend trade made more than two years ago the 62nd meeting of the Standing Committee of CITES at Geneva, 23-27 July 2012, agreed to withdraw its earlier recommendation to Parties to suspend trade in (*P. santalinus* L.f.) from India once the Secretariat receives the completed Non-Detriment Findings (NDF) study being undertaken the Institute of Forest Genetics and Tree Breeding (IFGTB), Coimbatore, India, one of the designated Scientific Authorities for CITES in India, in compliance with the long-term recommendations formulated by the Plants Committee at its 17th meeting (PC17, Geneva, April 2008) and as endorsed at the 61st meeting (Geneva, August 2011) of the Committee. The recommendations (reproduced verbatim) were:

*"If exports of wild origin are to continue:*

> a) *[India should] carry out a preliminary inventory of standing stock, establish estimates of sustainable off-take and establish a scientific monitoring system of the harvested and unharvested populations;*
>
> *b) [India should] establish a revised conservative export quota based on the inventory of standing stock and the estimates of sustainable off-take; and*
>
> *c) the Management Authority [should] report to the Secretariat the result of its actions to implement the provisions of Article IV, and how the Scientific Authority currently determines that levels of export are not detrimental to the populations concerned."*

The present report is the result of a study commissioned by the Ministry of Environment, Forests & Climate Change (MoEFCC), Government of India, to make fresh NDF study for the Red Sanders tree, which is listed in Appendix II of CITES. Owing to the high international demand for the Red Sanders wood and the consequent illicit trade that became rampant in recent years, the Government of Andhra Pradesh approached the MoEFCC in the year 2011 for permission to harvest the mature trees on a sustainable basis and also initiate

steps for exclusion of *Pterocarpus santalinus* L.f. from Appendix II of CITES. Subsequently, the MoEFCC charged the Institute of Forest Genetics and Tree Breeding (IFGTB), under the Indian Council of Forestry and Education (ICFRE), Coimbatore, to carry out an NDF study in 2011. The IFGTB submitted a negative NDF report the subsequent year denying harvest of natural populations of Red Sanders, which in effect meant denial of export quota as per CITES and calling for total stoppage of illegal felling and smuggling. On 30th April 2012, the Management Authority of India submitted to the CITES Secretariat a report comprising recommendations of the Management Authority along with a copy of NDF study undertaken by the IFGTB. Subsequently, the CITES Secretariat through the MoEFCC, Government of India, accorded a one-time permission for sale of the confiscated Red Sanders wood, with the proviso that the Government of Andhra Pradesh should conduct a fresh inventory of wild and cultivated populations for sustainable management by the year 2016. The Andhra Pradesh Forest Department initiated a stratified area inventory of the growing stock in Red Sanders rich forest areas in 2014. However, in the context of the present NDF study an independent field assessment was warranted to ensure an unbiased result.

The state government has sought to delist the Red Sanders tree from CITES Appendix II on the grounds that Red Sanders has good regeneration capacity and it has put adequate control measures in place to curb smuggling. The regeneration when compounded by the slow growth of the tree in no way seems to compensate for the high level of illegal off-take from the wild. Therefore, there is no denying the fact that the Red Sanders tree is the most exploited tree species in India; its rampant smuggling as often reported in the media and as evidenced by the crime reports and/or illegal trade information as well as the increasing stocks of confiscated wood, warranting its sale. The illegal felling/trade fetches huge returns in terms of financial gain, with high quality red sanders wood costing as much as Rs. 40,00,000/- INR per MT (equivalent to roughly 58040 US Dollars) in the open international market. The cost is said to be doubled during illicit trade. The gap between demand and supply, without adequate supplementation by way of extraction from cultivated areas, is feared to be the prime cause for the wanton illicit extraction from the wild for smuggling abroad. The natural habitat of the species is also threatened by many anthropogenic factors leading to certain

decline in the populations. The commercial exploitation of this tree since decades without any commensurate replenishment in the wild has remained the prime threat to the species leading to its continued depletion (Ahmedullah & Nayar, 1984). With no discernible mitigation of concerns whatsoever, the threat perception for the species remains the same today.

Considering the above, there is a primary need for BSI to conclude whether any proposed trade in red sanders would represent a risk and prove detrimental for the survival of wild populations of red sanders and impact the ecology of its natural habitat.

**THE NDF METHODOLOGY/STEPS**

The NDF methodology was first outlined by the IUCN (Rosier & Haywood, 2002), following which it was further deliberated upon at the Cancun NDF Workshop in the year 2008 for application to various taxonomic groups resulting in the NDF Guidance prepared by Austria (Rose, 2014), and NDF Guidance for Perennial Plants (Wolf et al., 2016).

The present report is developed along the lines proposed by Leaman & Oldfield (2014) and improved version by Wolf et al. (2016) for perennial plants and Wolf et al. (2018) specifically for timber species. The nine-step NDF process (Figure 1) follows the following pathway: 1. Review specimen identification, → 2. Review compliance with artificially propagated requirements, → 3. review relevant exclusions and previously made NDFs, → 4. evaluate conservation concerns, → 5. evaluate intrinsic biological risk, → 6. evaluate harvest impacts, →7. evaluate trade impacts, → 8. evaluate effectiveness of management measures, → 9. make a non-detriment finding or provide related advice. The sequential steps are depicted/outlined below:

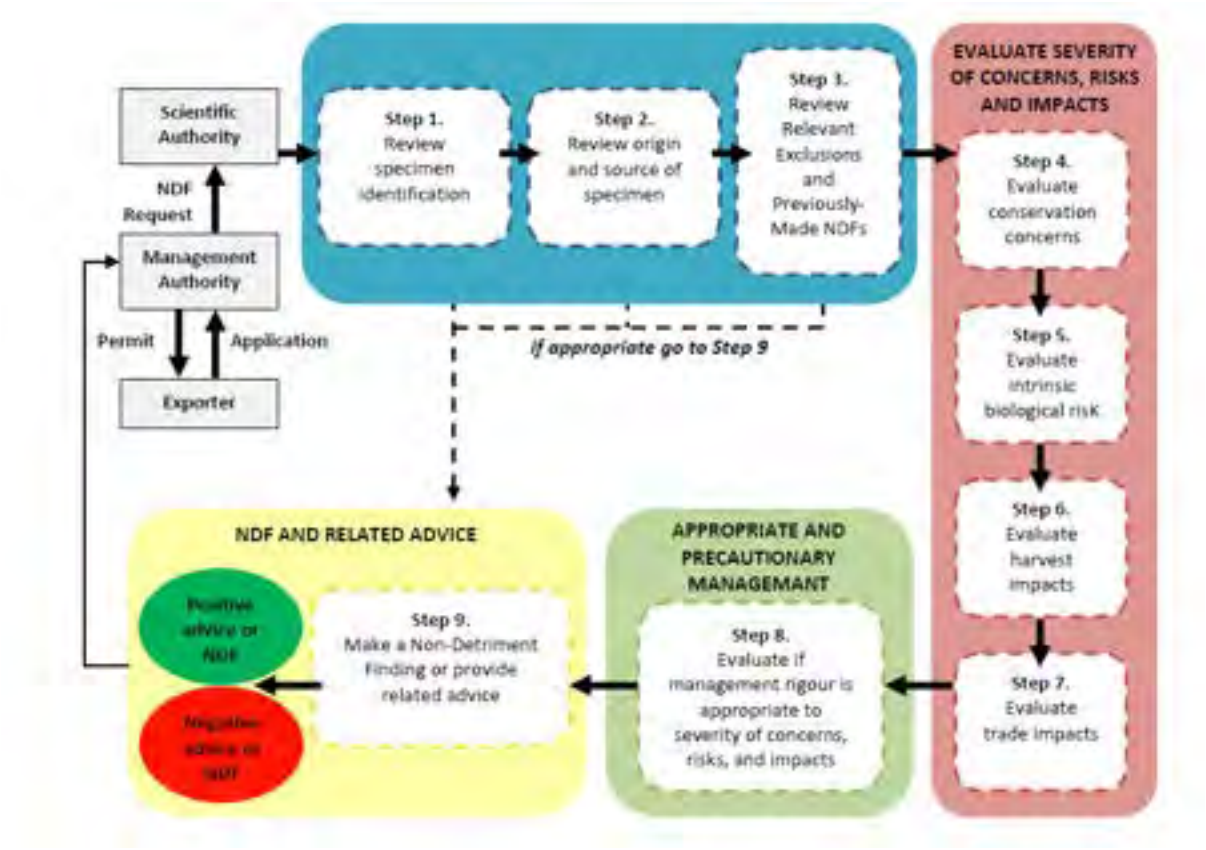



Figure 1. Nine-step NDF process (*Source*: Leaman & Oldfield, 2014)

*Study of wild populations*: Towards a quantitative field evaluation for the wild populations of Red Sanders tree sample plots of 0.1 ha were established randomly in the five districts (Kadapa, Chittoor, Nellore, Kurnool, Prakasam) of Andhra Pradesh where the natural populations occur; about 616 sample plots (within 228 forest beats) within the forest areas known to be bearing Red Sanders were randomly covered during the study.

*Study of cultivated living stock*: The areas known to have cultivations of Red Sanders within the country were surveyed to assess the living stock in the States of Tamil Nadu, Andhra Pradesh, Karnataka, and Kerala. Plantations developed by Government agencies (State Forest Departments/research units) and wood farmers on their private lands were surveyed and random sampling of girth was done to derive the average gbh of the cultivated trees.

# NDF Process
## (Step 1 - Step 9)

**STEP 1. REVIEW OF SPECIMEN IDENTIFICATION**

**1.1. Has the plant/specimen been correctly identified, and, is the scientific name used compliant with the appropriate CITES Standard?**

Taxonomically, *Pterocarpus santalinus* L.f., commonly known as the Red Sanders tree, is a distinct tree species with crocodile skin bark, 3-foliolate leaves (rarely 4-5),broadly ovate or nearly orbicular, flowers axillary in simple or sparingly branched racemes, and pod with 0.8 cm long stipe concavely curved between the stipe and style. It is included in the subfamily Papilionoideae, which is one of the six monophyletic subfamilies now recognised under the family Leguminosae.

The genus *Pterocarpus* Jacq. is pantropical with about 35-40 species (Klitgaard & Lavin, 2005) in the world. Rojo (1972) in his revisionary work included only 20 species under genus; it is presumed that he merged/lumped many 'good' species under synonymy. Rojo (1972) includes all Asian species of *Pterocarpus* under two forms of *Pterocarpus indicus* Willd., i.e., forma *indicus* and forma *echinatus*, with binomials for the Asian *Pterocarpus* taxa placed under synonymy of each. This is in total disagreement with the work of Prain (1900) who recognised only five species in Asia. Oddly, Chauhan & Vijendra Rao (2003) mention that the genus has 60 species globally; this estimate appears to be on a very high side. Many species of *Pterocarpus* across its natural range are exploited either for timber or medicine. There are 5 species of *Pterocarpus*, especially with winged fruits, that are found in south and southeast Asia. The genus is represented in India by the following 5 species: *Pterocarpus dalbergioides* DC., *P. indicus* Willd., *P. macrocarpus* Kurz, *P. marsupium* Roxb. subsp. *marsupium*, *P. marsupium* subsp. *acuminatus* (Prain) Thoth., *P. santalinus* L.f.

The trade name of the species *Pterocarpus santalinus* L.f. is Red Sanders

The known vernacular names of *Pterocarpus santalinus* are:

In Indian languages:

*Agarugandha, Arka, Chandana, Harichandana, Kshudrachandana, Kuchandana. Kushikam, Patranga, Tilaparni, Rakthachandan* (Sanskrit); *Lalchandan, Raktha Chandan* (Hindi); *Agarugandhamu, Chandanum,*

*Raktagandhamu, Yerrachachandanam, Rakthachandanam* (Telugu); *Atti, Kusanddanam, Pidagattam, Salliyam, Sandanavengai, Sandauam, Sensandakkattai, Sensandanam, Sivappuchandanam, Semmaram*- (Tamil); *Patrangam, Tilaparnni, Chenchandanam* (Malayalam); *Ratanjan* (Marathi); *Ratanjali* (Gujarati); *Lalchandan, Rakthachandan* (Bengali); *Agaru, Honne, Kempugandha, Patranga, Raktashandana* (Kannada)

In foreign languages:

Red Sanders, Red Sandal wood, Almug, Red sadal wood, Red Sanders, Red Sandas, Red Sanders wood, Ruby wood, Sandalwood, Saunders wood (English); *Nasani, Sandaku* (Burmese); *Zitan* (Chinese); *Rod Sandelved, Sandeltrae* (Danish); *Rood Sandelhout, Sandelboom* (Dutch); *Santal Rouge* (French); *Caliaturholz, Rotes Sandelholz, Rothes Sandelholz, Rothes Santelholz* (German); *Lal Chandan, Ragat Chandan, Rukhto Chandan, Undum* (Hawaiian); *Kayu merah* (Indonesian); *Sandalo Rosso* (Italian); *Cendana Janggi* (Malay); *Sandalo Vermelho* (Portuguese); *Sandalo Rojo* (Spanish); *Naga Narra* (Taglog); *Rakta Candan* (Nepalese)

Names in systems of medicine: *Rakta Chandan* (Ayurveda); *Sandal surkh* (Unani )

The taxonomic status of *Pterocarpus* species can be checked online at the following websites: The Plant List (http//:www.theplantlist.org), IPNI (http//: www.ipni.org), ILDIS (http//:ildis.org), TROPICOS (http//:www.tropicos.org)

The specimens of *Pterocarpus santalinus* L.f. examined during this study in the major Indian herbaria are at *Annexure* - I.

It is confirmed that the scientific name used (*Pterocarpus santalinus* L.f.) is compliant with the appropriate CITES Standard.

# *Pterocarpus santalinus* L.f.

Habit

Multistems

Flowering branches

Inflorescence

Fruiting branch

Pod

## STEP 2: REVIEW COMPLIANCE WITH ARTIFICIALLY PROPAGATED REQUIREMENTS

### 2.1. Is the permit application for artificially propagated specimens?

The MA has asked the SA to assess the Red Sanders tree in an all inclusive manner as an umbrella study. Therefore, the assessment of wild as well as cultivated populations was done as part of this NDF study.

The answer to whether the export of wild-sourced plants may be allowed would be 'no', while the answer to whether the export of cultivated/artificially propagated specimens may be allowed is 'yes'.

### 2.2. Is export of Art. Prop. specimens of this species permitted?

Yes.

### 2.3. Do specimens clearly meet all the requirements for Art. Prop.?

Yes. This step in the NDF process involves evaluation of the specimen (Red Sanders) sourced from artificially propagated stock. If specimens identified for export are declared as artificially propagated the Scientific Authority should ensure that they conform to the requirements laid down in the CITES Resolutions. According to the guidelines, if an applicant for export permit provides information to conclude that the specimens clearly meet all CITES requirements for artificially propagated an NDF may not be necessary and a simple positive decision may be made to approve export.

According to CITES the core definition of the term ‘artificially propagated’ "*shall be interpreted to refer to plant specimens: a) grown under controlled conditions; and b) grown from seeds, cuttings, divisions, callus tissues or other plant tissues, spores or other propagules that either are exempt from the provisions of the Convention or have been derived from cultivated parental stock. It further determines that plants grown from cuttings or divisions are considered to be artificially propagated only if the traded specimens do not contain any material collected from the wild*" [Resolution Conf. 11.11 (Rev.

COP17)]. Further, it is clarified that "*timber, other parts and derivatives of trees from monospecific tree plantations should be considered as artificially propagated*". [Resolution Conf. 10.13 (Rev. COP15)]

In context of the definition of 'artificially propagated' the CITES Resolution Conf. 11.11 (Rev. COP 17) with regard to the regulation of trade in plants (reproduced verbatim) "*determines that plants grown from cuttings or divisions are considered 'artificially propagated' only if the traded specimens do not contain any material collected from the wild. However, it* ***recommends that an exception may be granted and specimens deemed to be 'artificially propagated' if grown from wild-collected seeds*** subject to the condition, among others, that *"the relevant Management Authority of that range State has determined that the collection of seeds or spores was legal and consistent with relevant national laws for the protection and conservation of the species; .... and the relevant Scientific Authority of that range State has determined that a) collection of the seeds or spores was not detrimental to the survival of the species in the wild; and b). allowing trade in such specimens has a positive effect on the conservation of wild populations".*

**Improvement of Art. Prop. specimens**: Some aspects of scientific interventions for improvement of artificial propagation of Red Sanders are reviewed.

*Advancing regeneration:* Assisted natural regeneration has been one of the restoration strategies, with studies undertaken to see the effects of specific treatments on seedling recruitment and establishment through control of vegetation/grass (Aide & Cavelier, 1994) and reducing competition (Bouffard et al., 2007) and litter control (Marrero-Gomez et al., 2000). Removal of competing/invasive species and clearing canopy is also known to be useful in encouraging regeneration. Kukrety et al. (2012) evaluated the impacts of silvicultural treatments for improving establishment of advancing regeneration in Red Sanders. Such studies have implications in restoration of wild populations of Red Sanders in degraded or threatened habitats.

*Micropropagation*: While conventional propagation of Red Sanders through vegetative means has not been very successful in terms of large-scale

production for forestry purposes, tissue culture is viewed as a promising technique for mass multiplication. Work on tissue culture of Red Sanders began in the early 1980s and attempts to improve shoot sprouting using seedling explants continue (Patri et al., 1988; Sita et al., 1992; Anuradha & Pulliaiah, 1999; Arockiasamy et al., 2000). The advances in biotechnology applications for micro-propagation of Red Sanders have been recently reviewed (Teixeira da Silva et al., 2018). The survival , which in effect translates into successful rooting, of *in vitro* raised plants with proper hardening/acclimatisation and successful transfer to field conditions, is the anticipated aim of any protocol development exercise. The Red Sanders has been subject of many biotechnological studies: Prakash et al. (2006) used mature nodal explants from elite quality Red Sanders tree for *in vitro* multiplication; with combinations of serial transfer technique and incorporating antioxidant into the culture medium they were able to minimise the medium browning and improve explant survival during shoot sprouting leading to successful establishment (c. 70%) of micropropagated plantlets. Leaf segments from 1-2 year old plants were also used as source of *ex vitro* explants (Ashrafee et al., 2014). Key advances, including *in vitro* conditions for tissue culture studies, in the biotechnology studies of Red Sanders tree have been reviewed recently by Teixeira da Silva et al. (2018). The future prospects for tissue culture based biotechnology in Red Sanders look promising, with many useful protocols for direct shoot regeneration from a variety of explants /through callus induction. As most explants are derived from seeds/seedlings that are not appropriate for clonal propagation development of clonal method from elite germplasm is warranted (Teixeira da Silva et al., 2018). As in the case of most tropical trees the challenge that remains is to reduce the rate of mortality of the micropropagated plants. Studies to address this issue need to be encouraged.

Considering the above, it is clear that there is an imperative need to develop science-based tree breeding/improvement programmes to help promote Red Sanders plantations in conducive areas with high confidence level and totally prevent harvest/extraction from the wild populations. This, along with strict protection of wild populations, could prove to be the most viable and practical option for the conservation of this threatened species.

## STEP 3. REVIEW OF RELEVANT EXCLUSIONS AND PREVIOUSLY MADE NDFS

### 3.1. Are the specimens covered by CITES Appendix II?

Yes. The Red Sanders tree (*Pterocarpus santalinus* L.f.) is listed in **CITES Appendix II, with Annotation #7** which determines that no commodities other than logs, wood chips, powder and extracts are controlled under CITES. All other commodities are excluded from CITES control. In this context reference may be made to Article 1 of the Convention which indicates in which cases commodities or products can be exempt from CITES controls. Sub-paragraph (b) of Article I of the Convention means the following:

- *"Any individual animal or plant, whether alive or dead, is regulated.*
- *For plant and animal species in Appendix I all parts or derivatives are always regulated and cannot be exempted.*
- *For plant species in Appendices II and III it is possible to exempt certain commodities and products from the CITES listing. These parts and derivatives have to be specified in an Annotation to the listing in the CITES Appendices. These Annotations are marked with "#", followed by a number.*
- *Regulated are only those parts or derivatives which are readily recognizable (cf. Res. Conf. 9.6 Rev. COP 16)".*

Therefore, for the purpose of clarification it may be mentioned that an Annotation is a note attached to certain species in the Appendices to indicate which parts or derivatives fall under the CITES listing (Uwe, 2018).

### 3.2. Is the harvest of wild export of wild harvested specimens of this species permitted?

No. In context of the Red Sanders tree (*Pterocarpus santalinus* L.f.), the threatened endemic species that is in high demand in the international market for its high quality timber and source of dyes as well as medicine, incense industry, crafted artefacts and many other uses. As the international trade, mostly illicit in nature, involves hundreds of tonnes of wood, chips and powder annually, legal export is sourced mostly from seized/confiscated stocks and is

often limited to value-added products or sometimes as extracts, viz., oleoresin. CITES implementation in the species is apparently very less/insignificant and limited only to seized/confiscated wood. In the current listing "exclusion of the powder in accordance with **annotation #7** would mean that a significant proportion of trade in Red Sanders powder be outside the CITES control" [COP Prop. 27, The Hague (Netherlands), June 2007]. It was agreed subsequently (PC 15) that trade in powder and extract should be covered by CITES controls. Further, it was also agreed that finished products (musical instruments, furniture, etc.) should be exempt from the control of CITES. Therefore, Red Sanders was annotated with the revised annotation (Annotation #7rev.), wherein logs, wood chips, powder and extracts are designated.

### 3.3. Has a science-based NDF been made for this species that is still valid and sufficient to evaluate the current application?

Yes. However, while reviewing the earlier NDF report (Hegde et al., 2012) it was found that although the findings in terms of girth class classification were almost similar, the report did not cover the cultivated stock of Red Sanders. Therefore, the present NDF study was extended to assess the cultivated stock also.

A comparison of the present NDF studies of Botanical Survey of India (Deccan Regional Centre) [BSI(DRC)] with studies of IFGTB (Hegde et al., 2012) is made hereunder (Table 1).

Table 1. Comparison of Red Sanders (RS) surveys of BSI(DRC) and IFGTB

| *S. No.* | *Name of the Forest Division* | *Ranges with RS* | | *Beats with RS* | | *No. of sampling plots* | |
|---|---|---|---|---|---|---|---|
| | | *BSI(DRC)* | *IFGTB* | *BSI(DRC)* | *IFGTB* | *BSI(DRC)* | *IFGTB* |
| 1 | Chittoor East | 4 | 7 | 23 | 25 | 144 | 5 |
| 2 | Giddalur | 2 | 2 | 9 | 6 | 27 | 19 |
| 3 | Kadapa | 5 | 5 | 37 | 33 | 109 | 107 |
| 4 | Nandyal | 1 | 1 | 4 | 6 | 14 | 22 |
| 5 | Nellore | 4 | 4 | 28 | 17 | 82 | 27 |
| 6 | Proddatur | 4 | 4 | 20 | 26 | 70 | 79 |
| 7 | Rajampet | 4 | 4 | 28 | 32 | 91 | 62 |
| 8 | WLM Tirupati | 3 | 3 | 24 | 26 | 79 | 84 |
| Total | | 27 | 30 | 173 | 171 | 616 | 405 |

*Field work*: A comparison of field studies undertaken by IFGTB in 2012 (Table 1) as part of the earlier NDF study and the present study undertaken by BSI(DRC) shows that there is much similarity in the survey patterns carried out by both studies in terms of Forest Divisions within which the Red Sanders occurs. The FDs covered by both teams included, Chittoor East, Giddalur, Kadapa, Nandyal, Nellore, Proddatur, Rajampet and WLM Tirupati. Overall, the Red Sanders ranges covered by both IFGTB and BSI(DRC) are comparable, with IFGTB finding Red Sanders in 30 ranges and BSI(DRC) finding Red Sanders in 27 ranges only; during the present study the Red Sanders was not found by the BSI teams in three ranges, viz., Chittoor, Karvetinagar, Bhakarapet (Pileru) of Chittoor East Division. Similarly, IFGTB had covered 171 forest beats containing Red Sanders while BSI(DRC) has covered 173 beats. IFGTB had sampled 405 plots while BSI(DRC) has sampled 616 plots, out of which 344 plots only were found to be bearing Red Sanders, across whole natural range of Red Sanders in this study.

In the earlier NDF study (Hegde et al., 2012) the harvestable girth class (> 70 cm) was found to be 7.8 percent. Even if one allows a margin of error owing to difference in the approach adopted by the two NDF studies/difference in the sampling plots it clear that the harvestable girth class in the wild populations have been reduced drastically over the last six years. It is pertinent to mention that in the previous NDF study a very high percentage (15.7 percent) of harvestable trees at Nandyal Division was recorded, while in the present study the Red Sanders trees above 70 cm girth were not found at all in any of the plots sampled. Therefore, excluding the Nandyal populations in the previous NDF study (Hegde et al., 2012), the percentage of harvestable trees would work out to be only 3.9 percent.

**Broad findings of NDF by BSI(DRC)**: As seen in the above section the NDF field study of BSI(DRC) across the entire natural range of Red Sanders in Andhra Pradesh shows Red Sanders populations on an average (8 divisions) are more in the lower girth class range (<30 cm girth: >50%), (31-40 cm girth: 22.38%), (41-50 cm girth: 14.33%), (51-60 cm girth:7.31%), (61-70 cm girth:3.02%), which shows that a total of 97.79 % of Red Sanders trees are in the lower girth class, i.e., non harvestable, whereas higher girth class trees (71-80 cm girth: 1.24%), (81-90 cm girth:0.34%) (>90 cm girth:0.61%), totalling a mere 2.19%.

This confirms that a very small percentage of the standing Red Sanders in its natural range is harvestable. The slow progression from 30 cm girth class to 70 cm girth class, spanning almost 50-60 years (Hegde et al., 2012), is an issue that has to be taken into consideration in future management plans. It must further be considered that it takes 10-12 years for growth of Red sanders from one girth class to the next girth class. What is most worrying is that the Red Sanders trees in the higher girth class are widely scattered throughout its natural range or even absent in some areas which were earlier known to harbour Red Sanders.

Considering that the Red Sanders tree is extremely slow-growing saplings would take almost 80-100 years to reach the harvestable size (>70 cm girth). Even these 'harvestable' natural standing stocks are extremely threatened; debarking by smugglers to test the heartwood formation makes the trees vulnerable to infestations. It was observed that lack of management of coppicing trees render the multi-stems unproductive as good quality heartwood formation in such trees/multi-stems is suspect.

BSI(DRC) teams also found that the species (both in lower girth and higher girth classes) is highly threatened by illegal felling, annual fires and cattle grazing, etc. which are adversely affecting the population structure/dynamics and population biology.

### 3.4. Review of Red Sanders plantations in India

As per the State Forest Department records and secondary data in public domain a total of ca. 14214.418 ha of area is under Red Sanders cultivation in India (Map 1).

During the present study, selected plantation sites were randomly visited. Preference was given to plantations that were established before 1980, (i.e., with 35/40 years or older planted trees) to ensure that harvestable stock could be evaluated in the context of the present situation. The year 1980 was considered as the cut-off year for all practical purposes; it is accepted that the pre-1980 plantations would be able to yield some quantum of Red Sanders wood with gbh class of 70-80 cm or above. The post-1980 plantations would not reach the desired girth class, except perhaps in moist forest areas such as

in Kerala, where the heartwood formation would not be of the desired grain quality.

The break-up of plantations in all Indian states as per the available State Forest Records and information gleaned from secondary sources is given in Table 2.

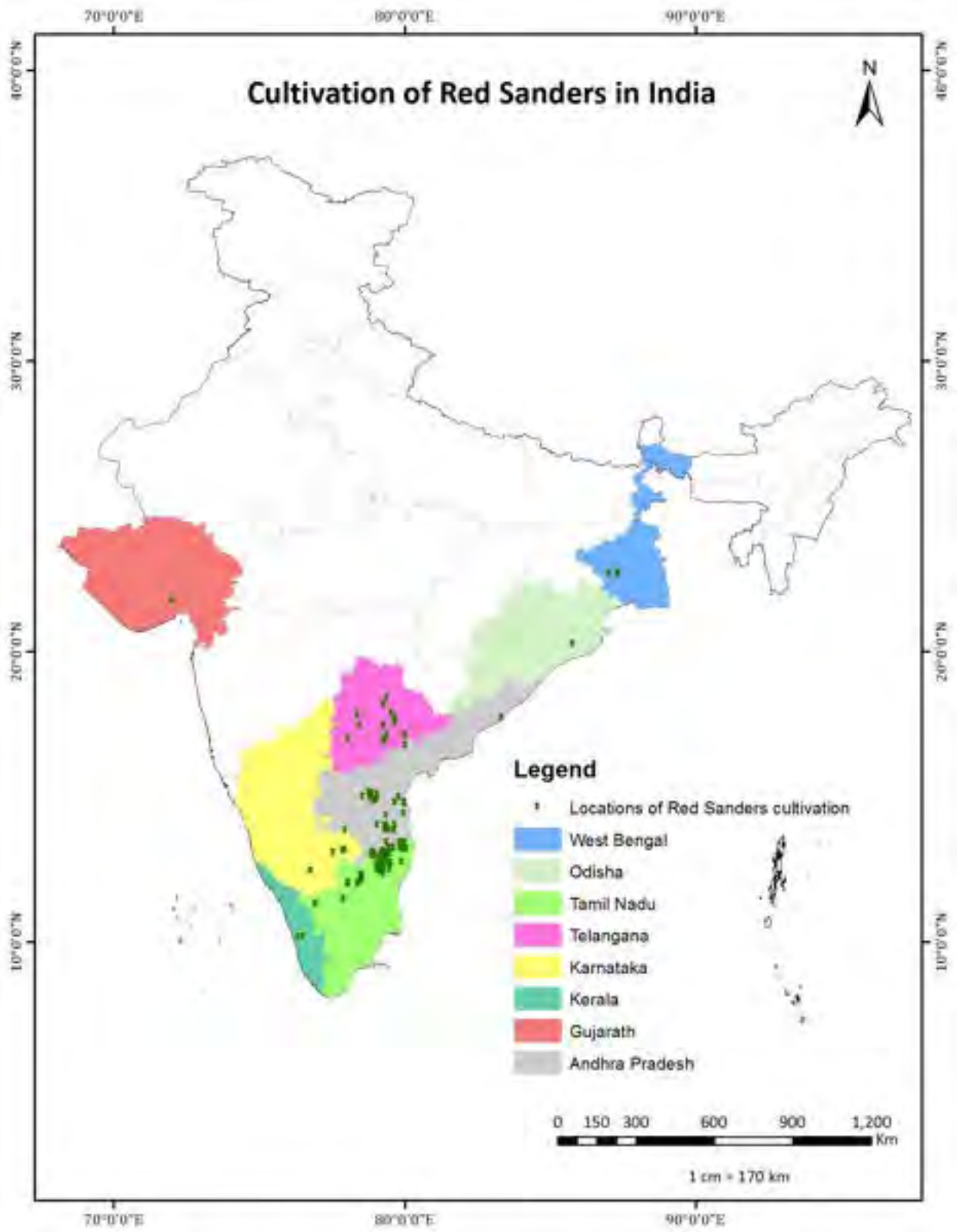

Cultivation of Red Sanders in India
N
70°0'0"E
80°0'0"E
90°0'0"E
40°0'0"N
30°0'0"N
20°0'0"N
10°0'0"N
Legend
Locations of Red Sanders cultivation
West Bengal
Odisha
Tamil Nadu
Telangana
Karnataka
Kerala
Gujarath
Andhra Pradesh
0 150 300 600 900 1,200
Km
1 cm = 170 km

Table 2. State-wise breakup of plantations as per forest department records

| *State* | *Govt. plantations as per forest department records (in ha)* | *Approx. number of mature individuals* | *Private plantations (in ha)* | *Approx. number of mature individuals* | *Total plantations in Govt. & private plantations (in ha)* | *Total trees in Govt. & private plantations* |
|---|---|---|---|---|---|---|
| Andhra Pradesh | 6839.428 | 7591765 | 1175.686 | 196706 | 8015.114 | 7788471 |
| Karnataka | 413.2 | 27800 | 0 | 0 | 413.2 | 27800 |
| Odisha | 1.3 | 105 | 0 | 0 | 1.3 | 105 |
| Tamil Nadu | 6953.17 | 590229 | 14.6687 | 12004 | 6967.83 | 602233 |
| Telangana | 0 | 0 | 15.842 | 5543 | 15.842 | 5543 |
| West Bengal | 5.32 | 2211 | 0 | 0 | 5.32 | 2211 |
| Gujarat | 0 | 0 | 0.08 | 40 | 0.08 | 40 |
| Kerala | 2 | 1000 | 0 | 0 | 2 | 1000 |
| Total | 14214.418 | 8213110 | 1206.2767 | 214293 | 15420.686 | 8427403 |

*Source*: State Forest Department Records and public domain information

Table 3. State-wise breakup of plantations (pre-1980 & post-1980) surveyed by BSI(DRC)

| *State* | *Surveyed area (in ha)* | *Approx. number of mature individuals* | *Avg. height (m)* | *Avg. girth (m)* | *Area (in ha) (Post-1980)* | *Post-1980 trees* | *Area (in ha) (Pre-1980)* | *Pre-1980 trees* | *Avg. harvestable height (m)* | *Avg. harvestable girth (m)* | *Percentage of harvestable area* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Andhra Pradesh | 1899.85 | 418061 | 9.38 | 0.6048 | 1058.99 | 330498 | 840.86 | 87563 | 11.33 | 0.81 | 44.25 |
| Karnataka | 413.2 | 27800 | 5.5 | 0.516 | 30.2 | 11800 | 383 | 16000 | 5.25 | 0.525 | 92.69 |
| Odisha | 1.3 | 105 | 6 | 0.55 | 1.3 | 105 | 0 | 0 | 0 | 0 | 0 |
| Tamil Nadu | 3703.49 | 399219 | 8.81 | 0.8298 | 1230.58 | 117217 | 2472.91 | 282002 | 0.8795 | 66.83 | 66.77 |
| Telangana | 15.842 | 5543 | 5.9 | 0.421 | 15.842 | 5543 | 0 | 0 | 0 | 0 | 0 |
| West Bengal | 5.32 | 2211 | 8.75 | 0.8257 | 1.9 | 1867 | 3.42 | 344 | 1.175 | 0.092 | 64.28 |
| Gujarat | 0.08 | 40 | 12 | 0.9 | 0 | 0 | 0.08 | 40 | 0.9 | 0.0021 | 100 |
| Kerala | 2 | 1000 | 18.29 | 0.8957 | 2 | 1000 | 0 | 0 | 0 | 0 | 0 |
| Total | 6041.082 | 853979 | 9 | 0.6864 | 2340.812 | 468030 | 3700.27 | 385949 | 9.98 | 0.8579 | 61.25 |

Based on the information culled from the State Forest Departments and secondary sources, the NDF project team randomly sampled the plantations as part of the field assessment. The areas surveyed by the team are reflected in the map. The state-wise break-up of old plantations (pre-1980) and new plantations (post-1980) are shown in Table 3.

### 3.5. Cultivated stock assessment of Red Sanders in Andhra Pradesh

A review of the records of the State Forest Department of Andhra Pradesh revealed that out of a total of 8015.114 ha area under Red Sanders cultivation, Government plantations cover an area of 6839.428 ha while private plantations cover an area of ca. 1175.686 ha. The Government plantations are said to have 75,91,765 individual trees of all girth classes. The private plantations are said to have 1,96,706 individual trees of Red Sanders, as per the records.

As per the Forest Department records the State has an area of about 1871.498 ha under Red Sanders cultivation that is old/harvestable; i.e., about 20.05 percent of the total area under Red Sanders cultivation. The remaining area, i.e., 5468.11 ha (79.94 percent) of the total area under cultivation comprises new plantations, from which no immediate harvesting of wood can be contemplated.

As per the APFD records, the Red Sanders cultivations in the different Forest Divisions of Andhra Pradesh are as under (Table 4):

Table 4. Red Sanders cultivation in the forest divisions of Andhra Pradesh

| *Name of the Forest Division* | *Pre-1980 plantation area (in ha)* | *Post-1980 plantation area (in ha)* | *Total plantation area (in ha)* |
|---|---|---|---|
| Anantapuram | 0 | 15.5 | 15.5 |
| Chittoor East | 669 | 1422 | 2091 |
| Chittoor West | 0 | 191.61 | 191.61 |
| Giddalur | 0 | 100 | 100 |
| Guntur | 0 | 20 | 20 |
| Kadapa | 0 | 989 | 989 |
| Nandhyal | 0 | 50 | 50 |
| Nellore | 0 | 1430 | 1430 |
| Proddatur | 0 | 505 | 505 |
| Rajampet | 701.68 | 585 | 1286.68 |
| Tirupati WLM | 0 | 160 | 160 |
| Vizianagaram | 0.818 | 0 | 0.818 |
| | 1371.498 | 5468.11 | 6839.608 |

*Source:* APFD RC.No.867/2014/Prod.2, dated 31.10.2018

### 3.5.1. Review of cultivated stock of Red Sanders in Andhra Pradesh:

During the present NDF study the project team covered an area of 840 ha of old plantations, i.e., 61.24 percent of the area under Red Sanders cultivation (pre-1980). The total Red Sanders cultivated area covered by the BSI(DRC) team is 1899.85 ha, including both Government and private plantations.

The Division-wise assessment is as under:

*Chittoor West*

In this Division the Red Sanders plantations covering 132.19 ha with 1,46,934 individual trees were reportedly developed during the period 1961-1988 (Ref. APFD: RC No. 867/2014/Prod. 2, dated 30 October 2018). Oddly enough, none of these 'plantations' were traceable during the present NDF study. As per official records the new plantations (post-1980) cover an area of c. 191.61 ha. One good plantation in the Chittoor West Range was found at Keenatampally Beat, near Koyyur village; this was established in 1988-89 and covers 15 ha with about 15,000 trees of average girth of 45 cm and average height of 5 m.

In the context of private plantations the one at Rishi Valley School, Thettu, Madanapalle Range, with Red Sanders planted sporadically in an area covering 70 ha; this plantation is fairly good with ca. 700 trees falling in the girth class of 70-80 cm gbh and average height being 7.5 m.

*Kadapa*

In the Kadapa Division the so-called 'plantations' of Red Sanders officially cover 989 ha out of which 500 ha are reportedly for the purpose of forest 'gap-filling' exercise carried out during 1998-99; these are doubtful 'plantations' as they have actually become subsumed in the Reserve Forests and Sri Lankamaleshwara Wild Life Sanctuary and cannot be distinguished as plantations. On field assessment it was difficult to identify/distinguish the cultivated Red Sanders from the natural/wild ones; no records of monitoring exist to evaluate if these so-called 'gap filling' exercises yielded any substantial results. The remaining 489 ha plantations have been raised from 2010-11 onwards only.

# Plantations in Andhra Pradesh

Keenatampalli, Chittoor West Division

Vontimitta, Kadapa Division

Vinjamur, Nellore Division

Bitragunta, Kavali Range, Nellore Division

Chinnanapet, Venkatagiri Range, Nellore Division

# Plantations in Andhra Pradesh

Horticulture Nursery, Kodur, Rajampet Division

Red Wood Park, KRSP Kodur, Rajampet Division

YSR Estate, Kondur, Chitvel Range, Rajampet Division

Patha Road, Balapally Beat, Rajampet Division

Salivendula Beat, Chitvel Range, Rajampet Division

# Plantations in Andhra Pradesh

DFO office, Poolbagh, Vizianagaram Division

Kondakarakam, Nellimarla Mandal, Vizianagaram Division

Vedullavalasa, Vizianagaram Division

Polayavalasa, Vizianagaram Division

# Plantations in Andhra Pradesh

Chakrayagudem, Eluru Division, West Godavari District

Jangareddygudem, Eluru Division, West Godavari District

*Chittoor East*

In this Division the Red Sanders plantations covering 2091 ha have been developed by the Forest Department; these are well-established in almost all areas except in KN Agaram Block, Karveti Nagar Range (established in 1965 over an area of 14 ha) and Surendera Nagar (established in 1979 in 4 ha area) where the success rate is around 40 percent. Out of 2091 ha only 669 ha are pre-1980 plantations, i.e., have harvestable trees; the average girth (gbh) of the trees in this Division is c.70 cm, which means that these cultivated stocks would become harvestable soon and a harvest cycle can be planned on a selective basis. The remaining 1422 ha of plantations are of post-1980 period.

The plantations of Red Sanders by private farmers are mostly by way of peripheral plantations along the fences of agricultural fields; exceptions are found at two places, i.e., Nagari and TP Palem, where the Red Sanders are grown by way of monoculture plantations.

Red Sanders plantations reportedly established during 1956-1988 supposedly at Vampally (97 ha), Inagaluru (16 ha) and Pallem (7 ha) in Srikalahasthi Range and a few in Chittoor Range were not traceable during this study.

*Tirupati WLM*

The peculiarity of the Red Sanders plantations, which are reportedly established by the TTD, is by way of 'avenue plantations' along the roads within as well as outside the entire campus areas of all the educational institutions run by the TTD. Clearly, these were not planted specifically for extraction purposes. As these are not formal 'plantations' as such there are no specific management measures in place as a result of which the trees are vulnerable due to road expansion plans. The natural regeneration in these trees is also, as expected, very poor with grazing pressure in the area making the situation worse.

As per the official records the plantations reportedly raised by the State Forest Department (Ref. APFD: RC No. 867/2014/Prod. 2, dated 30 October 2018) during the period 1953-1989, covering c. 207 ha with 2,29,770 individual Red Sanders trees are also not traceable.

The Forest Department has raised some new plantations of Red Sanders and its associates in an area of 160 ha from the year 1990 onwards.

The private plantation near Narasingapuram, covering ca. 17.40 ha with 4113 individual trees, is fairly good; this plantation is at some risk as a road widening and flyover bridge construction plan is being envisaged by the local administration. It was reported that approximately 1300 Red Sanders trees, whose gbh is around 70 cm, are earmarked for felling.

*Proddatur*

This Division has Red Sanders plantations covering c. 560 ha area. About 55 ha area of these plantations are fairly old plantations raised during the period 1961 -1974. However, except for an area of 1 ha which contained about 30 individual trees, these were not traceable. The remaining 505 ha of Red Sanders plantations are new, having been raised from the year 2011 onwards.

*Giddalur*

The Red Sanders plantations in this Division cover an area of ca. 100 ha; these are very recent plantations raised since 2016 onwards and one would have to wait for 4-5 decades for the expected yield of heartwood.

*Rajampet*

The Red Sanders plantations in this Forest Division are Government plantations covering about 1286.68 ha area, of which 701.68 ha are old plantations located in Reserve Forest; these plantations are mostly located at Salivendula RF, Seshachalam RF and Redwood Park at Kodur. During the field assessment, it was found that the trees fall in the girth class of 70 -80 cm gbh. The remaining area of 585 ha is post-1980 plantations.

*Guntur*

This Forest Division has Red Sanders plantations, covering c. 20 ha, that are relatively young having been raised during 2014-2015, and are, therefore, of not much significance in the present context.

*Eluru*

The Red Sanders plantations in this Division, covering c. 5 ha area, are all raised by private wood farmers. On assessment, it was found that these plantations have about 807 individual trees, with an average gbh of 75 cm and clear bole of about 3-4 m, therefore, harvestable.

*Nandyal*

The Red Sanders plantations in this Division are very recent ones, not meriting a detailed field assessment.

*Nellore*

The Red Sanders plantations in this Division, covering an area of 1430 ha, were established by the Forest Department only during this decade, therefore, these plantations would have tree girth under the non-harvestable class. However, there are a few exceptions. The Red Sanders plantation in 4 ha area planted during 1997-98 under the VSS scheme at Yathalur Beat, Chinanapet village, Venkatagiri Range, where the tree growth is very good with gbh above 50 cm. The plantation at Koturpally, Rapur Range, established in 1991-92, is also good, comprising Red Sanders trees of 5 m height and 40 cm gbh. Other good plantations are also at Ramkur Beat established during 1992-93 with average height of 5.5 m and 62 cm gbh.

Of the private plantations, there is a plantation in Rapur with an average height of 6 m and 60 cm gbh; these trees have been planted on the periphery of mango orchards.

*Vizianagaram*

The Red Sanders plantations raised by Forest department cover about 0.818 ha while the private plantations cover about 4 ha. During field assessment of the plantations, it was found that the cultivated trees in this particular Division are often the tallest; the average height of the trees is 12 m with c. 100 cm gbh. However, as these plantations are in moist climatic conditions the heartwood formation is expected to be rather less and of poor quality.

*Srikakulam*

There are no Red Sanders plantations established by the State Forest Department, whereas the few known plantations by private farmers/wood growers are all less than 10 years old. The average height of these cultivated Red Sanders trees is c. 7 m with 40 cm gbh. Therefore, no Red Sanders wood yield can be anticipated in the immediate future.

### 3.5.2. Review of cultivated stock of Red Sanders in Tamil Nadu

The total area under Red Sanders plantation is 6967.74 ha as per the SFD records and secondary information; this includes 6953.17 ha of Government-owned plantations and 14.66 ha of private ownership. The distribution of Red Sanders plantations in various forest divisions/circles are given in Table 5.

Table 5. Plantations with approximate/estimated number of trees in Tamil Nadu

| *Name of the circle/forest division* | *Area (in ha)* | *Number of trees available/survived* |
|---|---|---|
| Afforestation Division, Tiruvannamalai | 524.5 | 14694 |
| Chennai Circle | 1737.42 | 422225 |
| Dharmapuri Circle (Dharmapuri, Harur, Hosur divisions) | 2600.05 | 33659 |
| Social Forestry Division Vellore | 890.7 | 3289 |
| Tiruvannamalai Division | 164.4 | 27876 |
| Vellore Division, Vellore | 1036.01 | 88486 |
| Private lands (in Coimbatore, Erode, Salem districts) | 14.6687 | 12004 |
| Total | 6967.7487 | 602233 |
| *Surveyed by BSI* | | |
| Total plantations (including old & new) | 3703.49 | 399219 |
| Pre-1980 plantations | 2472.91 | 282002 |
| Post-1980 plantations | 1230.58 | 117217 |

*Source:* TNFD letter. No. E2/15433/2011, dated 06.03.2012

During the present survey/assessment for the NDF study the BSI(DRC) team surveyed a total of 3703.49 ha (including old/new). Out of this total area

surveyed, the new plantations (post-1980) comprise 1230.58 ha, i.e., 33.22 %. The old (pre-1980) plantations covered during this study is ca. 2472.91 ha, i.e., 66.77 % of the known Red Sanders plantation area; the oldest plantation is at Thaniyar Nursery, Periamalai Beat, Polur RF, Tiruvannamalai Division, with few individuals, but with maximum gbh (200 cm). It was observed that a majority of the plantations are well established, with the height of Red Sanders trees ranging from 4-15 m and gbh ranging from 30-200 cm.

In general, it was observed that in 11 divisions and 10 districts the Red Sanders plantations that were raised by the Forest Department are having good trees from which heartwood could be extracted. On the other hand, the private plantations in Tamil Nadu, which were mostly established in recent years, are not having Red Sanders of good size, i.e., harvestable trees.

Apparently, some of the Red Sanders trees planted in Government lands adjoining Reserve Forest area earlier during 1920-70 have dispersed their seed to the deeper forest areas where they have become established/ naturalized.

The regeneration aspect in a few Red Sanders plantations that were planted in conducive areas adjacent to reserved forests area is good, indicating that the plantations would be sustainable in the future. Vallimalai RF (Santavasal Range, Tiruvannamalai Division), Vanganur RF (SVG Puram Beat, Tiruvallur Division), Peranamallur Section/Beat (Arani Range), Athubambadi Beat, Polur SF (Tiruvannamalai Division) are excellent examples of regeneration in plantation areas.

In the context of wood quality it was observed that the colour of the heartwood in plantation-raised trees is rather paler compared to the wild trees; similarly, the texture of the bark is also perceptibly different compared to the trees growing in wild/natural conditions. The sapwood content in cultivated tress also appears to be more when compared to the wild trees**.**

### 3.5.3. Review of cultivated stock of Red Sanders in Kerala

It was observed that plantations of Red Sanders trees cover a little over ca. 2 ha only. These plantations are under the management of the Research Wing, Kerala State Forest Department.

# Plantations in Tamil Nadu

S. V. G. Puram Beat, Vanganur RF, Tiruttani Range, Tiruvallur Division

Ammor Beat, Arcot Range, Vellore Division

# Plantations in Tamil Nadu

Nayapakkam Beat, Tiruvallur Range & Division

Sankagiri Beat, Metture Range, Salem Division

Sennamalai karadu Beat, Sirumugai range, Coimbatore Division

# Plantations in Tamil Nadu

Nemlur Beat,Gummadipoondi Range, Tiruvallur Division

Mylapore Beat, Red Hills Range, Tiruvallur Division

### 3.5.4. Review of cultivated stock of Red Sanders in Karnataka

There are as many as 6 plantations in the State. The cultivated stock of Red Sanders in Karnataka are mostly under the management of State Forest Department; this includes 2 plantations in Mandya Forest Division and rest under Bengaluru Research Division. All these plantations have been covered during this survey.

On assessment, it was found that about 80 percent of individuals are multi-stemmed in Yeswanthpur A & B Blocks, Kolar Research Range, Nallal A2 beat, Hosakote Research Range, Bengaluru Research Division of Karnataka Forest Department. Much of this is owing to natural coppicing that occurs in the absence of management measures such as the pruning of unwanted stems to allow single boles to grow vigorously in a healthy way.

The regeneration of plantations established around 1965 at Hulikere Lower Beat, Mandya Forest Range, is very indeed good; the red gravelly soils in the area conducive to the growth of Red Sanders; regeneration in these plantation areas is excellent.

The quality of Red Sanders heartwood in Hulikere is also good compared to other research and forest ranges in Karnataka.

However, leaf gall disease has been found in the Hulikere Forest; there is a need to address the issue scientifically. Invasive species are also a threat to the cultivated stock. Invasive species such as *Chromolaena odorata (*Syn. *Eupatorium odoratum)*, *Lantana camara* and *Gliricidia sepium* are replacing the original grass species that were uprooted by way of maintenance measure/management practice. (e.g., K Shettihalli Beat/RF, Sriranagapatnam Forest Range, Mandya Forest Division), with the result that regeneration has also been significantly reduced in such areas.

### 3.5.5. Review of cultivated stock of Red Sanders in West Bengal

The Red Sanders plantations in West Bengal cover about 5.32 ha area. About 29 individuals of Red Sanders trees were initially introduced in the Arabari Forest Range of Midnapore district during 1950's; the average height of the trees is now 12 m with about 150 cm gbh (the max gbh is 230 cm in 18 m high originally planted trees; the gbh of new/regenerated trees is 57 cm and height is 6 m). Overall, the regeneration is also excellent. About 367 trees were planted recently in the year 2000 in the adjoining areas in same Range; their maximum girth is 60 cm and 7 m tall at present.

The sandy loam soil and climatic conditions in the area support the seed recruitment and establishment of seedlings in this area.

About 10 individuals were introduced long back (around 1950) in the *ex-situ* conservation area of Amlachati Vesaj Udyan, State Silviculture South Division, Jhagram District of West Bengal. The average height of these trees is 10 m and the average girth (gbh) is ca. 120 cm, with a maximum of 170 cm.

However, the heartwood quality is very poor, proving that the Red Sanders has to be only grown in ecologically conducive areas for good heartwood yield.

### 3.5.6. Review of cultivated stock of Red Sanders in Telangana

The area under Red Sanders cultivation in the State of Telangana is c. 15.842 ha. These are recent plantations being only 5-13 years old, raised by farmers in private lands. The girth (gbh) of these trees is less than 40 cm and, therefore, not harvestable.

## 3.6. Fixing quota for export of cultivated red sanders wood

### 3.6.1. Red Sanders wood from confiscated/seized stock

While export of Red Sanders wood in any form (raw, processed/unprocessed) sourced from the wild is prohibited for export under the CITES regulatory regime as well as the EXIM policy of Government of India, a onetime relaxation had been granted to the Governments of Andhra Pradesh, Tamil Nadu, Maharashtra and Karnataka for allowing the export of Red Sanders wood sourced from the seized/confiscated stock. The one-time relaxation for export (Year 2012) for the four states are: Andhra Pradesh-8498.095 MT, Tamil Nadu - 1200 MT, Maharashtra - 299.732 MT, Karnataka - 186.588.

The national quota allowed by the CITES Secretariat to India for Red Sanders specimens from Source "I" is in Table 6.

Table 6. National quota allowed by CITES Secretariat

| *S. No.* | *Year* | *Source "I" (quantity in MT)* |
|---|---|---|
| 1 | 2012-13 | 11,806* |
| 2 | 2013-14 | 11,507 |
| 3 | 2014-15 | 9,090.09 |
| 4 | 2015-16 | 9,090.09 |
| 5 | 2016-17 | 9,090.09 |

* one-time quota granted for India

The details of the Red Sanders wood sold and the revenue realised from the one-time quota with respect to Andhra Pradesh are in Table 7.

Table 7. Details of the quantity of Red Sanders wood sold and revenue realized by APFD from the quota of 8498 MTs

| *S. No.* | *Year of sale* | *Quantity (in MTs)* | *Total Revenue realized (in INR) (crores)* |
|---|---|---|---|
| 1 | 2005-06 | 233.619 | 2.870 |
| 2 | 2008-09 | 1998.591 | 46.210 |
| Before bifurcation of State Sub-total | | 2232.210 | 49.080 |
| 1. | 2014-15 (Phase –I) | 2174.148 | 609.609 |
| 2. | 2015-16 (Phase-II to V) | 840.234 | 178.060 |
| 3. | 2016-17 (Phase-VI) | 843.207 | 238.780 |
| 4. | 2017-18 (Phase-VII to IX) | 992.412 | 204.970 |
| 5. | 2018-19 (Phase-X and XI) | 639.512 | 251.820 |
| After bifurcation of State Sub-total | | 5489.513 | 1483.239 |
| Grand total | | 7721.723 | 1532.319 |

*Source:* APFD

During 2018-2019 the state of Andhra Pradesh has generated a revenue of 251.82 crores from the sale of 639.512 MT (Phase X & XI) Red Sanders wood and the remaining quantity available out of the permitted quota (8498 MT for Andhra Pradesh) is 776.277 MT (RC.No. 867/2014/Prod.2, dated 30th October 2018).

The date for export of Red Sanders by Andhra Pradesh had been extended up to 31st December 2017 vide Notification No. 24/2015-2020, dated 29th August 2016. Subsequently, the time for finalising the modalities and complete the process of export was extended further up to 30th April 2019 vide Notification No. 08/2015-2020, dated 23rd May 2017.

As per Notification No. 40/2015-2020, dated 3rd October 2018, issued by the Directorate General of Foreign Trade (DGFT) the time up to 30th April 2019 for 'finalizing the modalities and complete the process of export of the respective allocated quantities of Red Sanders wood' has been granted to the Governments of Maharashtra and Tamil Nadu.

As per the latest Notification of DGFT (No. 56/2015-2020, dated 18th February 2019, the Government of India has amended the export policy of Red Sanders wood under **Chapter 44 of the ITC (HS), 2018, Schedule -2 (Export Policy),** to include Red Sanders wood obtained from private land (including Pattaland) (Sl. No. 188A) and specified value-added products of Red Sanders wood and other handicrafts made from the Red Sanders wood procured from legal sources (Sl. No. 189). Thus, the export of the Red Sanders wood exclusively sourced from the cultivated origin from private land (including Pattaland) has now been notified to allow 'restricted' export (subject to certain policy conditions/ documentation) of Red Sanders wood in the form of logs, roots and value-added products to facilitate export. This comes as a great relief to the Red Sanders wood farmers who have been pressurizing the Government for this kind of relaxation/amendment of the export policy. The present notification addresses most of their grievances to a large extent.

The issue of quota from the confiscated/seized source needs to be determined based on the quantity of RSW with the State Forest Departments. As per information available, the quantum RSW from confiscated/seized source is reflected in Table 8.

Table 8. Confiscated Red Sanders Stock details in various states

| *State Name* | *Quantity in MT* |
|---|---|
| Manipur | 3.044 |
| Maharashtra | 1115.04 |
| Karnataka | 257.73 |
| Telangana | 1123.972 |
| Tamil Nadu | 987 |
| JNCH, Mumbai | 1189.956 |
| Andhra Pradesh* | 7888.981 |
| | 12565.723 |

* This excludes the remaining quantity of Red Sanders wood (776.277 MT) after completing the export/sale based on the previous one-time quota/permission.

The existing stocks of seized/confiscated Red Sanders, which are to the tune of 12565.723 MT, are lying with State Forest Departments. This is over and above the quantum of 11,806 MT of Red Sanders seized wood for which a 'one-time permission' was granted by the CITES Secretariat earlier. A decision on the disposal of the existing seized stock (12565.723 MT) needs to be taken by the Management Authority of CITES in India, i.e., the Ministry of Environment, Forests and Climate Change (MoEFCC).

### 3.6.2. Existing export quota from cultivated stock

The present yearly export quota from the cultivated stock of 310 MT as per the quota permission of CITES Secretariat (Table 9) is being divided between the state Andhra Pradesh (250 MT) and Tamil Nadu (60 MT).

Table 9. Yearly quota permitted for export of Red Sanders wood

| *S. No.* | *Year* | *Source "A" (quantity in MT)* |
|---|---|---|
| 1 | 2012-13 | 310 |
| 2 | 2013-14 | 310 |
| 3 | 2014-15 | 310 |
| 4 | 2015-16 | 310 |
| 5 | 2016-17 | 310 |

*Source:* CITES national export website

### 3.6.3. Proposed quota for Red Sanders from cultivated source

As seen from the tree volume of the cultivated stock in all the states having cultivation of Red Sanders (Table 10) the state of Tamil Nadu has the maximum cultivated stock (45065 MT), followed by Andhra Pradesh (14367 MT), Karnataka (511 MT), West Bengal (125 MT). The states of Gujarat, Kerala Telangana and Odisha have negligible cultivated stock.

Table 10. Tree volume of cultivated stock as per the present NDF study

| *State* | *Surveyed area (in ha)* | *Approx. number of mature trees* | *Avg. height (m)* | *Avg. girth (m)* | *Post-1980 area (in ha)* | *Post 1980 trees* | *Pre-1980 area (in ha)* | *Pre-1980 trees* | *Avg. harve-stable height (m)* | *Avg. harve-stable girth (cm)* | *% of harve-stable area (in ha)* | *Results after Hoppus formula* | *Tree volume (in CU M)* | *Tree volume (in MTs)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Andhra Pradesh | 1899.85 | 418061 | 9.38 | 0.6048 | 1058.99 | 330498 | 840.86 | 87563 | 11.33 | 81 | 44.25 | 0.464601 | 40681.84094 | 14366.66 |
| Karnataka | 413.2 | 27800 | 5.5 | 0.516 | 30.2 | 11800 | 383 | 16000 | 5.25 | 52.5 | 92.69 | 0.090439 | 1447.03125 | 511.0143 |
| Odisha | 1.3 | 105 | 6 | 0.55 | 1.3 | 105 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Tamil Nadu | 3703.49 | 399219 | 8.81 | 0.8298 | 1230.58 | 117217 | 2472.91 | 282002 | 9.36 | 87.95 | 66.77 | 0.452509 | 127608.5407 | 45064.53 |
| Telangana | 15.842 | 5543 | 5.9 | 0.421 | 15.842 | 5543 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| West Bengal | 5.32 | 2211 | 8.75 | 0.8257 | 1.9 | 1867 | 3.42 | 344 | 12 | 117.5 | 64.28 | 1.035469 | 356.20125 | 125.7913 |
| Gujarat | 0.08 | 40 | 12 | 0.9 | 0 | 0 | 0.08 | 40 | 12 | 90 | 100 | 0.6075 | 24.3 | 8.581464 |
| Kerala | 2 | 1000 | 18.29 | 0.8957 | 2 | 1000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 6041.082 | 853979 | 9 | 0.6864 | 2340.812 | 468030 | 3700.27 | 385949 | 9.98 | 0.8579 | 61.25 | | 170117.9141 | 60076.57 |

Based on the cultivated stock assessment made in the present NDF study (Table 10) the suggested yearly quota from the cultivated source is computed as under**:**

Tamil Nadu standing Red Sanders crop: 45,000 MT
*Extraction potential*: 45,000 / 50 = 900 MT per annum
Andhra Pradesh standing RS crop: 14,000 MT
*Extraction potential*: 14,000 / 50 = 280 MT per annum
Karnataka standing RS crop: 511 MT
*Extraction potential*: 511 / 50 = 10 MT per annum
Extraction potential for all 3 states **:** 1190 MT per annum

The potential for extraction of Red Sanders in these states is roughly calculated based on the cultivated tree volume and on the premise that the Red Sanders trees move from one girth class to another in about ten years at an average in optimum growth conditions that are specific to Red Sanders. Therefore, to attain the harvestable girth class of > 70 cm the standing trees of girth class 60-70 cm would take ten years. This would be the girth class for ready replenishment of stocks for next harvest/off-take. It is observed that most of plantations in Andhra Pradesh are relatively recent, i.e., from 2010/12 onwards; a few old ones in the forest fringe areas, i.e., Rajampet Division (Salivendula RF, Seshchalam RF, Railway Kodur), Chittoor East Range (Shasis hills, Nefti Nagar, Deer Park, Karaveti Nagar), Nellore Division (Chinanapet, near Yathalur, Kavali range), Vizianagaram Division (Phool Bagh) are at a fairly mature/established stage where they can yield harvestable wood. The oldest plantation in Tamil Nadu are at Thaniyar Nursery. Therefore, the above mentioned quota for all the three states (Tamil Nadu, Andhra Pradesh, Karnataka) has been computed and prescribed to ensure sustainability/availability of the Red Sanders plantations for the next fifty years.

A recent study of heartwood proportion analysis across all age classes of plantations showed that Red Sanders wood of a moderate amount of heartwood could be harvested in 40-50 years rotation age (Suresh et al., 2017). It has been observed that the growth of Red Sanders, including girth volume, is

more in wet/moist climatic conditions that prevail in West Bengal and Kerala (Babu, 1992).

### 3.6.4. Justification for including Government plantations in export quota

A total area of 15,420 ha is under Red Sanders cultivation. This includes 14,214 ha (92.2 %) of Government lands and 1206 ha (7.8 %) of private lands (including pattalands). It is seen that most of the harvestable trees are in Government lands (Table 10) and, therefore, there is now a strong justification for allowing sustainable harvest from Government plantations raised by the State Forest Departments, particularly the Andhra Pradesh Forest Department (6813 ha) and Tamil Nadu Forest Department (6953 ha), which have a fairly good quantity of harvestable Red Sanders wood (> 70 cm girth). Sourcing Red Sanders wood from both government and private plantations for export would be advisable. As per the field study/random sampling carried out as part of the NDF study, it is observed that Tamil Nadu has 64.28 percent harvestable area of Red Sanders tree under cultivation, while Andhra Pradesh has 44.25 percent area of Red Sanders with harvestable size. **Therefore, it is practical to also allow sustainable harvest of cultivated trees of Red Sanders from Government lands, including forests, to help reduce pressure on the wild populations. A good harvest management plan, with considerations of rotation age, for cultivated Red Sanders in Government lands, including forests, needs to be developed.**

Periodic assessments of cultivated stock may be made to ascertain the quota over the years. A sustainable harvest regime needs to be planned for the next two decades based on the present data and the data that would be collected through any fresh assessment in the future.

Implicit in the above assessment of available/existing stocks of Red Sanders from the cultivated source (Source "A") there is a need for fixing of a regular annual quota for export of Source "A" material.

A recommendation for the above is derived from the present NDF study to ensure a "regulated" export based on a sustainable harvest regime of cultivated stocks, and make sure that standing cultivated stocks do not get exhausted too soon and adversely impact the wild stock/populations by way of illegal extraction from the wild.

# Plantations in Karnataka


Nallal A2 Beat, Hoskote Research Range, Bengaluru Research Division


K. Shettihalli Beat, Srirangapatnam Forest Range, Mandya Forest Division


Hulikere Lower Beat, Mandya Forest Range and Division

# Plantations in West Bengal

Arabari Range, Midnapore District

Regenaration at Arabari Range

Regeneration at Arabari Range

# Plantations in Telangana

Deshaipally Village , Veena Vanka Mandal, Karimnagar District

Thimmapur Village, Sangem Mandal, Warangal Division

## STEP 4: REVIEW OF CONSERVATION CONCERNS

### 4.1. Considering the conservation status assessments what is the indicated severity of conservation concern?

**Severity of conservation concern: High**

**Review of earlier status assessments**

The Red Sanders tree, *Pterocarpus santalinus*, an endemic tree with a narrow distribution range in Pallakonda-Seshachalam-Veligonda-Nallamala hills was feared to be on the verge of depletion way back in 1984 (Ahmedullah & Nayar, 1984) owing to continuous exploitation of the wood from the wild for illegal trade. Subsequently, it was enumerated as a 'Threatened' plant in the BSI publication *Endemic Plants of the Indian Region* (Ahmedullah & Nayar, 1987).

More than a decade later, the Red Sanders tree was assessed as **Endangered (EN)** in the IUCN Red List in 1998 as it was highly threatened primarily by rampant illegal extraction compounded by other threat factors such as livestock grazing and repeated forest fires, leading to a gradual decline of the wild populations. However, much to the dismay of the scientific community, it was re-assessed as Near Threatened (NT) in 2018, without resorting to a wider consultative process. The assessment rationale reads, "The species is globally assessed as **Near Threatened** as it almost qualifies for the **Vulnerable B1ab(iii, v)**". This self-contradictory statement reflects an ambiguity that makes the assessment suspect. While such assessments are made, the benefit of doubt, if any, should go in favour of the species which is clearly subject to severe threats. The logic for down-listing the species, in a scenario when all the threat factors are continuing to be operated and illegal felling/trade continuing rampantly, with the wild populations continuously declining, was incomprehensible, particularly when it was conceded that "the species has been subject to historical population decline due to over-extraction of trees for timber". The 2018 Red List Assessment also acknowledges that "currently, the species suffers from low fruit set and hence poor regeneration. Therefore, in the future, the population of the species may decline further and it is also predicted to suffer from genetic erosion, and inbreeding depression due to relatively remaining small population(s)".

In the context of the natural distribution of *Pterocarpus santalinus*, the 2018 IUCN Red List assessment also mentions that Red Sanders is 'native' to Tamil Nadu and Karnataka and depicts the same in the annexed distribution map. The populations presently found in Tamil Nadu and Karnataka are purely cultivated ones. Some plantations in Tamil Nadu (Chengalpatu, N. Arcot) were established in the 1960's and later became naturalized. Similarly, the populations in Karnataka (Mandya) are cultivated plants that became naturalized.

Further, the argument of the 2018 'global assessment' rests on the criteria of area of occupancy (AOO) and extent of occurrence (EOO) which apparently take into consideration the cultivated areas of Red Sanders in the neighbouring states such as Tamil Nadu and Karnataka as well, thereby, effectively increasing the AOO and EOO. This is not acceptable as a bulk of the cultivated stock is in a juvenile stage of development which cannot be deemed to be full-fledged mature populations. It may be noted that wild populations are strictly endemic to the state of Andhra Pradesh only. The EOO as per the present study is 19655.921 $km^2$ and AOO is 1068 $km^2$ which have been depicted in the conservation assessment tool, GeoCAT (Figure 2).

Figure 2. AOO and EOO of Red Sanders depicted in GeoCAT software

All the above warrants a review of the 2018 IUCN Red List assessment of *Pterocarpus santalinus*.

### 4.2. Conservation concerns

The concern about the manner in which *Pterocarpus santalinus* was down-listed from 'Endangered' category to the 'Near Threatened' category, despite clear evidence to the contrary, is compelling. Therefore, there is an urgent

need to challenge this assessment and call for a re-assessment, based on the fact that it is a narrow endemic, with discontinuities in occupancy/habitat, and has increasing fragmentation of populations/rapidly shrinking habitats and subject to severe threats, including rampant illicit felling/smuggling, livestock grazing, repeated forest fires, invasive species and other anthropogenic factors.

### 4.3. Present threat assessment

**Severity of threat perception: High**

A threat assessment was done as part of the current NDF study in Kadapa-Chittoor-Nellore-Prakasam-Kurnool districts of Andhra Pradesh. The specific threats observed during the field tours in all the forest divisions of Andhra Pradesh that naturally bear Red Sanders tree are as under:

**Kadapa Forest Division**

*Threats*

- Old cut stumps of Red Sanders were observed in Ippenta, Maddimadugu East beats of Kadapa Range, Kadikota, Korthimadugu, Guvvalacheruvu beats of Rayachoti range; Nadimaplly, Ontimitta, Madhavaram, Pathur, Chintharajupalli, Dasarladoddi, Nandalur beats of Ontimitta range; and Bonagundi Cheruvu beat of Vempalli Range. These indicate rampant illegal felling of the species in the areas.
- Forest fires are very common along all beats.
- Livestock grazing was observed in Maddimadugu West of Kadapa Range.

*General observations*

- Red Sanders leaves are used as fodder in Guvvalacheruvu East Beat of Rayachoti Range.

**Chittoor East Forest Division**

*Threats*

- Illegal felling was observed in S.K. Madugu, P. Gollapalli, Chellur beats in Satyavedu Range, Aadavaram in Sri Kalakasthi Range.

- Populations of Red Sanders were earlier known/recorded in Ganugapenta and Mangalampet beats of Pileru (Bhakarapet) Range, but at present only some remnant old cut stumps are seen, indicating that the tree species has been subjected to illicit felling with the entire populations having become depleted now.
- Evidence of forest fires were found in almost all the forest beats, indicating that forest fires are frequent in this Division.
- Grazing by cattle was found to be very common in Nendrangunta, Yerpedu beats of Tirupathi range as well as the entire Pileru range.
- Invasive weeds are very common all the beats of Pileru Range and Melanchur beat of Sri Kalakasthi range.

**Giddalur Forest Division**

*Threats*

- Old cut stumps were seen in Ambavaram beat of Kanigiri Range, pointing heavy illicit felling in the area.
- Livestock grazing was found to be very common in Ambavaram Beat of Kanigiri Range.
- The seedlings of Red Sanders were observed to be eaten by caterpillars in Ambavaram Beat of Kanigiri Range.
- Quarrying for granite (locally known as blue metal) was observed in Vedullacheruvu Beat of Kanigiri Range. This illegal activity is indirectly impacting/degrading the natural Red Sanders forests.

*General observations*

- During the lean summer months the young foliage of Red Sanders tree was collected by local communities for use as fodder.

**Nellore Division**

*Threats*

- Fresh felling of Red Sanders trees was observed in Udayagiri Range.
- Old cut stumps were observed in Rajupalem Beat of Rapur Range, Atmakur Beat of Venkatagiri Range, indicating heavy illicit felling of Red Sanders.

- Livestock grazing was observed at Koturpalli Beat of Rapur Range.
- Forest fires, believed to be lit by locals, were found quite frequently.

**Tirupathi WLM Division**

*Threats*

- Illegal felling was found to be very common in Papanasanam, Gundampeta, Kangimadugu, Balapally West of Balapally Range; and Bhakarapet and Talakona South in Chamala Range.
- The NDF project team members saw smugglers operating in Krishnapuram beat of Tirupathi range. Fresh felling of Red Sanders was observed in Karakambadi, Mamandur South, while three-year-old stumps of felled Red Sanders trees were observed in TN Palem Central and Papavinasanam Beats of Tirupathi Range.
- Introduction of *Acacia auriculiformis* and *Pinus* trees around the Alipiri and Papavinasanam beats of Tirupathi Range, carrying populations of Red Sanders, are posing a threat to the native species.
- The invasive weed, *Waltheria indica,* is found to be common in the entire Tirupathi Range.
- High pilgrim pressure was evident in the entire Tirumala forest area which harbours many temples inside the forests; the anthropogenic pressure is degrading the forest areas.
- Livestock grazing was seen frequent in Desettipalli Beat of Balapally Range and Nagapatla West of Chamala Range.

*General observations*

- It was reported that most of the smugglers come in the attire of pilgrims and later enter the forests areas for illicit felling/smuggling of Red Sanders.

**Proddatur Division**

*Threats*

- Cutting of *Chloroxylon swietenia* (Ceylon Satinwood) along with Red Sanders was observed in Thaduku Beat of Porumamilla Range.

- Old cut stumps of Red Sanders were noticed in Jyothi Beat of Porumamilla Range, indicating that illicit felling was carried out in the area.
- Fresh forest fires was observed in Mallepalle, Siddavaram, Tekurupeta, Balayyapalli, Jyothi beats.

*General observations*

- Most of the seized artefacts crafted from Red Sanders wood are from Porumamilla Range, indicating that some local communities subsist on illicit felling/trade of wood.
- It was observed that oxen and bullock carts are often used for transporting the illegally felled Red Sanders trees in Byanapalli Beat of Proddathur Range.
- Young leaves of Red Sanders were being used as fodder by the local village inhabitants.

**Rajampet Division**

*Threats*

- Illegal felling was observed in Rollamadugu, Armanipenta, Vathalur, Annasagar and Annasamudram beats of Rajampet Range; Konduru Beat of Chitvel Range; and K.V. Bhavi South, N.G. Penta beats of Koduru Range.
- In the entire Rajampet Forest Division, particularly Vanarajpalli of Sanipaya Range, Rollamadugu, and Armanipenta of Rajampeta Range, it was reported that smugglers check the quality of the wood prior to identifying trees for felling. This was clearly evident on the bark of the Red Sanders tree. The open debarked/damaged tree trunks are susceptible to pathological infections.
- Invasive weeds are found to be very common in Salivendula Beat of Chitvel Range.

The present threat assessment surveys show that the species is subjected to very high levels of threat, with factors such as illegal felling, repeated annual fires, livestock grazing and invasive weeds adversely affecting population

dynamics. Some secondary threats include pathological/pest infestations, damage due to debarking, anthropogenic/pilgrim pressure, etc.

Some village communities in Andhra Pradesh (particularly in Proddatur Range) and Tamil Nadu (Jawadi and Malyali tribes who inhabit the twin mountains of the same name that are at a distance of about 110 km from Seshachalam hills) are dependent on the Red Sanders wood and sandal wood for subsistence/ livelihood means; the Jawadi Malyalis form part of the communities who are traditional woodcutters and hunters and thrive on smuggling of Red Sanders wood. (Sensitisation programmes conducted by the Forest Department has apparently not yielded any substantial results.)

In terms of the primary basic threat factors, the same conclusion was drawn by the earlier NDF study (Hegde et al., 2012) conducted for the Red Sanders tree by another Scientific Authority (IFGTB) designated by the CITES Management Authority for India.

The rapidly increasing level of illegal trade reflected in the increasing stocks of seized/confiscated Red Sanders wood is indicative of the fact that the protection measures in place, although well structured, are inadequate in the face of rampant smuggling activities.

The present threat assessment done as part of this NDF study strengthens the argument for keeping the species in the Endangered (EN) category owing to the following major risk factors: (i) being a tree species with a very long gestation period the species is at greater risk, (ii) endemic nature or narrow geographic range at global level, (iii) niche specificity in terms of climate, physiographic and edaphic factors (Red Sanders tree has an exclusive preference for areas with quartzite and shale), and (iv) the severity of threat is very high.

Therefore, there is no denying the fact that the Red Sanders is indeed an endangered species, with high severity of threat, and the conservation concerns are very much valid in the present-day context.

**Illegal felling and transport using bullocks at Boyanapalli Beat, Proddatur Division**

Boyanapalle beat, Proddatur range and division

## Cattle grazing at Rajampet Division

# Debarking and felling

Armanipenta Beat, Rajampet Division

Peddavangali Beat, Nandyal Division

Gudigunta Beat, Nellore Division

Sailendrakona Beat, Thirupati Division

# Forest Fires

Pileru Range, Chittoor East Division

Jyothi Beat, Proddatur Division

**Artifacts / Carvings seized at Porumamilla Range, Proddatur Division**

## STEP 5: EVALUATION OF INTRINSIC BIOLOGICAL RISK

**What is the severity of potential biological risk?**

**Risk Severity : High**

### 5.1. Geographic distribution

The species, *Pterocarpus santalinus* L.f., is endemic to the Eastern Ghats region of Andhra Pradesh where it forms part of the dry deciduous forest tracts at elevations ranging from 200 m to 900 m, with well-drained loamy lateritic soils and 800-1200 mm rainfall (Ahmedullah & Nayar, 1984). The species is confined to a narrow range (Kadapa-Nellore-Chittoor) of the Eastern Ghats.

*Geographic distribution*: The species, *Pterocarpus santalinus* L.f., is endemic to the Eastern Ghats region of Andhra Pradesh where it forms part of the dry deciduous forest tracts at elevations ranging from 200 m to 900 m, with well-drained loamy lateritic soils and 800-1200 mm rainfall (Ahmedullah & Nayar, 1984). The species occurs naturally in the Seshachalam-Veligonda hill ranges and Palakonda-Lankamala-Nallamala hill ranges in the Kadapa, Chittoor, Nellore, Kurnool and Prakasam districts of Andhra Pradesh. It has also been recorded in North Arcot and Chengalpet districts of Tamil Nadu. It is also under cultivation in Tamil Nadu, Andhra Pradesh, Karnataka, Kerala, Odisha, Maharashtra and West Bengal; the plantations are raised by Government agencies (mostly the Forest Departments) and farmers in private lands.

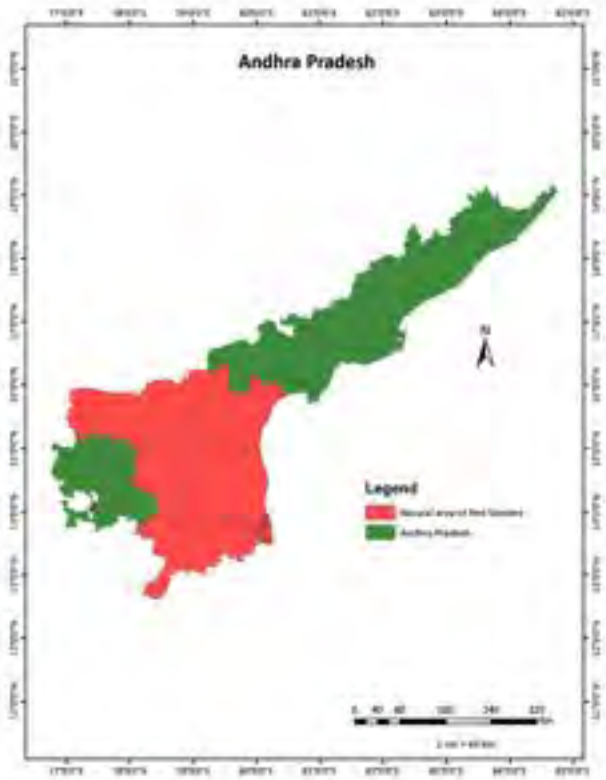
There are records of its introduction in Sri Lanka (Rudd ,1991); Arunakumara et al., 2011), Philippines (Pardo de Tavera, 2008) and Taiwan (Huang & Ohashi, 1977).

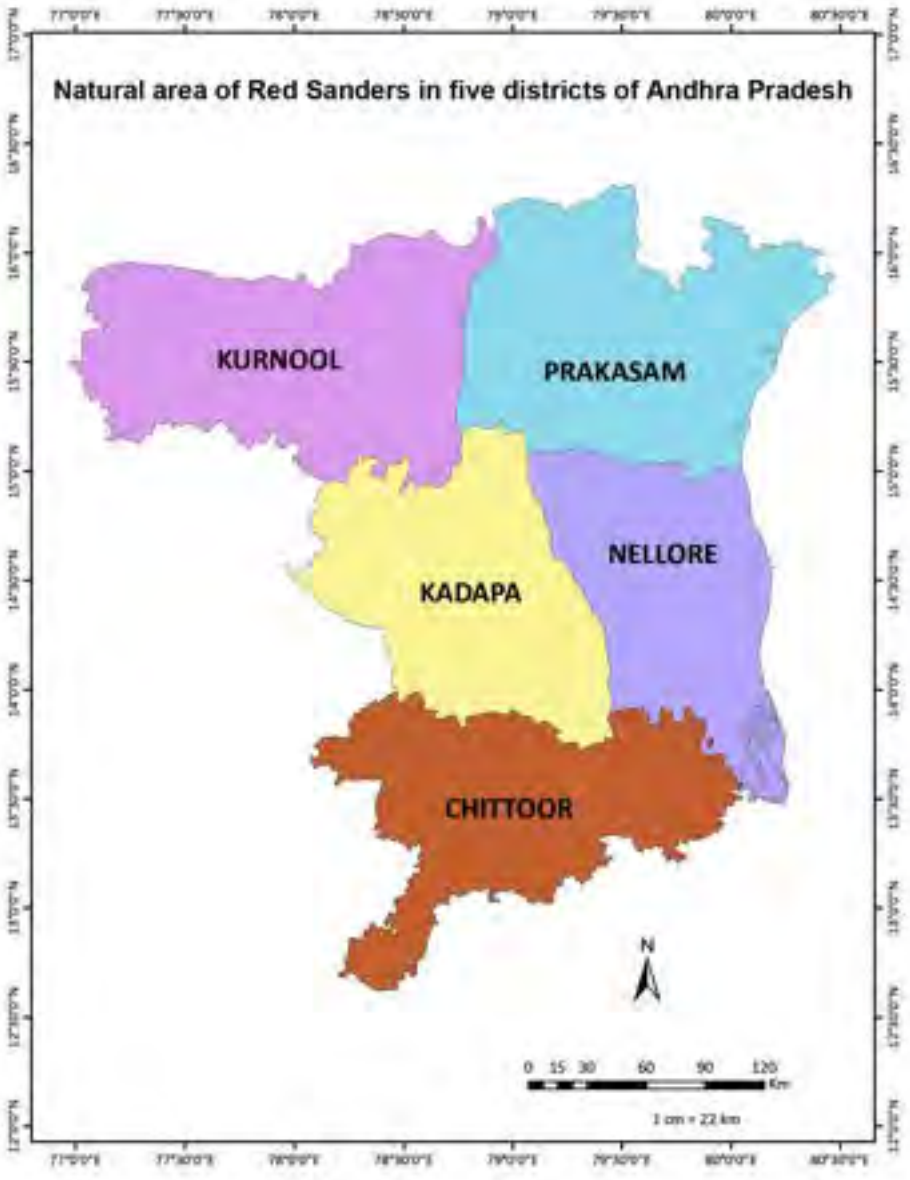
The other species of the same genus occurring in India are: *Pterocarpus dalbergioides* DC., *P. indicus* Willd., *P. macrocarpus* Kurz, *P. marsupium* Roxb., *P. marsupium* subsp. *acuminatus* (Prain) Thoth.

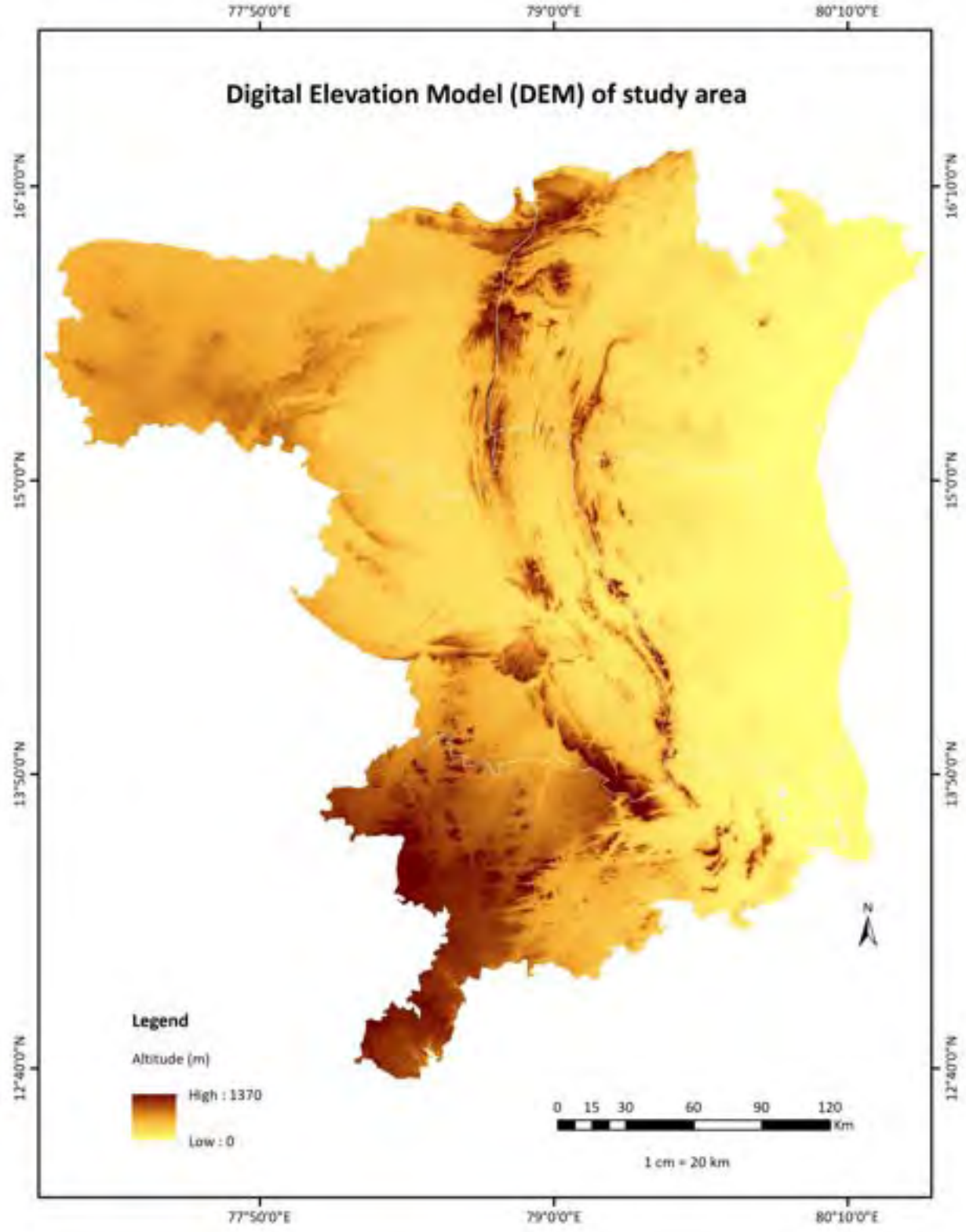
### 5.2. National/sub-national population size and distribution

The species is spread across 19655.921 $km^2$ in its area of natural distribution/occurrence. It is mostly concentrated (in order of density) in the Kadapa, Rajampet and Proddatur Forest Divisions of Andhra Pradesh, followed

# Distribution of *Pterocarpus santalinus* L. f.


Digital Elevation Model (DEM) of study area
77°50'0"E
79°0'0"E
80°10'0"E
16°10'0"N
15°0'0"N
13°50'0"N
12°40'0"N
Legend
Altitude (m)
High : 1370
Low : 0
0 15 30 60 90 120
Km
1 cm = 20 km
N

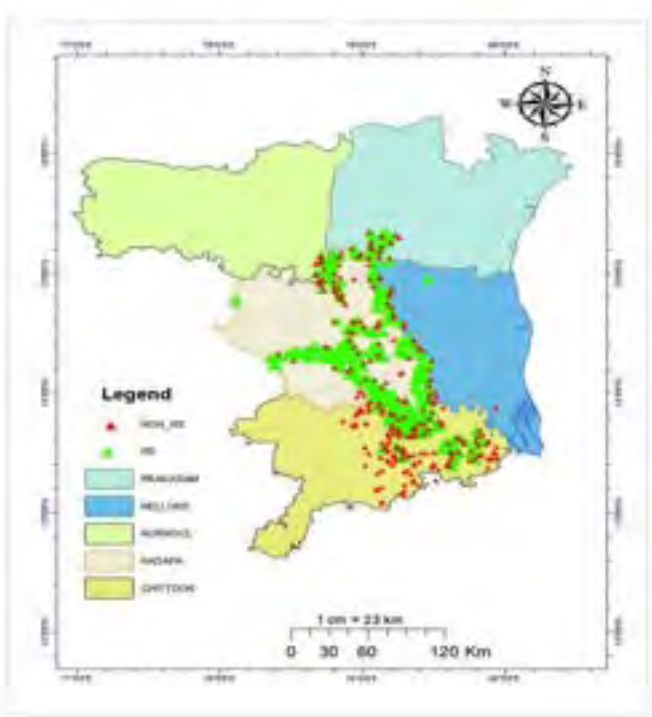
by Tirupati, Chittoor East, Nellore with sporadic distribution in Giddalur and Nandyal.

### 5.3. Size structure of national/sub-national populations

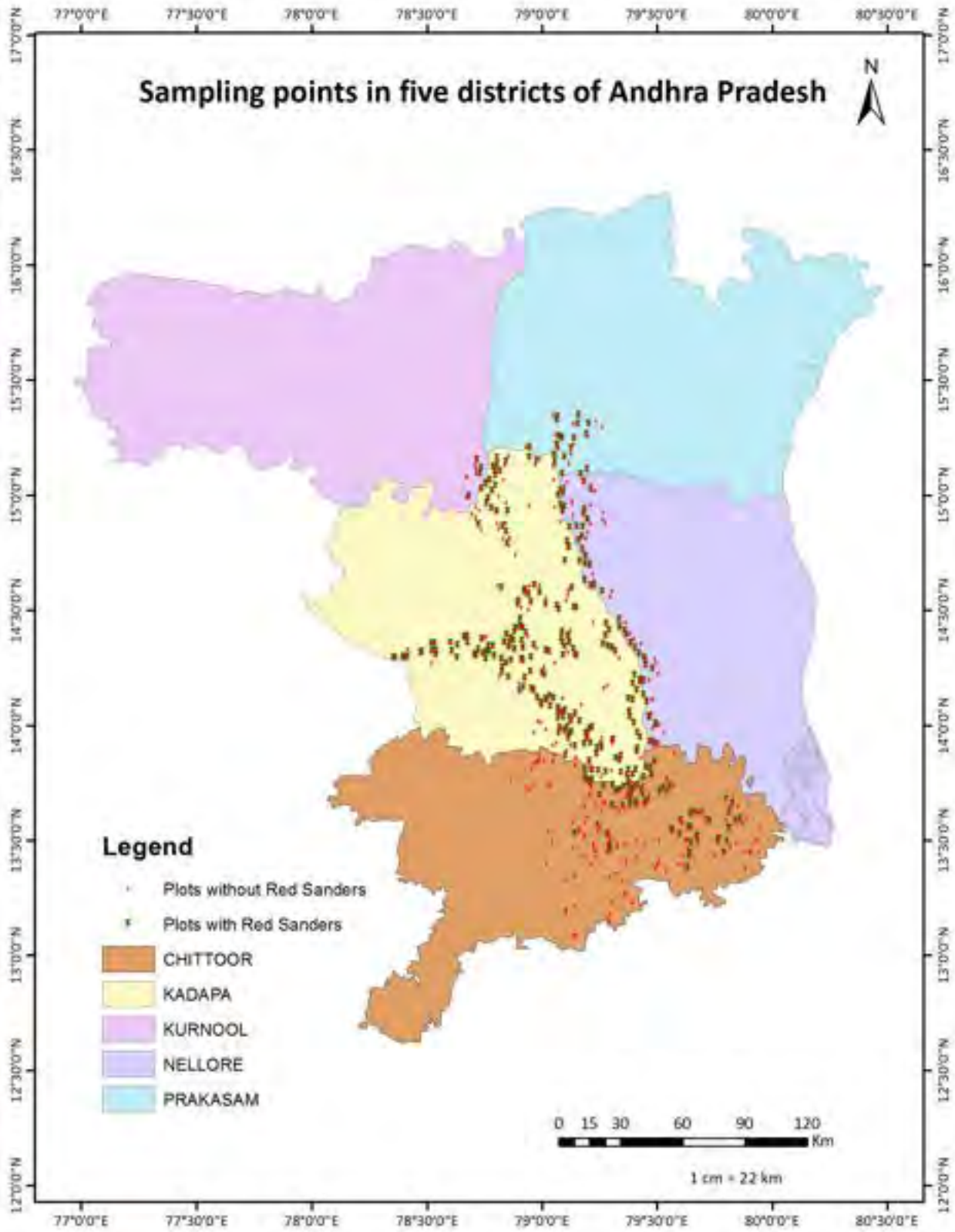
A field study was taken as part of the present NDF, the results of which are given below in terms of population structure/density and frequency.

*Abundance*: Quantitative assessment for Red Sanders was done by establishing 0.1 ha sample plots randomly in all the five districts (Kadapa, Chittoor, Nellore, Kurnool, Prakasam) of Andhra Pradesh comprising its natural range. As many as 616 sample plots (within 228 beats) within these Red Sanders forest areas were randomly covered during the study. The phyto-sociological parameters such as Relative Density (rD), Relative Dominance (rD) and Importance Value Index (IVI) were calculated following Cottom & Curtis (1956).

The major forest divisions studied (Kadapa FD, Nandyal FD, Chittoor East FD, Giddalur FD, Nellore FD, Tirupati WLMD, Proddatur FD, Rajampet FD) are depicted in Map 2.



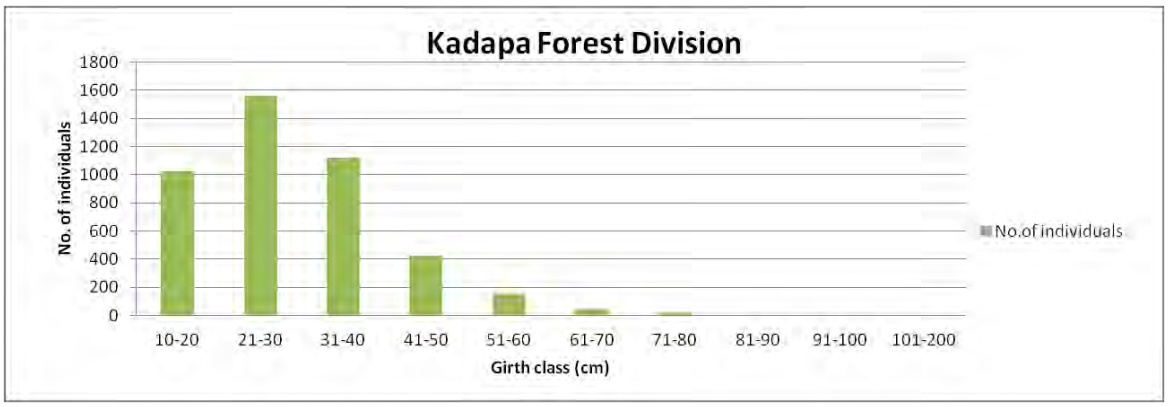

Map 2. Sampling points in the five districts of Andhra Pradesh


Sampling points in five districts of Andhra Pradesh
N
77°0'0"E
77°30'0"E
78°0'0"E
78°30'0"E
79°0'0"E
79°30'0"E
80°0'0"E
80°30'0"E
17°0'0"N
16°30'0"N
16°0'0"N
15°30'0"N
15°0'0"N
14°30'0"N
14°0'0"N
13°30'0"N
13°0'0"N
12°30'0"N
12°0'0"N
Legend
Plots without Red Sanders
Plots with Red Sanders
CHITTOOR
KADAPA
KURNOOL
NELLORE
PRAKASAM
0 15 30 60 90 120
Km
1 cm = 22 km

The resultant analytical findings/observations with respect to the individual major forest divisions studied are discussed below in brief.

***Kadapa Forest Division***

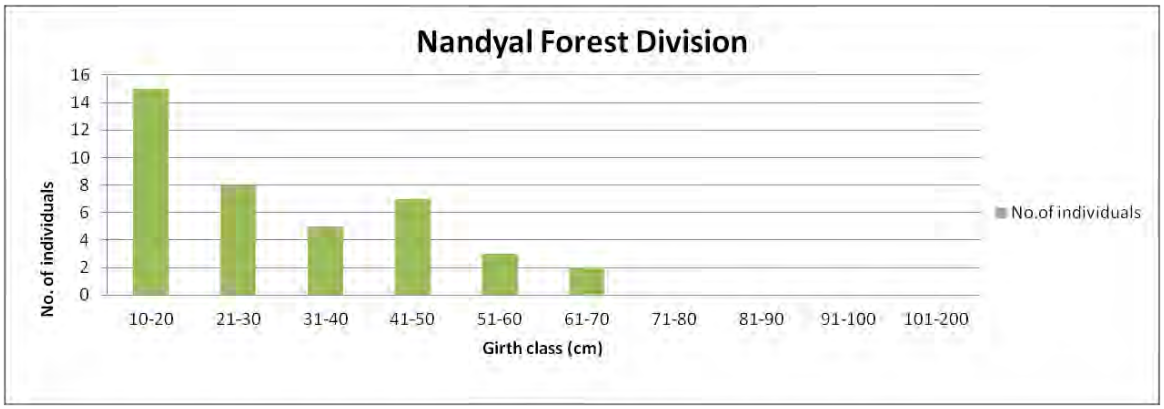
*Analysis*: Out of the 109 plots surveyed it was found that 87 plots had Red Sanders. The Red Sanders tree is the most dominant tree species in this Division, followed by *Croton scabiosus* and *Anogeissus latifolia*. It is observed that more than 94% of the Red Sanders trees are below 50 cm gbh and less than 1 % (0.7%) are above 70 cm gbh. Guvvalacheruvu West beat has some patches of pure stands of Red Sanders.




*General observations*: It is observed that the regeneration of Red Sanders in hill slope areas and plateau are very high as compared to the plain areas. Coppicing (multistem individuals) is more in Kadapa Division as compared to other forest divisions. In terms of local utilisation by the local people the leaves of Red Sanders are used as fodder in Guvvalacheruvu East Beat. On threat assessment, it was found that Gadikota, Chinntharajupalli, Dasarladoddi, Nandalur are highly threatened areas.

***Nandyal Forest Division***

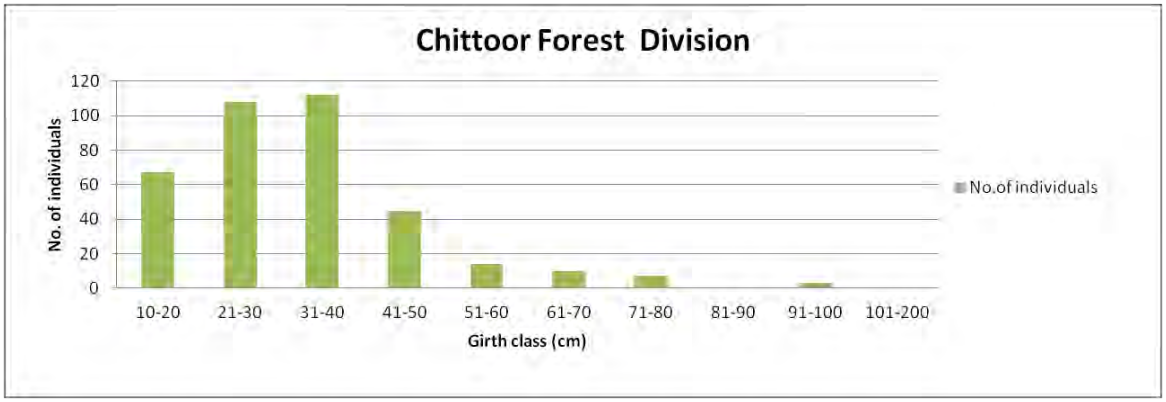
*Analysis*: Out of the 14 plots surveyed 5 plots had Red Sanders as part of their composition. The forest areas in this Division are dominated by *Anogeissus latifolia*, *Tectona grandis, Terminalia tomentosa, Chloroxylon sweitenia.* The Red Sanders tree (*Pterocarpus santalinus*) is ranked in 10$^{th}$ position based on the IVI. It is interesting to note that 87% of the Red Sanders trees are below 50 cm gbh and no trees of this species are found to be above 70 cm gbh.




*Observations*: The populations of *Pterocarpus santalinus* are scanty and distributed in small patches. In many places, *Pterocarpus santalinus* is replaced by *Pterocarpus marsupium* trees. No major threats to the species were observed, except normal threat perception for forest areas in general.

***Chittoor East Forest Division***

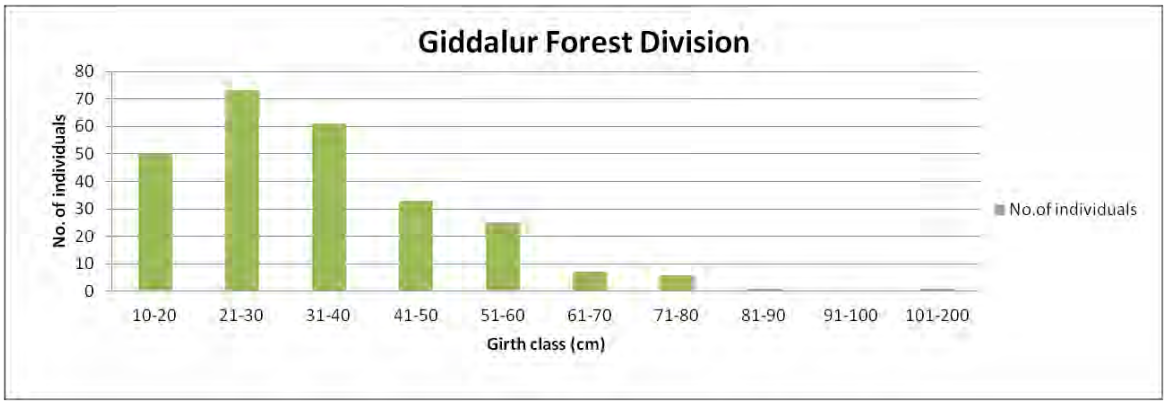
*Analysis*: It is found that out of 144 plots 33 plots bore Red Sanders. Species such as *Albizzia amara, Syzygium alternifolium, Wrightia tinctoria, Chloroxylon sweitenia* are the dominant based on the IVI. Red Sanders tree is ranked in 5$^{th}$ place in the forests of Chittoor East Division. It was found that about 90.7 % of the Red Sanders trees are below 50 cm gbh class and only 2.72 % of the trees are found to be above 70 cm gbh class.




*General observations*: Maximum forest areas are scrub jungles and Red Sanders are reported mostly from Srikalahasthi range. It was found that out of 144 sample plots studied only 33 plots in these forest areas were having Red Sanders as part of their species composition. Therefore, the Red Sanders populations are very scanty. In terms of threats, it was noted that forest fires are very frequent in these areas.

### *Giddalur Forest Division*

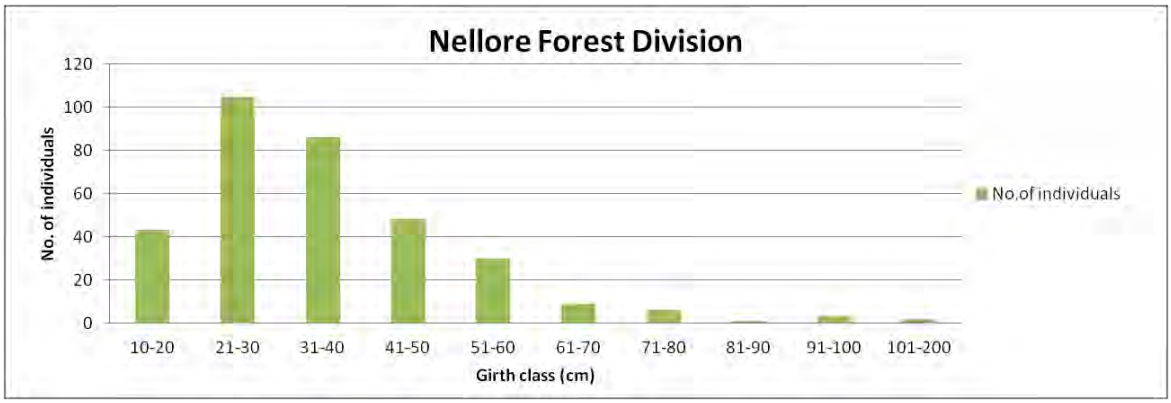
*Analysis:* Out of 27 plots studied only 15 plots were found to bear Red Sanders trees. On analysis of these Red Sanders bearing forests it is found that *Anogeissus latifolia, Chloroxylon sweitenia, Pterocarpus santalinus* are the dominant trees species in this forest division. The species *Pterocarpus santalinus* is ranked third in these forests. On girth class analysis, it is found that 84.44 % of the Red Sanders trees are below 50 cm gbh while only a small percentage (3.1 %) is above 70 cm gbh class.




*General observations*: It was noted that seedlings of Red Sanders are affected by some insects. In terms of threat perception, it was found that illegal quarrying for granite was observed in Vedullacheruvu Beat.

### *Nellore Forest Division*

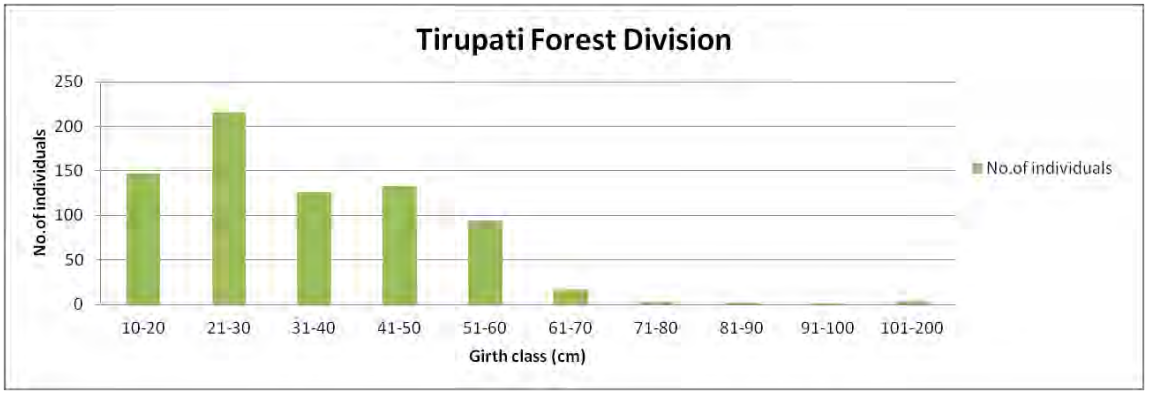
*Analysis:* On analysis, it was found that out of 82 plots studies 45 plots are having Red Sanders as part of their species composition. It was observed during the field study that *Anogeissus latifolia, Chloroxylon sweitenia, Pterocarpus santalinus* are the dominant trees species in this division. The Red Sanders is ranked 3$^{rd}$ in terms of dominance. On analysis it is found that 84.68% of Red Sanders trees are below 50 cm gbh class whereas only 3.6 % are above 70 cm gbh class.




*General observations*: Generally, Red Sanders populations are found more on the slopes areas than plains and plateaus in this Division. In terms of threat perception, it was noted that illegal felling was taking place in Udayagiri range. Forest fires are very also very frequent in these forest areas.

***Tirupati Wild Life Management Division***

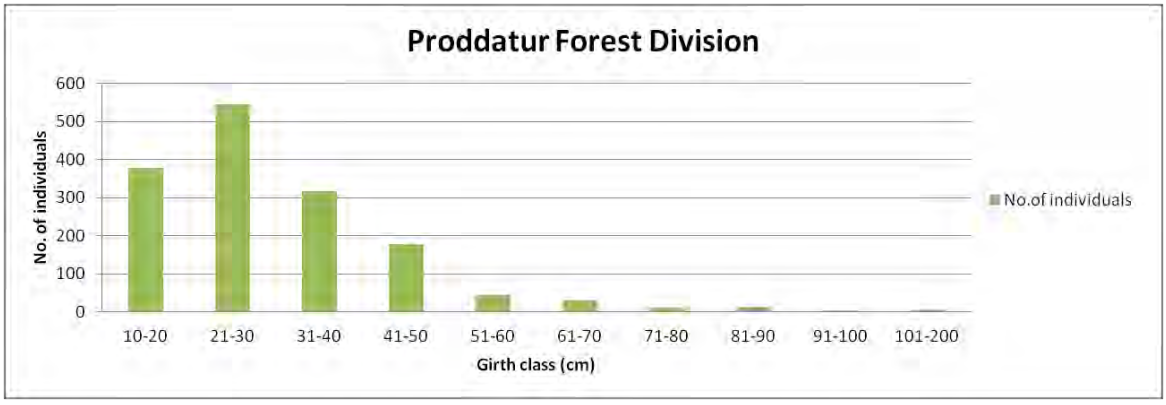
*Analysis:* Out of 79 plots studied it was found that 48 plots are bearing some Red Sanders trees. It is found that *Phoenix loureiroi, Syzygium alternifolium, Pterocarpus santalinus* and *Anogeissus latifolia* are the most dominant trees species in this forest division. On analysis, it is found that 83.62 percent of the Red Sanders trees are below 50 cm gbh and only a paltry 1.34 percent is above the 70 cm gbh class. In terms of trend along gradients, it was found that the population of Red Sanders is gradually increasing from 300-600 m and gradually decreasing after 650 m altitude. No populations of Red Sanders were recorded above 1000 m elevation.



*General observations*: In terms of threat perception, it is found that illegal felling is very common in the Ballapally range area. It was noted that most of the smugglers come in the garb of pilgrims and later enter the forest areas for smuggling. Introduction of *Acacia auriculiformis* and *Pinus* trees around the Tirumala hills are posing threat to the native species. The entire Tirumala area, with many temples in the forest areas, is subject to various anthropogenic pressures.

***Proddatur Forest Division***

*Analysis:* Out of 70 plots surveyed during this study only 41 plots were found to have Red Sanders trees. *Anogeissus latifolia, Pterocarpus santalinus, Chloroxylon sweitenia,* are the dominant trees species based on the IVI values. The Red Sanders is ranked second in terms of dominance. On analysis, it is found that 93% of the Red Sanders trees are below 50 cm gbh and only 2.22 % fall in the > 70 cm gbh class.

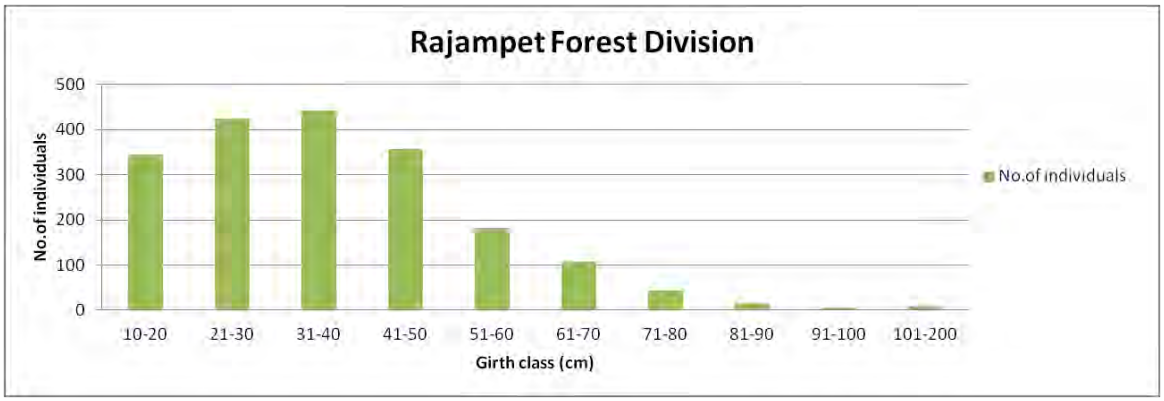



*General observations*: It was noted that a good amount of artefacts carved from Red Sanders wood were seized from this forest division. It was also observed that oxen and bullock carts are used for transporting the illegally felled Red Sanders trees in Boyanapalli Beat. In terms of local utilisation, it was noted that leaves of Red Sanders are used as fodder by the local communities.

***Rajampet Forest Division***

*Analysis:* Out of 91 plots surveyed during the present study 70 plots were found to be Red Sanders bearing. It is found that *Pterocarpus santalinus, Acacia chundra, Anogeissus latifolia and Grewia daemia* are the dominant

trees species based on the IVI values. The Red Sanders tree found to be most dominant being ranked first. On girth class analysis, it was found that 81.16% of Red Sanders trees are below 50 cm gbh and only 3.83 % are in the >70 cm gbh class.




*General observations*: The Red Sanders tree is predominant in many beats in this forest division. In terms of threat perception, it was noted that in the entire Rajampet Forest Division the smugglers are checking the quality of the wood by removing the bark; this debarking makes the tree susceptible to infections, posing a threat to the populations.

**Girth class distribution**

Analysis of the girth class distribution for the Red Sanders populations studies showed that out of the total 616 sample plots only 344 plots were Red Sanders bearing forest plots. It was generally seen that more than 72% of individuals are under 40 cm gbh class. The harvestable girth class (of > 70 cm) of Red Sanders trees were just about 2.19 percent, of which only 0.61 percent were of > 90 cm girth. The younger individuals are more in the Proddatur Forest Division (ca. 81 percent) and less in Rajampet Forest Division (c. 65%). The higher girth class trees were found to be more in Rajampeta (3.83%), Nellore (3.6%) and Giddalur (3.08%) and less in Kadapa (0.7%). The >70 cm girth class trees were totally absent in the Nandhyal Forest Division. The summary of the girth class distribution in the eight Forest Divisions bearing Red Sanders are depicted in Table 11 and Figure 3.

Table 11. Summary of girth class distribution of Red Sanders

| *Division* | *Total Plots* | *RS Plots* | *<30* | *31-40* | *41-50* | *51-60* | *61-70* | *71-80* | *81-90* | *>90* | *Total %* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Chittoor East | 144 | 33 | 47.81 | 30.60 | 12.30 | 3.83 | 2.73 | 1.91 | 0.00 | 0.82 | 100 |
| Giddalur | 27 | 15 | 47.86 | 23.74 | 12.84 | 9.73 | 2.72 | 2.33 | 0.39 | 0.39 | 100 |
| Kadapa | 109 | 87 | 59.28 | 25.61 | 9.73 | 3.53 | 1.15 | 0.48 | 0.11 | 0.11 | 100 |
| Nandyal | 14 | 5 | 57.50 | 12.50 | 17.50 | 7.50 | 5.00 | 0.00 | 0.00 | 0.00 | 100 |
| Nellore | 82 | 45 | 44.44 | 25.83 | 14.41 | 9.01 | 2.70 | 1.80 | 0.30 | 1.50 | 100 |
| Proddatur | 70 | 41 | 60.54 | 20.81 | 11.65 | 2.81 | 1.96 | 0.72 | 0.85 | 0.65 | 100 |
| Rajampet | 91 | 70 | 39.80 | 22.93 | 18.43 | 9.47 | 5.54 | 2.28 | 0.83 | 0.72 | 100 |
| WLM Tirupati | 79 | 48 | 48.72 | 17.05 | 17.85 | 12.62 | 2.42 | 0.40 | 0.27 | 0.67 | 100 |
| Total | 616 | 344 | 50.74 | 22.38 | 14.33 | 7.31 | 3.02 | 1.24 | 0.34 | 0.61 | 100 |

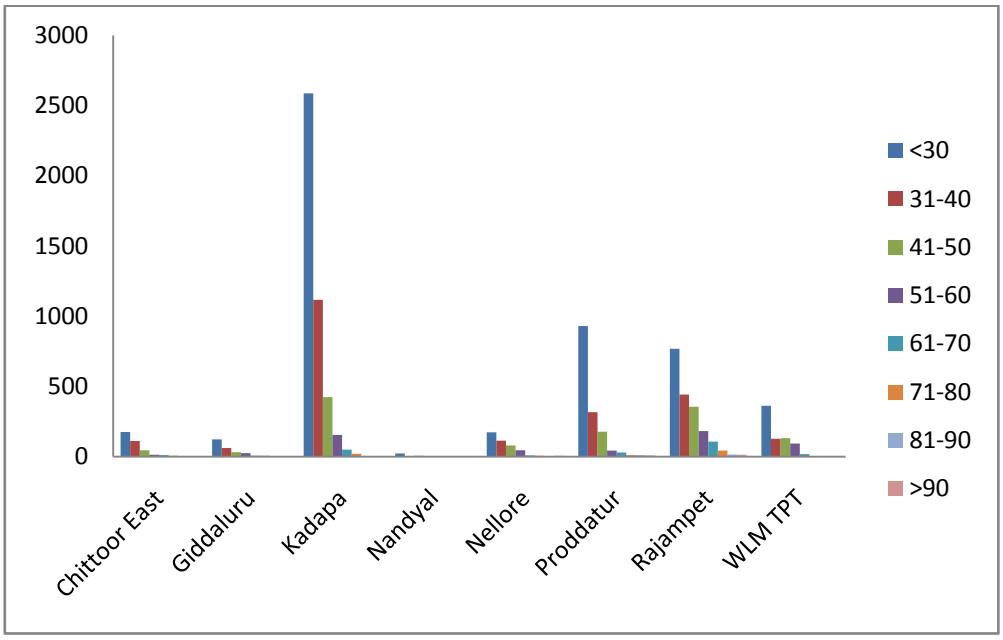



Figure 3. Girth class distribution of Red Sanders in the eight forest divisions of Andhra Pradesh

**Stratum-wise distribution**

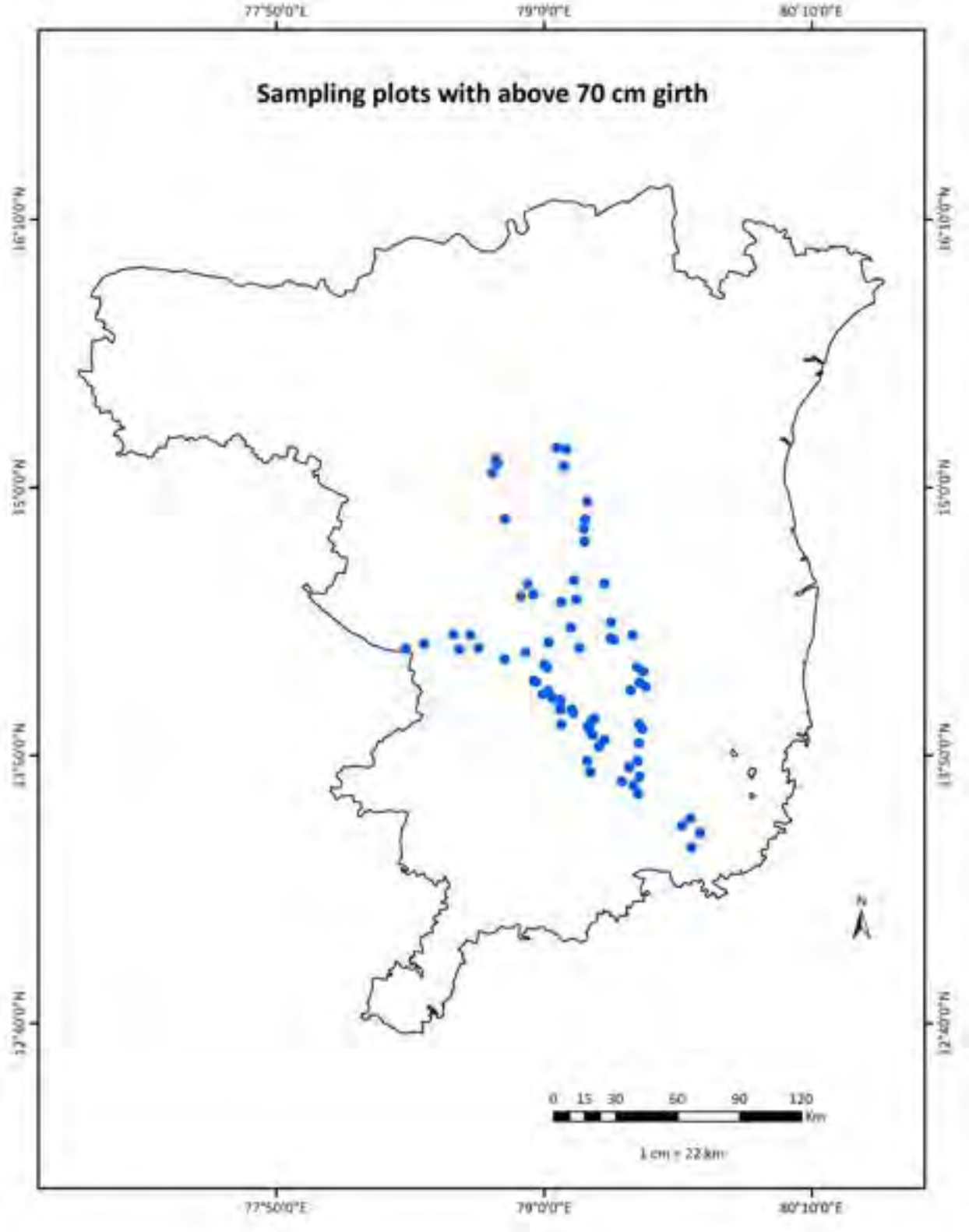
As part of this NDF study field survey was conducted in 30 forest ranges covering 228 beats in the five forest divisions of Andhra Pradesh. Out of these Red Sanders populations were recorded only in 27 ranges and 173 forest beats.

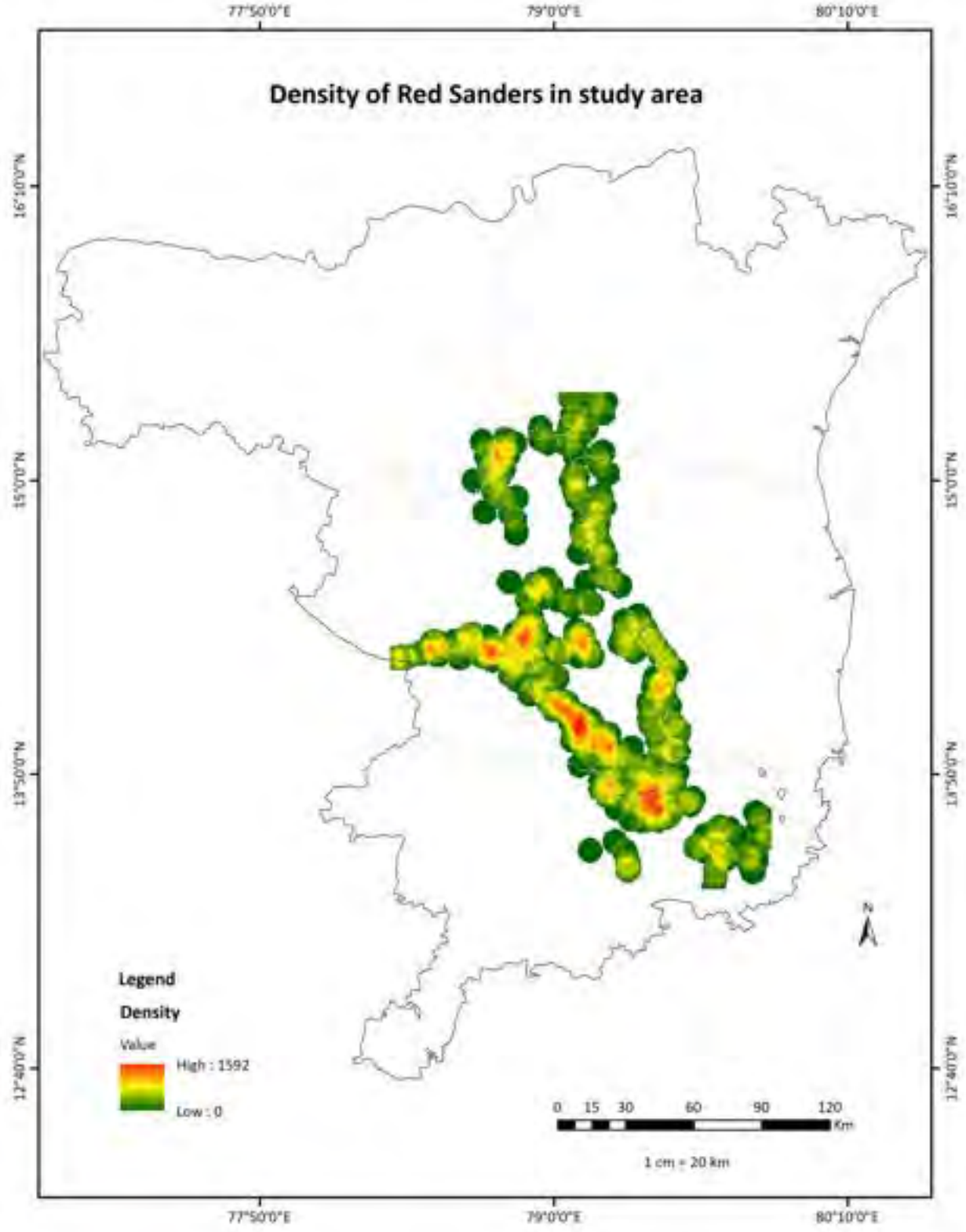
The stratum-wise analysis of the present study reveals that populations of Red Sanders are more in the plateau areas (48%) followed by the slope areas (43%). Although in general Red Sanders are predominantly found in the slopes, the

obvious reason for the marginally out of true distribution derived in this study is that the sampled plots were mostly laid in the plateau areas (Kadapa and Rajampet areas). The distribution of Red Sanders is mostly governed by elevation; it grows best in the optimum elevation range of 300-600 m. In Tirupati hills, for example, the plateau areas did not harbour many trees of Red Sanders as the areas are at elevations above 700 m. The distribution of Red Sanders was found to be very low in the plains, sometimes even negligible. The sample points laid in the plains of Giddalur, Kadapa and Nandyal showed a total absence of Red Sanders trees. The stratum-wise distribution of Red Sanders tree is summarised in Table 12.

Table 12. Summary of stratum-wise distribution of Red Sanders

| *S. No.* | *Name of the Forest Division* | *Total No. of Ranges* | | | *Total No. of Beats* | | | *No. of sampling plots* | | | *Stratum-wise RS population (%)* | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *Total* | *Non-RS* | *RS* | *Total* | *Non-RS* | *RS* | *Total* | *Non-RS* | *RS* | *Plain* | *Slope* | *Plateau* | *Total* |
| 1 | Chittoor East | 7 | 3 | 4 | 65 | 42 | 23 | 144 | 111 | 33 | 2.22 | 40.63 | 57.14 | 100 |
| 2 | Giddalur | 2 | 0 | 2 | 9 | 0 | 9 | 27 | 12 | 15 | 0.00 | 45.81 | 54.19 | 100 |
| 3 | Kadapa | 5 | 0 | 5 | 38 | 1 | 37 | 109 | 22 | 87 | 12.26 | 43.94 | 43.80 | 100 |
| 4 | Nandyal | 1 | 0 | 1 | 6 | 2 | 4 | 14 | 9 | 5 | 0.00 | 41.67 | 58.33 | 100 |
| 5 | Nellore | 4 | 0 | 4 | 28 | 0 | 28 | 82 | 37 | 45 | 0.00 | 50.99 | 49.01 | 100 |
| 6 | Proddatur | 4 | 0 | 4 | 22 | 2 | 20 | 70 | 29 | 41 | 2.41 | 59.94 | 37.34 | 100 |
| 7 | Rajampet | 4 | 0 | 4 | 32 | 4 | 28 | 91 | 21 | 70 | 24.81 | 33.19 | 42.00 | 100 |
| 8 | WLM Tirupati | 3 | 0 | 3 | 28 | 4 | 24 | 79 | 31 | 48 | 14.80 | 36.90 | 48.30 | 100 |
| | | 30 | 3 | 27 | 228 | 55 | 173 | 616 | 272 | 344 | 7.06 | 43.76 | 48.76 | 100 |


Sampling plots with above 70 cm girth
77°50'0"E
79°0'0"E
80°10'0"E
0 15 30 60 90 120
Km
1 cm = 22 km


Density of Red Sanders in study area
77°50'0"E
79°0'0"E
80°10'0"E
16°10'0"N
15°0'0"N
13°50'0"N
12°40'0"N
Legend
Density
Value
High : 1592
Low : 0
0 15 30 60 90 120
Km
1 cm = 20 km
N

**NOTE:** It may be noted that the Andhra Pradesh Forest Department (APFD) has completed a quantitative study by establishing the 0.1 ha in three strata viz., Hills (above 30° slope above or below 300m elevation), Plain area (below 30° slope and below 300m elevation) and Plateau area (below 30° slope and above 300m elevation) randomly in Red Sanders bearing forest divisions (APFD, 2015). As the NDF required an independent study a fresh field study was conducted for the purpose. Owing to this reason the present BSI study has not taken the APFD enumeration details/inventory into consideration as it was planned to be an independent one with primary data for the purpose of developing an unbiased NDF for Red Sanders.

### 5.4. Habitat specificity and vulnerability

**Risk severity: High**

***Habitat specificity***: The Red Sanders is known to effectively utilise the micro-habitats on the dry hill slopes (Raju & Nagaraju, 1999). The Red Sanders tree is almost niche-specific in terms of the geology of the area in which it prefers to grow; it is found in areas with quartzite and shale, indicating a geo-botanical response to these stratigraphic/geological formations along the Kadapa-Nellore-Chittoor range of the Eastern Ghats. A study has found that almost 80 percent of naturally growing Red Sanders occurs in rocky outcrops comprising quartzite with the remaining in areas having shale (Raju & Nagaraju, 1999). Of the various rock formations investigated, areas with quartzites, which contain high levels of potassium, were found more suitable for Red Sanders of good quality. In another interesting study (Raju & Raju, 2000) it was seen that the heartwood of *Pterocarpus santalinus* accumulated larger quantities of uranium and thorium in comparison to *Pterocarpus dalbergioides* and *Pterocarpus marsupium*.

***Vulnerability***: Owing to the fact that the Red Sanders has been subject to historical illegal felling/extraction from the wild for illicit trade, which continues to this day, the wild populations are continuously declining rapidly. The species is also vulnerable to various other factors, including ecological/biological factors.

*Vulnerability to disturbance regime*: Selective felling of *Pterocarpus santalinus* is the direct result of its high demand in the international market. Selective felling/over-exploitation of a single species alters its regeneration potential and affects the population structure in its entirety (Bharali et al., 2013). A study on the tree diversity structure of a dry deciduous area in Sri Lankamalla sanctuary in southern Eastern Ghats (Mastan et al., 2016) revealed that the population structure of *Pterocarpus santalinus* has a high abundance of individuals in the lower girth class owing to its regeneration potential, adaptation to local conditions and also due to selective logging of the higher girth class trees.

To specifically evaluate the impacts of a disturbance regime on the population structure of Red Sanders a study was undertaken by Ankalaiah et al. (2017); the study assessed the impacts of logging and other threats on this endemic tree species. The study assessed the impacts on three selected sites (Guvvalacheruvu, Vangimalla and Gadala) in the Kadapa hill ranges taking into account the life forms of Red Sanders under development (seedlings, saplings, regenerating trees and fully mature trees) with reference to various disturbance regimes, selective logging being considered as the primary threat. The results showed variations in the distribution of gbh class and population structure of Red Sanders; trees and seedlings were observed to be the major life forms. Sapling distribution showed high variation as major thinning apparently occurred in the progression from the seedling stage to fully established maturity stages. Among the three study sites, the moderately disturbed site showed high density of individuals of all life forms and basal area value. In the relatively less disturbed site all the three life forms, except for regenerating trees, scored a second place, while in the highly disturbed site regenerating trees scored a second position and all other life forms had lesser number of individuals. The gbh class-wide distribution in the highly disturbed site showed reverse 'J' shaped curve with most individuals occurring in the lower girth classes of 10-30 cm (52%) and 31-50 cm (42%). Significantly, in the study of Ankalaiah et al. (2017) the highly disturbed study site lacked large girth class trees, i.e., reproductively fit mature individuals, while, surprisingly, a high percentage of cut stems and non-reverse 'J' shape population occurred in less disturbed site. The study indicated that selective logging is the major

factor that influenced the variation of population structure, stem density and basal area. The study concluded that selective felling of Red Sanders can be a major factor for abnormal size-class distribution and total lack of mature trees is owing to past and present indiscriminate and rampant illicit felling of the tree species.

*Biological vulnerability*: The pollination ecology is also said to be vulnerable to the hot/arid climatic conditions that prevail in the region. The Red Sanders tree is known to suffer from low fruit (ca. 6 percent) set and hence poor regeneration. The natural fruit set occurs as a result of pollinator activity in the moonlit nights; the severely hot winds prevent the pollinators, rock bee (*Apis dorsata*) and carpenter bee (*Apis xylo-copa*), from visiting the flowers/forage for nectar during daytime only. The blooming phenology and pollination mechanism in Red Sanders have been dealt with in detail by Rao et al. (2001) and Rao & Raju (2002). In conditions when the pollinators are scarce, self-compatibility through geitonogamy remains the only option for seed production; this is a biological strategy to produce seeds in adverse conditions of resource scarcity including pollinators. However, cross-pollination mainly occurs showing that facultative xenogamous breeding system prevails in Red Sanders.

Compared to the high flower production, with the phenomena of intermittent mass blooming, the natural fruit production/set is very low, owing to the large scale abortions, with xenogamous fruits developing to maturity and autogamous and geitonogamous fruits dropping off. This suggests that the species has not evolved any strategy to increase fruit set through geitonogamy (Rao et al., 2001). The factors for low fruit set could mainly be the limiting climatic factors during seeding and progressive purging of poor seeds from self-pollination, less probability of out-crossing, due to limitations of population size and availability of pollinator. Lower fruit production due to selective abortions may be attributed to the limitation of resources (Bawa & Webb, 1984). Therefore, in the future, the populations of the species may decline further and it is also predicted to suffer from genetic erosion and inbreeding depression due to relatively small remaining populations (Arunakumara et al., 2011). Clearly, population size is critical for the survival of the species.

*Vulnerability to repeated forest fires:* The Red Sanders seedlings are adversely affected by the repeated forest fires in the early developmental stages, despite their characteristic die-back quality. The repeated forest fires also have a continuous scorching effect throughout the tree's life (Hole, 1913), posing a potential and constant threat. Interestingly, seed germination, seedling height and root collar diameter were notably encouraged by fire (Kukrety et al., 2013); but this is applicable when seedlings are subjected to forest fire on one or two instances only. In tropical dry forests survival of seedlings is said to be influenced by various abiotic and/or anthropogenic factors and a majority of the plant populations show greater reduction in the seedling stage (Khurana & Singh, 2001). Therefore, the Red Sanders is also prone to exhibit a higher degree of thinning during the seedling to maturity phases owing to factors such as repeated forest fires to which its natural area is very susceptible.

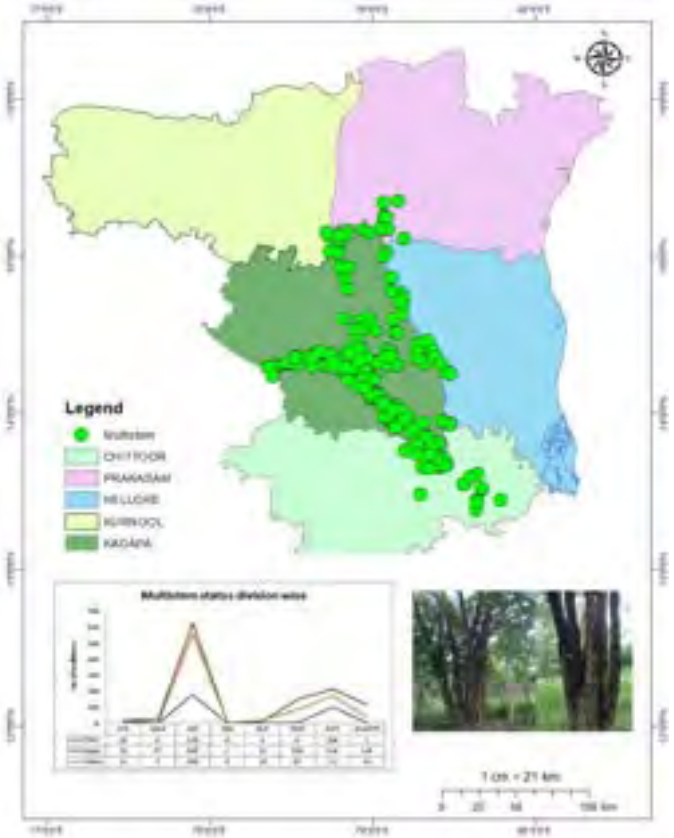
**5.5 Resilience of tree species**

The Red Sanders tree has survived rampant exploitation since the sixteenth century owing to its regeneration potential and immense capacity for coppicing. It would not, therefore, not be wrong to say that this resilience has helped the species survive so far despite sustained exploitation over the decades.

***Regeneration***: Under conducive edaphic conditions the natural regeneration in Red Sanders tree is fairly good; with good loose soil containing adequate moisture, seeds sprout well provided they are safeguarded from intensive browsing pressure and recurring fires. Characteristically, a die-back feature is observed until the roots of seedlings develop a thick enough root to be able to sprout a vigorous shoot capable of withstanding drought conditions. Seedlings attain a height of about 10-15 cm with a long tap root system by the end of the first season (Luna, 2005). The regeneration potential of the species has helped the species survive and re-establish fresh populations.

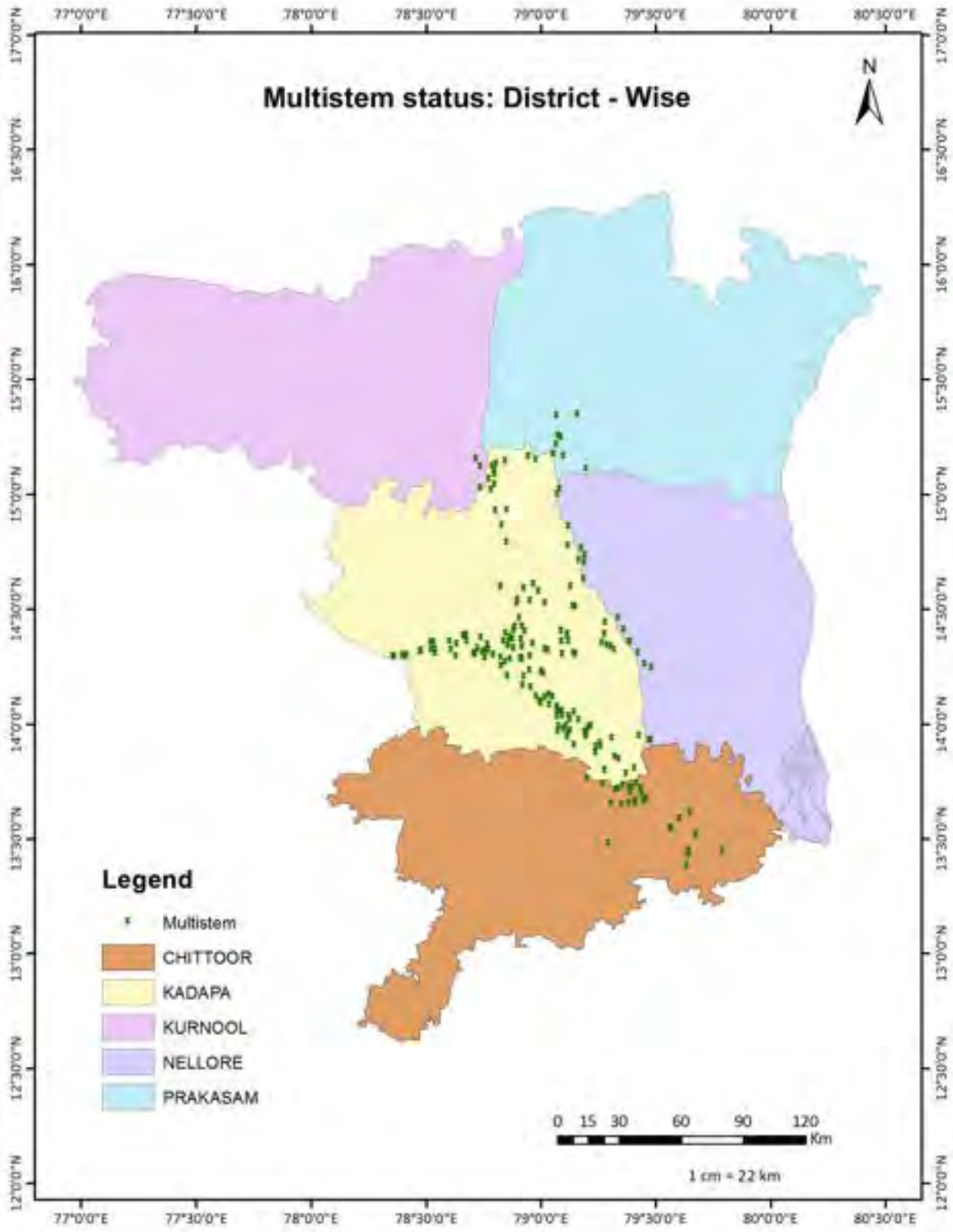
***Coppicing***: In the present study coppicing was found to be intense in Kadapa, Rajampet, Proddatur and WLM Tirupati (in the same order) indicating prevalence of continuous illegal felling practices in these areas (Map 3). In the

context of stratum-wise analysis it is found that maximum coppicing is in the slope areas followed by plateau, with a bare minimum in the plains, indicating greater resilience in slope areas.




Map 3. Areas with coppicing in Red Sanders bearing forests

During the random sampling done in the fieldwork for the NDF study it was observed that the Red Sanders forests areas were dotted with small to large areas having coppices/multi-stems indicating past as well as present Illicit felling of Red Sanders trees. These gap areas were mostly without mature individuals, a reflection of the fact that Red Sanders trees were being systematically lopped off in the forest areas, particularly in the Kadapa-Rajampet-Tirupati-Proddatur-Nellore ranges. Fresh felling was observed mostly in Tirupati and Udayagiri range of Nellore District indicating that smugglers were presently targeting the species in these areas. It was also seen that the selection for felling was based on age/girth class and the trees were selectively and randomly felled leaving a mix of mature and young trees in certain forest areas. The specific areas where first-hand observations were made in the eight forest divisions of Andhra Pradesh are given below:


Multistem status: District - Wise
N
77°0'0"E
77°30'0"E
78°0'0"E
78°30'0"E
79°0'0"E
79°30'0"E
80°0'0"E
80°30'0"E
17°0'0"N
16°30'0"N
16°0'0"N
15°30'0"N
15°0'0"N
14°30'0"N
14°0'0"N
13°30'0"N
13°0'0"N
12°30'0"N
12°0'0"N
Legend
Multistem
CHITTOOR
KADAPA
KURNOOL
NELLORE
PRAKASAM
0 15 30 60 90 120
Km
1 cm = 22 km

*Kadapa Division:* Vampalli Range (Bonagundicheruvu) Kadapa Range (Rasoolpalli, Ippapenta, Guvvalacheruvu East), Vontimitta Range (Nandalur, Dasarladoddi, Chintarajupalli, Mantapampalli, Patur).

*Giddalur Division:* Singasanipalli, Ambavaram

*Nandyal Division:* Utla and Peddavangli

*Rajampet Division:* Rajampet Range (Annasagar, Annasamudram, Aramanipenta, Rollamadugu, Thummalabailu, Vattalur), Sanipaya Range (Jandrapenta), Kodur Range (K.V. Bhavi North and South), Chitvel Range (Chukkavaripally, Kondur).

*Proddatur Division:* Proddatur Range (Boyanapalle), Badvel Range (Gangireddipally), Porumamilla Range (Jyothi and Thaduku).

*Nellore Division:* Udayagiri Range (Gudigunta), Atmakur Range (Venkatapuram), Rapur Range (Koturpalle, Rajupalem).

*Chittoor East Division:* Puttur Range (Vadamalpet), Srikalahasti Range (Katur and Ramapuram), Satyavedu Range (S K Madugu), Tirupati Range (Chellur).

*Tirupati Division:* Balapalli Range (Sailendrakona, Papanasanam, Mogilipenta, Kangimadugu, Balapalli West, Papavinasanam), Chamala Range (Talakona South, Nagapatla West), Tirupati Range (Krishnapuram, Karakambadi, Mamandur South, TN Palem).

Without any doubt, it can be said that the characteristic regeneration potential and the coppicing capacity of the Red Sanders have contributed immensely to the resilience of the species and helped it survive so far despite wanton exploitation over the years.

## Intrinsic Biological Risks

Hulikere Beat, Mandya Division Range, Karnataka

Ambavaram Beat, Giddalur Division, Andhra Pradesh

Proddatur Division, Andhra Pradesh

# Intrinsic Biological Risks

Kondavelagada, Nellimarla Mandal, Vizianagaram Division

Kondavelagada, Nellimarla Mandal, Vizianagaram Division

Kondakarakam, Nellimarla Mandal, Vizianagaram Division

# Regeneration

Vallimalai RF & Beat, Santhavasal Range, Tiruvannamalai Division, Tamil Nadu

# Coppicing in Red Sanders

Kodur Range, Rajampet Division

Papavinasanam Beat, Thirupati Division

## STEP 6: EVALUATE IMPACTS OF WILD HARVEST

### 6.1. Impact of harvest on target populations

**Severity of wild harvest: High**

As has been mentioned in the earlier step that illegal felling is the single major threat to which the Red Sanders is subjected, and this certainly has had an adverse impact on the wild populations of the species. It must be acknowledged that illicit selective logging of Red Sanders is the direct result of its high demand in international market. The selective logging/harvest of Red Sanders can be seen across its entire natural range in the State of Andhra Pradesh, with its regeneration potential and, in effect, changes in its population structure. A recent study (Ankalaiah et al., 2017) assessed the impacts of harvest on Red Sanders on some selected sites in the natural range of the species in context of selective logging along with other threat factors. The significant finding was that the highly disturbed areas lacked large girth class trees, i.e., reproductively fit mature individuals, while, surprisingly, high percentage of cut stems and non-reverse 'J' shape population occurred in less disturbed site. This indicated that selective logging is the major factor that influenced the variation of population structure, stem density and basal area. It was concluded that selective felling of Red Sanders can be a major factor for abnormal size-class distribution and total the lack of mature trees in some areas is owing to indiscriminate and rampant illicit felling of the tree species.

Girth class analysis made through the present study indicates that the impact of illicit harvest of Red Sanders is of medium to high severity across the natural range of the species (Ref. Step 5).

The exploitation of Red Sanders by smugglers is inordinately high, impacting natural populations. Although the seedling recruitment/establishment and regeneration is fairly good, the rate of depletion of natural populations of Red Sanders is a cause for concern.

### 6.2. Impact of harvest on national population

**Severity of wild harvest: High**

The species is endemic to the Seshachalam-Veligonda hill ranges and Palakonda-Lankamala-Nallamala hill ranges of the Eastern Ghats of Andhra

Pradesh and as the wild populations are confined to this narrow range, the national populations are subject to considerable risk in view of the fact that illicit harvest from the wild is rampant in its natural range. It would only be a matter of time for the natural/national populations to become depleted, if protection measures are not properly implemented and the illicit trade fully controlled.

*Cultivated source:* The single best option for reducing the pressure on the wild populations is to go in for large-scale cultivation programmes. The State Governments of Andhra Pradesh, Tamil Nadu, Telangana and Karnataka are doing a yeoman service in this direction by encouraging farmers to cultivate Red Sanders in their private lands.

From a commercial standpoint planting Red Sanders may not be very viable in terms of quick returns/gains. In cultivated stocks the slow growth of Red Sanders or the long gestation period leads to long rotation period slowing the economic returns for wood farmers.

### 6.3. Impact of harvest on other similar species

**Severity of wild harvest on similar species: Low**

The only other species of *Pterocarpus* in the peninsular India is *P. marsupium*, commercially known as 'Beejasal' in trade, which is exploited for its use in medicine and timber and as source of 'Kino gum', a resinous exudate. However, the timber is not as much sought after as Red Sanders. *P. marsupium* is found in the dry deciduous mixed forests of India south of the Himalaya, being more abundant in the states of Gujarat, Madhya Pradesh, Chhattisgarh, Bihar and Odisha. Therefore, the impact of harvest of *P. santalinus* does not have any direct bearing on the other species, *P. marsupium,* which has its own trade value/importance in international market. The other species of the genus in India are *P. dalbergioides* (endemic to Andaman-Nicobar islands), *P. indicus* and *P. macrocarpus*, all of which are of use as timber and in medicine, but their demand is exclusive from that of *P. santalinus.*

**Confiscated Red Sanders logs at Porumamilla Range, Proddatur Division**

## STEP 7: EVALUATE IMPACTS OF TRADE

### What is the impact of legal and illegal trade on the national populations of the species concerned?

*Background*: The Red Sanders is said to be in trade since the sixteenth century; it was initially being exported to the European countries as a source of natural dye, which subsequently diminished as the artificial dyes made their way into the market stream. The Dutch traders were also known to have exported huge quantities of wood. Export of Red Sanders to Europe continued in the seventeenth century primarily for dye, although there was some demand for wood as well. Exports averaged about 3000 tonnes annually around 1880; the primary demand was by the United Kingdom. Export of Red Sanders as a textile dye effectively diminished with the advent of synthetic/artificial dyes. The value of Red Sanders wood began to shoot up again in the international market when the Japanese approached the Forest Department of Andhra Pradesh for wood. The history of utilisation/trade of Red Sanders wood has been recorded in detail (Reddy, 1972). As per records (Gamble, 1902), during the five years ending in 1882-83 about 12,782 tonnes of Red Sanders was exported to UK, 1116 tonnes to France and 1687 tonnes to other Indian and Sri Lankan ports. During 1882-1901 Red Sanders wood was extracted by contractors without any restrictions as to the localities from which it was to be procured. As per earlier records, the Andhra Pradesh Forest Department (APFD) has sold about 1400 MTs of Red Sanders; the sale was effected at the rate of Rs. 1,20,000 per MT (APFD 2005). Subsequently, 2002 MT of Red Sanders wood was auctioned in 2008; the bid rate was Rs. 2.5 to Rs 7 lakhs per MT (GoAP, 2009) for different grades of wood, averaging Rs. 4 lakhs per MT. Over the years the value of traded Red Sanders wood increased to US $ 150,000 per Cubic Metre (Wenbin & Xiufang, 2013) and at present it is said to be worth around Rs. 40 lakhs (ca. US $ 58040) per tonne.

At present, the legal trade is mostly from seized/confiscated source which is sold by e-auction, mostly through the State Forest Departments of Andhra Pradesh, Karnataka, and Tamil Nadu. The State Forest Departments are the authorised agencies for effecting sale/export from seized/confiscated source.

The details of trade as per the CITES Trade Database are given at Table 13 and depicted in Figure 4.

Table 13. Trade of Red Sanders from 2010-2017

| *Year* | *2010* | *2011* | *2012* | *2013* | *2014* | *2015* | *2016* | *2017* |
|---|---|---|---|---|---|---|---|---|
| Exports in MT | 69.1 | 32.3 | 5.4 | 5.4 | 752.2 | 288.4 | 727.2 | 15859.9 |

*Source*: CITES Trade Database

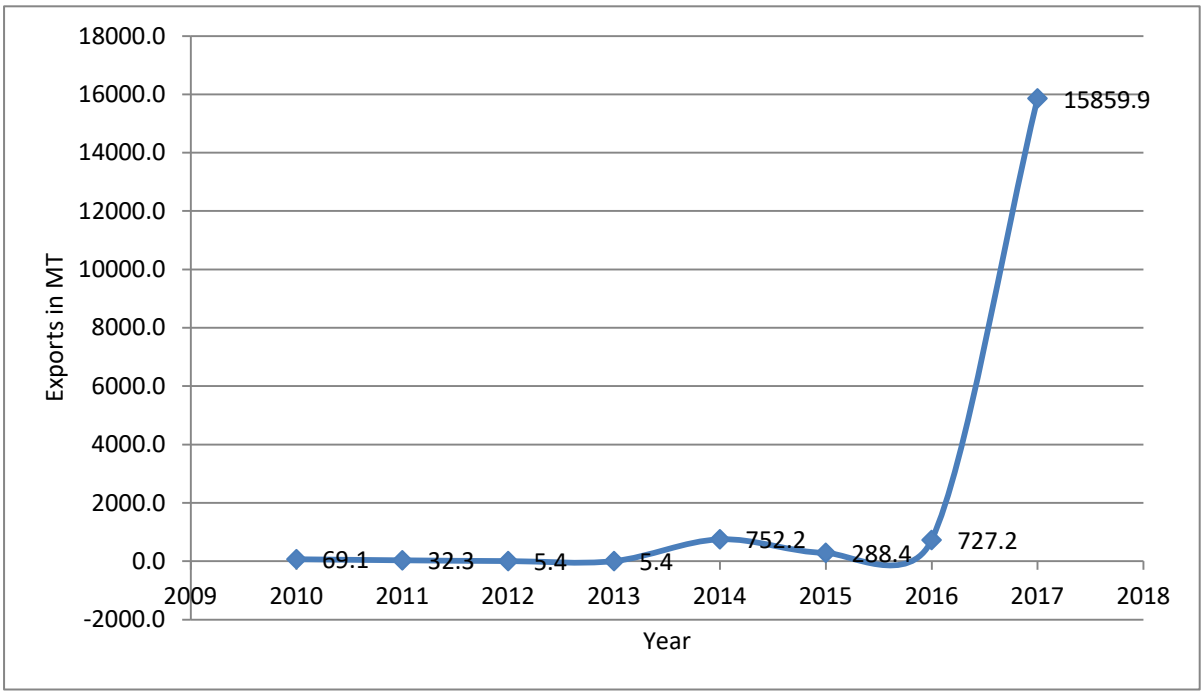



Figure 4. Trade in Red Sanders based on CITES Trade Database

The steep rise in the sale of Red Sanders is owing to the one-time permit/ national quota accorded by the CITES Secretariat during 2014-2015 for sale of 9,090.09 MT of seized/confiscated wood; the revenue accrued by the state of Andhra Pradesh from the sale of Red Sanders wood from its quota of 8498 MTs during the current period (2018-2019) is Rs. 251.82 crores (APFD, 2019). The yearly quota permitted for India from Source A from the year 2012 onwards is 310 MT. The quantum of trade include Red Sanders logs/timber, chips, powder, extracts, sawn wood and carvings (artifacts); the source is mostly from 'unknown origin'/'India', which would apparently be seized specimens. The quantum of pre-convention specimens amount to about 5,900 MT.

No quantitative studies on the impacts of the legal/illegal trade on the natural populations are available. However, the previous NDF as well as the present

study clearly point out that the illegal felling is at the cost of natural populations.

### 7.1. Trade level in relation to harvest area production

The trade level from wild populations, particularly for girth classes above 40-50 cm is quite high. However, detailed information is not available owing to poor documentation process and lack of proper monitoring mechanism. In context of private plantations, it is seen that trade level from cultivated stock is not much at present. The private plantations in Andhra Pradesh and Tamil Nadu are rather young and would need some three to four decades to reach harvestable size.

### 7.2. Magnitude and trend in national legal trade

The Red Sanders tree is in great demand in the international market owing to its multiple use in medicine, turnery, furniture making, handicraft making, etc. The heartwood is highly priced in the international market. The countries to which Red Sanders (in various forma such as handicrafts, powder/chips, musical instruments, etc.) is exported are: Japan, Hong Kong, Malaysia, China, Taiwan, Singapore, Indonesia, Korea, UAE, Oman, Pakistan, Bangladesh, Saudi Arabia, France, Germany, UK, Spain, Switzerland, USA, Canada, Madagascar, Russia, etc. Those engaged in export of this resource are required to obtain an export license, for which a certificate of origin, with details of quantity and date of procurement, needs to be obtained from the office of the PCCF of State from which the Red Sanders has been sourced. Stock verification is done by an official from the office of the PCCF. The trade data on Red Sanders from the year 2010 to 2017 is indicative of the high level of trade of this species.

### 7.3. Magnitude of illegal trade

**Magnitude of illegal trade**: **High**

It is clear that legal trade is much very limited as compared to the illicit trade that is rampant in context to Red Sanders. The numerous seizures of Red Sanders wood from various states (through which the logs are transited) in India as well as other countries bear testimony to the fact that illegal felling from the wild is wanton and trade unabated. The details of seizures of Red Sanders from 2002 onwards are given below (Table 14).

Table 14**.** Details of criminal cases booked in relation to Red Sanders (2002 to 2018)

| *Year* | *No. of cases recorded* | *Red Sanders wood seized (in MT)* | *Number of vehicles seized* | *No. of persons arrested* |
|---|---|---|---|---|
| 2002-03 | 183 | 187.72 | 42 | 39 |
| 2003-04 | 481 | 719.09 | 122 | 320 |
| 2004-05 | 269 | 323.93 | 118 | 310 |
| 2005-06 | 458 | 623.99 | 199 | 319 |
| 2006-07 | 728 | 1028.89 | 393 | 378 |
| 2007-08 | 890 | 1438.84 | 304 | 819 |
| 2008-09 | 668 | 797.66 | 223 | 433 |
| 2009-10 | 880 | 922.07 | 384 | 630 |
| 2010-11 | 1373 | 1250.21 | 772 | 1391 |
| 2011-12 | 1346 | 1437.18 | 985 | 2658 |
| 2012-13 | 1488 | 1389.58 | 1002 | 3139 |
| 2013-14 | 2038 | 188.21 | 1366 | 4243 |
| 2014-15 | 1353 | 886.59 | 971 | 3831 |
| 2015-16 | 752 | 353.48 | 474 | 2586 |
| 2016-17 | 630 | 309 | 486 | 2384 |
| 2017-18 | 373 | 155.018 | 312 | 1973 |
| Total: | 14132 | 13734 | 8553 | 25387 |

*Source*: APFD

The high demand of Red Sanders in international market is the main cause of illegal felling and smuggling. The overexploitation of Red Sanders tree from the wild over decades without any commensurate replenishment in the wild has remained the major threat to the species leading to its continued depletion (Ahmedullah & Nayar, 1984). Despite many protection measures being put in place by the State Forest Departments there is no containment of the rampant smuggling/illicit trade whatsoever, due to which the threat perception for the species is much more now than it was earlier.

In the recent years illegal felling and smuggling of Red Sanders has increased many folds and the off take is being illegally exported to many countries threatening the survival of the natural populations in the wild.

It is clear that illegal felling/smuggling/trade continues unabated as evidenced by the news reports in the media with singular regularity.

Owing to its exorbitant rate, the demand for Red Sanders in international market has made a quantum leap which has given rise to heavy illegal felling in the natural forests. The illegal activities relating to Red Sanders in Chittoor were documented in context to the protection measures (Bhagyaraj, 2017).

The magnitude of illegal trade mostly remains unrecorded as documentation is possible only after seizures take place and are recorded through the administrative procedures/process of the concerned state. It is expected that only about 30 percent of illegal trade is recorded through seizures.

*Review of confiscated/seized stock*

Confiscated stocks of Red Sanders are in custody of the state forest departments of Andhra Pradesh, Manipur, Maharashtra, Karnataka, Telangana and Tamil Nadu. Some stocks are also in the custody of customs house (JNCH, Mumbai). The quantum of stock in these states as per their communications to BSI is given below (Table 15).

Table 15. Confiscated Red Sanders stock in various states

| *State Name* | *Quantity in MTs* |
|---|---|
| Manipur | 3.044 |
| Maharashtra | 1115.04 |
| Karnataka | 257.73 |
| Telangana | 1123.972 |
| Tamil Nadu | 987 |
| JNCH, Mumbai | 1189.956 |
| Andhra Pradesh | 7888.981 |
| Total | 12565.723 |

It is generally seen that seized wood has all classes of logs, although only the ones above 70 cm girth class are sought in the international market. The seized logs are of 50-90 cm girth. However, the local woodcutters also indiscriminately cut the trees, apparently for domestic use as small timber for minor construction and/or agricultural implements/tools. However, the demand for the Red Sanders wood in the local market is believed to be very low.

The illegal trade could also affect the international market value/potential of Red Sanders wood cultivated by farmers, for whom it is of high subsistence value. The slow growth of the tree, which takes about 18-22 years to start developing the heartwood and takes about 70-80 years to give the heartwood (>70 cm girth) of the desired quality, leads to a very long rotation period, and therefore, does not lend itself to quick market returns for the farmers. The illegal trade, thus, only adds to their woes. It is expected that permission for export of Red Sanders from cultivated source would considerably reduce the illicit felling from the wild and thereby help in the containment of illegal trade.

## STEP 8: EVALUATE APPROPRIATE RIGOUR OF EXISTING MANAGEMENT/ PROTECTION MEASURES

### 8.1. What management/protection measures are in place for the target species?

**Review of legislations**

***National level***: The two main legislations regulating/governing the harvest of forest produce, including medicinal plants, at the national level are the Indian Forest Act, 1927, and the Wildlife (Protection) Act, 1927, (amended in 1991, 2002). The former Act strengthens the laws in context to forest produce, including NTFPs and medicinal plants, and empowers states through the forest department to regulate the harvest/transit of forest produce from reserved forest, protected areas and forests adjoining villages. Most of the Indian states and Union Territories (UTs) have 'Negative Lists' of species that are banned from harvest from forest areas. While the Indian Forest Act, 1927, is by and large adopted by most Indian states and UTs, a few states have their own Acts in place; these are broadly based on the Indian Forest Act itself. Further, the states frame their own set of Rules under the said Act to preserve/protect their forest resources.

At national level the Red Sanders tree was included in India's Negative List of Exports under the EXIM policy in March 1996, theoretically banning virtually all export of wild-harvested specimens. The 1997-2002 and 2002-2007 listing annotated that "value added products" of the wood such as extracts, dyes and musical instruments could be exported, if the wood was procured from legal sources. As per the amendment of the Schedule 2 Appendix 2 of *ITC(HC) Classifications of Export and items* 1997-2002 "export of plants, plant portions and their derivatives and extracts obtained from the wild is prohibited"; the Negative List of 29 plant species also includes *Pterocarpus santalinus* (ref. Notification No. 2(RE-98)/1997-2002, dated 13$^{th}$ April 1998, issued by the Ministry of Commerce, Government of India).

***State level***: The state of Andhra Pradesh has enacted the *A.P. Forest Act, 1967,* for protection of forest trees (including those specified in Schedule I (Prohibited Trees) and Schedule II (Reserved Trees). The Red Sanders tree (*Pterocarpus santalinus*) is included in Schedule II (Reserved Trees). For all practical purposes the *A.P. Forest Act, 1967*, serves as the umbrella legislation

for all matters pertaining to the forests of the state; under this Act, there are 16 Rules that address various issues.

Rule 8(iii) of *The AP Forest Offences (Compounding and Prosecution) Rules*, *1969*, empowers the Forest Range Officer (FRO) to take action in case of offences involving fast moving motor vehicles carrying Sandal wood, Red Sanders wood or teak or any other high value timber.

The *AP Forest Act* was amended in 2016 to ensure that almost all forest offences are made cognizable and non-bailable, with the police officers also having concurrent powers to investigate the forest offences.

The state of Andhra Pradesh has taken a lead in having two special Rules specifically for a single tree species that had been categorized until recently as "Endangered" following IUCN criteria. The two Rules are: *The AP Sandalwood and Red Sanders Wood Transit Rules (1969)* and *The AP Red Sanders Wood Possession Rules (1989)*, which have been framed in accordance with the enabling provisions of the umbrella legislation, *The AP Forest Act, 1967*. This is indeed a unique and commendable legislative measure for protecting a single tree species, namely, the Red Sanders.

Review of the specific legislation, i.e., The *AP Sandalwood and Red Sanders Wood Transit Rules* (1969) and *The AP Red Sanders Wood Possession Rules* (1989), as well as *The AP Forest Offences (Compounding & Prosecution) Rules*,1969, Section 8(iii), shows that there are no specific enforcement or empowerment issues. The Red Sanders Wood Task Force (RSWTF), located at Tirupati, which is headed by the Inspector General of Police, looks into the enforcement issues in important Red Sanders areas.

According to *The AP Preservation of Private Forest Rules (1978)*, the Red Sanders tree is listed in Schedule II (Reserved Trees); the felling, sale or transport of the species require specific permission from the Divisional Forest Officer (DFO). *The AP Sandalwood and Red Sanders Transit Rules, 1969*, also require that import/export and cartage of wood, chips or powder need special permit with details of source, quantity and destination, and the items also need to be marked/sealed. *The AP Red Sanders Possession Rules, 1989*, state that a license would be required for possession of Red Sanders wood in excess of 20 kg, with maintenance of records of manufacture/trade of products being mandatory. Even under the said license the possession of Red Sanders is

capped; no licensee can possess more than 1 Mt/1000 kg at any one time. Domestic use is excluded from the purview of this Rule.

The above two are, therefore, examples of ideal legislation, that have proven effective to some extent.

Smugglers of Red Sanders trees are being booked under *The Preventive Detention Act, 1950*, and laws.

The following further initiatives have been taken for amending *The A.P. Forest Act, 1967*:

- The A.P. Forest Act was amended by Gazette Notification, dated 19th May 2016.
- It came into effect by Gazette Notification, dated, 25th May 2016
- All the forest offences are made cognizable and non-bailable.
- The Red Sanders, Sandalwood and Schedule Trees are given special status of protection.
- The punishments have been enhanced.
- The term of imprisonment may be from 5 years to 10 years.
- Fine may be from Rs. 3.00 lakhs to Rs. 10.00 lakhs
- The illegally acquired property from Sandalwood or Red Sanders or 'Schedule Trees' are liable for forfeiture.
- Special courts may be constituted by the Government for the trial of forest offences.

It is clear that on the legislation front the state of Andhra Pradesh has made good headway, with proper Acts and Rules in place insofar as Red Sanders is concerned. However, it must be appreciated that legislation itself is not enough to stop illegal felling or smuggling of Red Sanders. Enforcement of legislation comes into play only when the forest offences are booked, with good conviction rate; the Acts/Rules in themselves are not enough to serve as a deterrent to illegal activities, probably owing to lack of awareness among the perpetrators of forest crimes or due to scant respect for the preventive legislation/laws out of criminal arrogance.

**Tamil Nadu**

As in the case of Andhra Pradesh, the state of Tamil Nadu also has enacted *The T.N. Red Sanders Wood Transit Rules, 1968*. Under the said Rules

import/export and cartage of Red Sanders wood specifically requires a permit reflecting the details of the source, quantity and destination. Further, no person can have in his possession or transport timber logs, chips, powder, without a special permit issued by the DFO. However, the Rules would not apply to Red Sanders wood up to 5 kg being moved for personal use by a bona fide owner or his authorised representative from trees grown on his own lands on the condition that the said person shall obtain/carry a certificate from the Village 'Munsif' to the effect that the Red Sanders wood is sourced from the owners 'pattaland', and that the quantity of wood cut does not exceed 5 kg on one single occasion. For possession/transport of Red Sanders exceeding 5 kg the owner is required to obtain a certificate from the DFO deployed by the State in the area over which he/she has jurisdiction. Felling of Red Sanders is banned in the state of Tamil Nadu, with restrictions imposed/permit requirements for cutting of Red Sanders from hilly lands/private lands.

**Karnataka**

No specific legislation by way of an Act/Rules have been enacted/framed specifically for Red Sanders by the Government of Karnataka. However, as in the case of other forest produce, the Red Sanders is also subject to permit requirements for sale/transport. The permit requirements also apply for the sale of Red Sanders products through tender/auction process at specified depots or through a license for sale at pre-approved rates.

**Review of protection measures**

**Andhra Pradesh**

*Fire lines*: To protect the Red Sanders from forest fires 'fire lines' have been cleared in almost all Forest Divisions. The aftermath of fires have been observed to be damaging in fire-prone areas such as Jyoti Beat, Proddatur Division; these areas did have had fire lines, but they were apparently not effective in stopping massive forest fires, which continue to impact Red Sanders populations. Therefore, how effective these lines are for containment of forest fires cannot really be gauged.

*Trenches***:** Trenches are often dug in forest fringes to discourage encroachment of forest land and, to a lesser extent, smuggling.

The following protection measures have been adopted by the Andhra Pradesh Forest Department (APFD) to protect Red Sanders from illegal felling/ smuggling.

*Base Camps*: Deployed for patrolling and perambulating Red Sanders forests and to gather information about the movement of smugglers in the interior areas of Forests. They are positioned at strategic locations (Table 16). In each Base camp, local villagers are employed as protection watchers. At present, base camps are operating at 193 places in AP. Out of 193 Base Camps, 86 are in Red Sander bearing areas.

Table 16. Division-wise details of base camps established

| *Name of Circle* | *Total Base Camps in Circle* | *Base Camps situated in RS bearing areas* | |
|---|---|---|---|
| | | *Name of Division* | *No. of Base Camps* |
| Anantapur | 14 | -- | 0 |
| Guntur | 14 | Giddalur | 5 |
| | | Nellore | 9 |
| Kurnool | 36 | Nandyal | 7 |
| | | Proddatur | 12 |
| | | Kadapa | 17 |
| Rajahmundry | 31 | -- | 0 |
| Visakhapatnam | 21 | -- | 0 |
| WLM Circle, Tirupati | 36 | Chittoor East | 6 |
| | | Rajampet WL | 16 |
| | | WLM Tirupati | 14 |
| FDPT Srisailam | 41 | -- | 0 |
| Grand Total: | 193 | | 86 |

*Source*: APFD

*Strike Forces*: Strike forces are meant for regular patrolling and interception in fringe areas and outside forests. Each strike force is provided with a vehicle and a driver and five protection watchers. At present, 52 Strike Forces have been deployed for patrolling in vulnerable areas (Table 17). Out of 52 Strike Forces, 30 Strike Forces are located in Red Sander bearing areas.

Table 17. Location of Strike Forces in Red Sanders areas

| *Name of Circle* | *Total Strike Forces in Circle* | *Strike Force situated in RS bearing areas* | |
|---|---|---|---|
| | | *Name of Division* | *No. of Strike Force* |
| Anantapur | 2 | -- | 0 |
| Guntur | 6 | Giddalur | 2 |
| | | Nellore | 3 |
| Kurnool | 11 | Nandyal | 1 |
| | | Proddatur | 3 |
| | | Kadapa | 6 |
| Rajahmundry | 8 | -- | 0 |
| Visakhapatnam | 6 | -- | 0 |
| WLM Circle, Tirupati | 15 | Chittoor East | 4 |
| | | Rajampet WL | 4 |
| | | WLM Tirupati | 7 |
| FDPT Srisailam | 4 | -- | 0 |
| Grand Total: | 52 | | 30 |

*Source*: APFD

*Check Posts***:** They are located at crucial points on roads leading to Chennai, Bangalore, Hyderabad, Nellore and other vulnerable routes (Table 18). At present, 113 check posts have been established in vulnerable locations by placing ex-servicemen/tribal watchers. Out of 113 Check posts, 50 check posts are in Red Sander bearing divisions.

Table 18. Location of check posts in Red Sanders areas

| *Name of Circle* | *Total Check Posts in circle* | *Check Posts situated in RS bearing areas* | |
|---|---|---|---|
| | | *Name of Division* | *No. of Check Posts* |
| Anantapur | 9 | -- | |
| Guntur | 18 | Giddalur | 5 |
| | | Nellore | 13 |
| Kurnool | 13 | Nandyal | 2 |
| | | Proddatur | 5 |
| | | Kadapa | 6 |
| Rajahmundry | 34 | -- | 0 |
| Visakhapatnam | 15 | -- | 0 |
| WLM Circle, Tirupati | 19 | Chittoor East | 8 |
| | | Rajampet WL | 8 |
| | | WLM Tirupati | 3 |
| FDPT Srisailam | 5 | -- | |
| Grand Total: | 113 | | 50 |

*Source*: APFD

*Boat party***:** One boat party has also been deployed to patrol and comb forest areas in Somasila back waters covering 4 Divisions i.e., Rajampet, Kadapa, Proddatur, Nellore.

*E-Surveillance (iVIS)*: Web-enabled CCTV cameras (infrared cameras) have been fixed at certain vulnerable locations for e-surveillance and monitoring of Red Sanders areas, by way of a pilot project.

At present there are about 19 CCTV cameras installed in Red Sander areas for protection and monitoring in Tirupati (WL), Rajampet (WL) and Chittoor East divisions of WLM Circle, Tirupati. (The project was initiated during the year 2015-2016 and is being implemented through iVIS Pvt Ltd.) The details of the location where CCTV cameras installed and monitored by iVIS Pvt Ltd are in Table 19.

Table 19. Location of CCTV cameras installed

| *S. No.* | *Name of Division* | *Name of Range* | *Location* |
|---|---|---|---|
| 1 | Tirupati (WL) | SVNP, Balapalli | Boring Road |
| 2 | Tirupati (WL) | SVNP, Balapalli | Jyothi Colony |
| 3 | Tirupati (WL) | SVNP, Balapalli | Ramapuram Gate |
| 4 | Tirupati (WL) | SVNP, Balapalli | Vegetikona |
| 5 | Tirupati (WL) | SVNP, Balapalli | Darga Road |
| 6 | Tirupati (WL) | SVNP, Tirupati | Malati Lane |
| 7 | Tirupati (WL) | SVNP, Tirupati | Thadkal Railway Track |
| 8 | Tirupati (WL) | SVNP, Tirupati | Theendra Gunta |
| 9 | Tirupati (WL) | SVNP, Tirupati | Watch Tower-1 back side of Sarovar |
| 10 | Tirupati (WL) | SVNP, Tirupati | Watch tower-2 at T.N. Palem |
| 11 | Tirupati (WL) | SVNP, Tirupati | Back side of DFO office (Vigilance) |
| 12 | Tirupati (WL) | SVNP, Tirupati | Signal point |
| 13 | Tirupati (WL) | SVNP, Tirupati | Anjaneyapuram Check post |
| 14 | Rajampet (WL) | Koduru | Gurrappagarikunta – M.Bhavi beat |
| 15 | Rajampet (WL) | Koduru | Jandagutta- K.V. Bhavi beat |
| 16 | Rajampet (WL) | Sanipaya | Dona Road opp- Jandrapenta beat |
| 17 | Rajampet (WL) | Sanipaya | Pump House- Jandrapenta beat |
| 18 | Rajampet (WL) | Sanipaya | Kavalaipalli watch tower – T. Sundupalli |
| 19 | Chittoor East | Tirupati | CWC Godown, Renigunta |

*Source*: APFD

The e-surveillance promises to be effective with greater area coverage. There is clearly a need to replicate the project in other Red Sanders areas.

*Publicity Measures*: Various publicity measures such as wall writings, publicity boards and publicity vans with audio visual facilities are being used to sensitize villagers in the fringe areas.

*Dog Squads***:** Two dog squads, one at Tirupati and another one at Kadapa, are maintained in RS bearing areas. Both the dog squads, which are under the control of Tirupati Urban Superintendent of Police and Kadapa Superintendent of Police, are maintained by the Task Force. With collaboration of the Police Department these dogs have been trained in detecting Red Sanders wood. These trained dogs are being used effectively to detect illegally stored Red Sanders wood. There is a need for more dog squads to be deployed in main Red Sanders transit routes/zones.

*Red Sanders Anti-Smuggling Task Force (RSASTF)*

In G.O.Ms.No.217, Finance (HR.I) Department, dated, 25th November 2014, the Government has issued orders for formation of Red Sanders Anti-Smuggling Task Force (RSASTF) and sanctioned 463 Posts in Police and Forest Department to control Red Sanders smuggling (Table 20).

Table 20. Staff strength of RSASTF

| *Institution* | *Sanctioned* | *Filled* | *Vacant* |
|---|---|---|---|
| RSASTF, Tirupati | 463 | 247 | 216 |

*Source*: APFD

There is an urgent need to fill up the vacant post to make the Task Force more effective in curbing the smuggling activities.

**Impact of protection measures:**

The establishment of base camps, Strike Force, Check Posts, E-surveillance and boat parties resulted in booking of considerable number of Red Sanders criminal cases during the last five years from 2014-15 till date (Table 21).

Table 21. Criminal cases booked with reference to Red Sanders

| *Year* | *No. of cases* | *RS wood seized (in tons)* | *No. of vehicles seized* | *No. of persons arrested.* |
|---|---|---|---|---|
| *(1)* | *(2)* | *(3)* | *(4)* | *(5)* |
| 2014-15 | 1385 | 918.49 | 994 | 3952 |
| 2015-16 | 753 | 355.658 | 480 | 2587 |
| 2016-17 | 911 | 487.632 | 705 | 3344 |
| 2017-18 | 890 | 363.879 | 685 | 2776 |
| 2018-19 | 500 | 178.08 | 321 | 943 |

*Source*: APFD

The above-mentioned protection measures are apparently having a considerable impact by way of reduction of smuggling activities, particularly during the last two years (FYs: 2017-18 & 2018-19). However, data on convictions is wanting; in fact, it is said to be fairly low. The rate of convictions will actually determine the success of these measures.

### 8.1. Do existing management measures adequately mitigate harvest impacts and trade impacts for the populations/sub-populations?

No. The management measures/practices by the Andhra Pradesh State Forest Department (APFD) that were commonly observed during the field assessment for this NDF study were the establishment of base camps in Red Sanders areas, mobile patrolling, combing operations, trenches along the boundaries and preparing fire lines prior to the summer season. While the management practices of the APFD are laudable, it must be recognized that the forest area to be covered is quite vast and the man force/infrastructure is inadequate. There is an urgent need to strengthen these.

If the positive trend continues and the measures are further strengthened, there is yet some hope for the better protection of Red Sanders forests. With better infrastructure in terms of staffing requirements and facilities such as arms and vehicles for better enforcement, there is scope for improvement of the situation and, perhaps in years to come there would be a possibility of legal/regulated harvesting from the wild (outside PA areas) through a proper harvest management plan, with requisite precautionary measures built-in to make sure that viable populations, both in terms of number and size, remain constant/stable. However, such a situation is not likely to come at least in the next five decades, given the fact the growth progression from one girth class to another in Red Sanders is about ten years. In such a scenario, there would be a need for a science-based/quantitative monitoring mechanism to make sure that regulated harvest from the wild does not lead to the reduction of Red Sanders populations to levels that might directly or indirectly threaten the populations and prove detrimental to their survival. This would certainly not be possible until effective control of illegal trade and smuggling is achieved, and a proper monitoring mechanism for the standing wild populations is in place.

#### 8.1.1. The way forward for enforcement:

However, considering the present scenario where the harvestable girth size plants are at the lowest, with only 2.19 per cent, it must be appreciated that

any further fragmentation/reduction in its populations would lead to a situation where the species, *Pterocarpus santalinus*, may have to be shifted to Appendix I of CITES (vide CITES Conf. 9.24 (Rev. COP 17, Johannesburg, South Africa, 2016). Therefore, there is an urgent need to facilitate better enforcement to avoid Red Sanders from becoming eligible for inclusion in Appendix I in the future.

In context to enforcement for plants, the CITES recommends [Resolution Conf. 11.11 (Rev. COP 17)] that Parties to the Convention ensure that "*(i) enforcement officers are adequately informed of CITES requirements, procedures governing inspection and clearance of CITES plant specimens, and the procedures necessary for the detection of illegal trade; (ii) enforcement agencies obtain access to materials and expertise enabling identification of plant specimens in trade, including whether the specimens are of wild or artificially propagated origin; (iii) enforcing agencies utilise annual reports, plant health documents, nursery catalogues and other sources of information to detect possible illegal trade; (iv) enforcing agencies maintain close liaison with the Management Authority and Scientific Authorities for the purpose of setting and implementing enforcement priorities; and (v) material in trade is carefully checked in order to improve enforcement and in particular that plants declared to have been artificially propagated are checked both on import and on export*." Therefore, there is a need for the State Forest Departments to adopt this recommendation to ensure better enforcement and monitoring.

# Protection measures

Base camp at Porumamilla Range

Base camp at Gadikota Beat, Kadapa Division

Fire line at Rapur Range, Nellore Division

Trench at Porumamilla Range, Nellore Division

Boat party at Somasila Reservoir

Watch tower at Rajampet Range

# Wood grading Mettupalayam, Coimbatore Division, Tamil Nadu



## STEP 9: MAKE NDF AND PROVIDE RELATED ADVICE

### I. NON DETRIMENT FINDING OF RED SANDERS TREE

**From Step 1**

**9.1. Specimens identification is not clear and/or scientific name is not compliant.**

The specimen identification is clear in this case and most specimens being exported legally are under the same name. The Red Sanders wood is characteristic and there are no records of it being exported (logs, chips) under a different name.

**From Step 2**

**9.2. Export of artificially propagated specimens of this species is not permitted by national law or relevant sub-national legislation.**

Export of artificially propagated specimens of this species is permitted by national law or relevant sub-national legislation subject to certain requirements and documentation (DGFT Notification No. 56/2015-2020, dated 18 February 2019).

**9.3. Specimens covered by the export permit application clearly meet all requirements for artificially propagated according to Res. Conf. 11.11 (Rev. COP 15).**

The present standing stocks of cultivated Red Sanders have been developed through seeds sourced from the wild. However, the Scientific Authority is convinced that the seed collection being done for this is not detrimental to the wild populations. This is in accordance with the exemption granted (CITES Resolution Conf. 11.11 (Rev. COP 17) with regard to the regulation of trade in specimens deemed to be 'artificially propagated' if grown from wild-collected seeds.

As the cultivated specimens of *Pterocarpus santalinus* are permitted under the national legislation/Rules, subject to certain conditions, a **positive advice** is proposed for export of specimens from cultivated sources (Source A) in this NDF report.

**From Step 3**

**9.4. The specimen is not covered by CITES Appendix II.**

The specimen is listed under Appendix II of CITES (Ref Step 3) and also protected by national and sub-national legislation.

**9.5. Export of wild harvested specimens of this species is not permitted by national or relevant sub-national legislation or regulation.**

The wild-harvested specimens are protected by national-level as well as state-level regulations/rules and export of Red Sanders is not permitted (See Step 8 for details).

Accordingly, this NDF proposes **negative advice** for harvest from wild/natural populations (Source W) for the time being.

**9.6. Evidences used for a previous NDF is still valid and sufficient to evaluate the current permit application.**

The results of the previous NDF (Hegde et al., 2012) are still valid and, therefore, in accordance with the findings of the earlier NDF as well as the present NDF, the export of Red Sanders harvested from the wild may not be allowed for the present. From the two NDF studies, it is evident that the harvestable girth class in the wild populations have been reduced drastically over the last six years.

**From Steps 4 - 8**

**9.7. Do existing management measures adequately mitigate harvest and trade impacts?**

No. The management and protection measures are fairly good and innovative, but for want of sufficient infrastructure, they are presently not rigorous or effective enough to mitigate the impacts of harvest and trade.

Therefore, this NDF proposes **negative advice** for harvest from wild/natural populations (Source 'W') for the time being.

**II. RELATED ADVICE:**

1. In view of the negative NDF, harvesting of Red Sanders (*Pterocarpus santalinus*) from the wild/natural areas needs to be discouraged. The decision on 'sustainable harvest' from the wild may be taken only after detailed ecological studies are undertaken to make sure that the harvestable populations are sufficiently stabilised and population dynamics of Red Sanders will allow regulated off-take from the wild. This is imperative for the future security of the species.

2. The quota from cultivated stock is proposed to be revised as per the extraction potential of the States (Tamil Nadu, Andhra Pradesh, Karnataka) having cultivated stock in private/government land. The proposed national quota may be fixed at 1190 MT per annum. The State Forest Working Plan Guidelines in the states with Red Sanders plantations in Government lands, including forest areas, need to include specific management plans/harvest plans with approved rotation periods for sustainable harvest of Red Sanders wood from plantations in forest areas. It may be mandated that at least 10 percent of the plantation trees be left unharvested to allow seed production for future use in keeping with CITES Resol. Conf. 11.11 (Rev. COP 17).

3. Export of Red Sanders wood in log form and roots or value added products such as (including chips, powder, extracts, dyes, musical instruments or parts thereof, furniture or parts thereof, toys, dolls, and other handicrafts made from Red Sanders wood procured legally from (i) cultivated stock (in private/Government lands, including forests) or (ii) from seized/confiscated material auctioned by the authorised Government agencies may be permitted, subject to fulfilment of laid down policy conditions/necessary documentation.

4. As the monitoring mechanism for populations of Red Sanders is inadequate there is need for developing a mechanism wherein populations/stocks are properly monitored it is suggested that
    a. the e-auctioning of confiscated RS wood be done through one nodal agency in the country to facilitate and regulate the

sale/export by way of a single-window portal; as the State of Andhra Pradesh is a major custodian of the wild stock the APFD may be considered the nodal agency. All states with seized/confiscated stock could send the same to APFD for disposal through e-auction. The proceeds of the sale could be on basis of a 60:40 ratio for Andhra Pradesh and other states, with the cost of cartage to be borne by the APFD;

b. similarly, for sale/export of Red Sanders from cultivated stock the wood farmers/private agencies from all states/agencies may be done through the APFD.

5. As per the CITES/DGFT guidelines 30 percent of the proceeds of the Red Sanders sale is mandated to be ploughed back for the express purpose of protection, management and regeneration/recovery of the species. (Thus, if the revenue accrued by the Government is Rs. 100/- by way of sale/export, 30 percent will be utilised for management, protection and regeneration/recovery of populations). This condition must be strictly followed by the APFD, Government of Andhra Pradesh, for conservation and protection of Red Sanders.

6. The single greatest threat to Red Sanders populations being illicit felling/smuggling, there is an urgent need for stringent enforcement of all relevant legislation/Rules to curb smuggling at any cost and ensure the survival of this species in the wild. A separate Multi-Disciplinary Expert Committee, comprising enforcement/forest officers, techno-legal experts, representatives of CITES Scientific Authorities, as well as representatives of environmental NGOs and forest/rural communities may be set up to go into the modalities of proper enforcement [as per CITES Resolution Conf. 11.11 (Rev. COP 17)] to ensure the future survival of the species. It is imperative that local forest/rural communities should also be given a responsible role in enforcement.

7. Acknowledging that capacity building is imperative for effective enforcement, the CITES Management Authority of India needs to ensure that requisite infrastructure, in terms of human resources and high-tech

equipment is built in the State Forest Departments with augmentation of necessary budgetary allocation for this purpose.

8. Red Sanders tree management guidelines based on scientific principles and practices should be made available to wood farmers for helping them get a better quality yield in lesser period. These guidelines should address issues such as management of pathological infestations, arboriculture practices, germplasm selection, tree improvement, etc. The National Biodiversity Authority (NBA), with its envisaged research programmes on Red Sanders tree, would be an ideal agency to formulate these guidelines.

9. There is an urgent need to encourage farmers to source plantation material (seeds/seedlings) from the plantations, i.e., cultivated parental stock, so that they can be considered to be 'artificially propagated' as per the CITES definition, and discourage collection of plantation material from the wild. As CITES determines that plants grown from cuttings or divisions are considered to be 'artificially propagated' only if the traded specimens do not contain any material collected from the wild, the concerned state Governments/Forest Departments need to ensure that all future plantations are established through seed/plantation material sourced/derived from cultivated parental stock.

10. There is a need for encouraging greater dialogue between CITES Management Authority, Custom Departments, State Forest Departments and State Police Departments with regard to export controls and CITES implementation for the species.

# References

## References


Ahmedullah, M. & Nayar, M.P. 1984. Red Sanders tree (*Pterocarpus santalinus* Linn. f.) on the verge of depletion. *Bull. Bot. Surv. India* 26: 142-143.

Ahmedullah, M. & Nayar, M.P. 1987. *Endemic Plants of Indian Region*, vol. I, Botanical Survey of India, Calcutta, pp. 261.

Aide, M.T. & Cavelier, J. 1994. Barriers to lowland tropical forest restoration in the Sierra Nevada de Santa Maria, Columbia. *Restor. Ecol.* 2: 219-229.

Ankalaiah, C., Mastan, T. & Reddy, M.S. 2017. A study on the density, population structure and regeneration of Red Sanders *Pterocarpus santalinus* (Fabales: Fabaceae) in a protected natural habitat - Sri Lankamalleswara Wildlife Sanctuary, Andhra Pradesh, India. *J. Threat. Taxa* 9(9): 10669-10674, http://doi.org/10.11609/jott.2869.9.9.10669-10674.

Anuradha, M. & Pullaiah, T. 1998. Investigations on germination of *Pterocarpus santalinus* (Red Sanders) with special reference to in-vitro seed culture. *Indian Forester* 124: 508.

APFD 2004. Working Plan of Kadapa Forest Division. Andhra Pradesh Forest Department.

APFD 2015. Inventory of Red Sanders in three divisions of Andhra Pradesh (personal communication)

Arockiasamy, S., Ignacimuthu, S. & Melchias, G. 2000. Influence of growth regulators and explants type on *in vitro* shoot propagation and rooting of red Sandalwood (*Pterocarpus santalinus* L.f.). *Ind. J. Exp. Bot.* 38: 1270-1273.

Arunakumara, K.K.I.U., Walpola, B.C., Subasinghe, S. & Yoon, M.H. 2011. *Pterocarpus santalinus* Linn f. (Rath handun): A Review of its Botany, Uses, Phytochemistry and Pharmacology. *J. Korean Soc. Appl. Biol. Chem.* 54 (4): 495-500.

Ashrafee, T.S., Rahman, M.M., Chakraborty, A. & Prodhan, S.H. 2014. Antibacterial potentiality of red sandalwood callus against pathogenic isolates of *Aeromonas* and *Pseudomonas*. *Univer. J. Plant Sci.* 2 (4): 86-91.

Babu, N.V.T. 1992. Introduction of Red Sanders in Kerala. *Indian Forester* 118 (2): 109-111.

Bawa, K.S. & Webb, C.J. 1984. Flower, fruit and seed abortion in tropical forest trees: Implications for the evolution of paternal and maternal productive patterns. *Am. J. Bot.* 71: 736-751.

Bhagyaraj, A. 2017. Red Sanders invisible activities in Chittoor District: A Case study. *Int. J. Adv. Res*. 5 (9): 1073-1080.

Bharali, S., Paul, A. & Khan, M.L. 2013. Population studies of *Rhododendron mechukae* – A newly recorded endemic species from Eastern Himalaya. *India. J. Biodivers. Manag. Forestry* 2 (3): 1-5.

Bouffard, D., Nolet, P., Delargrange, S., Loreenzetti, F. & Yamasaki, S. 2007. Vegetation control treatments to favor naturally regenerated *Betula alleghaniensis* saplings following seed-tree cut: sapling monitoring two years after treatment. *Restor. Ecol.* 15: 679-687.

Chauhan, L. & Vijendra Rao, R. 2003. *Wood anatomy of the legumes of India: Their identification, properties and uses*. Bishen Singh & Mahendra Pal Singh, Dehra Dun, India.

Cottom, G. & Curtis, J.T. 1956. The use of distance measures in the phyto-sociological sampling. *Ecol.* 37: 451-460.

Gamble, J.S. 1902. *A Manual of Indian Timbers*. Sampson Low, Marston & Company, Limited, London, pp. 856.

GoAP 2009. G.O.Rt. No. 77 of EFS&T (For-III) Dept. dt. 12.02.2009, available in website http://goir.ap.gov.in/Reports.aspx.

Hegde, M., Gurudev, S. & Krishnakumar, N. 2012. *Non-Detriment Findings (NDFs) study for Pterocarpus santalinus L.f. (Red Sanders) in*

*India*. Institute of Forest Genetics and Tree Breeding, Coimbatore. pp. 28.

Hole, R.S. 1913. Red Sanders (*Pterocarpus santalinus*). *The Indian Forest Records*. 4 (4): 1-10.

Huang, T.C. & Ohashi, H. 1977. *In*: Li, H. L. et al. (Eds.) *Flora of Taiwan*, Vol. 3: 148-421.

Kedaranath, S., Rawat, M.S., Uniyal, D.P. & Kantham, D.L. 1976. Studies on field grafting and growth of grafts in red sanders. *Indian Forester* 102: 761-765.

Kesava Reddy, K. & Srivasuki, K.P. 1990. Vegetative propagation of red sanders (*Pterocarpus santalinus* Linn. f.). *Indian Forester* 116: 536-540.

Khurana, E. & Singh, J. 2001. Ecology of seed and seedling growth for conservation and restoration of tropical dry forest: A review. *Environmental Conservation* 28: 39-52.

Klitgaard, B.B. & Lavin, M. 2005. The tribe Dalbergieae sens.lat. *In*: Lewis, G., Shrire, B., MacKinder, B. & Lock, M. (Eds.). *Legumes of the World*. Royal Botanic Garden, Kew.

Konda, C.V. 1972. Red Sanders and its History of Utilisation. *Indian Forester* 98 (10): 589-593.

Kukrety, S., Dwivedi, P., Jose, S. & Alavalapati, J.R.R. 2012. Facilitating Establishment of Advance Regeneration of *Pterocarpus santalinus* L.- An Endangered Tree Species from India. *Restor. Ecol.* 21 (3): 372-379. –URL: https://doi.org/10.1111/j.1526-100X.2012.00890.x.

Kukrety, S., Dwivedi, P., Jose, S. & Alavalapati, J.R.R. 2013. Stakeholders perceptions on developing sustainable Red Sanders (*Pterocarpus santalinus* L.) wood trade in Andhra Pradesh, India. *Forest Policy Econ.* 26: 43-53.

Leaman, D.J. & Oldfield, T.E.E. 2014. CITES non-detriment findings: guidance for perennial plants. A nine-step process to support CITES Scientific Authorities making science-based non-detriment findings

(NDFs) for species listed in CITES Appendix II. Version 1.0. – BfN-Skripten 358; Bundesamt für Naturschutz Bonn, Germany; 88 pp.– URL: https://www.bfn.de/fileadmin/MDB/documents/service/skript358.pdf.

Luna, R.K. 2005. *Plantation Trees*. International Book Distributors, Dehradun, Uttaranchal, India, pp. 608-614.

MacLachlan, I.R. & Gasson, P. 2010. PCA of CITES listed *Pterocarpus santalinus* (Leguminosae) wood. *IAWA J.* 31 (2): 121-138.

Mastan, T., Sadasivaiah, B. & Sridhar Reddy, M. 2016. Tree diversity structure of a tropical dry deciduous forest in Sri Lankamalla Wildlife Sanctuary, southern eastern Ghats. *Indian Forester* 142 (9): 813-819.

Pardo de Tavera, T.H. 2008. The Medicinal Plants of the Philippines. (Translator: Jerome Beers Thomas (August 22, 2008).

Patri, S., Bhatnagar, S.P. & Bhojwani, S.S. 1988. Preliminary investigations on micropropagation of a leguminous timber tree: *Pterocarpus santalinus*. *Phytomorphology* 38: 41-45.

Prain, D. 1900. Report on the Indian species of *Pterocarpus*. *Indian Forester* 26: 1-16.

Prakash, E., Sreenivasa Rao, T.J.V. & Meru, E.S. 2006. Micropropagation of red sanders (*Pterocarpus santalinus* L.) using mature nodal explants. *J. For. Res*. 11: 329-335.

Raju, K.K. & Nagaraju, A. 1999. Geobotany of Red Sanders (*Pterocarpus santalinus*) – a case study from the southeastern portion of Andhra Pradesh. *Environ. Geol.* 37 (4): 340-344.

Raju, K.K. & Raju, A.N. 2000. Biogeochemical investigation in south eastern Andhra Pradesh: the distribution of rare earths, thorium and uranium in plants and soils. *Environ. Geol.* 39 (10): 1102-1106.

Rao, P.S., Atluri, J.B. & Subba Reddi, C. 2001. Intermittent mass blooming, midnight anthesis and rockbee pollination in *Pterocarpus santalinus* (Fabaceae). *Nordic J. Bot.* 21 (3): 271-276.

Rao, P.S. & Solomon Raju, A.J. 2002. Pollination ecology of the Red Sanders (*Pterocarpus santalinus* (Fabaceae)), an endemic and endangered tree species. *Curr. Sci.* 83: 9-12.

Rojo, J.P. 1972. *Pterocarpus* (Leguminosae-Papilionoideae) revised for the World. *Planerogamarum Monographiae* 5: 1 - 119. J. Cramer, Germany.

Rose, M. 2014. *Non-Detriment Findings in CITES (NDFs)*. Version 1.2. On behalf of the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management. Vienna, Austria: Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management.

Rosser, A. & Haywood, M. 2002. Guidance for CITES Scientific Authorities: Checklist to assist in making non-detriment findings to Appendix II exports. IUCN, Gland, Switzerland & Cambridge, UK. xi + 146 pp.

Rudd, V.E. 1991. *A Revised Handbook of the Flora of Ceylon* 7: 108-381.

Sarangi, P.K. 2010. Conservation, Production and Marketing of Red Sanders, *Pterocarpus santalinus* L.f. *Indian Forester* 136 (5): 569-579.

Sita, G.L., Sreenatha, K.S. & Sujatha, S. 1992. Plantlet production from shoot tip cultures of Red sandalwood (*Pterocarpus santalinus* L.f.). *Curr. Sci.* 62: 7-10.

Soundararajan, V. & Joshi, S.C. 2012. *Endemic possessions of Eastern Ghats: Red Sanders* (*Pterocarpus santalinus* Linn.f.). Institute of Wood Science & Technology (IWST), Bangalore, India.

Suresh, K., Hegde, M., Deenathayalan, P., Karthick Kumar, P., Thangapandi, M., Gurudev Singh, B. & Krishnakumar, N. 2017. Variation in Heartwood Formation and Wood Density in Plantation-Grown Red Sanders (*Pterocarpus santalinus*). *In:* Pandey, K., Ramakantha, V., Chauhan, S. Arun Kumar, A. (Eds.). *Wood is Good.* Springer, pp. 139-151. DOI: 10.1007/978-981-10-3115-1_14.

Teixeira da Silva, J.A., Kher, M.M., Soner, D. & Nataraj, M. 2018. Red sandalwood (*Pterocarpus santalinus* L.f.): biology, importance,

propagation and micro propagation. *J. For. Res*. 1-10. https://doi.org/10.1007/s11676-018-0714-6.

Uwe, S. 2018. *Plant Annotations in the CITES Appendices – An Illustrated Manual*. Bundesamt für Naturschutz (BfN), Federal Agency for Nature Conservation, Germany, 75 pp.

Wenbin, H. & Xiufang, S. 2013. *Tropical Hardwood Flows in China: Case studies of Rosewood and Okoumé*. Forest Trends Association, Washington DC, USA.

Wolf, D., Oldfield, T.E.E., Schippmann, U., McGough, N. & Leaman, D.J. 2016. CITES Non-Detrimental Findings, Guidance for perennial plants: A nine-step process to support CITES Scientific Authorities in making science-based non detrimental findings (NDFs) for species listed in CITES Appendix II ver. 3.0. Bundesamt für Naturschutz (BfN), Bonn, Germany.

Wolf., D., Oldfield, T.E.E & McGough, N. 2018. CITES Non-Detrimental Findings, Guidance for Timber: A nine-step process to support CITES Scientific Authorities in making science-based non detrimental findings (NDFs) for timber/tree species listed in CITES Appendix II ver. 3.0. Bundesamt für Naturschutz (BfN), Bonn, Germany.

*Annexure - I*

# Specimens examined as part of the NDF studies on Red Sanders (*Pterocarpus santalinus* L.f.) tree in India

**Andhra Pradesh**

Andhra Pradesh, Eastern Ghats, Chittoor district, Papavinasanam, 13°43'10.8''N, 79°20'48.4'', 726 m.a.s.l., 10.01.2016, *J. Swamy & S. Nagaraju* 007501 (BSID); Andhra Pradesh, Eastern Ghats, Nellore district, Penchalakona, 14°20'12.6''N, 79°24'37.2'', 171 m.a.s.l., 13.07.2016, *J.Swamy & S. Nagaraju* 007878 (BSID); Andhra Pradesh, Eastern Ghats, Nellore district, Stambalakona, 14°05'22.7''N, 79°28'16.1'', 284 m.a.s.l., 15.07.2016, *J.Swamy & S. Nagaraju* 007878 (BSID); Andhra Pradesh, Eastern Ghats, Nellore district, Eswarakona, Rapur, 178 m.a.s.l., 12.07.2016, *J.Swamy & S. Nagaraju* 008149 (BSID); Andhra Pradesh, Eastern Ghats, Nellore district, on the way to Rapur from Chitvel, Near Palamadugu, 14°11'39.7''N, 79°26'44.4'', 253m.a.s.l., 12.07.2016, *J.Swamy & S. Nagaraju* 008156 (BSID); Andhra Pradesh, Eastern Ghats, Nellore district, Penchalakona, 14°20'12.6''N, 79°24'37.2'', 171 m.a.s.l., 13.07.2016, *J.Swamy & S. Nagaraju* 008160 (BSID); Andhra Pradesh, Chittoor district, on the way to Thumburutheertham, 13°44'079.8''N, 79°21'72.7'', 329 m.a.s.l., 08.01.2016, *J. Swamy* 7300 (BSID); Andhra Pradesh, Chittor, Tirumala, 810 m.a.s.l., 13.09.2008, *M.V.S & B. Ravi Prasad* Rao 31083 (BSID); Kadapa, Idupulapaya RF, 413 m.a.s.l., 27.09.2010, *K. Raja Kullayiswami & B. Sada Sivaiah* 40313 (BSID); Nellore, Nelapattu, 12.08.1999, *P. Venu* 111237 (BSID); Nellore district, Durgam, 29.10.1998, *P. Venu* 110139 (BSID); Flora of Seshachalam Biosphere Reserve, Chittoor District, Srivaripaadalu, Thirumala FB, N $13^0$40'45.9", E$79^0$19'58.2", 1081m.a.s.l., 17.06.2012, *P. V. Prasanna & M. Sankara Rao* 002849 (BSID); Flora of Seshachalam Biosphere Reserve, Chittoor District, SVU campus on the way to Vedapatasala, , 30.05.2013, *P. V. Prasanna & M. Sankara Rao* 003201 (BSID); Flora of Seshachalam Biosphere Reserve, Inuparallagutta, N $14^0$20' 13.4", E$78^0$46'48.8", 234 m.a.s.l., 31.07.201, *P. V. Prasanna & M. Sankara Rao* 003315 (BSID); Flora of Seshachalam

Biosphere Reserve, Rollamadugu- cross -SR palem, N 14057.192', E79021.149', 320 m.a.s.l., 11.03.2016, *S. Nagaraju* 006979 (BSID).

Andhra Pradesh, Penchalakona, 400 m, 18.07.1986, *A. S. Rao* ASR6397 (Barcode No. MH00216392; Acc. No. 148902) MH; Andhra Pradesh, Vijayawada, 06.08.1983, *P. Venkanna* 5652 (Barcode No. MH00216393; Acc. No. 140884) MH; Andhra Pradesh, Cuddapah district, Jhana Konda, 1000 ft, August 1989, *J. S. Gamble* 21217 (Barcode No. MH00216394) MH; Andhra Pradesh, Guvvala chervu ghat, 1000 ft, July 1884, J. S. Gamble 15023 (Barcode No. MH00216395; Acc. No. 17187) MH; Andhra Pradesh, Cuddapah district, 1885*, J. S. Gamble* (Barcode No. MH00216396; Acc. No. 17183) MH; Andhra Pradesh, Cuddapah district, *J. S. Gamble* (Barcode No. MH00216397; Acc. No. 17189) MH; Andhra Pradesh, Balapalli, 250 m, 20.07.1962, *J. L. Ellis* 14294 (Barcode No. MH00216398; Acc. No. 28388) MH; Andhra Pradesh, Kodur, July 1834, J. S. Gamble 15005 (Barcode No. MH00216399; Acc. No. 17188) MH; Andhra Pradesh, Chittoor district, Chittoor, 20.12.1918, J. S. Gamble 15755 (Barcode No. MH00216400; Acc. No. 17195) MH; Andhra Pradesh, Chittoor district, Mamandur, 28.02.1914, *J. S. Gamble* 10145 (Barcode No. MH00216401) MH; Andhra Pradesh, Chittoor district, Chittoor, 20.12.1918, *J. S. Gamble* 15755 (Barcode No. MH00216402; Acc. No. 17197) MH; Andhra Pradesh, Chittoor district, Akasaganga, 30.12.1975, *G. V. Subba Rao* 46881 (Barcode No. MH00216403; Acc. No. 91317) MH; Andhra Pradesh, Chittoor district, Panapakam Forest rest house compound,375 m, 15.06.1969, *G. V. Subba Rao* 31884 (Barcode No. MH00216404; Acc. No. 61419) MH; Andhra Pradesh, Chittoor district, Way to Tirumala hills, 1050 m, 17.08.1989, *D. Rangacharuyulu* 2352 (Barcode No. MH00216405; Acc. No. 147919) MH; Andhra Pradesh, Chittoor district, Talakona R. F, 26.06.1987, *E. Vajravelu* 82232 (Barcode No. MH00216406; Acc. No. 145243) MH; Andhra Pradesh, Chittoor district, Mamandur, 28.02.1914, *J. S. Gamble* 10145 (Barcode No. MH00216408; Acc. No. 17194) MH; Andhra Pradesh, Chittoor Reserved Forest, 06.10.1938, K. C. Jacob 431 (Barcode No. MH00216409; Acc. No. 83937) MH; Andhra Pradesh, Chittoor district, Panapakam Forest rest house compound, 375 m, 15.06.1969, *G. V. Subba Rao* 31884

(Barcode No. MH00216410; Acc. No. 61418) MH; Andhra Pradesh, Chittoor district, Akasaganga, 30.12.1975, *G. V. Subba Rao* 46881 (Barcode No. MH00216411; Acc. No. 91316) MH; Andhra Pradesh, Chittoor district, Mamandur, 900 m, 21.04.1986, *D. Rangacharuyulu* 539 (Barcode No. MH00216412; Acc. No. 148145) MH.

Andhra Pradesh, Chittoor district, Tirupati hills, 13.08.1998, *N. Venkata Subramanian* (Acc. No. 20807) FRC; Andhra Pradesh, Paparasiri, Thumipalli Hills, 13.08.1998, *N. Venkata Subramanian* (Acc. No. 20829) FRC; Andhra Pradesh, Pularani pakkam, 10.08.1998, *N. Venkata Subramanian* (Acc. No. 20831) FRC; Andhra Pradesh, Kodur, 17.11.1965, *K. N. Subramanian* 2458 (Acc. No. 2309) FRC; Andhra Pradesh, Chittoor district, 1400 f.t, 01.02.1918, *C. E. C Fischer* 4256 (Acc. No. 3934) FRC; Andhra Pradesh, Cuddapaha district, 1987, *J. S. Gamble* (Acc. No. 3935) FRC.

Andhra Pradesh, Chittoor District, 1400 ft, 01.02.1918, *C. E. C. Fischer* 4256 (Acc. No. 131878) CAL; Chittoor District, 1400 ft, 01.02.1918, *C. E. C. Fischer* 4256 (Acc. No. 131879) CAL; Andhra Pradesh, Nellore district, Mullemkonda hills, Block B, Veligonda Reserve, 26.07.1914, *M. S. Ramaswami* 1255 (Acc. No. 131896) CAL; Andhra Pradesh, Nellore, 20.05.1900 2386 (Acc. No. 131887) CAL; Andhra Pradesh, Nellore, 20.05.1900 2386 (Acc. No. 131885) CAL; Cuddapah, 24.07.1899, 238 (Acc. No. 131890) CAL; Cuddapah, Rollamadugu, 1600 ft, February 1883, *J. S. Gamble* 11148 (Acc. No. 131888) CAL; Chittoor, Mamandur, 900m, 21.04.1986, *D. Rangacharyulu* 539 (Barcode No. CAL 0000003301) CAL; Chittoor, Talakona RF, 900m, 26.06.1987, *E. Vajravelu* 82232 CAL; Prakasam district, Konapalli R. F, 24.05.1985, *R. K. Mohan* 936 CAL.

Andhra Pradesh, Chittoor, 21.12.1899, 14927 (Acc. No.131892) CAL; Andhra Pradesh, December,1981 (Acc. No. 131894) CAL; Andhra Pradesh, Nellore, 20.05.1900 2386 (Acc. No. 131886) CAL; Andhra Pradesh, Nellore, 20.05.1900, 2386 (Acc. No. 131881) CAL; Andhra Pradesh, Nellore, 20.05.1900, 2386 (Acc. No. 131886) CAL; Andhra Pradesh,

Nellore, 20.05.1900, 2386 (Acc. No. 131884) CAL; Andhra Pradesh, Nellore, 20.05.1900, 2386 (Acc. No. 131887) CAL; Cuddapah, 24.07.1899, 238 (Acc. No. 131889) CAL.

**Tamil Nadu**

Tamil Nadu, Chengalpot district, Kambakkam hills, 06.05.1913, *D. Rangacharuyulu* (Barcode No. MH00216413; Acc. No. 17196) MH; Tamil Nadu, North Arcot district, Mordana R. F, 25.10.1986, *M. B. Viswanath* 1215 (Barcode No. MH00216414; Acc. No. 153247) MH; Tamil Nadu, 30.01.1904, 74 (Barcode No. MH00216415; Acc. No. 86897) MH.

Tamil Nadu, Vellore district, Amoor, 11.08.1998, *N. Venkata Subramanian* (Acc. No. 20809) FRC; Tamil Nadu, Madras, Mylapore, 12.08.1998, N. *Venkata Subramanian* (Acc. No. 20808) FRC; Tamil Nadu, Madras, Mylapore, 12.08.1998, *N. Venkata Subramanian* (Acc. No. 20828) FRC; Tamil Nadu, Gudiyatham, Veerapalli Reserve, Bharatha rani, 14.08.1998, *N. Venkata Subramanian* (Acc. No. 20830) FRC.

Tamil Nadu, Denkaikotta, Dharmapuri, Ayyur, Ayyur R. F, Foothills, 1050 m, 08.09.1978, *K. N. Matthew & Venugopal* 17144 CAL; Tamil Nadu, South Arcot, Tindivanam, 29.01.1901, *District Forest Officer* 2427 (Acc. No. 13891) CAL; Tamil Nadu, South Arcot, Tindivanam, 29.01.1901, 2427 (Acc. No. 13891) CAL.

**West Bengal**

West Bengal, Kolkata, Howrah, Indian Botanic Garden, A. K. Narsear, 22.05.1968 CAL.

**Misc.**

T. Kistnaswamy Naidu, July, 1884 CAL; Mr. Lane, 01.09.1900 (Acc. No. 131875) CAL; Mr. Lane, 01.09.1900 (Acc. No. 131876) CAL.

**Dr. SATYA PRAKASH YADAV**
**Additional Director General of Forests**
**(Project Tiger)**
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सत्यमेव जयते

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पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE
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**D.O. No. 3-1/2019WL(Part-2)(Volume-1)**

**Dated the 16th June, 2022**

Dear Ms Higuero,

Thank you for your letter dated 10 June 2022. As we understand from the letter, the Secretariat has requested two clarifications from us regarding artificially propagated red sanders, to which our response is as follows:

**1. That the Standing Committee requested India to provide "data to support the case that these stocks meet the provisions of Resolution Conf. 11.11 (Rev. CoP17) for artificially propagated specimens and assess the possible impact on wild populations"**

To recap, this is a recommendation made by the Plants Committee at PC23 in July 2017. In fulfilment of this recommendation, India's Scientific Authority conducted a non-detriment finding study for red sanders and the 2019 Report of the Botanical Survey of India (BSI) titled "Non-detriment Findings Report on the Red Sanders Tree (*Pterocarpus santalinus* L.f.)" (the 2019 NDF Report) was forwarded to the Secretariat, confirmation of receipt of which was received on 20 May 2020.

Regarding the substance of the clarification, it is addressed in detail in the 2019 NDF Report, which for ease of reference is enclosed once again with this letter. In particular, please refer to pages 7-9, 13-25, 28-31, 74, and 76. BSI surveyed the plantations / cultivated stock of red sanders in the country, and concluded that they meet the requirements of Resolution Conf. 11.11 (Rev. CoP17) to qualify as artificially propagated. This information was submitted to the Secretariat more than two years ago.

We would like to highlight that this point of clarification was not mentioned in the Secretariat's letter dated 12 April 2022. In fact, in its report to SC74 (SC74 Doc. 30.1), the Secretariat determined on pages 9 and 65-66 that this recommendation (recommendation "b)" of the Plants Committee) has been complied with. This was changed to "partially complied with" in SC74 Doc. 30.1 Add., noting that confirmation on the quotas to be published for artificially propagated specimens for 2020 onwards was needed. Both the Secretariat's letter, as well as the recommendation of the Standing Committee at SC74 (in SC74 Sum. 10 (Rev. 1)) only refer to this recommendation in order to request India to clarify how the 2019 NDF Report will translate into publication of quotas, which is addressed in point 2 below.

....Cont/

Nature Protects If She is Protected

**2. The CITES Standing Committee requested "clarification from India as to how the study submitted under this recommendation will translate into the publication of quotas for artificially propagated specimens for 2020 onwards"**

We interpret this question to mean how we intend to publish quotas henceforth, since it is not now possible to publish quotas for 2020-21. In accordance with the Convention, we intend to publish quotas on the basis of the 2019 NDF Report, or any future non-detriment finding advice provided by our Scientific Authorities. In furtherance of this, my letter dated 20 April 2020 stated that we are establishing an annual quota (April – March) of 1190 MT for artificially propagated red sanders. This quota has been recommended by our Scientific Authority in the 2019 NDF Report (please see pages 30 and 76). In keeping with the advice in the 2019 Report, we will continue to not permit export of red sanders from the wild, and so a zero quota will continue to apply to wild specimens.

In addition to the quota for artificially propagated red sanders, we have informed the Secretariat that there are 13,301.692 MTs of seized / confiscated red sanders is in the custody of various State and Central enforcement agencies in the country and that we will be permitting export of seized / confiscated red sanders in a phased manner. Such exports will be permitted in accordance with the advice of our Scientific Authority and Resolution Conf. 17.8.

In conclusion, we would like to highlight that our Scientific Authority has recommended the sustainable harvest and export of artificially propagated red sanders so as to reduce the pressure of illegal trade on the wild population of the species (please see pages 31 and 57 of the 2019 NDF Report). For many years, State Forest Departments have been distributing cultivation material and encouraging farmers to plant red sanders. If they are now unable to harvest and export mature trees, it is likely to discourage such plantation activity, which in the long run will be detrimental to the species.

We appreciate that this is a busy time for the Secretariat with the deadline for submission of CoP proposals being 17 June. We are thankful for the wonderful job that the Secretariat does to keep our Convention running. We suggest that in case further clarifications are required, a conference call may be arranged to discuss them.

With best regards

Yours sincerely,

16.6.22

**(Dr. S.P. Yadav)**

**Ms. Ivonne Higuero**
**Secretary General**
**CITES Secretariat**
**Geneva, Switzerland**

Annex 5b (in the language in which they were received)

Government Of Nepal
Ministry of Forests And Environment
Department of Forests and Soil Conservation

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Babar Mahal
Kathmandu, Nepal

Ref. No. 285

Date: 16/09/2022

**The CITES Secretariat**
**International Environment House**
**11 Chemin des Anémones**
**CH-1219 Châtelaine, Geneva**
**Switzerland**

As the CITES Secretariat has been regularly supporting us in the sustainable trade of Jatamansi (*Nardostachys grandiflora*) by providing annual export quota as listed in Table 1, I would like to request you for the continuation of the similar export quota (Oil: 5782 L and derivatives{Marc}: 376,800 kg) for the year 2022. We have already submitted and the secretariat has endorsed the annual report mentioning the annual trade and export data of the CITES listed flora species from Nepal.

With the request of providing export quota, I would like to assure the CITES Secretariat and other parties on our strong commitment on Sustainable Management of the species and adherence to our Non-Detrimental Findings of the species as well as fulfilment of all the compliance.

I thank you in advance for your kind consideration on issuance of the export quota and supporting us in the Sustainable Management of the CITES species.

**Sincerely,**

.....

Director General

**Dr. Rajendra KC**
Director General
Heal of Management Authority (Flora)

*Table 1: Export Quota of Nardostachys grandiflora provided by CITES Secretariat in various years*

| Year | Species | App. | Quotas | Unit | Source code | Specimen type | Publication date |
|---|---|---|---|---|---|---|---|
| 2021 | Nardostachys grandiflora | II | 5782 | L | | oil. wild specimen for commercial purposes. | 02 Nov 2021 |
| 2021 | Nardostachys grandiflora | II | 376800 | kg | | derivatives (root pith). wild specimen for commercial purposes. | 02 Nov 2021 |
| 2020 | Nardostachys grandiflora± | II | 382700 | kg | | rhizomes | 18 Sep 2020 |
| 2019 | Nardostachys grandiflora | II | | kg | | | 29 Jul 2019 |

Asunción, de julio de 2022.-

**Nota AA N° 06 /2022**

**Isabel Camarena Osorno,** Oficial Científico
**Servicios Científicos**
**Secretaría CITES**
**Presente**

***Ref.: Remitir intención de cupos precautorios de exportación de extracto y madera de la especie Bulnesia sarmientoi (Palo Santo) PARA EL AÑO 2022.***

Tengo el agrado de dirigirme a Usted con la finalidad de remitirle, y por su intermedio a la Secretaría CITES, la intención de los cupos precautorios de exportación de extracto y madera de la especie *Bulnesia sarmientoi* (palo santo) para el año 2022 y los fundamentos para la misma.

Por la presente nota informamos que la intención de cupos consiste en 1600 toneladas (T) de madera y 270 toneladas (T) de extracto de *Bulnesia sarmientoi* (palo santo) para el año 2022.

Si bien estos cupos suponen un leve aumento con respecto a las 1400 T de madera y 250 T de extracto del cupo de 2020, éstos se hallan sustentados por el Dictamen de Extracción No Perjudicial (DENP) y consideramos que los mismos siguen siendo cautelosos por los motivos que pasamos a explicar a continuación:

Actualmente contamos con 10 (diez) Planes de Manejo Forestal (cuatro más que el año 2020) aprobados por el Instituto Forestal Nacional (INFONA) para el aprovechamiento de *Bulnesia sarmientoi*, considerando además que desde el cupo de 2020 el total de lo exportado proviene de Planes de Manejo Forestal (PMF).

Según el DENP incluso con el aumento de 1400 T y 250 T a 1600 T y 270 T para madera y extracto respectivamente, con los 10 (diez) planes de manejo forestal que actualmente cuentan con aprobación de la autoridad forestal, es suficiente para cubrir aproximadamente 12 años de cupo con estas cifras.

Con la aprobación de estos 10 (diez) planes de manejo forestal, se suman un total de 48.232 (cuarenta y ocho mil doscientas treinta y dos) hectáreas de bosques manejados que contienen *Bulnesia sarmientoi*. Sin embargo, esa cantidad puede ir aumentando enormemente en el futuro ya que aún existen 596.888 (quinientas noventa y seis mil ochocientos ochenta y ocho) hectáreas de bosques que contienen *Bulnesia sarmientoi* como reservas forestales de los Planes de Uso de la Tierra (PUT) y que podrían ser aprovechados como futuros Planes de Manejo Forestal.

Cabe resaltar además que, por los datos proveídos en el DENP, tenemos la absoluta certeza que, siempre y cuando se mantengan reservas forestales y áreas silvestres protegidas en las zonas de distribución de *Bulnesia sarmientoi*, la conservación de esta especie es y será segura, ya que el aprovechamiento de la misma no apeligra su supervivencia, puesto que aparentemente su estrategia principal de reproducción es vegetativa, es decir, por brotes de incluso rebrotes de troncos cortados; y por lo que según nuestro entender su principal amenaza sería el cambio del uso del suelo.

Por todo lo expuesto y ante cualquier duda o sugerencia, quedo atento y con gusto responderé,

Atentamente.

**Lic. Rafael Sosa**, Director General
Dirección General de Protección y Conservación de la Biodiversidad
Autoridad Administrativa Alterna CITES PY

A la presente nota se adjunta el Dictamen de Extracción No Perjudicial (DENP) para *Bulnesia sarmientoi* para los años 2021 a 2025, y la carta de aprobación del mismo por parte de la Autoridad Científica CITES del Paraguay.

Poder Ejecutivo
Ministerio del Ambiente y Desarrollo Sostenible

Resolución N° 560

***POR LA CUAL SE APRUEBA EL DICTAMEN DE EXTRACCION NO PERJUDICIAL PARA LA ESPECIE Bulnesia Sarmientoi (PALO SANTO) EN PARAGUAY, PERIODO 2021-2025.----***

*Asunción, 10 de DICIEMBRE de 2021*

***VISTO:*** *El Memorándum CITES N° 007/21 de fecha 29 de noviembre d e2021, firmado por el Lic. Frederick Bauer, Director de la Dirección de Vida Silvestre/Autoridad Administrativa CITES – Paraguay; el Memorándum DGPCB N° 1136/2021 de fecha 02 de diciembre de 2021, firmado por el Lic. Rafael Sosa, Director General de la Dirección General de Protección y Conservación de la Biodiversidad; el Dictamen A.J. N° 844/2021 de fecha 09 de diciembre de 2021, firmado por el Abg. Claudio Velázquez de la Dirección de Asesoría Jurídica; Memorándum CITES N° 010/21, firmado por el Lic. Frederick Bauer, Director de la Dirección de Vida Silvestre/Autoridad Administrativa CITES – Paraguay; el Memorándum DGPCB N° 1152/2021 de fecha 09 de diciembre de 2021, firmado por el Lic. Rafael Sosa, Director General de la Dirección General de Protección y Conservación de la Biodiversidad a la Secretaria General, y; ----------*

***CONSIDERANDO:*** *Que, la Ley N° 583/76 «QUE APRUEBA Y RATIFICA LA CONVENCION SOBRE EL COMERCIO INTERNACIONAL DE ESPECIES AMENAZADAS DE FAUNA Y FLORA SILVESTRES (CITES)», cuya autoridad de aplicación es el Ministerio del Ambiente y Desarrollo Sostenible (MADES), establece que el comercio internacional de especies silvestres del Apéndice II de CITES, deberá contar con el informe de una Autoridad Científica la cual dictamina que dicha extracción no es perjudicial para la supervivencia de la especie, y;----------*

*Que, la especie Bulnesia sarmientoi comúnmente denominada Palo Santo, se encuentra en el Apéndice II de CITES.----------*

*Que, la definición N° 11 contenida en la Notificación N° 2010/036 del Convenio CITES se establece que en relación a Bulnesia sarmientoi están incluidos en el Apéndice: las trozas, madera aserrada, láminas de chapa de madera, madera contrachapada, polvo y extractos.----------*

*Que, en la Revisión de la Conferencia de la Partes N° 15 en su Resolución Conf. N° 10.13 se aplican las definiciones para: trozas, madera aserrada, chapas de madera y madera contrachapada; respecto de las Anotaciones en los Apéndices.----------*

*Que, en la Revisión de la Conferencia de las Partes N° 15 en su Resolución Conf. N° 14.7 que trata de Gestión de cupos de exportación establecidos nacionalmente y en el cual se establece que un sistema de cupos de exportación es un instrumento de gestión que se utiliza para garantizar que las exportaciones de especímenes de una determinada especie se mantienen a un nivel que no es perjudicial para la población de la especie. El establecimiento de un cupo de exportación aconsejado por una Autoridad Científica cumple efectivamente el requisito de la CITES de formular dictámenes sobre extracciones no perjudiciales del medio silvestre para especies del Apéndice I o II y, para las especies del Apéndice II, con miras a garantizar que la especie se mantiene en toda su área de distribución a un nivel compatible con su función en el ecosistema en que ocurre.----------*

MINISTERIO DEL AMBIENTE Y DESARROLLO SOSTENIBLE * SECRETARÍA GENERAL *

MINISTERIO DEL AMBIENTE Y DESARROLLO SOSTENIBLE * MINISTRO *

AO/ML/RAO

Resolución N° 560

***POR LA CUAL SE APRUEBA EL DICTAMEN DE EXTRACCION NO PERJUDICIAL PARA LA ESPECIE Bulnesia Sarmientoi (PALO SANTO) EN PARAGUAY, PERIODO 2021-2025.----***

*Que, en la Revisión de la Conferencia de la Partes N° 17 en su Resolución Conf. N° 16.7 que trata de los Dictámenes de extracción no perjudicial y establece que los mismos deben estar basados en los resultados de una evaluación basada en datos científicos que permitan verificar si una exportación propuesta es perjudicial para la supervivencia de esa especie o no.----------*

*Que, en Octubre del 2015 se llevó a cabo el Primer Taller Internacional para la Conservación del Palo Santo conformado por las Autoridades Administrativas y Científicas CITES de Argentina, Bolivia, Paraguay, además de la Autoridad Administrativa de Francia y la OIMT – ITTO Brasil, como así también representantes del sector privado, actores locales e instituciones públicas, donde se llegó a las siguientes conclusiones:----------*

- ✓ *Necesidad de fortalecimiento institucional de los tres países.*
- ✓ *Trazabilidad de la madera y esencia: debe visibilizarse el origen de la especie (Plan de Uso de la Tierra (PUT), Plan de Manejo Forestal (PMF) y su Fiscalización), la expedición de guías de traslado y sistema de marcaje (sellos).*
- ✓ *Cupos de exportación. Se necesitan cupos para un período transitorio hasta que los estudios científicos arrojen información para la emisión de cupos en base a ellos.*
- ✓ *Se necesita un plan de acción regional (análisis, soluciones, alternativas, mecanismos).*
- ✓ *Establecimiento de la estructura de un sistema común de información de la especie (información legal, biológica, técnica y administrativa) para los tres países, a través de un sitio web y un software libre.*
- ✓ *Se deben generar mecanismos y criterios para elaborar un mapa donde se identifiquen sitios de distribución, áreas protegidas, áreas de conservación y de usos (PMF/ PUT).*
- ✓ *De forma colaborativa entre las instituciones, los usuarios y las comunidades locales, presentar al proyecto CITES - ITIO propuestas de estudios para un sistema de monitoreo.*
- ✓ *Incentivar los PMF de manera que sean una opción favorable para los productores.*
- ✓ *De los países presentes, Argentina, Bolivia y Paraguay, los dos primeros cuentan con Plan de*
- ✓ *Manejo de la especie, Bolivia lo realiza por Eco regiones, y Argentina Io tiene formalizado por resolución a nivel nacional. Se considera que un Plan de Manejo Regional del Palo Santo no sería viable, y se concluye en que cada país debe tener el propio, contando con estudios base.*

*Que, la Ley N° 96/92 de Vida Silvestre, establece en su artículo 33: "La Autoridad de Aplicación concederá autorizaciones para la colección, explotación, comercialización, tránsito, importación, exportación,) y reexportación de elementos de la flora silvestre, sea en carácter permanente u ocasional, con base en estudios científicos".----------*

*Que, en setiembre el 2015 se realizaron talleres con profesionales científicos botánicos, de manera a realizar entre otros el Dictamen de Extracción No Perjudicial de la mencionada especie.----------*

AOM/LBVAAO

Resolución N° 560

***POR LA CUAL SE APRUEBA EL DICTAMEN DE EXTRACCION NO PERJUDICIAL PARA LA ESPECIE Bulnesia Sarmientoi (PALO SANTO) EN PARAGUAY, PERIODO 2021-2025.----***

*Que, de acuerdo al Dictamen A.J. N° 844/2021 de fecha la Dirección de Asesoría Jurídica, expresa "...esta Asesoría no opone reparos para la continuación de trámites y aspectos formales del borrador de Resolución... ".----------*

*Que, la Ley N° 1561/2000 "Que crea el Sistema Nacional del Ambiente, el Consejo Nacional del Ambiente y la Secretaría del Ambiente", dispone en el Art. 18 Inc. g) Son funciones y atribuciones del Secretario Ejecutivo: "dictar todas las resoluciones que sean necesarias para la consecución de los fines de la Secretaría, pudiendo establecer los reglamentos internos necesarios para su funcionamiento".----------*

*Que, por Ley N° 6.123/2018 "Eleva al rango de Ministerio a la Secretaría del Ambiente y pasa a denominarse Ministerio del Ambiente y Desarrollo Sostenible.----------*

*Que, el Decreto N° 140 de fecha 29 de agosto de 2018, nombra al Señor César Ariel Oviedo Verdún, como Ministro del Ambiente y Desarrollo Sostenible.----------*

***POR TANTO,** en ejercicio de sus atribuciones legales, ----------*

***EL MINISTRO***
***DEL MINISTERIO DEL AMBIENTE Y DESARROLLO SOSTENIBLE***
***R E S U E L V E:***

***Art.1°.-APROBAR** el Dictamen de Extracción no Perjudicial de la especie Bulnesia sarmientoi (Palo Santo) en Paraguay, periodo 2021-2025, elaborado por la Consultora **V&S Consultora Ambiental Forestal** y aprobado por la Autoridad Científica CITES Paraguay según Nota DIB/MNHNP N° 09/2021, como anexo de la presente resolución y confirmado por el Comité de Revisión Científica de la Secretaria CITES en Ginebra.----------*

***Art.2°.-COMUNICAR** a quienes corresponda, y cumplido archivar. ----------*

***María Laura Bobadilla***
*Secretaria General*

***Ariel Oviedo***
*Ministro*

AO/MLB/AO

# Dictamen de Extracción No Perjudicial de *Bulnesia sarmientoi* Lorentz ex Griseb. (Palo Santo), en Paraguay

## 2021-2025


**Elaborado por:**
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## ACRONIMOS

| | |
|---|---|
| **MADES:** | Ministerio del Ambiente y Desarrollo Sostenible |
| **SEAM:** | Secretaria del Ambiente (actual MADES) |
| **DGPCB** | Dirección General de Protección y Conservación de la Biodiversidad |
| **DVS:** | Dirección de Vida Silvestre. |
| **DIB/MNHNP:** | Dirección de Investigación Biológica/Museo Nacional de Historia Natural del Paraguay |
| **Autoridad Administrativa CITES PY:** | DVS |
| **Autoridad Científica CITES PY:** | DIB/MNHNP |
| **INFONA:** | Instituto Forestal Nacional |
| **DGB/DGRF/ INFONA** | Dirección General de Bosques/Dirección de Gestión de Recursos Forestales/Instituto Forestal Nacional |
| **DGOR/ INFONA:** | Dirección General de Oficinas Regionales/Instituto Forestal Nacional |
| **DSNIF/INFONA** | Dirección de Sistema Nacional de Información Forestal/ Instituto Forestal Nacional |
| **UNA/FCA/CIF:** | Universidad Nacional de Asunción/Facultad de Ciencias Agrarias/Carrera de Ingeniería Forestal |
| **PRONII:** | Programa Nacional de Incentivo a los Investigadores |
| **CONACYT:** | Consejo Nacional de Ciencia y Tecnología |
| **MIC:** | Ministerio de Industria y Comercio |
| **REDIEX:** | Red de Inversores y Exportadores / Ministerio de Industria y Comercio |
| **VUE:** | Ventanilla Única del Exportador |
| **VUI:** | Ventanilla Única de Importador |
| **DENP:** | Dictamen de Extracción No Perjudicial |
| **PMF** | Plan de Manejo Forestal. |
| **PUT** | Plan de Uso de la Tierra |
| **IFN** | El Inventario Forestal Nacional |
| **PPM** | Parcelas Permanentes de Monitoreo |

## CONTENIDO

## I. ANTECEDENTES

El Palo Santo (*Bulnesia sarmientoi* Lorentz ex Griseb.), es una especie de gran valor cultural y económico, de la cual se han obtenido múltiples beneficios en Paraguay, Argentina y Bolivia. Anteriormente, su explotación, ya sea por los distintos pueblos indígenas de la región y/ o por los pobladores locales, no representaba un peligro para su conservación; sin embargo, en los últimos años, los niveles de exportación han aumentado en tanto que los ecosistemas que lo contienen cada vez más han sufrido deforestación.

La especie, fue considerada para su inclusión dentro del Apéndices II de la Convención sobre el Comercio Internacional de Especies Amenazadas de Fauna y Flora Silvestres (CITES) en el año 2003, debido a su similitud con la especie de la misma familia ZYGOPHYLLACEAE, *Guaiacum sanctum* L., lo que implicaba disminuir la disponibilidad dc productos derivados de esta especie en el mercado internacional.

La postura de Argentina como país dentro del área de distribución fue de colaboración, asumiendo el compromiso con Paraguay para realizar los estudios pertinentes y presentar en forma conjunta la propuesta de inclusión de la especie dentro del Apéndice II.

Paraguay recabó datos biológicos, pero no lo suficientemente representativos para conocer el estado actual de la especie. Argentina, por su lado, tampoco obtuvo toda la información necesaria para la inclusión de la especie dentro del Apéndice II durante la CoP14, por lo que, a modo de precaución, solicitó la inclusión de la especie dentro del Apéndice III (PC17 Doc. 5.3 (Rev. 1). Esta medida entró en vigor el 12 de febrero de 2008 para otorgar más tiempo a los países del área de distribución y generar información detallada sobre la especie, haciendo énfasis a los datos requeridos para la inclusión de las especies dentro del Apéndice II de CITES, siguiendo las disposiciones de la Res. Conf. 9.24 (Rev. CoP14), detalladas en el Anexo 6 del mismo documento, sobre los criterios para enmendar los Apéndices I y II, y teniendo en cuenta el objetivo 1.4 de la Conf. 14.2, que dice textualmente que "Los Apéndices reflejan correctamente las necesidades de conservación de las especies". También teniendo en cuenta los párrafos a y b del inciso 2 del Artículo II de la Convención, mencionados anteriormente.

En la CoP15, Argentina presentó la propuesta (CoP15 Prop. 42 – p. 2) de inclusión de la especie *Bulnesia sarmientoi* dentro del Apéndice II, con todos los requisitos necesarios que exige CITES. La propuesta de enmienda fue aceptada y entró en vigor a partir de junio del año 2010, con la anotación *#11*, que designa trozas, madera aserrada, láminas de chapa de madera, madera contrachapada, polvos y extractos.

Este documento sigue las normativas de CITES para la elaboración de Dictámenes de Extracción no Perjudicial para especies arbóreas, teniendo en cuenta las actualizaciones y revisiones de algunas Resoluciones, según lo acordado en la 18ª reunión dc la Conferencia de las Partes de la CITES (Ginebra, Agosto 2019). (Wolf, D. 2018, versión 2020).

## II. INFORMACIÓN DE LA ESPECIE

### 2.1. Biología Reproductiva

#### 2.1.1. Antecedentes botánicos y ecológicos de la especie

*Bulnesia sarmientoi* Lorentz ex Griseb. una especie arbórea de la familia ZYGOPHYLLACEAE, que se distribuye dentro del Gran Chaco Americano.

La especie fue descrita por Grisebach en el año 1879. Posteriormente, Lorentz, la coloca dentro del género *Bulnesia* y la nombra como *Bulnesia sarmientoi* Lorentz ex Griseb. El material tipo fue recolectado en la Provincia de Salta, por Lorentz y Hieronymus en 1873. Se encuentra depositado en el herbario de Córdoba (CORD).

Como información reciente, en la Base de Datos de Flora del Cono Sur del Instituto de Botánica Darwinion, se revela que *Gonopterodendron sarmientoi* (Lorentz ex Griseb.) A.C. Godoy Bürki et al es la nueva denominación taxonómica de *Bulnesia sarmientoi* Lorentz ex Griseb., teniendo como referencia bibliográfica el artículo publicado en el 2018 por A. C. Godoy-Bürki y colaboradores. Este último se refiere a un trabajo de investigación a nivel cromosómico de la Subfamilia Larreioideae de la Familia Zygophyllaceae que, de acuerdo al análisis filogenético, se establece la nueva denominación taxonómica de la especie.

En respuesta a una consulta que se realizó a la Comisión Científica de CITES, referente a la actualización nomenclatural de dicha especie, ésta informó que oportunamente se hará la comunicación oficial a los países donde se distribuye la especie y también en la página oficial de la Convención.

***Taxonomía***

| | |
|---|---|
| Clase: | Magnoliopsida |
| Orden: | Zygophyllales |
| Familia: | Zygophyllaceae |
| Subfamilia: | Larreoideae |
| Género: | *Bulnesia* |
| Especie: | *B. sarmientoi* Lorentz ex Griseb. |
| Sinónimos: | *Bulnesia gancedoi* Rojas Acosta |

**Nombres comunes**

Palo santo, guayacán, guayacán morado (Español); Gaïac (Francés); Palosaunda (Dialecto alemán - menonitas de Paraguay); Holy wood, guaiacwood (Inglés); Pau santo (Portugués).
En diferentes idiomas aborígenes están, en ibiocaí, hok (Mataco), meemong (Lengua-Maskoy), yvyra ocái (Guaraní), ticiyuk (Maka), jooc (Nivaclé) y arai (Ayoreo).

**Nombres comerciales**

Vera. Verawood, lignum vitae, Paraguay lignum vitae, Argentine lignum vitae, guaiac

## Características Biológicas

Árbol: de 8 - 20 metros de altura, copa rala, estrecha, redondeada en la cima, ramas ascendentes, entrenudos de 2-3 cm de largo y nudos ensanchados con anillos. Tronco recto, corto, a veces acanalado, con un DAP de 30 a 70 cm., corteza externa de color pardo, áspero y verrugoso, grietas irregulares poco profundas con placas irregulares a lo largo del tallo, corteza interna resinosa, de color amarillento y con gránulos diminutos de color anaranjado (López, J. et al, 1987).

Hojas: opuestas, caducas, compuestas, 2-pinnadas, pecioladas, lampiñas, dispuestas sobre ramas muy cortas; los foliolos son opuestos, ovados, asimétricos, redondeados en los extremos, glabros o solamente pubescentes en los márgenes, margen entero, de 1,5 a 4 cm de largo y 1,2 cm de ancho, con 4-7 nervios desde la base, subparalelos, poco visibles y sésiles sobre el pecíolo corto de menos de 1 cm. Los estomas son ciclocíticos y anomocíticos, con células epidérmicas numerosas y pequeñas (Arambarri, 2011).

Flores: blanco-amarillentas, pentámeras, hermafroditas, de 1,5 a 2 cm de ancho, están dispuestas 1 o 2 sobre las ramas (Imagen.6). Fruto cápsula pardo rojiza a grisácea cuando maduro y verde antes de la maduración, de 3,5 a 5 cm de largo, con tres alas grandes semicirculares, cada fruto con tres semillas oblongas, color verde lustrosas, de 1 a 1,5 cm de largo (Imagen 3).
Madera: La albura es blanco – amarillento y el duramen pardo – amarillento a pardo – verdoso característico; presenta veteado hermoso y bastante marcado del tipo espigado y formando por fajas longitudinales, más oscuras con brillo suave. Las sustancias resinosas y aceites esenciales que poseen sus elementos, le agregan un perfume agradable característico. La madera es muy dura y pesada (1.100 a 1.280 kg/m3), con abundantes cristales de Oxalato de Calcio, lo que le da ese color y resina (o aceite esencial) entre las fibras, ofreciendo dificultad para trabajarla. (CoP15 Prop. 42 – p. 2). La corteza externa marrón es dura y áspera con grietas irregulares no muy profundas que forman placas pequeñas que le da una apariencia verrugosa. Se desprende en trozos al ser frotada. (Degen & Mereles, 1997).

## Fenología

La fenología del Palo Santo comienza en primavera y concluye en verano, la floración ocurre de octubre a noviembre y la fructificación de diciembre a febrero, aproximadamente. La época de germinación de las semillas se da recién en invierno, es decir, aproximadamente 4 meses después de fructificar (Pin, et al, 2009) (Figs. 3-5). La especie alcanza el estado adulto aproximadamente a los 20 años (Brack & Weik, 1994). Los frutos maduros permanecen en la planta por varios meses (Palacios R.A., 2012). El mecanismo de dispersión de las semillas es la anemocoria, los frutos están provistos de alas membranosas, facilitando el transporte por el viento.

**Imagen 1.** Ramas en flores (M. Motte)

**Imagen 2.** Ramas con frutos verdes (L. Pérez de Molas)

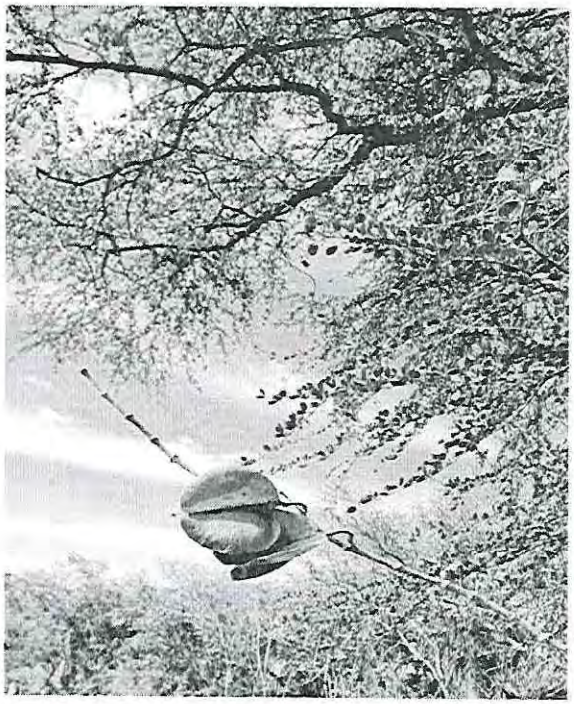


Imagen **3.** Rama con fruto (A. Vargas)

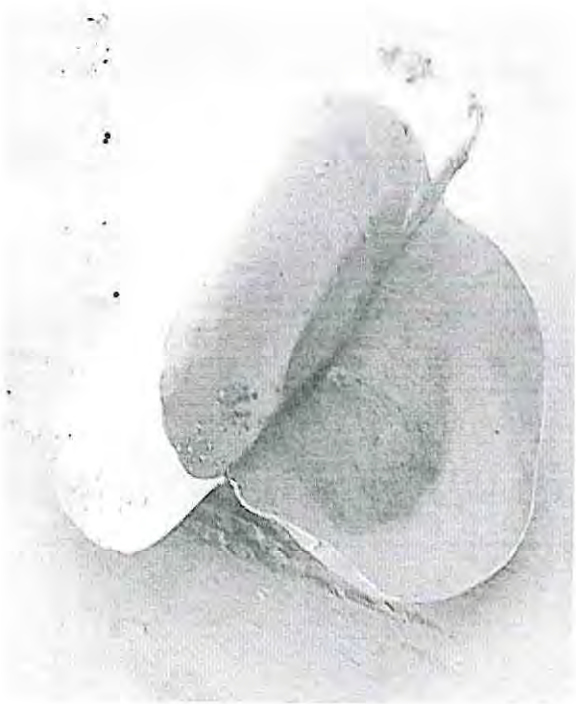


Imagen **4.** Fruto verde (A. Vargas)

**Imagen 5.** Semilla (T. Florentín Peña)

**Imagen 6.** Flores y boton floral (Lidia Perez de Molas)

## Mortalidad Natural

Según Rempel (2007), en observaciones de campo que realizó, detectó la mortalidad de árboles en estado de pudrición de la especie, coincidente con el paso de un viento muy fuerte que pudo haber desarraigado a los mismos; estos datos llaman la atención, por lo que deberían realizarse estudios sobre las causas de la mortandad de estos individuos para descartarlas o considerarlas como amenazas.

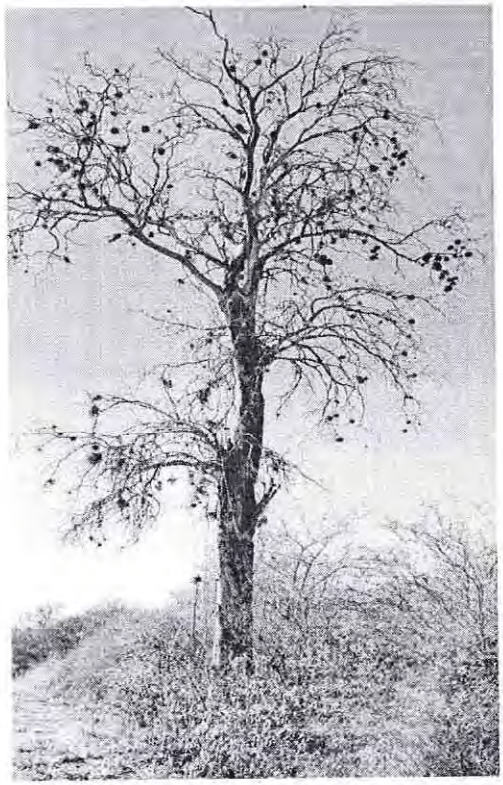


**Imagen 7.** Árbol muerto (A. Vargas)

## 2.2. HÁBITAT

Según Navarro (1997), la especie prefiere suelos arcillosos no muy bien drenados. Otros autores mencionan también que esta especie prefiere sitios bien drenados, lo que indica que la misma se desarrolla en condiciones diferentes en los países del área de distribución. En el Chaco Paraguayo, *Bulnesia sarmientoi* crece en los bosques xerófitos, Mereles (2005). Se desarrolla sobre suelos arcillosos, muy estructurados, duros cuando seco y pegajosos cuando húmedos, salobres a salados y con napa freática salobre a salada por encima de los 6 m de profundidad. En este ambiente, es la especie dominante del estrato superior, formando rodales puros denominados "palosantales", se encuentra frecuentemente asociada con *Sarcomphalus mistol*, *Maytenus vitis-idaea*, *Lycium boerhaviaefolium*, *Salta triflora* y *Trithrinax schyzophylla*. También se la encuentra en forma aislada dentro del bosque xeromórfico, compuesto por *Aspidosperma quebracho-blanco*, *Sarcotoxicum salicifolium*, *Cynophalla retusa*, *Tabebuia nodosa* y *Stetsonia coryne*, entre otras.

En la zona de distribución dentro del Chaco Argentino, el Palo Santo se encuentra en dos tipos de unidades fisonómicas, correspondientes al matorral o bosque bajo sobre paleocauces y en mosaicos de fisonomías sobre planicies aluviales de cursos menores. Es un árbol típico del Chaco seco, que puede crecer tanto en forma aislada o formando pequeños rodales en sitios bien drenados. (Giménez, 2003).

Cuando forma masas o poblaciones densas (36-110 individuos/ha), se desarrolla sobre suelos muy específicos y en transición, principalmente entre Solonetz y Cambisoles. (Céspedes, 2018). (Viveros Cuando forma masas o poblaciones densas (36-110 individuos/ha), se desarrolla sobre suelos muy específicos y en transición, principalmente entre Solonetz y Cambisoles. (Céspedes, 2018). (Viveros Cabaña, 2005), define que los suelos donde se adapta mejor *Bulnesia sarmientoi* Lorentz ex Griseb., son los Cambisoles (fracción de arcilla 30% y limosa bastante alta) y Luvisoles (los más abundantes del Chaco central, arenosos pasando por textura limosa hasta arcillosa en profundidades de hasta 70 cm, ricos en P, Mg y K) y eventualmente los Gleysoles (saturados por periodos prolongados, a partir de los 50 cm, generalmente con 50 a 80% de arcilla, en algunos casos con alto contenido de sal).

En su relación con especies exóticas, se ha demostrado que el Palo Santo tiene un efecto alelopático sobre una gramínea invasora, la especie *Megathyrsus maximum*, conocida como gatton panic, que es muy utilizada por ganaderos del Chaco. (Viveros Cabaña, 2005).

## 2.3. ÁREA DE DISTRIBUCIÓN

El Palo Santo *(Bulnesia sarmientoi)* es una especie endémica del Gran Chaco Americano, que se distribuye desde el sudeste de Bolivia (17°S), sectores limítrofes de Brasil, hasta el norte de Argentina donde alcanza su límite austral a los 25°S aproximadamente y por el centro-oeste de Paraguay., formando rodales casi puros denominados palosantales o puede formar parte de las especies arbóreas del bosque chaqueño típico (Cabrera, 1976; mencionado por Loto (2018). (Ilustración N° 1)

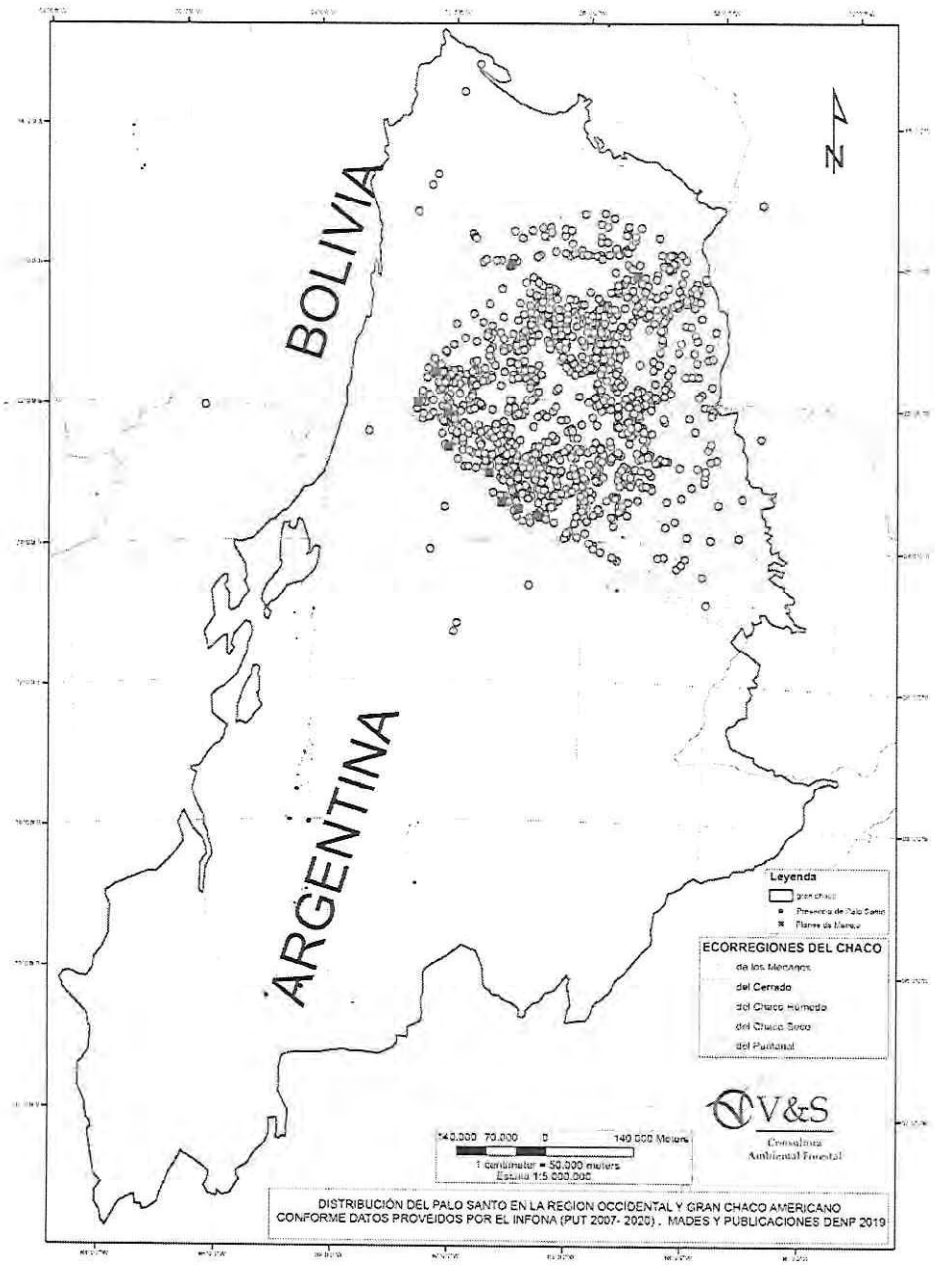
- **Argentina:** Norte y Noroeste (Provincias de Chaco, Salta, Formosa y Santiago del Estero).
- **Bolivia:** Sur-Este (Departamentos de Oruro, Santa Cruz y Tarija).
- **Brasil:** Sur-Oeste (Estado de Mato Grosso do Sul).

- **Paraguay:** Oeste (Departamentos de Alto Paraguay, Boquerón y Presidente Hayes). En este país tiene una amplia distribución, prácticamente abarca las 3/4 partes del Chaco paraguayo (CoP15 Prop. 42 – p.2).

En Paraguay, el Chaco americano abarca específicamente los departamentos de Alto Paraguay (8.234.900 ha), Boquerón (9.166.900 ha) y Presidente Hayes (7.290.700 ha), que juntos ocupan el 100% de la superficie de la Región Occidental. (REDIEX, 2009). Está localizado geográficamente entre los paralelos 19°-24° y los meridianos 57°-63° respectivamente.

La especie *Bulnesia sarmientoi* se encuentra presente en todas las Ecorregiones del Chaco, abarcando principalmente la Ecorregión Chaco Seco. Sin embargo, la especie tiene una distribución más abundante en la zona aledaña al Rio Pilcomayo.

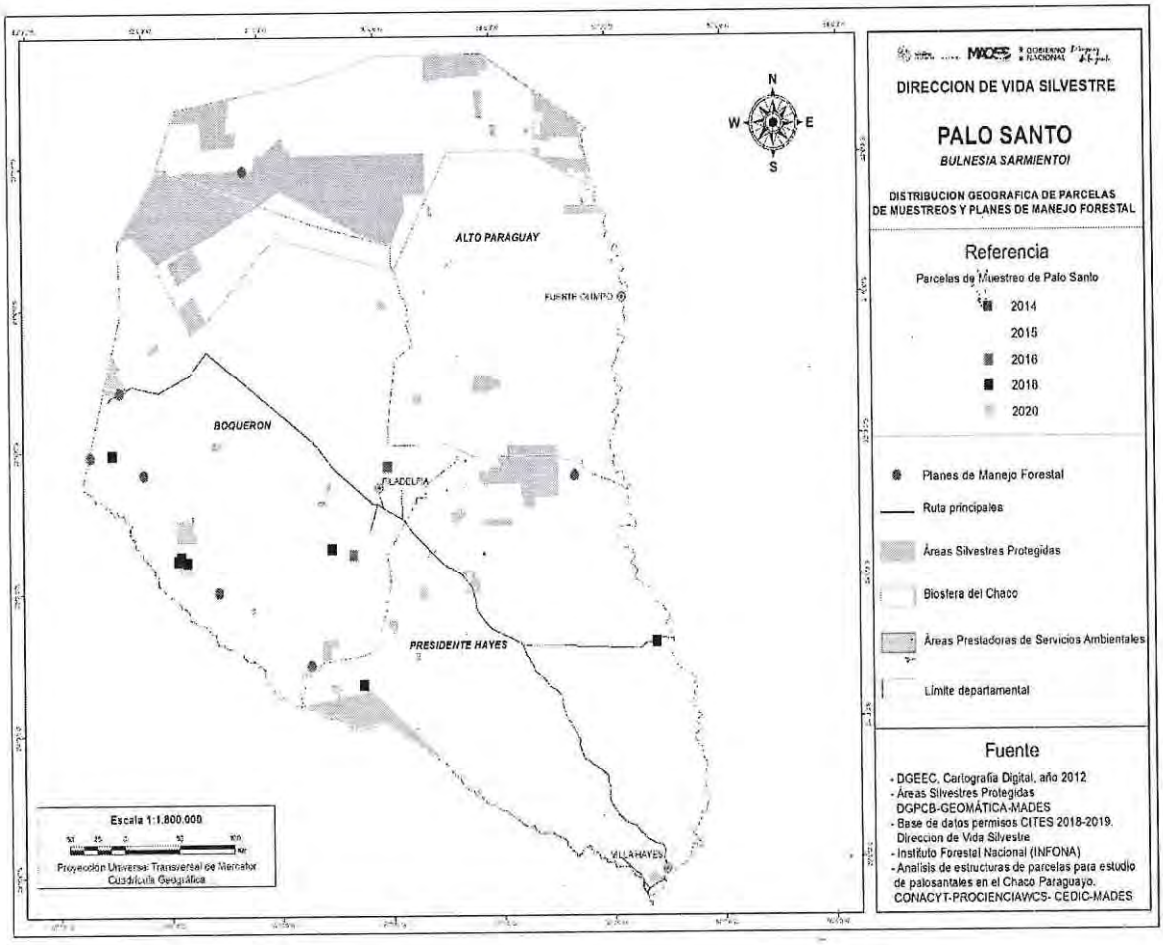
**Ilustración N° 1.** Distribución de *Bulnesia sarmientoi en* el Gran Chaco Americano




Fuente: V&S Consultora Ambiental Forestal (2021).

La Ilustración N° 1 muestra la distribución de la especie tomando como referencia los datos obtenidos de los 10 Planes de Manejo Forestal aprobados por el INFONA, de las publicaciones de Flora del Paraguay, Tesis de la Universidad Nacional de Asunción (UNA), de los sitios con Servicios Ambientales donde se constata la presencia de Palo Santo, Parcelas Permanentes instaladas por el INFONA, MADES y UNA y datos obtenidos del DENP 2017.

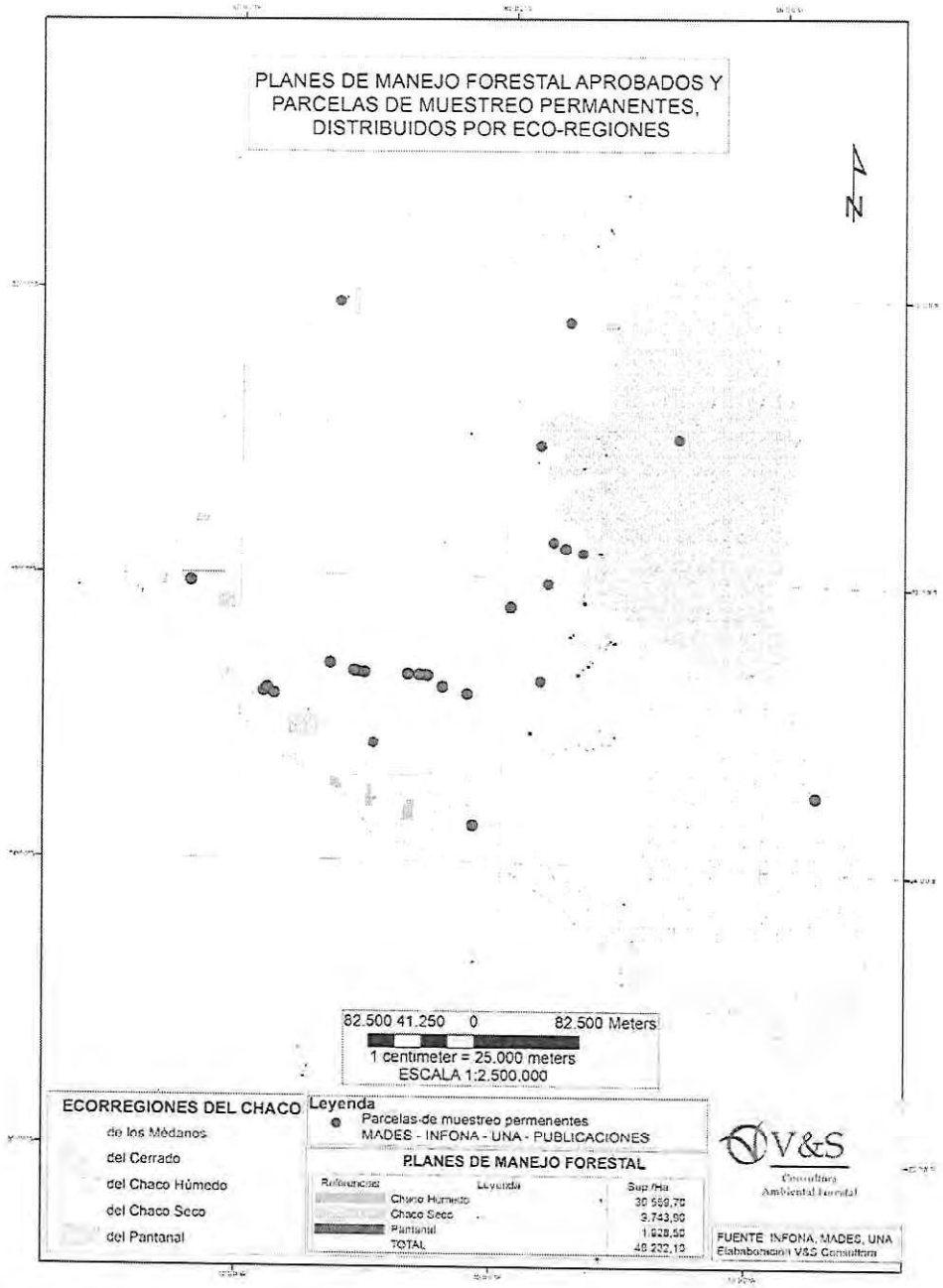
**Ilustración N° 2.** Ubicación de los sitios de distribución geográfica de parcelas de muestreo y Planes de Manejo Forestal de *Bulnesia sarmientoi* (2021).




Fuente: MADES 2021.

La Ilustración N° 2 se elaboró con datos proveídos por la Autoridad Administrativa donde se registra la especie dentro de las Áreas Protegidas, propiedades con Servicios Ambientales y sitios de investigación en las parcelas permanentes del INFONA-MADES-UNA.

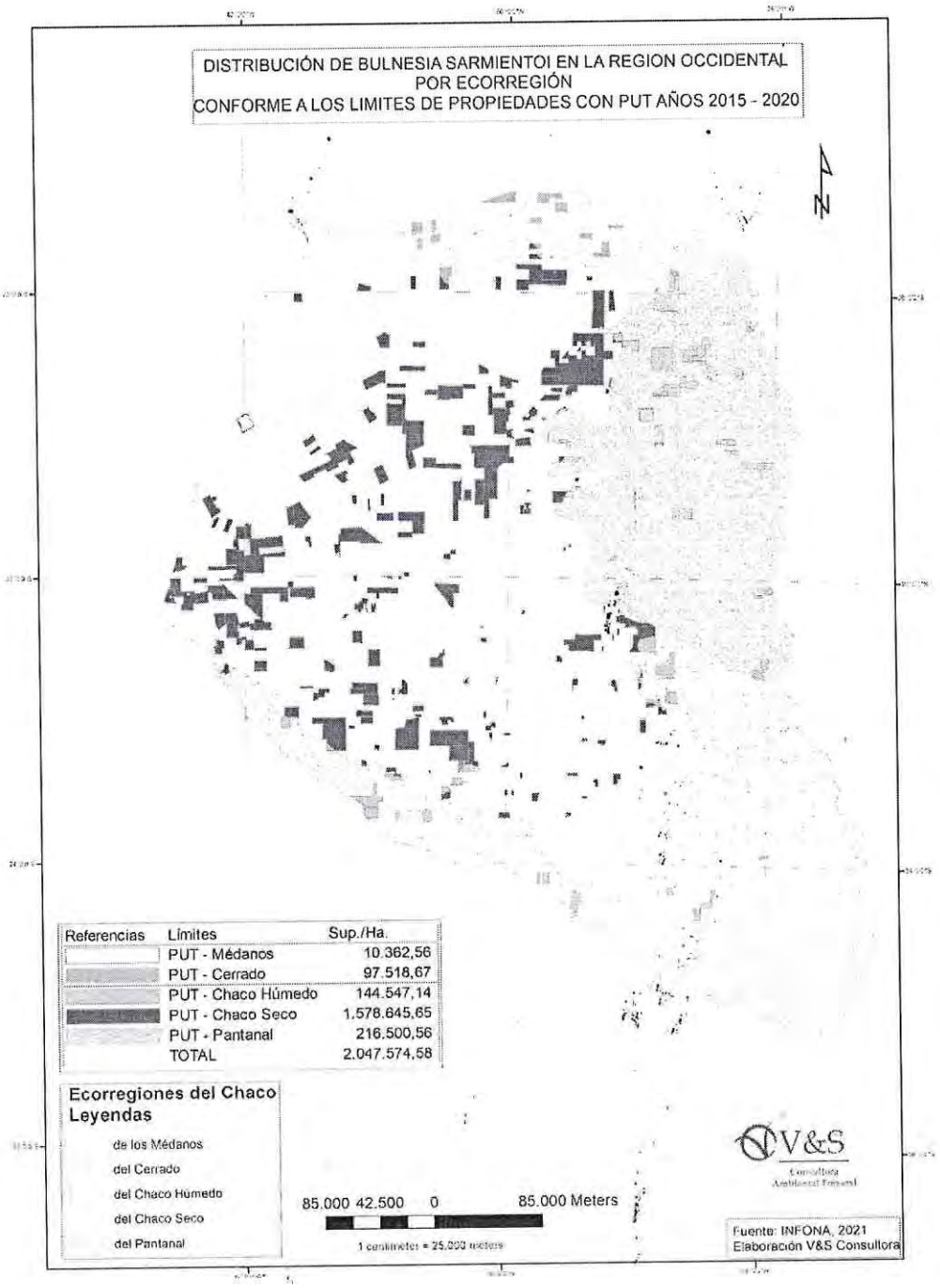
**Ilustración N° 3.** Ubicación de los sitios donde se encuentran los 10 Planes de Manejo Forestal y las Parcelas Permanentes e Inventario Forestal con *Bulnesia sarmientoi.* (2015-2020).




Fuente: Instituto Forestal Nacional. (2021), MADES-INFONA-UNA (2021), Céspedes (2018).

La Ilustración N° 3 muestra la distribución espacial de 10 Planes de Manejo Forestal vigentes proveídos por el INFONA, y las Parcelas Permanentes (MADES/INFONA/UNA) y del Inventario Forestal Nacional (INFONA), donde se observan los sitios con PMF y estudios de investigación de *Bulnesia sarmientoi,* distribuidos por Ecorregión.

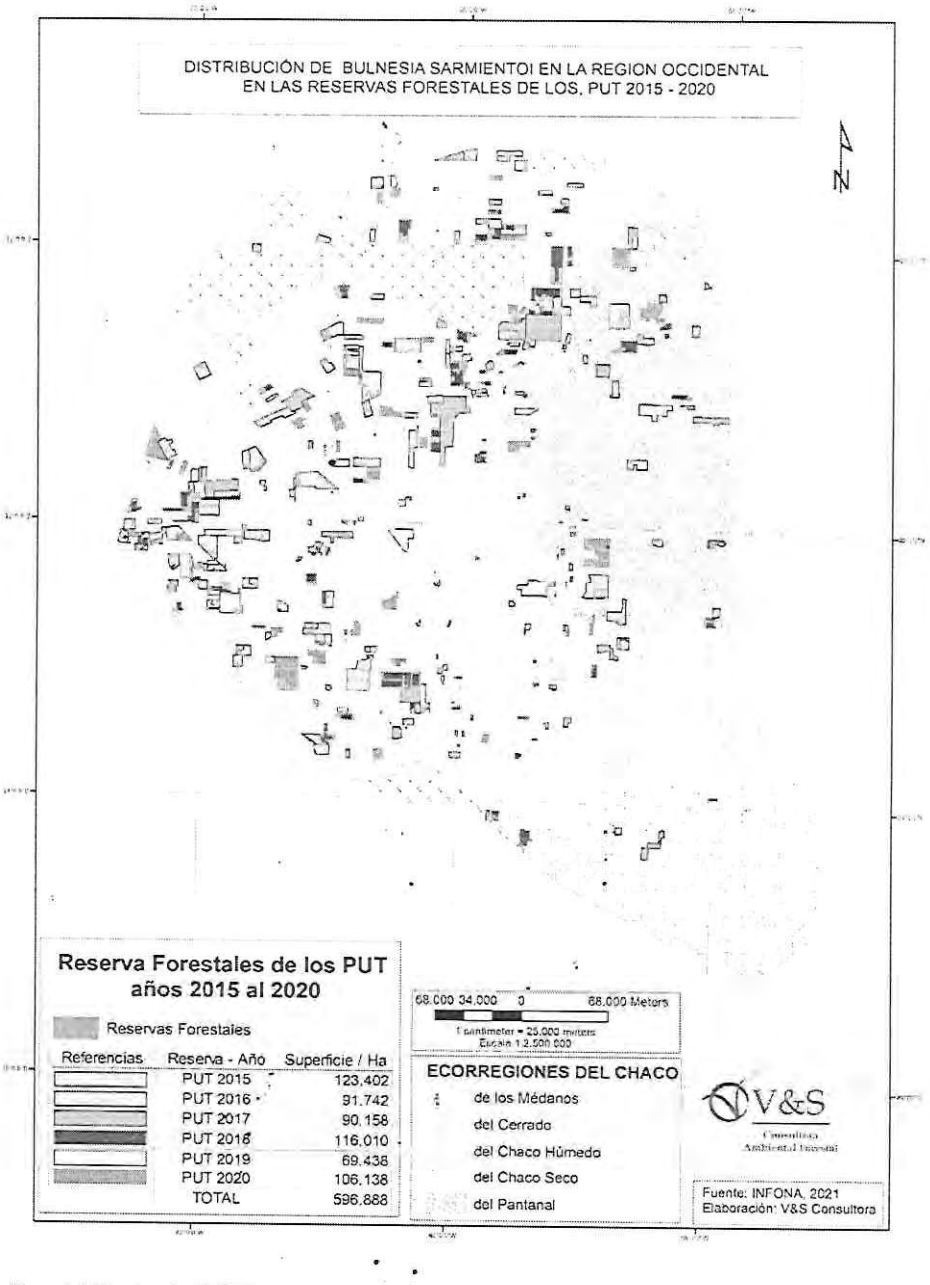
**Ilustración N° 4.** Distribución de *Bulnesia sarmientoi.* de acuerdo a los Planes de Uso de Tierra del INFONA (2015-2020).




Fuente: Instituto Forestal Nacional. (2021).

La Ilustración N° 4 muestra la ubicación de los Planes de Uso de la Tierra, aprobados por el INFONA, donde se registra existencia de la especie de Palo Santo. Estas propiedades mantienen las reservas forestales legales del 25% y más.

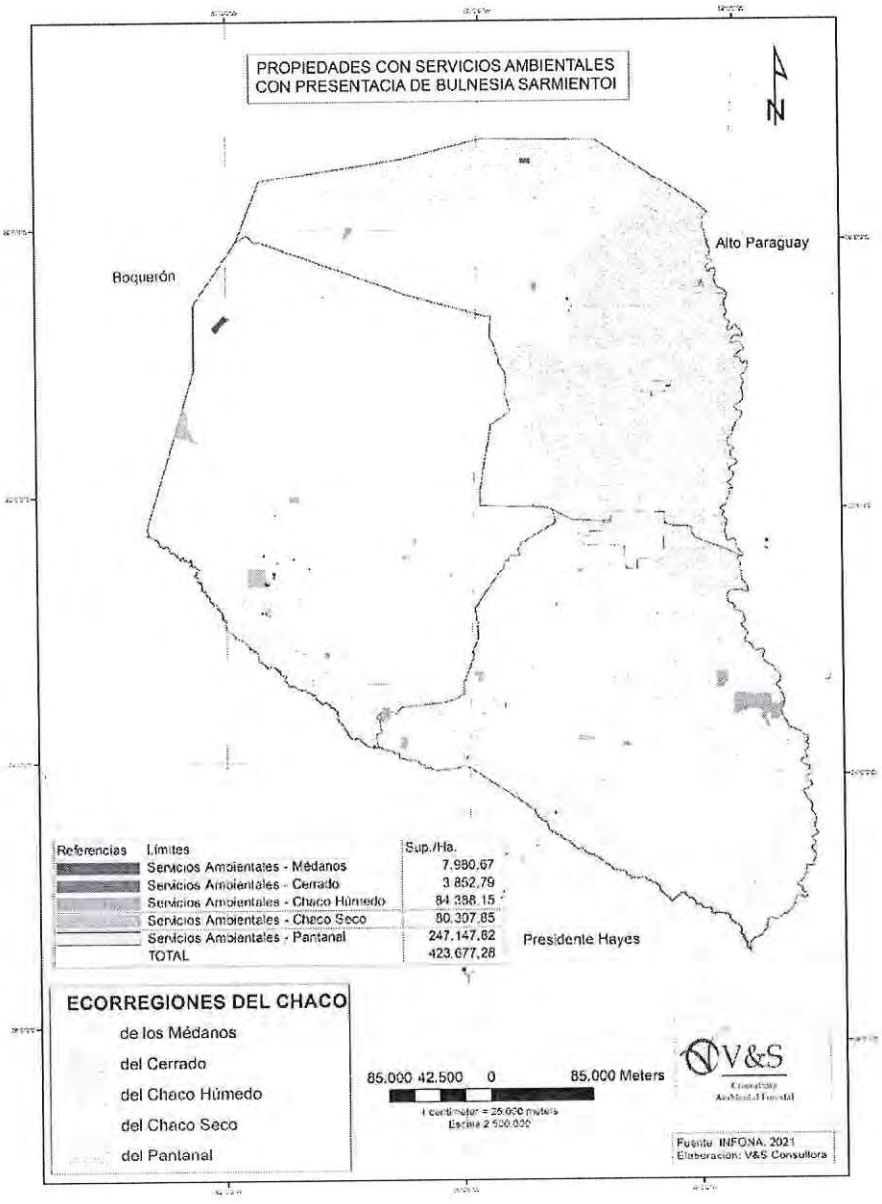
**Ilustración N° 5.** Distribución de *Bulnesia sarmientoi* en las reservas forestales de acuerdo a los Planes de Uso de Tierra aprobados por el INFONA (2015-2020).




Fuente: Instituto Forestal Nacional. (2021).

La ilustración N° 5 muestra la distribución de las Reservas Forestales de los Planes de Uso de la Tierra, aprobados por el INFONA (2015-2020), donde la ocurrencia del Palo Santo es marcada, cuya extensión aproximada es de 596.888 ha., que podrían ser aprovechados como futuros Planes de Manejo Forestal.

**Ilustración N° 6.** Presencia de *Bulnesia sarmientoi* en propiedades con Servicios Ambientales (2013-2019).




Fuente: MADES (2021)

En la Ilustración N° 6 se observan las propiedades que están bajo el régimen de Servicios Ambientales, de conformidad con la Ley N° 3001/2006, donde la ocurrencia de la especie *Bulnesia sarmientoi,* podría ser importante.

## 2.4. REGENERACIÓN NATURAL

La regeneración natural es la capacidad de una masa forestal de producir nuevos individuos a partir de semillas, emisión de brotes, renuevos de cepa y/o de raíz, logrando la perpetuidad de la misma, sin intervención de la mano del hombre (Serrada, 2003).

El éxito de cualquier regeneración depende de varios factores que frecuentemente varían según la especie. En todo caso, son imprescindibles dos condiciones: las cantidades de semillas viables y las condiciones microclimáticas y edáficas adecuadas para la germinación. Louman et al., Op. Cit. y Lamprecht, Op. Cit., citado por Ramírez, (2011).

### Reproducción sexual o por semillas

La floración de Palo Santo inicia en primavera y la fructificación de de mayo a junio, durando de 8 a 9 meses el proceso en condiciones naturales. (Brack & Weik, 1994; Viveros, 2005).

Los frutos tienen forma de cápsula y su unidad de dispersión es la semilla, este medio de dispersión corresponde a la autocoria, mecanismo relacionado únicamente a la planta madre que deja caer las semillas una vez maduras.

Una experiencia de germinación de Palo Santo en el Chaco argentino arrojó un porcentaje de viabilidad de semillas superior al 80%, con una sobrevivencia del 10% en dos meses. Los requerimientos hídricos de la especie indican que precisa de poco riego, altas temperaturas y abundante luz solar (Haene & Aparicio, 2001). Se ha demostrado además que la salinidad no es una variable que afecta a la germinación del Palo Santo. (Galeano, 2014).

### Reproducción asexual o por raíces

La reproducción asexual ocurre a través de raíces gemíferas, que son yemas en el extremo de las mismas cubiertas por un meristemo.

**Imagen N° 8.** Regeneración por raíz (A. Vargas)

Regeneración por rebrote (A. Vargas)

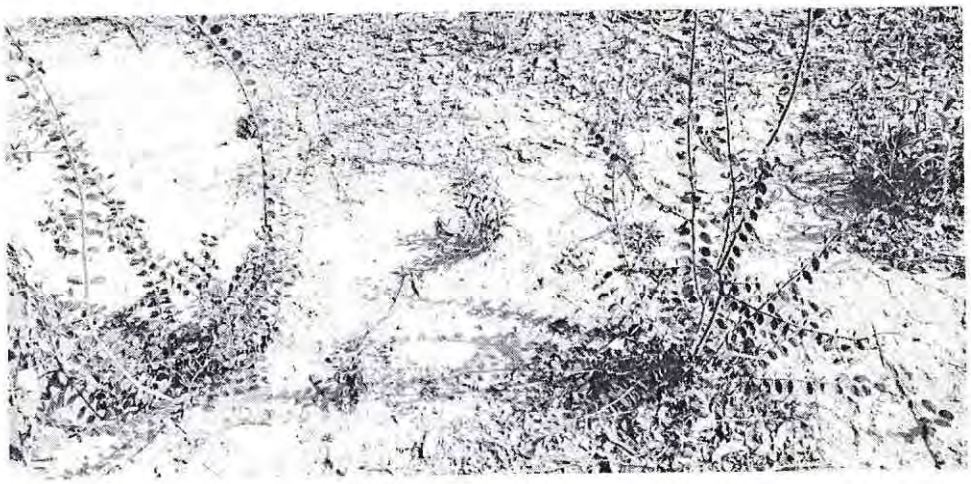


**Imagen N° 9.**Regeneración natural por raíces gemíferas (A. Vargas)

Según estudios realizados por Toews (2004), en parcelas de un sistema silvopastoril, ubicadas en el Dpto. de Boquerón (22° 05′11,1′′ S y 59°25′50,4′′ W), la regeneración de individuos de *Bulnesia sarmientoi* proviene de abundantes rebrotes de raíces, 338 individuos para una superficie de 7,2 ha; correspondiente a unos 47 individuos/ha. (DENP, 2017).

**Abundancia de regeneración**

El rango de abundancia de regeneración del Palo Santo es de 60 a 250 árboles/ha, sin embargo, los estudios conducidos por Pérez de Molas & Méreles, (2007), no concluyen sobre la manera de reproducción de esta especie por lo que no es posible distinguir si las plántulas provienen de semillas o de reproducción asexual.

La densidad poblacional de la regeneración natural registrada en una parcela fue de 455 individuos/ha, abarcando las categorías de plántulas (<0,29 m de altura), brinzales (desde 0,3 a 1,5 m de altura), latizal bajo (desde 1,6 m de altura hasta 4,9 cm de DAP) y latizal alto (desde 5 a 9,9 cm de DAP). Los valores de abundancia registrados en esta investigación son elevados y pueden estar influenciados por las condiciones ambientales del área de estudio, ya que la misma cuenta con un ambiente ideal para su reproducción. (Ramírez, 2011).

En el Chaco argentino, la regeneración de Palo Santo presenta una abundancia de 150 árboles por hectárea. Los valores de renovación observados (DAP 0 – 10 cm) fueron muy diversas, aunque en términos generales eran bajos o mostraron ausencias llamativas en algunas clases, se notó la escasez de individuos en la clase superior de los renovales (7 a 9,9 cm de DAP) y la mayoría de los renovales se concentraba en la clase de 0 a 3,9 cm de DAP. Lo observado sugiere o bien problemas de supervivencia natural de los brotes de Palo Santo, o el efecto negativo del ramoneo del ganado vacuno disperso en toda la región. (Degano & Zerbatto, 2009).

A continuación, se presentan las clasificaciones de regeneración definidas por sus diámetros y alturas, en todos los casos, el límite inferior es de cero individuos/ha, esta gran variabilidad se debe al elevado error determinado en cada una de las categorías. Es notable la escasa presencia de árboles de las 3 primeras categorías. Teniendo en cuenta que la especie tiende a presentar un patrón de distribución de forma agrupada, y habiéndose registrado casos de brotes de raíces, es de esperar que igualmente la regeneración natural presente un patrón de distribución similar al de sus progenitores. (Ramírez, 2011).

**Tabla N° 1.** Regeneración Natural de Palo Santo (95% de confianza)

| Estructura vertical | Parámetros | Abundancia | | Frecuencia (%) |
|---|---|---|---|---|
| | | Promedio (árboles/ha) | Límite Superior (árboles/ha) | |
| Latizal alto | 5cm a 9,9 cm de DAP | 60 | 130 | 40 |
| Latizal bajo* | >5 cm DAC >1,5m altura | 20 | 62 | 5 |
| Brinzal* | ≥0,30 a 1,50 m altura | 250 | 553 | 7,5 |
| Plántulas* | Hasta 0,29 m | 125 | 375 | 1,25 |
| **Total** | | **455** | **1120** | |

*Fuente: Ramírez (2011)*
**El 100% de los individuos registrados en estas categorías provienen de brotes de raíces.*

## Frecuencia de regeneración

La cantidad de individuos por hectárea guarda relación con la distribución de la especie. En la frecuencia de los últimos estratos de regeneración se registran bajos porcentajes en relación a la abundancia de los mismos, los árboles se agrupan en pequeñas superficies del bosque, indicando una distribución en forma agrupada.

La frecuencia absoluta de cada una de las categorías de la regeneración natural establece que todos los individuos de la categoría Plántulas (< 0,29 m de altura) representan 1,25 %, los Brinzales (> 0,30 m hasta 1,50 m de altura) 7,5 %, los Latizales bajos (>1,50 m de altura hasta 4,9 cm de DAP) 5 % y los Latizales altos (5cm hasta 9,9 cm de DAP) 40 %, siendo ésta la categoría que presentó la mayor presencia de individuos en las unidades relevadas. Es notable la escasa presencia de individuos de las 3 primeras categorías. (Ramírez, 2011).

## Estimación del crecimiento

El Palo Santo (*Bulnesia sarmientoi)* es una especie de crecimiento lento. Se pueden comparar los espesores de anillos con otras especies arbóreas de la Región Chaqueña como *Schinopsis quebracho-colorado*, con un espesor medio de 2,19 mm (Giménez, Ríos, 2000) y *Aspidosperma quebracho-blanco* con 2,1 mm. (Giménez, A. *et al.*, 2007); (DENP, 2017).

Los resultados de estudio divulgados en el DENP 2017, sobre el crecimiento estimado de *Bulnesia sarmientoi*, se presentan en la Tabla N° 2.

**Tabla N° 2.** Estimación de las edades de los árboles muestreados. *Fuente: DENP (2017)*

| N° de árbol | Departamento | Ecorregión | DAP (cm) | Conteo directo | | Conteo digital | | Edad estimada (años) |
|---|---|---|---|---|---|---|---|---|
| | | | | Cant. de anillos | Crecimiento | Cant. de anillos | Crecimiento | |
| 1 | Presidente Hayes | Chaco Húmedo | 51,0 | 181 | 0,28 | 178 | 0,29 | 180 |
| 2 | Boquerón | Chaco Seco | 32,5 | 107 | 0,30 | 112 | 0,29 | 109 |
| 3 | Boquerón | Chaco Seco | 35,3 | 128 | 0,28 | 128 | 0,28 | 128 |
| 4 | Presidente Hayes | Chaco Húmedo | 43,1 | 121 | 0,36 | 115 | 0,38 | 119 |
| 5 | A. Paraguay | Pantanal | 35,0 | 121 | 0,29 | 123 | 0,28 | 122 |
| 6 | A. Paraguay | Pantanal | 45,5 | 132 | 0,35 | 133 | 0,34 | 132 |
| 7 | Boquerón | Chaco Seco | 39,3 | 155 | 0,25 | 155 | 0,25 | 155 |
| 8 | Boquerón | Chaco Seco | 35,6 | 146 | 0,24 | 147 | 0,24 | 146 |
| 9 | A. Paraguay | Chaco Seco | 31,9 | 95 | 0,34 | 95 | 0,34 | 95 |
| 10 | A. Paraguay | Chaco Seco | 39,0 | 99 | 0,39 | 101 | 0,39 | 100 |
| 11 | A. Paraguay – A. Dulce | Chaco Seco | 31,0 | 115 | 0,27 | 113 | 0,27 | 114 |
| 12 | A. Paraguay – A. Dulce | Chaco Seco | 36,0 | 106 | 0,34 | 104 | 0,35 | 105 |

El DENP (2017) menciona que la evolución del DAB y la edad son relevantes para determinar estructuras de edades para bosques irregulares. Para un DAB de 45 cm corresponde una edad de 100 años. Los límites de confianza generales estimados en el presente trabajo son menores (0,29 - 0,33 cm/año).

En el 2018, en las localidades de Ing. Juárez y Las Lomitas de la Provincia de Formosa, Argentina, se realizó un estudio que indica que *Bulnesia sarmientoi* presenta anillos de crecimiento con un espesor promedio de 3,06 mm. El diámetro promedio obtenido para el rango de edad que la ley permite para la corta (80+/- 5 años) fue de 41,1 cm. Los individuos del sitio Ing. Juárez, presentaron un comportamiento constante en el incremento anual (IA) a través del tiempo, a diferencia de Las Lomitas que presentó mayor variación. Se podría inferir que el crecimiento de los árboles en Ing. Juárez, es independiente de la edad. Esto puede responder a que dicho sitio presenta diferencias en lo que se refiere a la precipitación anual acumulada, como así también puede estar influenciado por el relieve y/o las condiciones edáficas. En tanto el incremento anual diametral promedio para el rango de edad de 70 a 95 años, es de 6,0 mm en Las lomitas y de 4,2 mm en Ing. Juárez. (Chifarelli. V., 2018).

Giménez, en el 2008, realizó un estudio en Bazán, Lote 27, Provincia de Formosa, Argentina que tuvo por objeto caracterizar la calidad de madera rolliza y analizar la potencialidad de crecimiento del Palo Santo (*Bulnesia sarmientoi*). Para el estudio de crecimiento y leño se apearon 10 individuos en parcelas de inventario, dando como resultado que el tiempo entre clases diamétricas de 5 cm es de 12 años y la rotación de 62 años, para alcanzar el diámetro mínimo de corta. A partir de la remedición de los árboles de Palo Santo se calculó un incremento periódico anual de 1,14 mm/año. (Loto, 2018).

Rempel, en 2021, en Blumental, Departamento de Boquerón, realizó un estudio de análisis de crecimiento de árboles de Palo Santo de diferentes clases diamétricas y en diferentes condiciones fisionómicas de los bosques, con lo que se pudo constatar lo siguiente: En el área silvopastoril, que son árboles dejados en pie en combinación con la implantación de pasturas, tras 14 años de medición, se constató un crecimiento promedio diametral de 9,3 cm y una diferencia promedio, por árbol, de las distintas clases diametrales de 0,660 cm anual. Sin embargo, en el área de bosques de franjas de protección de la misma parcela, con un tiempo de medición de 12 años, el crecimiento diametral fue de 3,4 cm y una diferencia promedio por árbol de 0,28 cm anual. (Ver Tabla N° 3).

**Tabla N° 3.** Crecimiento comparativo del *B. sarmientoi* en áreas silvopastoril y franjas de separación

| Mediciones 14 años | | | | | | | Mediciones 12 años | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Fuste (m) | DAP (cm) | | DAP (cm) | | | Fuste (m) | DAP (cm) | | DAP (cm) | |
| Árbol N° | | 2007 | 2007 | 2021 | Diferencia | x año | Árbol N | 2009 | 2009 | 2021 | Diferencia | x año |
| 1 | P. santo | 3,0 | 24,4 | 32,9 | 8,5 | 0,607 | 21 | 3,8 | 35,5 | 38,6 | 3,1 | 0,26 |
| 2 | | 4,0 | 29,9 | 40,4 | 10,5 | 0,750 | 22 | 3,0 | 7,5 | 12,8 | 5,3 | 0,44 |
| 3 | | 4,0 | 26,0 | 36,1 | 10,1 | 0,721 | 23 | 2,0 | 4,8 | 9,4 | 4,6 | 0,38 |
| 4 | | 5,0 | 23,4 | 32,3 | 8,9 | 0,636 | 24 | 3,8 | 35,5 | 37,7 | 2,2 | 0,18 |
| 5 | | 6,5 | 26,8 | 0,0 | muerto | | 25 | 3,9 | 31,6 | 0,0 | muerto | |
| 6 | | 4,7 | 29,5 | 36,7 | 7,2 | 0,514 | 26 | 2,7 | 20,2 | 29,9 | 9,7 | 0,81 |
| 7 | | 4,8 | 33,5 | 41,8 | 8,3 | 0,593 | 27 | 2,5 | 40,6 | 42,0 | 1,4 | 0,12 |
| 8 | | 5,5 | 33,0 | 40,3 | 7,3 | 0,521 | 28 | 2,2 | 8,4 | 12,7 | 4,3 | 0,36 |
| 9 | | 4,5 | 19,3 | 32,8 | 13,5 | 0,964 | 29 | 5,3 | 36,3 | 39,4 | 3,1 | 0,26 |
| 10 | | 5,0 | 27,4 | 37,8 | 10,4 | 0,743 | 30 | 5,3 | 31,8 | 33,5 | 1,7 | 0,14 |
| 11 | | 4,2 | 28,7 | 37,0 | 8,3 | 0,593 | 31 | 2,5 | 15,4 | 23,1 | 7,7 | 0,64 |
| 12 | | 4,0 | 21,7 | 32,8 | 11,1 | 0,793 | 32 | 3,3 | 10,5 | 14,5 | 4,0 | 0,33 |
| 13 | | 3,7 | 26,9 | 31,2 | 4,3 | 0,307 | 33 | 1,7 | 13,5 | 16,8 | 3,3 | 0,28 |
| 14 | | 1,6 | 19,2 | 32,3 | 13,1 | 0,936 | 34 | 0,9 | 31,7 | 33,5 | 1,8 | 0,15 |
| 15 | | 6,0 | 33,3 | 40,0 | 6,7 | 0,479 | 35 | 4,0 | 35,5 | 36,2 | 0,7 | 0,06 |
| 16 | | 5,0 | 20,2 | 31,7 | 11,5 | 0,821 | 36 | 4,0 | 26,5 | 28,4 | 1,9 | 0,16 |
| 17 | | 4,0 | 43,5 | 52,3 | 8,8 | 0,629 | 37 | 0,9 | 35,5 | 37,0 | 1,5 | 0,13 |
| 18 | | 4,0 | 18,1 | 28,8 | 10,7 | 0,764 | 38 | 4,5 | 26,4 | 29,7 | 3,3 | 0,28 |
| 19 | | 4,0 | 14,4 | 23,6 | 9,2 | 0,657 | 39 | 4,3 | 36,5 | 39,9 | 3,4 | 0,28 |
| 20 | | 3,8 | 17,6 | 24,7 | 7,1 | 0,507 | 40 | 3,8 | 32,3 | 34,0 | 1,7 | 0,14 |
| **Promedio** | | **4,4** | **25,8** | **33,3** | **9,3** | **0,660** | **Promedio** | **3,2** | **25,8** | **27,5** | **3,4** | **0,28** |

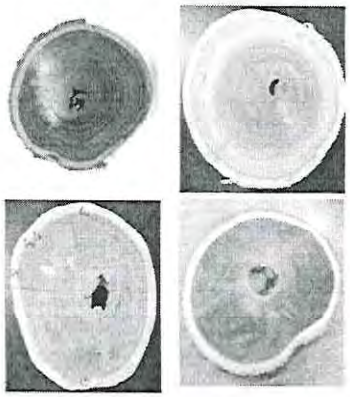
Fuente: E. Rempel (2021)

## Sanidad

La sanidad de los árboles hace referencia a la calidad en lo que se refiere a estado fitosanitario (sanos, enfermos, con heridas, acanalados) y calidades de fuste (recto, tortuoso, inclinado). Los defectos más frecuentes del rollo de Palo Santo son las costillas basales y la excentricidad del fuste. (Giménez, A. *et al*, 2007).

En un estudio realizado durante la cosecha, para determinar los daños y el estado fitosanitario del Palo Santo, se encontró que el 67% de los árboles cosechados estaban afectados en menos del 25%, mientras que, los árboles afectados en más de un 50% de la troza, fueron el 100% de los que se cosecharon con más de 35 cm de DAP. (DENP, 2017).

**Imagen N° 9.** Sanidad de Palo santo a 1,30 m de altura



Fuente: DENP. (2017)

### El poder calorífico y contenido de cenizas del Palo Santo

El poder calorífico promedio del Palo Santo es de 5.165 cal/g y el porcentaje de partículas de cenizas es de 2,5%, además proporciona carbón de calidad, se enciende fácilmente y produce humo fragante.

Si bien no es una de las especies más utilizadas como combustible sólido, se han registrado grandes cantidades de exportaciones de carbón y, en menor proporción, de leña, demostrándose así que es una especie de alta calidad para combustión y que podría ser más valorizada en el mercado.

**Tabla N° 4.** Determinación de cenizas y poder calorífico de *Bulnesia sarmientoi*

| Valores | Métodos | Árbol | | | | | | Promedio |
|---|---|---|---|---|---|---|---|---|
| | | 5 | 6 | 7 | 8 | 9 | 10 | |
| **Cenizas** (%p/p) | ABNT-NBR 8112-86 | 2,04 | 2,27 | 1,74 | 3,16 | 4,36 | 1,7 | **2,55** |
| **Poder calorífico** (cal/g) | ASTM D5865-04 | 5.206 | 5.254 | 5.196 | 5.134 | 5.065 | 5.137 | **5.165** |

Fuente: INTN (2016)

## 2.5 AMENAZAS

### Estado de conservación

**En Peligro (EN):** según UICN (API) (Unión Internacional para la Conservación de la Naturaleza). Lista Roja de la UICN publicada en https://www.iucnredlist.org. (Barstow, M., 2018).

Actualmente la especie se encuentra en el Apéndice II de la CITES, con anotación #11, que designa trozas, madera aserrada, láminas de chapa de madera, madera contrachapada, polvos y extractos.

En el año 2004, la SEAM publica su lista de "***elementos especiales***", donde se incluye a la especie *Bulnesia sarmientoi*, con rango de categoría N2N3, que implica que el elemento está en peligro en el país debido a su rareza (6-20 localizaciones, pocos individuos por hectáreas), u otros factores que lo hagan muy propensos a desaparecer del país o región y que el elemento es raro en el país o si bien es abundante en el país, es perseguido por el hombre por algún factor, según criterios del Centro de Datos para la Conservación – Paraguay.

A nivel nacional, según Resolución SEAM N° 2243/06, la especie es considerada como "En peligro de extinción"; por otra parte, en la Resolución SEAM N° 2531/06 especifica que las especies en peligro de extinción, no pueden ser explotadas ni industrial ni comercialmente a excepción de las que provienen de planes de manejo aprobados por las autoridades competentes, y que cuentan con sus correspondientes licencias ambientales.

*Por Resolución MADES N° 470/2019, la especie sigue siendo considerada como especie protegida de la flora silvestre nativa del Paraguay.*

### Degradación o pérdida de hábitat

La deforestación en Paraguay, especialmente en la Región Occidental o Chaco, donde la superficie boscosa remanente es todavía importante, es el gran desafío que se debe enfrentar a través de las políticas públicas y el Mecanismo REDD+ para la conservación de estos bosques, además de la internalización de la presión económica proveniente del sector ganadero principalmente.

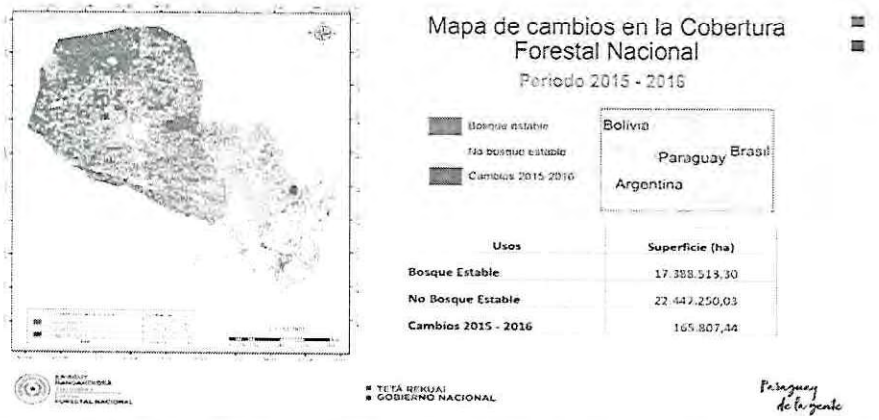
Entender las dinámicas asociadas al proceso de la deforestación requiere de una visión histórica donde el rescate y la comprensión de los principales hitos que rodearon al quehacer productivo y social resultan primordiales. Nos resulta útil en consecuencia un análisis de las causas directas y subyacentes, sin ahondar en el contexto en el cual se produjeron.

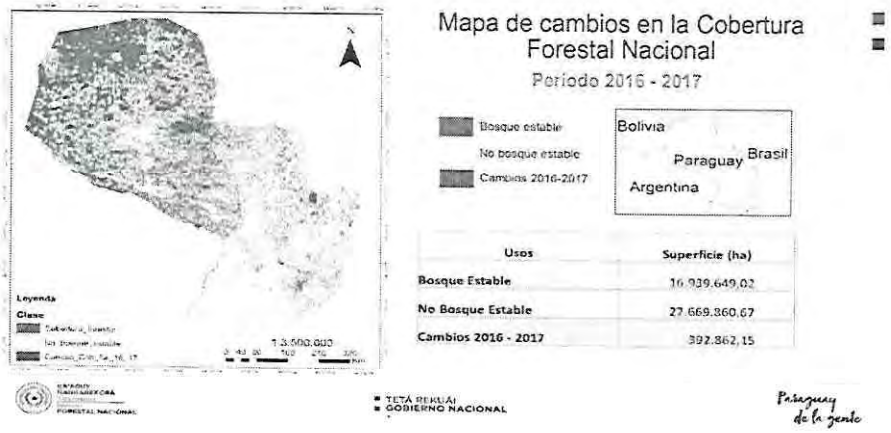
Las causas directas que se detectaron son: la expansión de la ganadería y agricultura, esta última en menor escala, utilización de la biomasa como leña y carbón, invasión de tierra/tala ilegal, asentamientos/colonias e incendios forestales o el uso de fuego para limpieza.

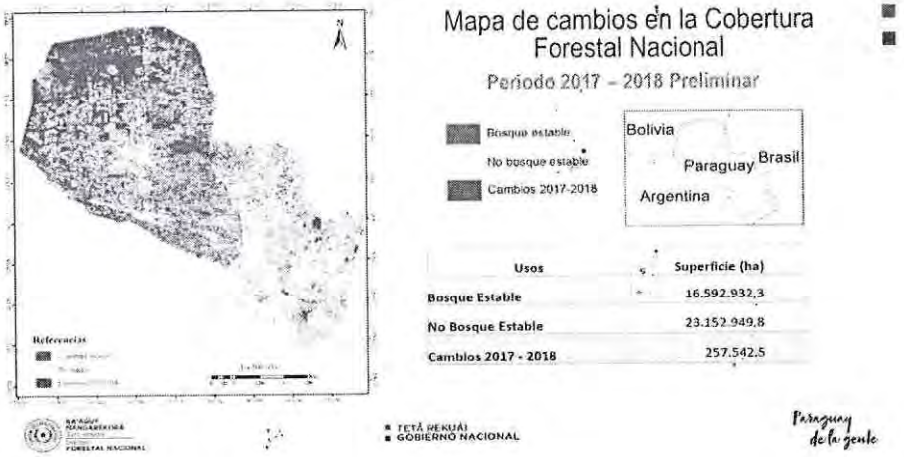
Las causas indirectas serian insuficiente incentivo para la conservación del bosque, políticas sectoriales desarticuladas, mercado internacional (precio), necesidad de capacidad institucional, factores culturales (impunidad), factores estructurales (multas y sanciones), pobreza (MADES/ PNUD/ FCPF, 2019).

Las ilustraciones siguientes muestran los cambios en la cobertura forestal nacional, ocurridos entre los años 2015-2018, que totalizan aproximadamente 816 mil hectáreas.

**Ilustración N° 7.** Cambio de Cobertura Boscosa (2015-2018)






Fuente: INFONA, 2021

**Incendios**

Los incendios son otra gran amenaza para el Gran Chaco. En el 2019, los incendios arrasaron miles de hectáreas de los bosques de esta región, incluyendo áreas protegidas que son de gran importancia para la conservación de especies.

En Paraguay, los incendios afectaron tres áreas protegidas ubicadas dentro del Pantanal, una de las principales reservas de humedales de Sudamérica. Según registros de la Secretaría de Emergencia Nacional, tanto en el Pantanal como en el área de Chovoreca fueron consumidas por las llamas 37.000 hectáreas de bosques. Se presume que el fuego fue provocado por intervención humana, aunque los detalles de la investigación aún no se conocen.

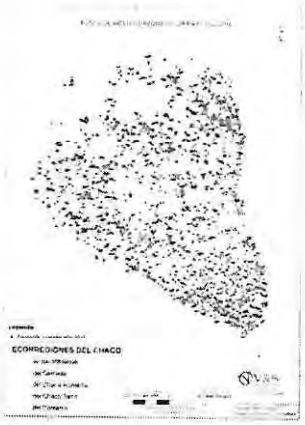
Los incendios forestales en la Región Occidental tienden a ocurrir anualmente, con mayor o menor incidencia sobre los bosques de la región, dependiendo de las anomalías climáticas, principalmente la falta de lluvias. Los meses de mayor ocurrencia de incendios son lo que coinciden con el fin de los meses secos: julio, agosto, setiembre, octubre e incluso noviembre, siendo los picos más altos agosto y septiembre.

Las causas que provocan estos incendios pueden ser varias; sin embargo, existe consenso de que una de las principales es la quema para limpieza y renovación de pasturas o habilitación de terrenos. Se citan además como causales las limpiezas en la franja de seguridad de las rutas, las fogatas realizadas por pescadores y cazadores a lo largo del río Paraguay y el origen por causas naturales. Según estudios científicos, las tormentas eléctricas son las causas más comunes de incendios iniciados de manera natural. (Brey et al, 2018); (Keeley y Syphard, 2018).

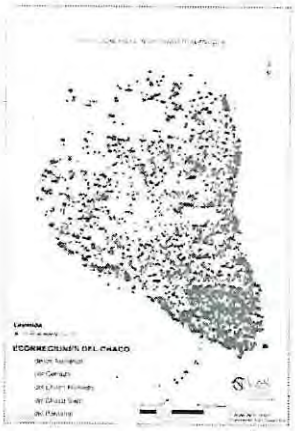
Los tres departamentos de la Región Occidental figuran frecuentemente entre las áreas donde se registra el mayor número de focos de calor. En el último reporte del Instituto Forestal Nacional (INFONA), de abril 2021, se detectaron 824 focos en Boquerón, 166 en Alto Paraguay y 134 en el Departamento de Presidente Hayes.

A continuación, mapas demostrativos de focos de calor en la Región Occidental (2015-2020).

**Ilustración N° 8.** Focos de calor 2015-2020




2015




2016


2017

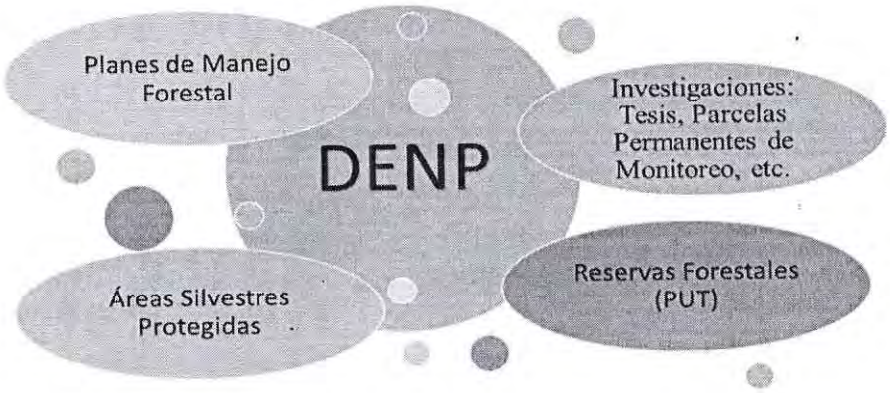

2018


2019


2020

## CRITERIOS PARA EL DISEÑO Y RELEVAMIENTO DE DATOS PARA ELABORAR EL DENP

***Diagrama de DENP***




Fuente: INFONA, 2021

## 2.6. POBLACIÓN ESTIMADA DE *Bulnesia sarmientoi* EN PARAGUAY

Para la elaboración de este documento, se tomaron en consideración los Planes de Manejo Forestal proveídos por el INFONA. También se tuvieron en cuenta los datos de las parcelas permanentes, instaladas por las Autoridad de CITES PY (MADES), INFONA y la UNA, dentro del marco del Proyecto *"Evaluación poblacional del palo santo (Bulnesia sarmientoi) en localidades de los Departamentos Alto Paraguay, Boquerón y Presidente Hayes"*, como así también los trabajos de Tesis de Grado de la UNA relacionados con la especie, las colecciones de herbario, y las publicaciones científicas sobre la especie desde el 2015 hasta la fecha. (Ilustración N° 3)

### PLANES DE MANEJO FORESTAL

Los 10 Planes de Manejo Forestal aprobados por el Instituto Nacional Forestal (INFONA), vigentes a la fecha y que incorporan el aprovechamiento del Palo Santo, totalizan una superficie de **48.232,1 ha**. Estos reportan, para cada área del plan, informaciones y valores de existencia en N° de árboles, Área Basal y Volumen comercial por hectárea, con indicación de los volúmenes aprovechables calculados o estimados de acuerdo a criterios establecidos por la Resolución N° 07/2002. Sobre esta base, la Autoridad Administrativa podrá tomar las decisiones de otorgar cupos para la exportación, principalmente del Palo Santo.

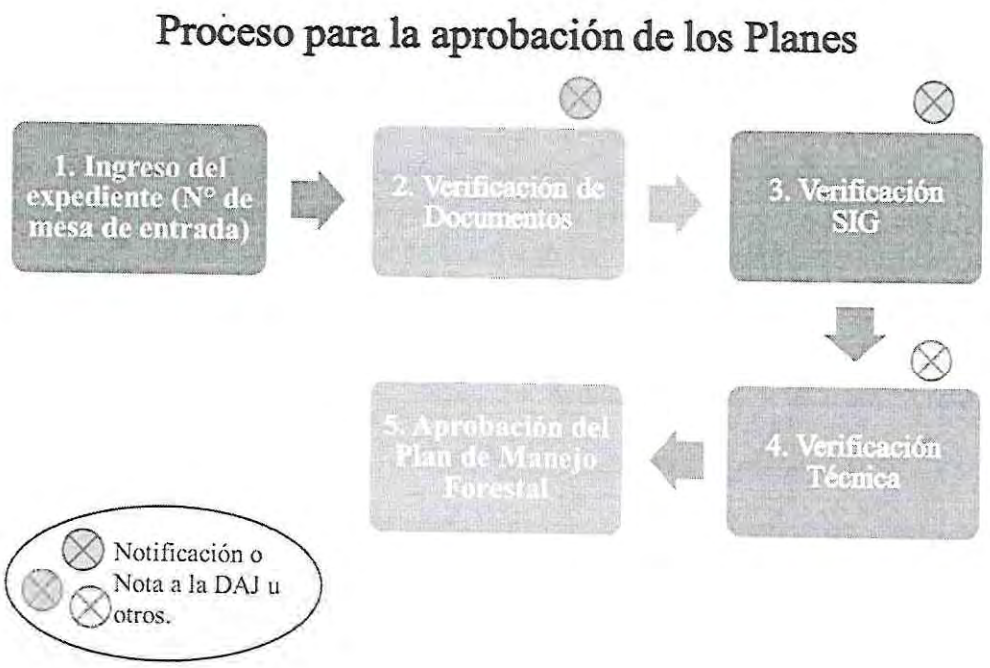
Asimismo, las Reservas Forestales que se establecen en función a los Planes de Uso de la Tierra, aprobados por el INFONA **(Ilustración N° 5)**, representan importante área (aproximadamente 597.000 ha) para su potencial manejo a través de Planes de Manejo Forestal, para el aprovechamiento de la especie ***Bulnesia sarmientoi.***

La elaboración de los Planes de Uso de la Tierra se sustenta en la Resolución SFN INT. N° 224/01 y la Resolución INFONA N° 348/12, fundamentado en el Artículo 42 de la Ley N° 422/73 "Forestal", que textualmente expresa *"Todas las propiedades rurales de más de veinte hectáreas en zonas forestales deberán mantener el veinticinco por ciento de su área de bosques naturales"*. En este mismo contexto, el

Inciso "c", del Artículo 1° de la Resolución SFN N° 1.105/07 **"POR LA CUAL SE ESTABLECEN NORMAS TÉCNICAS PARA LA PROTECCIÓN Y EL RACIONAL APROVECHAMIENTO DE LA ESPECIE FORESTAL PALO SANTO (*Bulnesia sarmientoi)*"**, establece que *"Las parcelas a ser desmontadas, no deberán superar a 100 ha. en forma continua. En dichas parcelas se deberá dejar un bosquete en el área de distribución de la especie, correspondiente al 5% de la superficie de la misma En caso de encontrarse dispersa la especie en la parcela a desmontar, se deberá aumentar el área a ser destinada como reserva forestal o franja de protección, a razón del 5% de cada parcela a ser desmontada"*. (Ver Ilustraciones N°5 y 8).

**Aprobación de los Planes**

La elaboración y presentación de los Planes de Manejo Forestal se rige por la Resolución SFN INT N° 07/02, sustentado en la Ley 422/73 "Ley Forestal" y su Decreto Reglamentario N° 1168/75. El proceso de aprobación de dichos planes, por el INFONA, sigue las etapas abajo indicadas en la infografía.




Fuente:
INFONA/DGRF 2021

**Cosecha**

Las especificaciones y consideraciones técnicas para la elaboración de los planes de manejo, incluyendo las operaciones de cosecha del Palo Santo están contenidas en los Términos de Referencias para la Elaboración de Planes de Manejo Forestal aprobado por la Resolución SFN INT N° 07/02. En el Capítulo III de los referidos Términos de Referencia, se prescribe que "Todo manejo forestal deberá conservar la diversidad biológica y sus valores asociados, los cursos de agua, los suelos y ecosistemas frágiles y únicos, además de los paisajes. Al realizar estos objetivos, las funciones ecológicas y la integridad del bosque, podrán ser mantenidas".

Tal como lo describe Villalba, (2018), en la mencionada resolución se establece que en el inventario forestal de reconocimiento deberá utilizarse un muestreo sistemático, de parcelas de tamaño fijo, no menor a 4.000 $m^2$ distribuidas sobre el área total a manejar. Las intensidades mínimas de muestreo se

fijarán en función a la superficie total del área a inventariar, así para superficies de hasta 1.000 hectáreas la intensidad mínima será del 0,5%. Se medirán los árboles con DAP igual o mayor a 10 cm, tomándose las variables especie, número de árbol, área basal, volumen comercial, volumen total, calidad de rollos y estado sanitario. Se determina como error de muestreo permisible el 10% sobre los totales de los parámetros número de árboles (N); área basal (AB) y volumen (V), con un nivel de confianza de los 90%, expresados como porcentajes del promedio.

Para el procesamiento de los datos del inventario se tendrá en cuenta, como mínimo, los siguientes aspectos: los resultados se resumirán en cuadros de distribución diamétrica de 10 cm. de DAP en adelante para cada especie, grupos de especies y el total de las especies utilizando clases diamétricas de 10 cm. de amplitud. Las especies deberán agruparse, al menos, en dos grupos: (1) Especies con valor comercial actual o potencial; y, (2) Las demás especies. Las variables a ser analizadas son: Número de individuos (N); Área Basal en $m^2$ (AB) y Volumen Comercial en $m^3$ (V). El Plan de Corta deberá tomar como referencia el Volumen resultante a todos los árboles de todas las especies con diámetros mínimo de corta. Villalba, (2018).

Como lo describe Villalba, (2018), una vez que el PMF es aprobado por INFONA, el profesional forestal deberá presentar el Plan Operativo Anual (Cuarteles de Corta) que no es más que la división administrativa de los trabajos a ejecutarse. Para las operaciones de aprovechamiento se deberá realizar el censo comercial, para ello se obtienen los datos del 100% de todos los árboles con valor comercial con DAP igual o mayor a los diámetros mínimos de corta, para cada especie.

**Temporadas**

No existen temporadas de aprovechamiento de la especie.

**Sistema de monitoreo y control de aprovechamiento**

El Instituto Forestal Nacional (INFONA), es la Autoridad de Aplicación de la Ley N° 422/73 "Forestal" y de la Ley N° 3464/08, y esta última le confiere funciones y atribuciones para:

a) Promover y fomentar el desarrollo forestal mediante la planificación, ejecución y **supervisión de planes**, programas y proyectos, tendientes al cumplimiento de los fines y objetivos de las normativas forestales.

b) **Monitorear y fiscalizar la extracción, industrialización y comercialización de productos maderables y no maderables provenientes del aprovechamiento del bosque** hasta la primera transformación de los mismos.

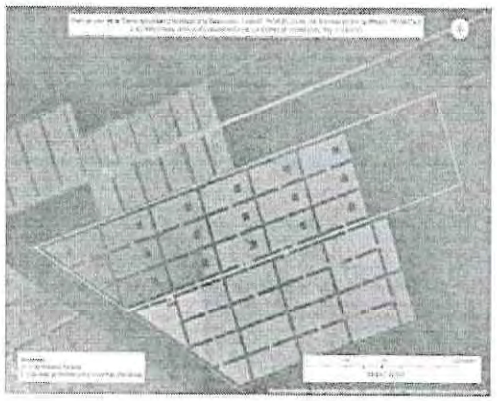
Una vez aprobado el Plan de Manejo Forestal, se deberá informar a la Autoridad de Aplicación el inicio de desarrollo de la actividad de aprovechamiento, que estará sujeto a fiscalizaciones.

En este marco, el INFONA realiza el control y monitoreo del Plan de Manejo para la verificación del cumplimiento de lo prescripto en el Plan aprobado.

En este marco la Dirección General de Oficinas Regionales (DGOR), es la encargada de la fiscalización *"in situ"* para comprobar el fiel cumplimiento de la ejecución del Plan de Manejo.

**Imagen N° 10.** Medición de toconesImagen N° 11. Regeneración en tocones

**Ilustración N° 8.** Islas de bosques con *Bulnesia sarmientoi* en una propiedad con PUT, Reserva Forestal incluida 5% e Islas de bosques *(Resolución SFN N° 1.105/07)*



Fuente: V&S Consultora Ambiental Forestal

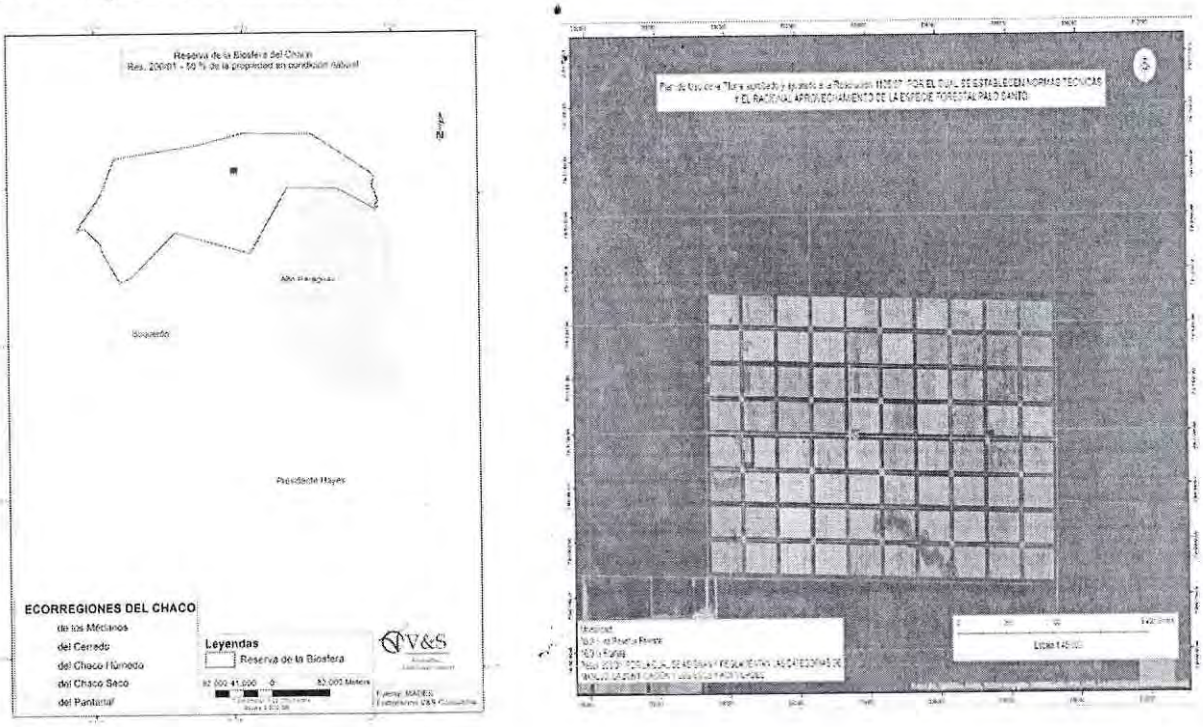
En los considerandos del Decreto N° 13202/2001, que Declara la Reserva de la Biosfera del Chaco, se enuncia: *"La necesidad de proteger extensiones representativas que albergan importantes muestras del patrimonio natural y cultural del Paraguay y en cumplimento de los mandatos de los Tratados suscritos, como base para el desarrollo sostenible a nivel nacional y regional". Asimismo,* el Artículo 7° del mencionado decreto expresa que *"Todos los planes y proyectos de desarrollo que se elaboren y desarrollen en los límites comprendidos en la Reserva de la Biosfera, serán adecuados a las normas ambientales que regulan el manejo y conservación de los recursos naturales y áreas silvestres protegidas, y su implementación ser coordinada por el SEAM y el Comité de Gestión de la Reserva".*

En este mismo contexto, la RESOLUCIÓN N° 200/*01 "POR LA CUAL SE ASIGNAN Y REGLAMENTAN LAS CATEGORIAS DE MANEJO, LA ZONIFICACIÓN Y LOS USOS Y ACTIVIDADES", establece:*

*Art. 22. Se definirá como Categoría VI, bajo el nombre genérico de Reserva* ***de Recursos Manejados, a*** *aquellas áreas que permiten conjugar el mantenimiento de la diversidad biológica con la utilización sustentable de los ecosistemas y sus componentes.*

*Art. 23 Son características de las áreas con categoría de Reserva de Recursos Manejados:*
a) *Poseer como mínimo 50 % de la superficie con mínimas alteraciones antrópicas, o en condiciones naturales.*

**Ilustración N° 9.** Propiedad en la Reserva de la Biosfera




Fuente: Fuente: V&S Consultora Ambiental Forestal (2021)

En esta ilustración se observa como referencia la ubicación de una propiedad dentro de la Reserva de la Biosfera del Chaco, que mantiene el 50% de su estado natural (bosque de reserva, franjas de protección, campo natural).

**Ecorregiones de la Región Occidental o Chaco**

Las Ecorregiones determinadas para la Región Occidental o Chaco en Paraguay fueron establecidas por el MADES en la Resolución SEAM N° 614/2013 del 14 de enero de 2013, "Por el cual se establecen las Ecorregiones para la Región Oriental y Occidental del Paraguay".

Mereles et al (2013), en base a la Resolución SEAM N° 614/2013, realizó un "Análisis cualitativo para la definición de las Ecorregiones de Paraguay". Estas ecorregiones se toman como referencia para ver la incidencia de la especie, distribución y así poder estimar la población de los planes de manejo, datos de investigación y las reservas de acuerdo a las características en cada hábitat.

Las Ecorregiones de la Región Occidental son:

**Médanos**

Los médanos se encuentran al Noroeste, del territorio chaqueño con una superficie de 757.680 ha y se caracterizan por médanos arenosos provenientes de sedimentos arenosos de los ríos Grande y Parapiti en Bolivia. Las especies más representativas de esta formación son: *Aspidosperma pyrifolium*, *Schinopsis cornuta*, *Schinopsis heterophylla*, *Jacaranda mimosifolia*, *Pterogyne nitens*, *Tabebuia aurea*, *Cochlospermum tetraporum*, *Agonandra excelsa*, *Chloroleucon chacoense*, *Elionurus muticus*, *Arachis batizocoi*, *Stachytarpheta* sp., *Gymnocalycium megatae*, *Pfaffia fruticulosa*, *Alternanthera* sp., entre otras.

**Cerrado**

Se ubica en el extremo Norte del Chaco y tiene una superficie de 1.227.920 ha, sus suelos son de dominancia arenosa de manto arenoso con arenas rojas ubicadas en Bolivia, el clima se encuentra entre las isoyetas de 600 a 800mm de Este a Oeste, su vegetación es una sabana arbolada con árboles aislados o islotes de bosques, las especies preponderantes son las siguientes: *Handroanthus albus*, *Cordia* aff. *glabrata*, *Luehea divaricata*, *Magonia pubescens*, *Hymenaea stigonocarpa*, *Hymenaea coubaril*, *Cochlospermum regium*, *Cochlospermum tetraporum*, *Helicteres guazumaefolia*, *Helicteres lhotzkyana*, *Sterculia striata*, *Muellera variabilis*.

**Pantanal**

El Pantanal se ubica al Este de la Región Occidental, sobre la costa litoral de rio Paraguay al norte de Tapucumi, tiene una superficie de 42.023.110 ha, sus suelos están entre los más duros, compactos y estructurados del Chaco Central, Oeste y Suroeste y los fluvisoles de la costa del río Paraguay y arenosoles del Norte y Oeste de la planicie chaqueña. El clima se caracteriza por una precipitación promedio entre 1300/1400 mm sobre la costa del Río Paraguay, la hidrología es la característica más importante de esta ecorregión por el desarrollo y la influencia del flujo de agua. Ocurren bosques con *Balfourodendron riedelianum* y praderas o sabanas arboladas de *Tabebuia aurea*, *Qualea parviflora*, *Duguetia furfurácea*, *Vochysia tucunarum*. También se puede encontrar características de la provincia chaqueña con bosques de *Schinopsis balansae* y las sabanas de *Copernicia alba*. (Oakley et al, 2005). Característico son las sabanas palmares de *Copernicia alba* que se desarrollan sobre suelos arcillosos, anegables, inundables y salobres, con predominancia de *Copernicia alba* en el estrato superior, esta formación es típica del bajo Chaco y todo el litoral del río Paraguay. Mereles, (2007). Ocurren también los bosques de ribera sobre suelos fluvisoles, con especies como: *Triplaris gardneriana*, *Vochysia tucunarum*, *Pouteria glomerata*, *Mimosa pellita*, *Albizia inundata*, *Vitex megapotamica*. (Mereles et al, 2013).

**Chaco húmedo**

Se ubica al sur y suroeste del Pantanal, siguiendo el curso del río Paraguay y extendiéndose hacia el suroeste en la Mesopotamia de los ríos Paraguay-Pilcomayo y más al oeste, con una extensión de 5.192.760 ha. Predominan las sabanas de árboles y arbustos que no sobrepasan los 10m. Es la Ecorregión en donde se desarrolla plenamente el denominado "mosaico bosque-sabana palmares- vegetación acuática", propio de esta parte del Chaco húmedo, asociado a la geomorfología del terreno desde las cotas más altas a las más bajas respectivamente, con los siguientes tipos de vegetación:

*Los bosques sub-húmedos y semi deciduos o "quebrachales de quebracho colorado:* formaciones boscosas transicionales y anegables por tiempo corto y en donde prosperan las siguientes especies, provenientes de varias Ecorregiónes: *Schinopsis balansae, Handroanthus heptaphyllus, Syagrus romanzoffiana, Enterolobium contortisiliquum, Diplokeleba floribunda*, entre otras.

*Sabanas palmares:* Formaciones monotípicas anegables e inundables por más tiempo que la anterior; la especie característica es *Copernicia alba*, acompañada de un rico estrato herbáceo acorde con la presencia por más o menos tiempo del agua.

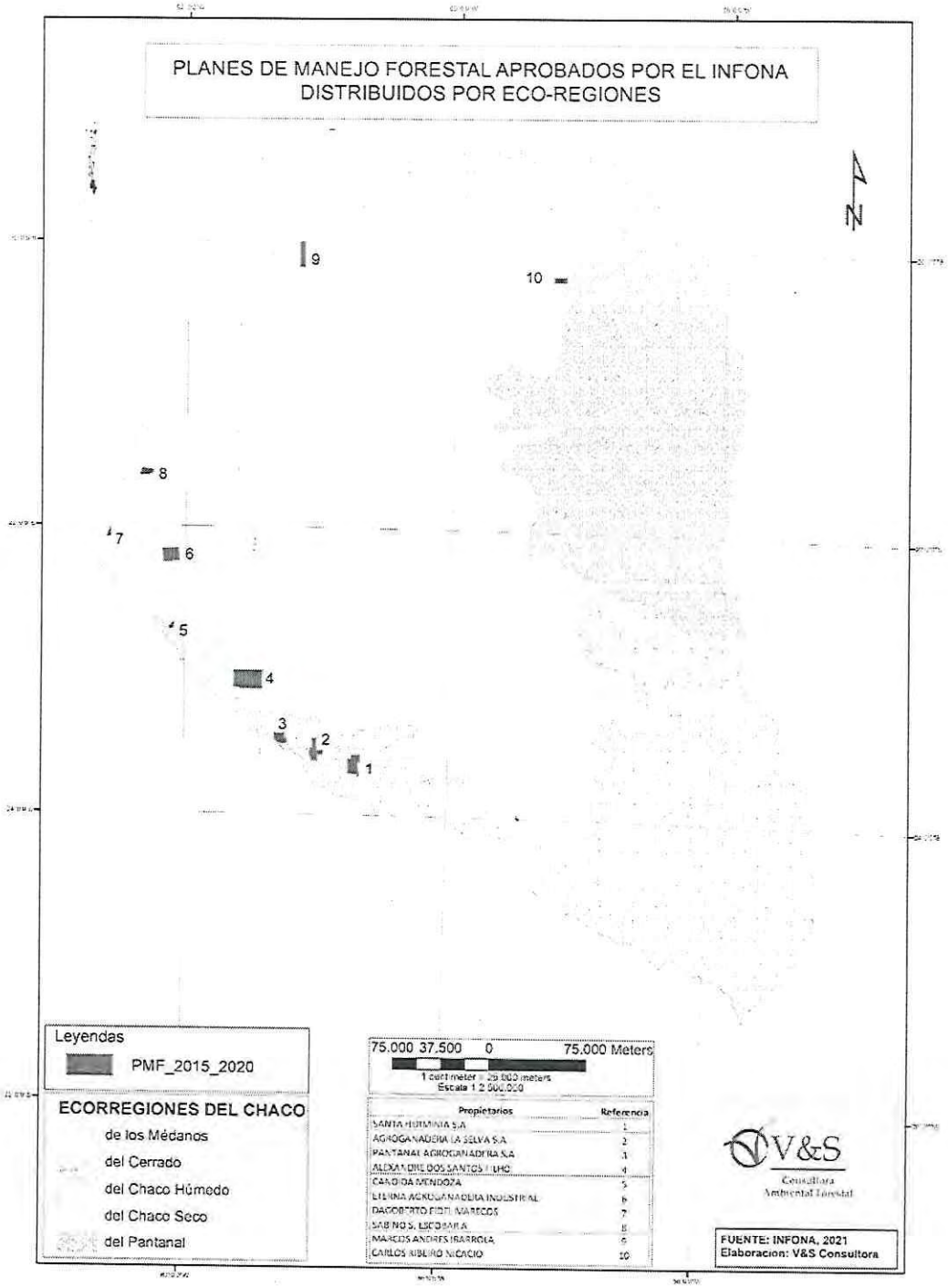
*Vegetación acuática*: se desarrollan muy bien como tales hacia el Sur-Oeste de la planicie, en el área conocida como Tinfunké y toda la antigua desembocadura del río Pilcomayo en el conocido "Estero Patiño". Ocupan las partes deprimidas del mosaico, generalmente ya con aguas permanentes y en donde se desarrollan especies ligadas al agua, las que a su vez presentan diferentes hábitos de vida: flotantes, sumergidas (libres o no) y enraizadas en el lodo del fondo. Algunas especies representativas, son: *Pontederia azurea, Thalia geniculata, Canna glauca, Alternanthera philoxeroides, Eleocharis montana, Eleocharis elegans*, entre otras

**Chaco seco**

Se ubica en el centro de la región chaqueña y colindante con las demás Ecorregiones, se extiende al Oeste hacia el área de los paleocauces recientes y, al Este, hacia la zona de las lagunas y riachos salados; al Norte, abarca el área de las serranías León y demás complejos, su extensión es de 12.721.160 ha. Su clima es extremo, con precipitaciones concentradas en el verano y temperaturas extremas, con máximas absolutas cercanas a los 48 °C y mínimas de -5 °C en el invierno seco. Su topografía se caracteriza por ser la más plana de la región llegando a más de 700 m.s.n.m. en Cerro Cabrera y más de 600 m.s.n.m. en Cerro León. Los suelos son muy variables dependiendo del contenido de arcilla o no, lo que incide directamente sobre su vegetación, que se caracteriza como *Bosque semi caducifolio xerófito.*

Se trata de un bosque abierto, variable dependiendo de los suelos, con una formación de arbustos bien desarrollados, donde destacan 3-4 especies arbóreas: *Ceiba chodatii, Schinopsis quebracho-colorado, Aspidosperma quebracho-blanco* y eventualmente *Bulnesia sarmientoi; Prosopis alba, P. nigra, Salta triflora, Quiabentia verticillata, Sarcomphalus mistol, Ximenia americana*, entre otras. Irrumpen en la gran unidad los paleocauces más antiguos con las sabanas con espartillo o "espartillares", el "matorral de saladar" o "saladares y los paleocauces más recientes o "peladares", cada uno de ellos con sus paisajes característicos. Una segunda intrusión es la de los cerros como León y Cabrera, los cerros tabulares, con una vegetación rupestre sobre las laderas y de cerrado sobre la cima de sus mesetas.

**Ilustración N° 10.** Distribución de los 10 Planes de Manejo Forestal vigentes, distribuidos por Ecorregiones




Fuente: INFONA (2021). Elaboración V&S Consultora Ambiental Forestal

**Estructura de los bosques con presencia de Palo santo**

Una comunidad vegetal puede ser caracterizada por su estructura, definida por la distribución vertical u horizontal que presenta:

Un primer paso necesario para manejar de forma más planificada los recursos forestales, es conocer los aspectos básicos de la estructura y la dinámica forestal del bosque con especies valiosas, a fin de determinar el grado de resiliencia de las comunidades forestales afectadas. La estructura forestal es la distribución de árboles en una superficie determinada, mientras que la dinámica representa el cambio de dicha estructura con el tiempo (Lamprecht, 1990); (Oliver and Larson, 1996). Disponer de referencias de estructura y dinámica del bosque es útil, ya que permite usar, como primera aproximación, modelos sencillos para evaluar tanto los impactos que recibió el recurso forestal como su recuperación potencial (Pinazo et al, 2003); (Gasparri et al, 2003).

El conocimiento de la estructura y la dinámica de las poblaciones de *Bulnesia sarmientoi* es necesario para una gestión forestal capaz de conservar la especie, asegurar la producción maderera de alta calidad y preservar los servicios ecosistémicos que brindan los bosques donde se encuentra. (Loto, 2018).

La especie *Bulnesia sarmientoi* se encuentra acompañada frecuentemente por *Sarcomphalus mistol*, *Maytenus vitis-idaea*, *Lycium boerhaviaefolium* y *Trithrimax schyzophylla*; sin embargo, se la encuentra también en forma aislada dentro del bosque xeromorfo, acompañando al *Aspidosperma quebracho-blanco*, *Sarcotoxicum salicifolium*, *Cynophalla retusa*, *Tabebuia nodosa* y *Stetsonia coryne*, entre otras. También aparece asociada con especies de *Prosopis nigra*, *Prosopis alba* y *Schinopsis quebracho-colorado*. (Brack & Weik, 1994)

Para la caracterización de los bosques con presencia de Palo Santo se han evaluado diez (10) Planes de Manejo Forestal (PMF) aprobados por el INFONA entre los años 2015-2020). Estos planes se listan en la siguiente tabla:

**Tabla N° 5.** Los 10 Planes de Manejo Forestal aprobados por el INFONA (2015-2020).

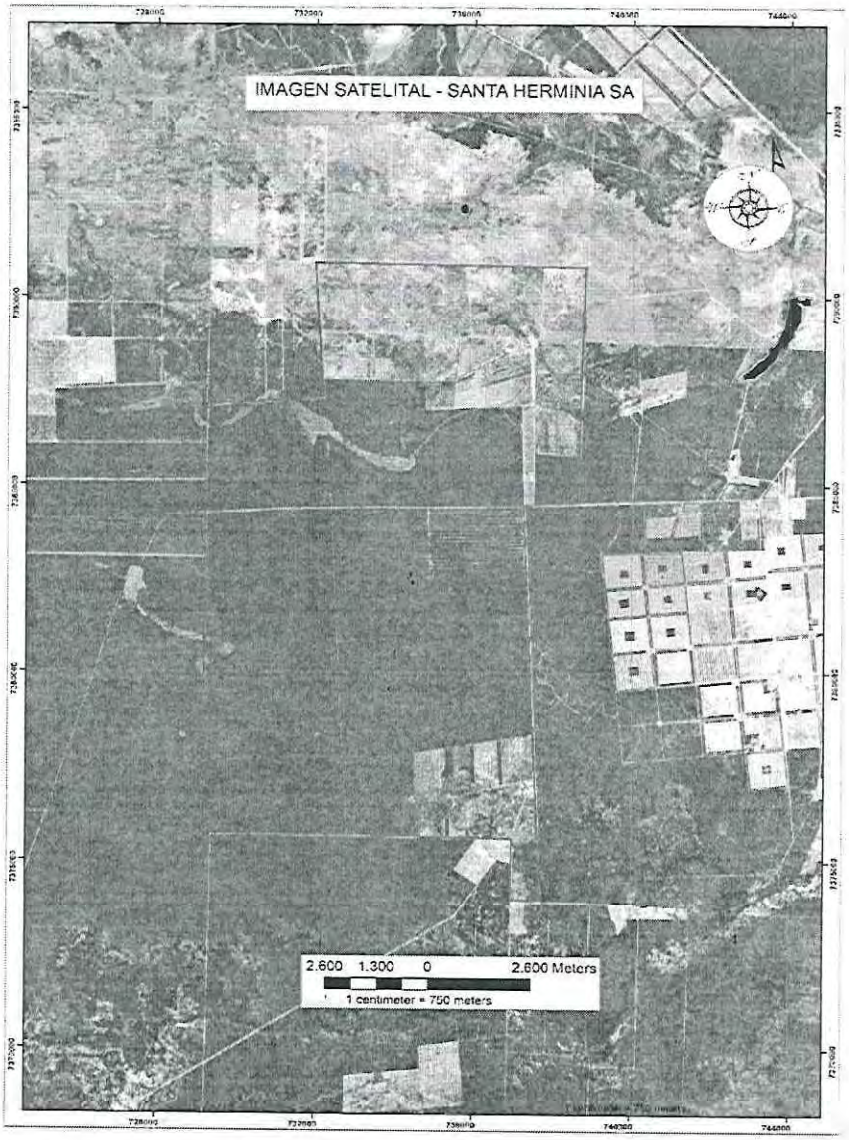
| N° | Nombre | Superficie (ha) | Sup. Bajo M. Forestal (ha) | Distrito | Departamento | x | y |
|---|---|---|---|---|---|---|---|
| 1 | Santa Herminia S.A. | 12.254,30 | 4.828,16 | Mcal. Estigarribia | Boquerón | 733.609 | 7.382.126 |
| 2 | Agro. La Selva S.A. | 9.401,60 | 2.694,40 | Mcal. Estigarribia | Boquerón | 703.400 | 7.394.000 |
| 3 | Pantanal Agro. S.A. | 6.491,26 | 5.488,81 | Mcal. Estigarribia | Boquerón | 676,754 | 7.404.408 |
| 4 | Alexandre Dos Santos | 30.501,60 | 22.712,90 | Mcal. Estigarribia | Boquerón | 656.789 | 7.448.886 |
| 5 | Cándida Mendoza | 892,30 | 835,40 | Mcal. Estigarribia | Boquerón | 593000 | 7490000 |
| 6 | Eterna Agro. Ind. S.A. | 12.386,20 | 3.387,80 | Mcal. Estigarribia | Boquerón | 591.938 | 7.544.253 |
| 7 | Dagoberto Marecos | 1.074,80 | 1.063,00 | Mcal. Estigarribia | Boquerón | 544.193 | 7.560.023 |
| 8 | Sabino Escobar ((F. Catalina) | 3.978,96 | 1.928,50 | Mcal. Estigarribia | Boquerón | 573.169 | 7.609.142 |
| 9 | Marcos Ibarrola | 8.000,00 | 3.756,50 | Bahía Negra | A. Paraguay | 692.750 | 7.778.384 |
| 10 | Carlos Ribeiro | 3.993,90 | 1.536,60 | Bahía Negra | A. Paraguay | 265.867 | 7.762.007 |
| **TOTAL** | | **88.974,92** | **48.232,10** | | | | |

Fuente: INFONA, 2021

A continuación, se presentan individualmente los PMF vigentes por cada Ecorregión, describiéndose su localización, coordenadas, dimensión del inmueble y superficie bajo manejo y los datos dasométricos que caracterizan el bosque bajo manejo.

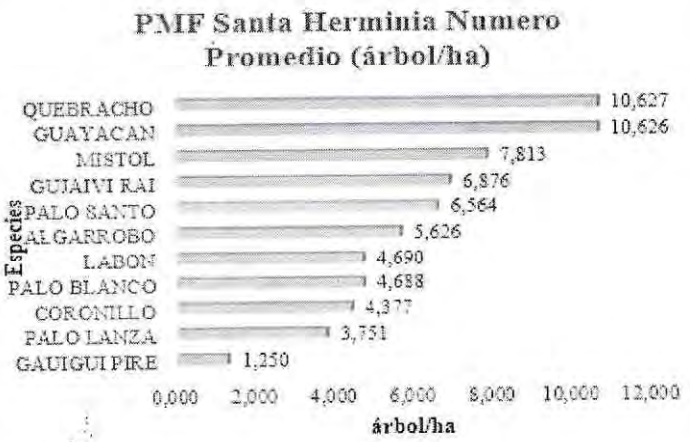
***PMF.01. SANTA HERMINIA S.A.***
Resolución INFONA N° 603/2016
Localización: Fortín Gral. Díaz, Distrito de Mcal Estigarribia, Dpto. Boquerón
Coordenadas: X: 733.609, Y: 7.382.126
Dimensión del inmueble: 12.254.30 Ha.
Bosque de Manejo: 4.828,16 Ha
Ecorregión: Chaco Húmedo

**Ilustración N° 11.** Propiedad Santa Herminia S.A.

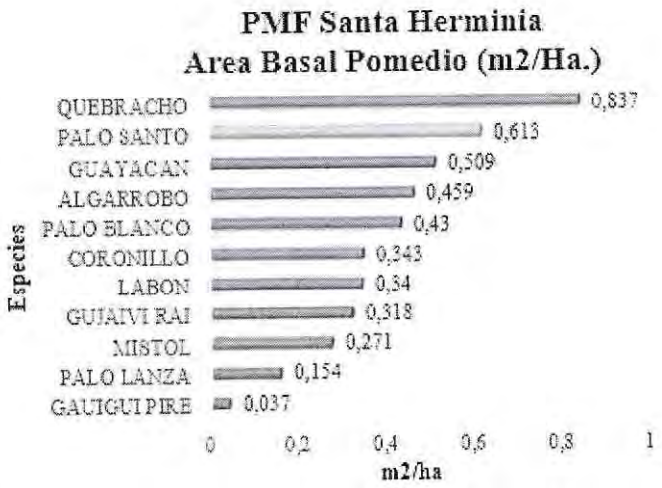



Fuente: V&S Consultora Ambiental Forestal, 2021

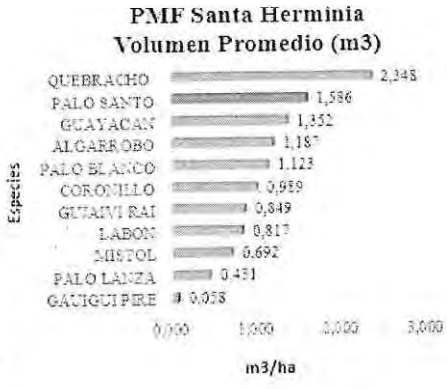
| especie | No. Prom. Arbol/ha |
|---|---|
| QUEBRACHO | 10,627 |
| GUAYACAN | 10,626 |
| MISTOL | 7,813 |
| GUJAIVI RAI | 6,876 |
| PALO SANTO | 6,564 |
| ALGARROBO | 5,626 |
| LABON | 4,690 |
| PALO BLANCO | 4,688 |
| CORONILLO | 4,377 |
| PALO LANZA | 3,751 |
| GAUIGUI PIRE | 1,250 |




| Especies | Area Basal Prom. (m2/ha.) |
|---|---|
| QUEBRACHO | 0,837 |
| PALO SANTO | 0,613 |
| GUAYACAN | 0,509 |
| ALGARROBO | 0,459 |
| PALO BLANCO | 0,43 |
| CORONILLO | 0,343 |
| LABON | 0,34 |
| GUJAIVI RAI | 0,318 |
| MISTOL | 0,271 |
| PALO LANZA | 0,154 |
| GAUIGUI PIRE | 0,037 |




| ESPECIES | Vol. Prom. (m3/ha) |
|---|---|
| QUEBRACHO | 2,348 |
| PALO SANTO | 1,586 |
| GUAYACAN | 1,352 |
| ALGARROBO | 1,187 |
| PALO BLANCO | 1,123 |
| CORONILLO | 0,959 |
| GUJAIVI RAI | 0,849 |
| LABON | 0,817 |
| MISTOL | 0,692 |
| PALO LANZA | 0,431 |
| GAUIGUI PIRE | 0,058 |



***PMF.02. AGROGANADERA LA SELVA S.A.***

Resolución INFONA N° 539/ 2018

Localización: El Tanque, Distrito de Mcal Estigarribia, Dpto. Boquerón

Coordenadas: X: 703.400, Y: 7.394.000

Dimensión del inmueble: 9401,6 ha.

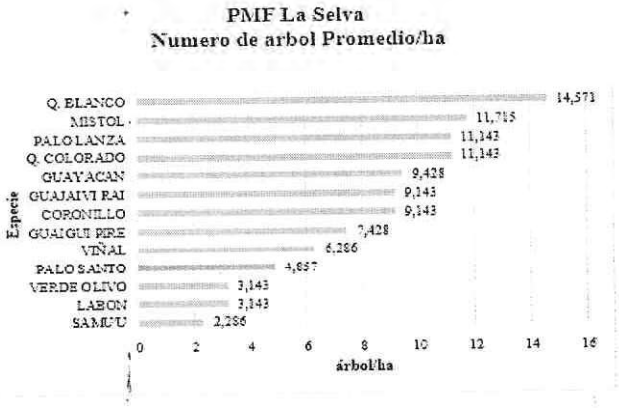
Bosque de Manejo: 2694,4 ha

Ecorregión: Chaco Húmedo

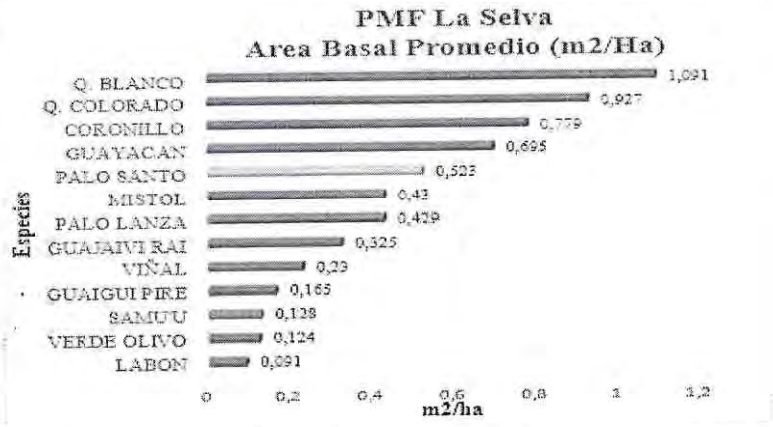
**Ilustración N° 12.** Propiedad Agroganadera La Selva S.A.


Fuente: V&S Consultora Ambiental Forestal, 2021

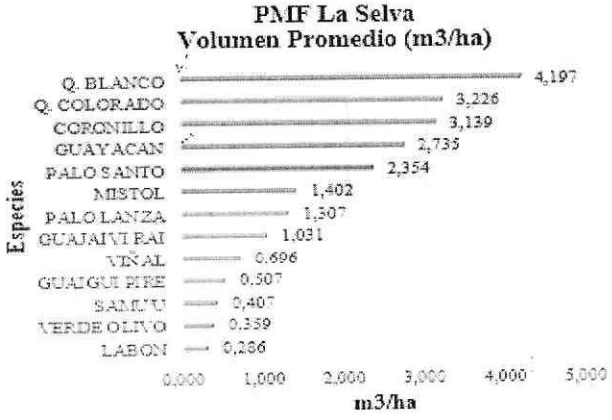
| Especie | No. Arbol Prom/ha |
|---|---|
| Q. BLANCO | 14,571 |
| MISTOL | 11,715 |
| PALO LANZA | 11,143 |
| Q. COLORADO | 11,143 |
| GUAYACAN | 9,428 |
| GUAJAIVI RAI | 9,143 |
| CORONILLO | 9,143 |
| GUAIGUI PIRE | 7,428 |
| VIÑAL | 6,286 |
| PALO SANTO | 4,857 |
| VERDE OLIVO | 3,143 |
| LABON | 3,143 |
| SAMU'U | 2,286 |




| Especies | Area Bas. Prom. (m2/ha) |
|---|---|
| Q. BLANCO | 1,091 |
| Q. COLORADO | 0,927 |
| CORONILLO | 0,779 |
| GUAYACAN | 0,695 |
| PALO SANTO | 0,523 |
| MISTOL | 0,43 |
| PALO LANZA | 0,429 |
| GUAJAIVI RAI | 0,325 |
| VIÑAL | 0,23 |
| GUAIGUI PIRE | 0,165 |
| SAMU'U | 0,128 |
| VERDE OLIVO | 0,124 |
| LABON | 0,091 |




| Especies | Vol. Prom (m3/ha) |
|---|---|
| Q. BLANCO | 4,197 |
| Q. COLORADO | 3,226 |
| CORONILLO | 3,139 |
| GUAYACAN | 2,735 |
| PALO SANTO | 2,354 |
| MISTOL | 1,402 |
| PALO LANZA | 1,307 |
| GUAJAIVI RAI | 1,031 |
| VIÑAL | 0,696 |
| GUAIGUI PIRE | 0,507 |
| SAMU'U | 0,407 |
| VERDE OLIVO | 0,359 |
| LABON | 0,286 |



***PMF.03. PANTANAL AGROGANADERA S.A.***

Resolución INFONA N° 398/2020

Localización: Fortín Margariño, Distrito de Mcal Estigarribia, Dpto. Boquerón

Coordenadas: X: 676,754, Y: 7.404.408

Dimensión del inmueble: 6.491,26 Ha.

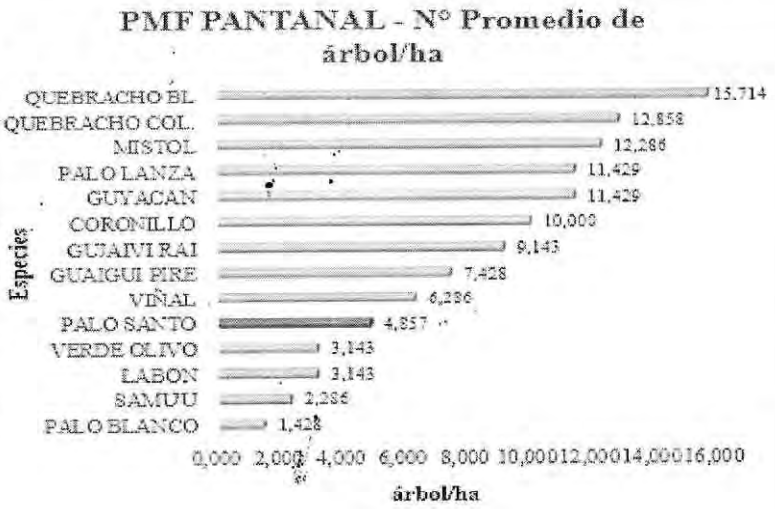
Bosque de Manejo: 5.488,81 Ha.

Ecorregión: Chaco Húmedo

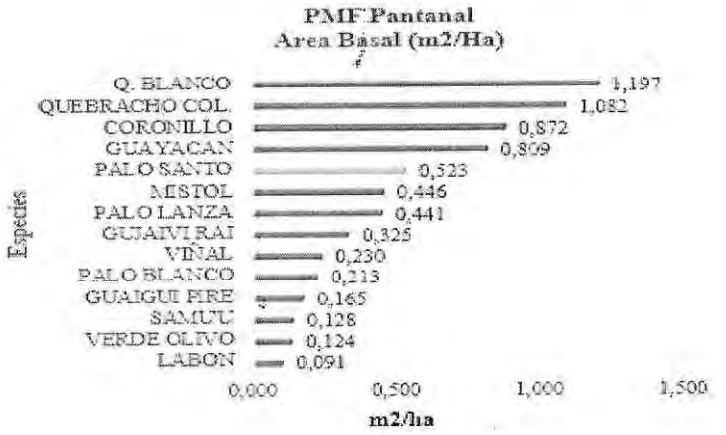
**Ilustración N° 13.** Pantanal Agroganadera S.A.


Fuente: V&S Consultora Ambiental Forestal, 2021

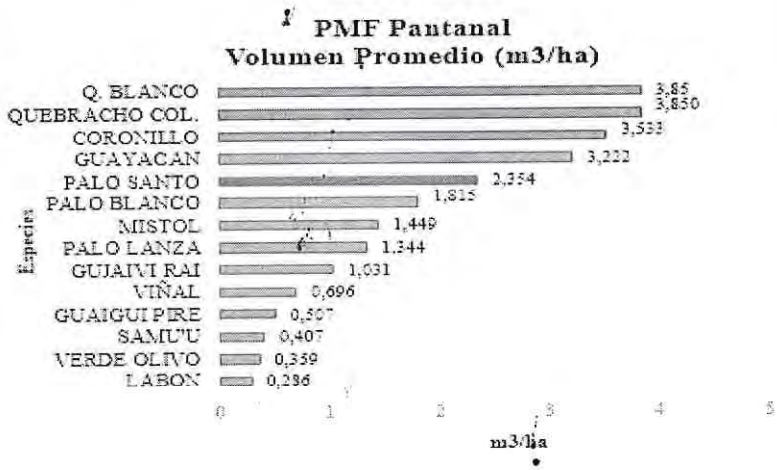
| Especie | N° Prom. Arbol/ha |
|---|---|
| QUEBRACHO BL | 15,714 |
| QUEBRACHO COL. | 12,858 |
| MISTOL | 12,286 |
| PALO LANZA | 11,429 |
| GUJAIVI RAI | 9,143 |
| PALO SANTO | 4,857 |
| VERDE OLIVO | 3,143 |
| LABON | 3,143 |
| SAMUU | 2,286 |
| PALO BLANCO | 1,428 |




| Especies | Area Bas. Prom. (m2/ha) |
|---|---|
| Q. BLANCO | 1,197 |
| QUEBRACHO COL. | 1,082 |
| CORONILLO | 0,872 |
| GUAYACAN | 0,809 |
| PALO SANTO | 0,523 |
| MISTOL | 0,446 |
| PALO LANZA | 0,441 |
| GUJAIVI RAI | 0,325 |
| VIÑAL | 0,230 |
| PALO BLANCO | 0,213 |
| GUAIGUI PIRE | 0,165 |
| SAMUU | 0,128 |
| VERDE OLIVO | 0,124 |
| LABON | 0,091 |




| Especies | Vol. Prom. (m3/ha) |
|---|---|
| Q. BLANCO | 3,85 |
| QUEBRACHO COL. | 3,850 |
| CORONILLO | 3,533 |
| GUAYACAN | 3,222 |
| PALO SANTO | 2,354 |
| PALO BLANCO | 1,815 |
| MISTOL | 1,449 |
| PALO LANZA | 1,344 |
| GUJAIVI RAI | 1,031 |
| VIÑAL | 0,696 |
| GUAIGUI PIRE | 0,507 |
| SAMUU | 0,407 |
| VERDE OLIVO | 0,359 |
| LABON | 0,286 |



***PMF.04. ALEXANDER DOS SANTOS FILHO***

Resolución INFONA N° 581/2017

Localización: Sector Linares, Distrito de Mcal. Estigarribia, Dpto. Boquerón

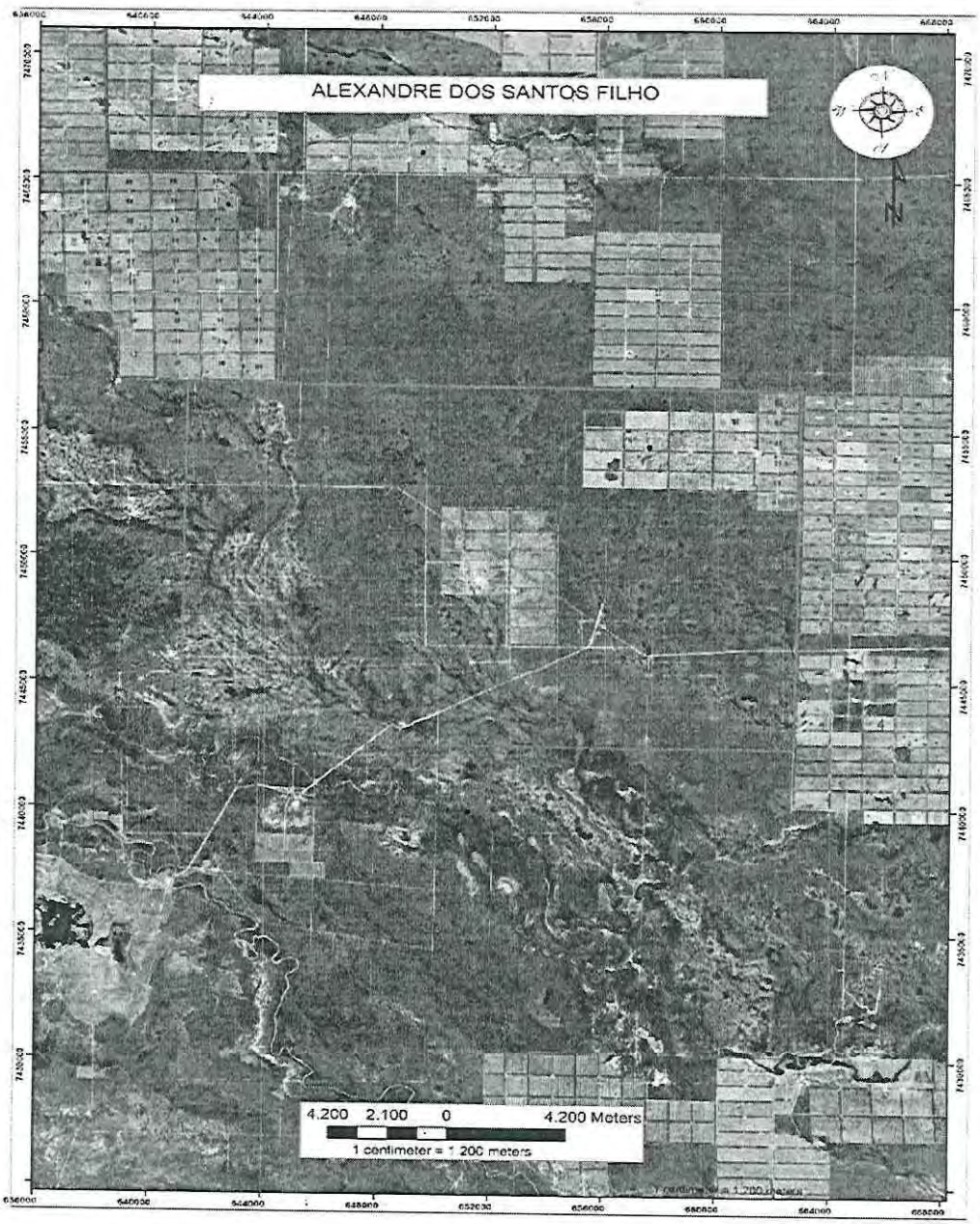
Coordenadas: X: 656.789, Y: 7.448.886

Dimensión del inmueble: 30.501,60 Ha.

Bosque de Manejo: 22.712,90 Ha.

Ecorregión: Chaco Húmedo

**Ilustración N° 14.** Propiedad Alexandre Dos Santos Fhilo

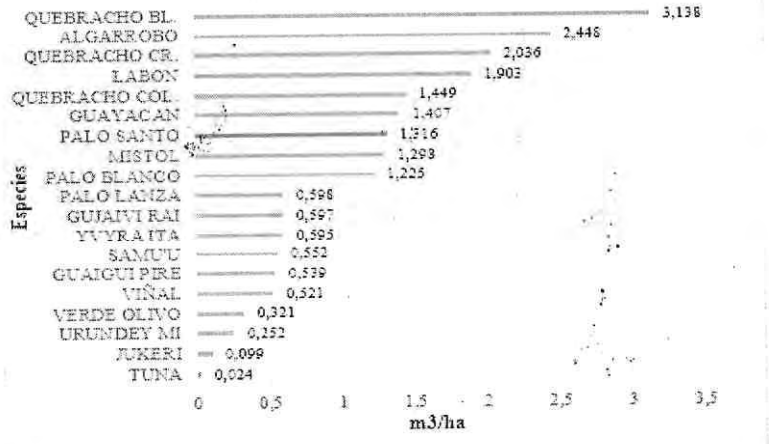



Fuente: V&S Consultora Ambiental Forestal, 2021

| Especies | N° Promedio árbol/ha |
|---|---|
| ALGARROBO | 16,583 |
| QUEBRACHO BL. | 16,333 |
| LABON | 13,25 |
| MISTOL | 12,75 |
| GUAYACAN | 9,333 |
| QUEBRACHO CR. | 9,166 |
| QUEBRACHO COL | 8,166 |
| GUAIGUI PIRE | 6,583 |
| PALO SANTO | 5,249 |
| PALO BLANCO | 5,083 |
| GUJAIVI RAI | 4,999 |
| VIÑAL | 4,917 |
| VERDE OLIVO | 4,833 |
| PALO LANZA | 4,501 |
| YVYRA ITA | 3,25 |
| URUNDEY MI | 1,917 |
| SAMUU | 1,751 |
| JUKERI | 0,916 |
| TUNA | 0,167 |


| Especies | Area Bas. Prom. (m2/ha) |
|---|---|
| QUEBRACHO BL. | 0,995 |
| ALGARROBO | 0,880 |
| LABON | 0,712 |
| QUEBRACHO CR. | 0,639 |
| MISTOL | 0,530 |
| GUAYACAN | 0,501 |
| QUEBRACHO COL. | 0,499 |
| PALO SANTO | 0,400 |
| PALO BLANCO | 0,392 |
| GUAIGUI PIRE | 0,251 |
| PALO LANZA | 0,229 |
| GUJAIVI RAI | 0,219 |
| YVYRA ITA | 0,218 |
| VIÑAL | 0,213 |
| SAMUU | 0,161 |
| VERDE OLIVO | 0,152 |
| URUNDEY MI | 0,100 |
| JUKERI | 0,045 |
| TUNA | 0,008 |


| Especie | Vol. Prom. (m3/ha) |
|---|---|
| QUEBRACHO BL. | 3,138 |
| ALGARROBO | 2,448 |
| QUEBRACHO CR. | 2,036 |
| LABON | 1,903 |
| QUEBRACHO COL. | 1,449 |
| GUAYACAN | 1,407 |
| PALO SANTO | 1,316 |
| MISTOL | 1,298 |
| PALO BLANCO | 1,225 |
| PALO LANZA | 0,598 |
| GUJAIVI RAI | 0,597 |
| YVYRA ITA | 0,595 |
| SAMUU | 0,552 |
| GUAIGUI PIRE | 0,539 |
| VIÑAL | 0,521 |
| VERDE OLIVO | 0,321 |
| URUNDEY MI | 0,252 |
| JUKERI | 0,099 |
| TUNA | 0,024 |



***PMF.05. CANDIDA MENDOZA***

Resolución INFONA N°1057/2019

Localización: Sector La Dorada, Distrito de Mcal. Estigarribia, Dpto. Boquerón

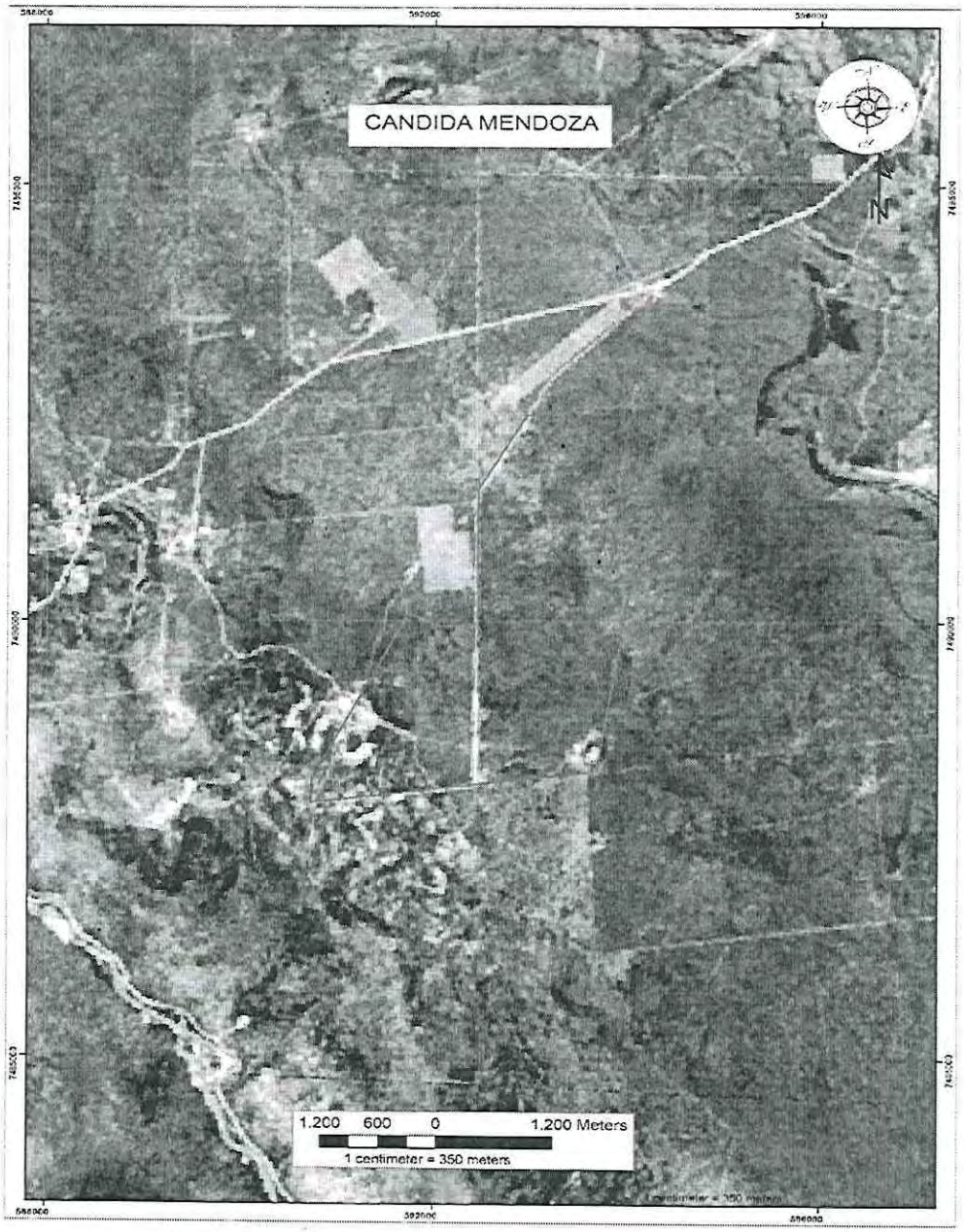
Coordenadas: X: 593000, Y: 7490000

Dimensión del inmueble: 892,30 Ha.

Bosque de Manejo: 835,40 Ha.

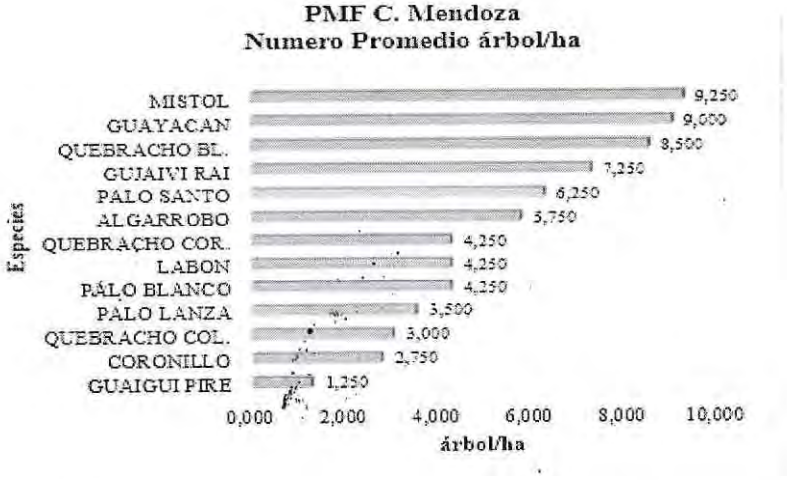
Ecorregión: Chaco Húmedo

**Ilustración N° 15.** Propiedad Cándida Mendoza

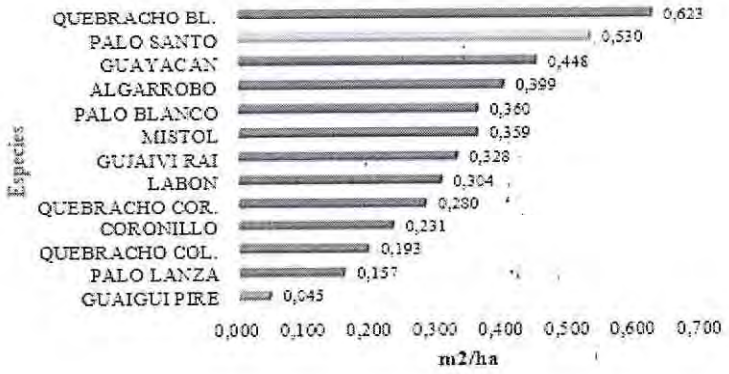



Fuente: V&S Consultora Ambiental Forestal, 2021

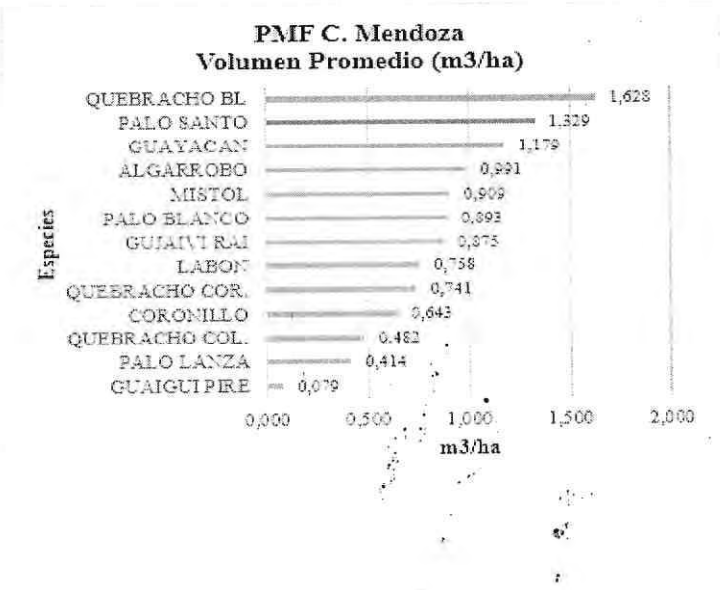
| Especie | No. Arbol/ha |
|---|---|
| MISTOL | 9,250 |
| GUAYACAN | 9,000 |
| QUEBRACHO BL. | 8,500 |
| GUJAIVI RAI | 7,250 |
| PALO SANTO | 6,250 |
| ALGARROBO | 5,750 |
| QUEBRACHO COR. | 4,250 |
| LABON | 4,250 |
| PALO BLANCO | 4,250 |
| PALO LANZA | 3,500 |
| QUEBRACHO COL. | 3,000 |
| CORONILLO | 2,750 |
| GUAIGUI PIRE | 1,250 |




| Especies | Ar. Bas. Prom. (m2/ha) |
|---|---|
| QUEBRACHO BL. | 0,623 |
| PALO SANTO | 0,530 |
| GUAYACAN | 0,448 |
| ALGARROBO | 0,399 |
| PALO BLANCO | 0,360 |
| MISTOL | 0,359 |
| GUJAIVI RAI | 0,328 |
| LABON | 0,304 |
| QUEBRACHO COR. | 0,280 |
| CORONILLO | 0,231 |
| QUEBRACHO COL. | 0,193 |
| PALO LANZA | 0,157 |
| GUAIGUI PIRE | 0,045 |




| Especies | Vol. Prom. (m3/ha) |
|---|---|
| QUEBRACHO BL | 1,628 |
| PALO SANTO | 1,329 |
| GUAYACAN | 1,179 |
| ALGARROBO | 0,991 |
| MISTOL | 0,909 |
| PALO BLANCO | 0,893 |
| GUJAIVI RAI | 0,875 |
| LABON | 0,758 |
| QUEBRACHO COR. | 0,741 |
| CORONILLO | 0,643 |
| QUEBRACHO COL. | 0,482 |
| PALO LANZA | 0,414 |
| GUAIGUI PIRE | 0,079 |



## *PMF.06. ETERNA AGROGANADERA INDUSTRIAL S.A.*

Resolución INFONA N° 397/2017 (Aprueba PMF integrado a PUT aprobado por Res. INFONA N° 0695/2014)

Localización: Sector Pozo Milico, Distrito de Mcal Estigarribia, Dpto. Boquerón

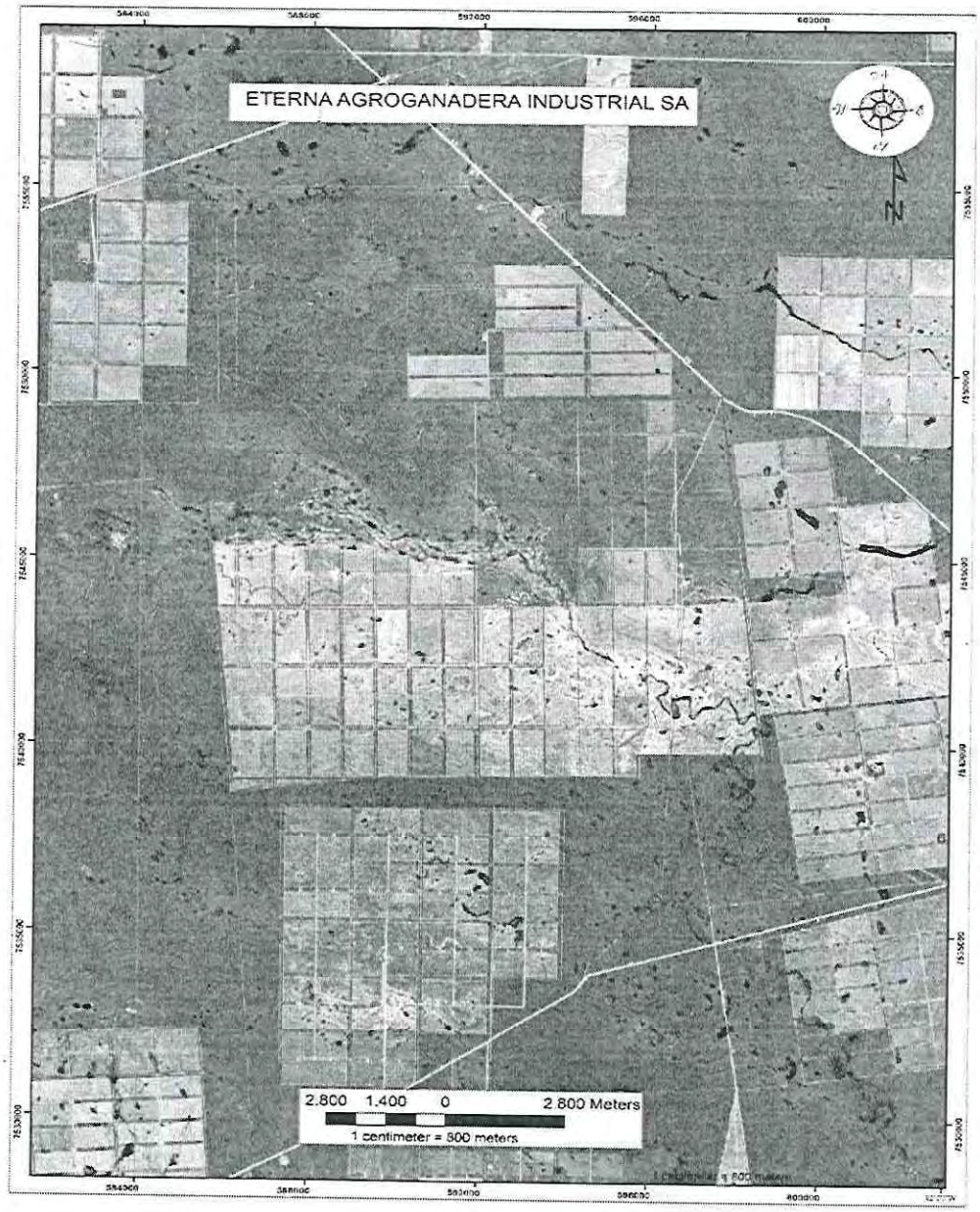
Coordenadas: X: 591.938, Y: 7.544.253

Dimensión del inmueble: 12.386,20 Ha.

Bosque de Manejo: 3.387,80 Ha.

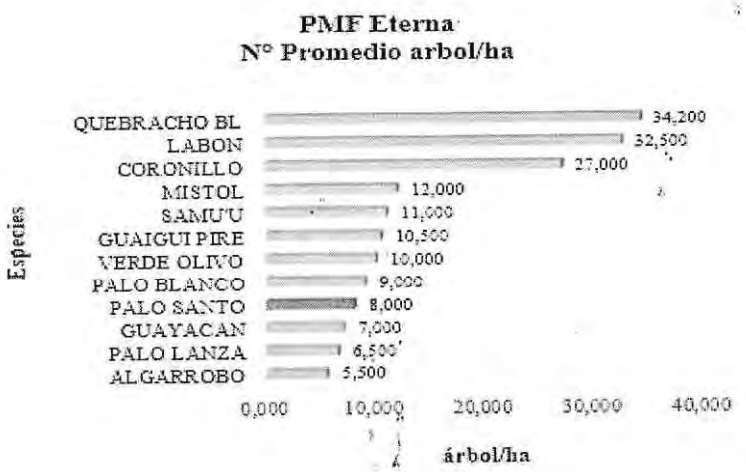
Ecorregión: Chaco Seco

**Ilustración N° 16.** Eterna Agroganadera Industrial S.A.

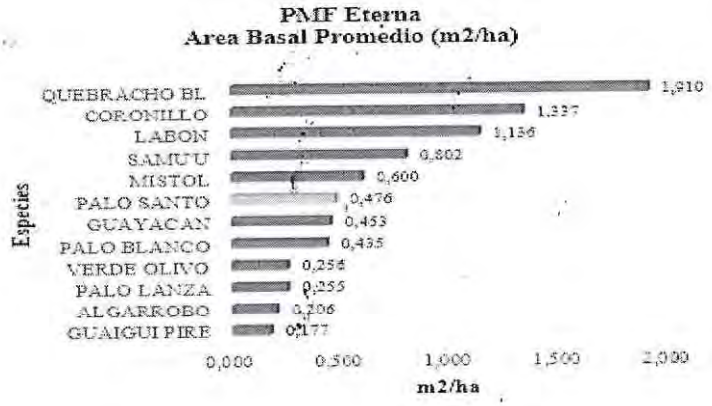



Fuente: V&S Consultora Ambiental Forestal, 2021

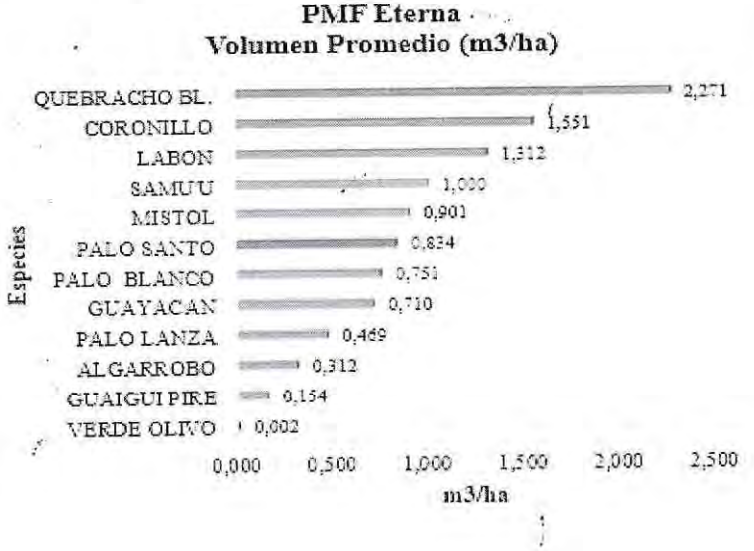
| Especie | No. Promedio Arbol-Ha |
|---|---|
| QUEBRACHO BL | 34,200 |
| LABON | 32,500 |
| CORONILLO | 27,000 |
| MISTOL | 12,000 |
| SAMUU | 11,000 |
| GUAIGUI PIRE | 10,500 |
| VERDE OLIVO | 10,000 |
| PALO BLANCO | 9,000 |
| PALO SANTO | 8,000 |
| GUAYACAN | 7,000 |
| PALO LANZA | 6,500 |
| ALGARROBO | 5,500 |




| Especies | Area Bas. Prom. m2/ha |
|---|---|
| QUEBRACHO BL | 1,910 |
| CORONILLO | 1,337 |
| LABON | 1,136 |
| SAMUU | 0,802 |
| MISTOL | 0,600 |
| PALO SANTO | 0,476 |
| GUAYACAN | 0,453 |
| PALO BLANCO | 0,435 |
| VERDE OLIVO | 0,256 |
| PALO LANZA | 0,255 |
| ALGARROBO | 0,206 |
| GUAIGUI PIRE | 0,177 |



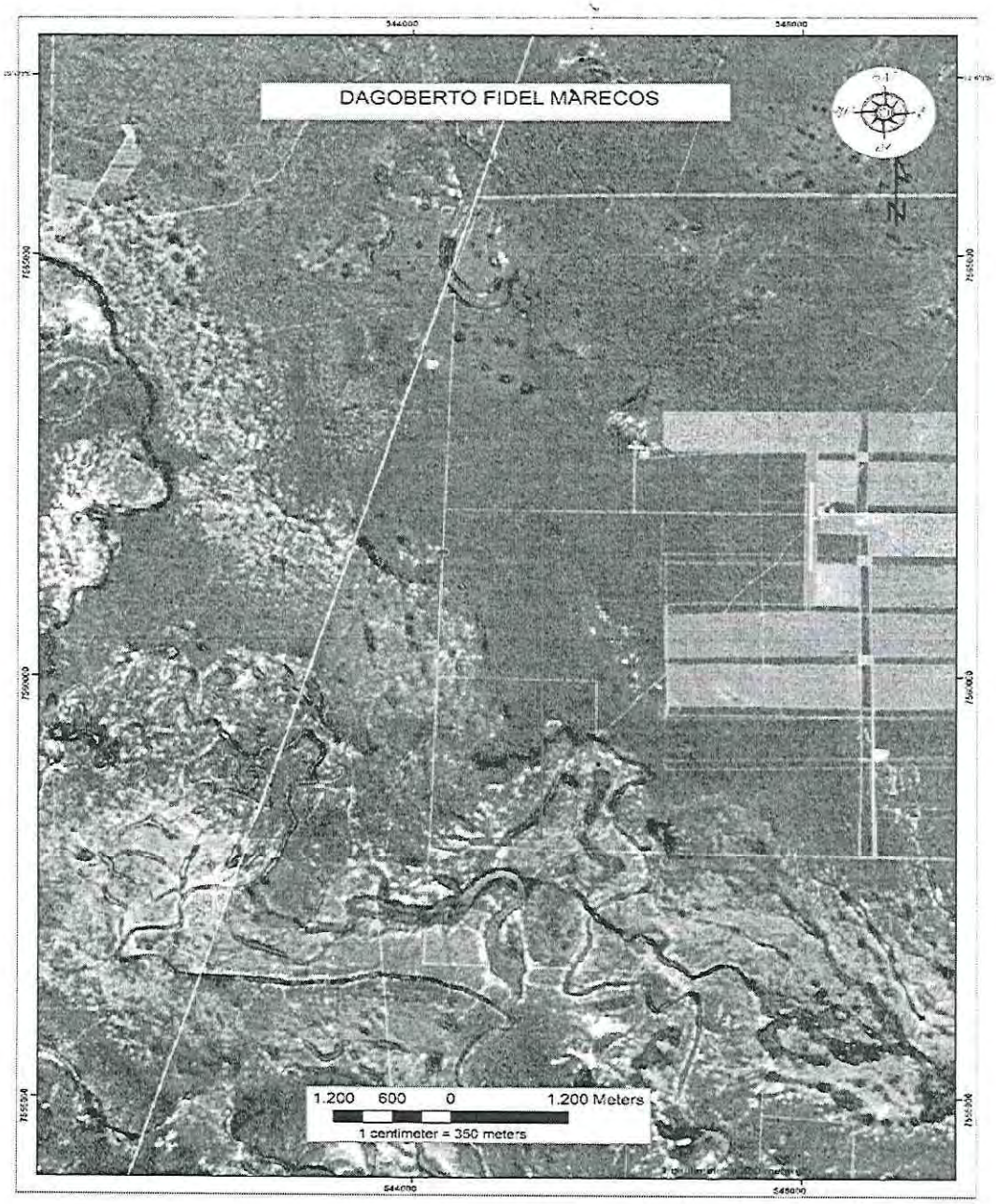

| Especies | Vol. Prom. (m3/ha) |
|---|---|
| QUEBRACHO BL. | 2,271 |
| CORONILLO | 1,551 |
| LABON | 1,312 |
| SAMUU | 1,000 |
| MISTOL | 0,901 |
| PALO SANTO | 0,834 |
| PALO BLANCO | 0,751 |
| GUAYACAN | 0,710 |
| PALO LANZA | 0,469 |
| ALGARROBO | 0,312 |
| GUAIGUI PIRE | 0,154 |
| VERDE OLIVO | 0,002 |



## *PMF.07. DAGOBERTO FIDEL MARECOS*

Resolución INFONA N° 353/2016
Localización: Sector Pozo Hondo, Distrito de Mcal Estigarribia, Dpto. Boquerón
Coordenadas: X: 544.193 Y: 7.560.023
Dimensión del inmueble: 1.074,80 Ha.
Bosque de Manejo: 1.063,00 Ha.
Ecorregión: Chaco Seco

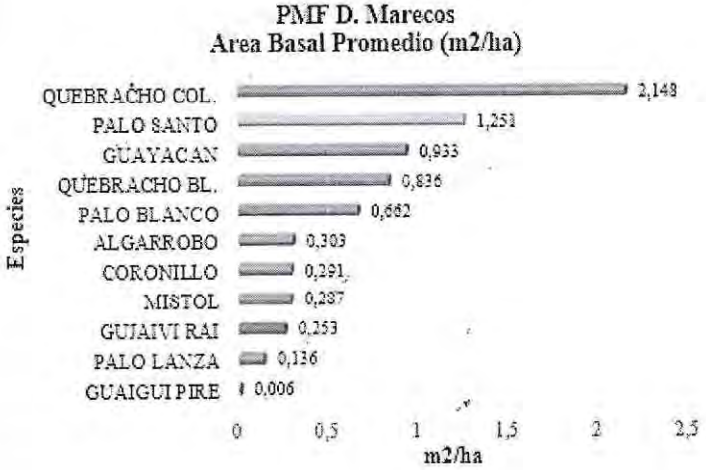
**Ilustración N° 17.** Propiedad Dagoberto Fidel Marecos



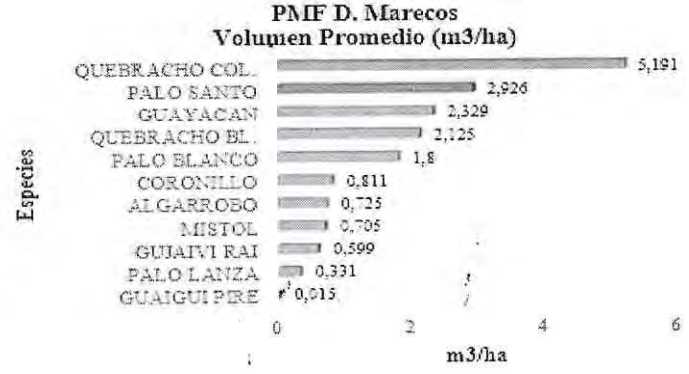

Fuente: V&S Consultora Ambiental Forestal, 2021

| Especie | No. Prom. Arbol/ha |
|---|---|
| QUEBRACHO COL. | 15,000 |
| PALO SANTO | 10,000 |
| GUAYACAN | 7,916 |
| MISTOL | 6,667 |
| ALGARROBO | 5,417 |
| GUJAIVI RAI | 5,000 |
| QUEBRACHO BL. | 5,000 |
| PALO BLANCO | 4,167 |
| PALO LANZA | 3,751 |
| CORONILLO | 2,501 |
| GUAIGUI PIRE | 0,417 |


| Especies | Area Bas. Prom. (m2/ha.) |
|---|---|
| QUEBRACHO COL. | 2,148 |
| PALO SANTO | 1,251 |
| GUAYACAN | 0,933 |
| QUEBRACHO BL. | 0,836 |
| PALO BLANCO | 0,662 |
| ALGARROBO | 0,303 |
| CORONILLO | 0,291 |
| MISTOL | 0,287 |
| GUJAIVI RAI | 0,253 |
| PALO LANZA | 0,136 |
| GUAIGUI PIRE | 0,006 |




| Especies | Vol. Prom. (m3/ha) |
|---|---|
| QUEBRACHO COL. | 5,191 |
| PALO SANTO | 2,926 |
| GUAYACAN | 2,329 |
| QUEBRACHO BL. | 2,125 |
| PALO BLANCO | 1,8 |
| CORONILLO | 0,811 |
| ALGARROBO | 0,725 |
| MISTOL | 0,705 |
| GUJAIVI RAI | 0,599 |
| PALO LANZA | 0,331 |
| GUAIGUI PIRE | 0,015 |



***PMF.08. SABINO ESCOBAR (Florencia Catalina)***

Resolución INFONA N° 758/2016

Localización: Sector Campo Herraje, Distrito de Mcal Estigarribia, Dpto. Boquerón

Coordenadas: X: 573.169 Y: 7.609.142

Dimensión del inmueble: 3.978,96 Ha.

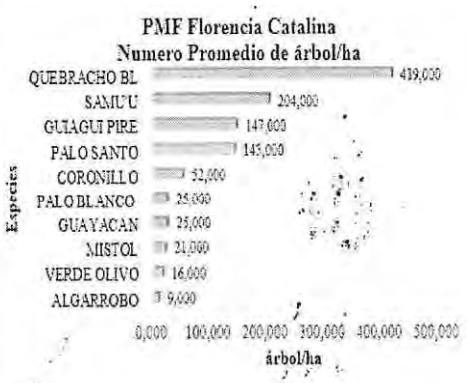
Bosque de Manejo: 3.756,50 Ha.

Ecorregión: Chaco Seco

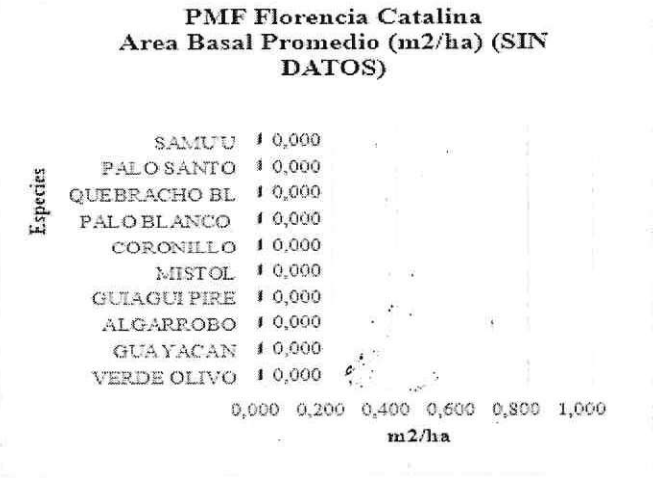
**Ilustración N° 18.** Propiedad Sabino Escobar (Estancia F. Catalina)


Fuente: V&S Consultora Ambiental Forestal, 2021

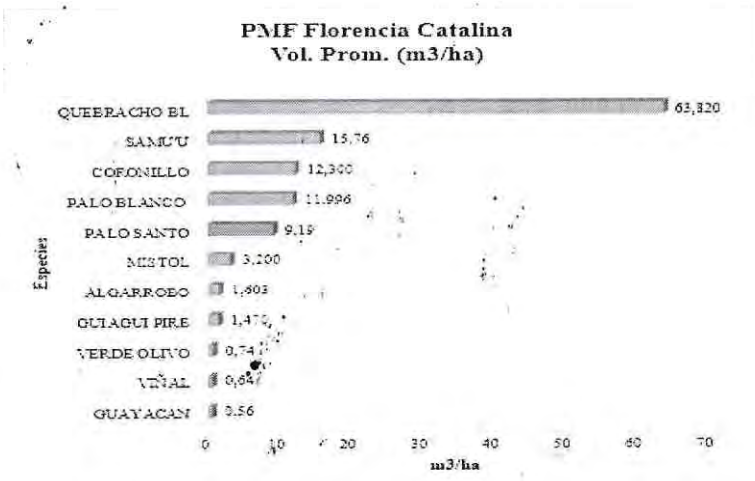
| Especie | No. Promedio Arbol/ha |
|---|---|
| ALGARROBO | 9,000 |
| VERDE OLIVO | 16,000 |
| MISTOL | 21,000 |
| GUAYACAN | 25,000 |
| PALO BLANCO | 25,000 |
| CORONILLO | 52,000 |
| PALO SANTO | 143,000 |
| GUIAGUI PIRE | 147,000 |
| SAMU'U | 204,000 |
| QUEBRACHO BL | 419,000 |




| Especies | Area Basal Prom. m2/ha |
|---|---|
| VERDE OLIVO | 0,000 |
| GUAYACAN | 0,000 |
| ALGARROBO | 0,000 |
| GUIAGUI PIRE | 0,000 |
| MISTOL | 0,000 |
| CORONILLO | 0,000 |
| PALO BLANCO | 0,000 |
| QUEBRACHO BL | 0,000 |
| PALO SANTO | 0,000 |
| SAMU'U | 0,000 |




| Especies | Vol. Prom. (m3/ha) |
|---|---|
| QUEBRACHO BL | 63,820 |
| SAMU'U | 15,76 |
| CORONILLO | 12,300 |
| PALO BLANCO | 11,996 |
| PALO SANTO | 9,19 |
| MISTOL | 3,200 |
| ALGARROBO | 1,603 |
| GUIAGUI PIRE | 1,470 |
| VERDE OLIVO | 0,74 |
| VIÑAL | 0,64 |
| GUAYACAN | 0,56 |



***PMF.09. MARCOS IBARROLA***

Resolución INFONA N° 147/2017

Localización: Sector, Lagerenza'i Distrito de Bahía Negra, Dpto. Alto Paraguay

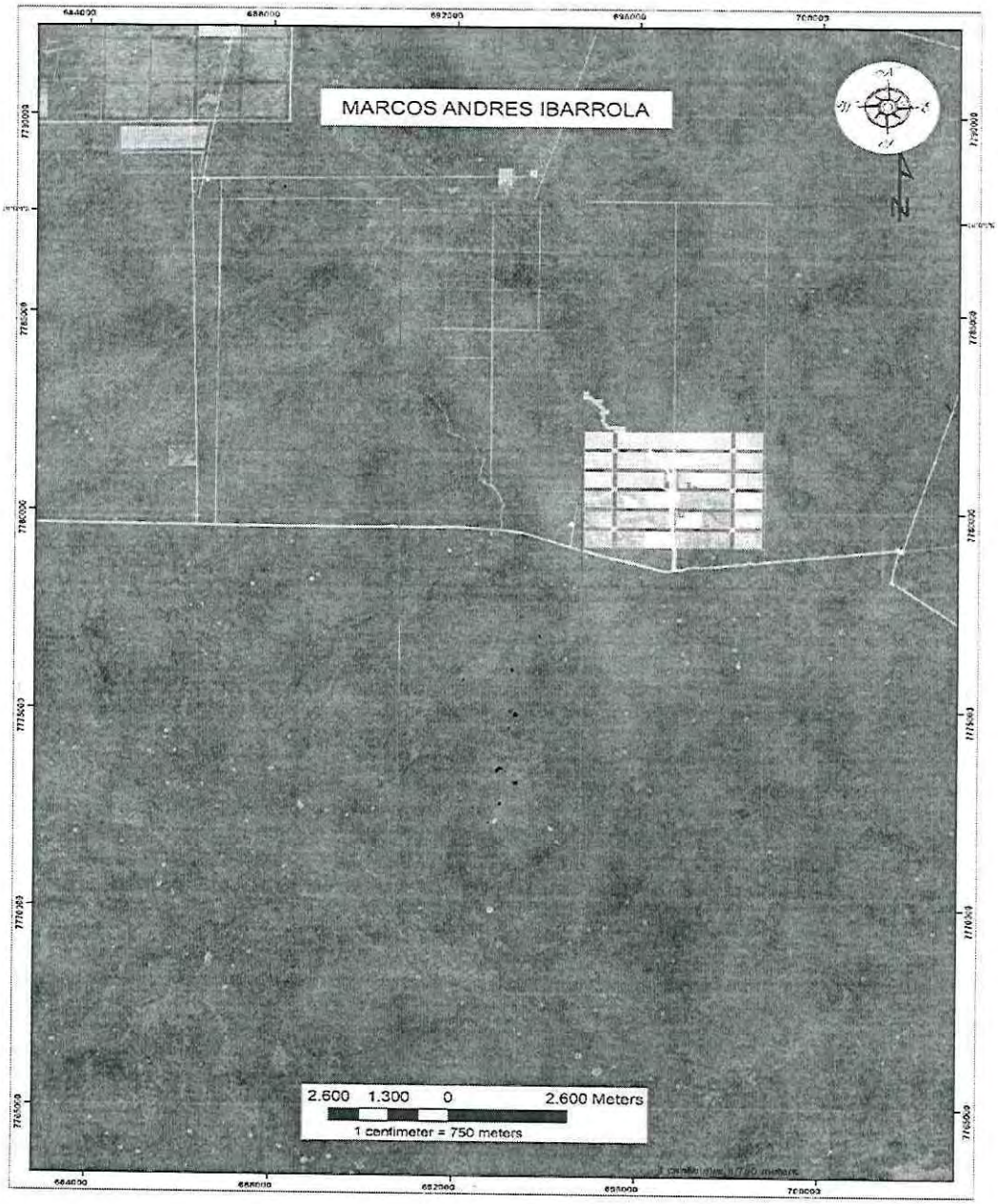
Coordenadas: X: 692.750Y: 7.778.384

Dimensión del inmueble: 8.000,00 Ha.

Bosque de Manejo: 3756,5 Ha.

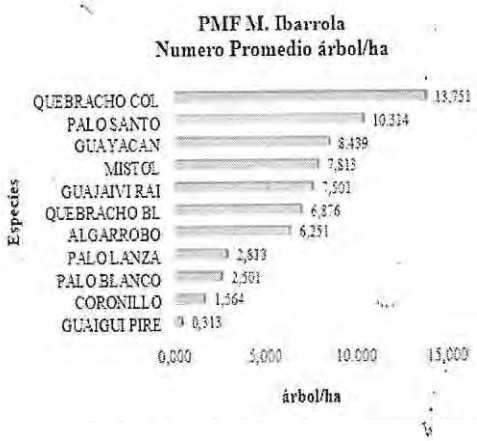
Ecorregión: Chaco Seco

**Ilustración N° 19.** Propiedad Marcos Ibarrola

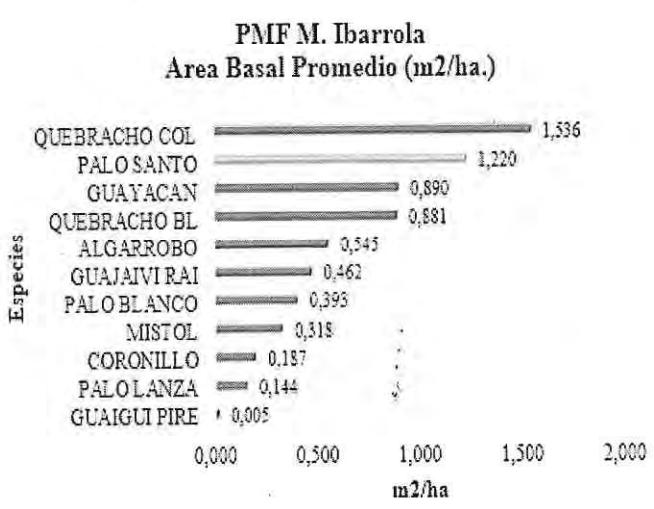



Fuente: V&S Consultora Ambiental Forestal, 2021

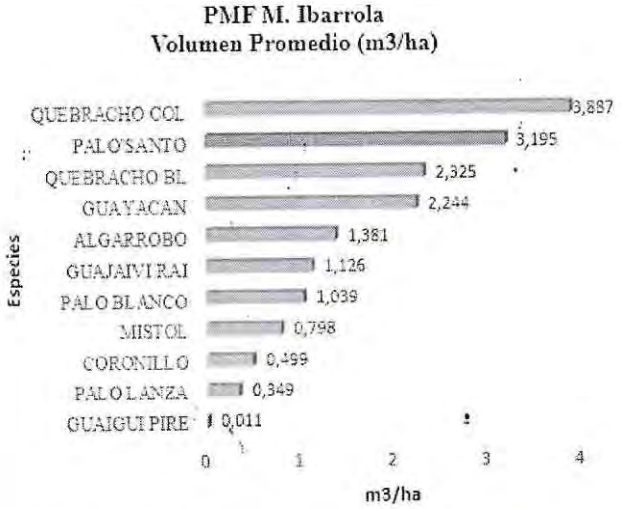
| Especie | No. Prom.Arb./ha |
|---|---|
| QUEBRACHO COL | 13,751 |
| PALO SANTO | 10,314 |
| GUAYACAN | 8,439 |
| MISTOL | 7,813 |
| GUAJAIVI RAI | 7,501 |
| QUEBRACHO BL | 6,876 |
| ALGARROBO | 6,251 |
| PALO LANZA | 2,813 |
| PALO BLANCO | 2,501 |
| CORONILLO | 1,564 |
| GUAIGUI PIRE | 0,313 |




| Especies | Area Bas. Prom (m2/ha) |
|---|---|
| QUEBRACHO COL | 1,536 |
| PALO SANTO | 1,220 |
| GUAYACAN | 0,890 |
| QUEBRACHO BL | 0,881 |
| ALGARROBO | 0,545 |
| GUAJAIVI RAI | 0,462 |
| PALO BLANCO | 0,393 |
| MISTOL | 0,318 |
| CORONILLO | 0,187 |
| PALO LANZA | 0,144 |
| GUAIGUI PIRE | 0,005 |




| Especies | Vol. Prom. (m3/ha) |
|---|---|
| QUEBRACHO COL | 3,887 |
| PALO SANTO | 3,195 |
| QUEBRACHO BL | 2,325 |
| GUAYACAN | 2,244 |
| ALGARROBO | 1,381 |
| GUAJAIVI RAI | 1,126 |
| PALO BLANCO | 1,039 |
| MISTOL | 0,798 |
| CORONILLO | 0,499 |
| PALO LANZA | 0,349 |
| GUAIGUI PIRE | 0,011 |



***PMF.10. CARLOS RIBEIRO***

Resolución INFONA N° 24/2016 Nueva

Localización: Sector, Colonia San Gabriel Arcángel Distrito de Bahía Negra, Dpto. Alto Paraguay

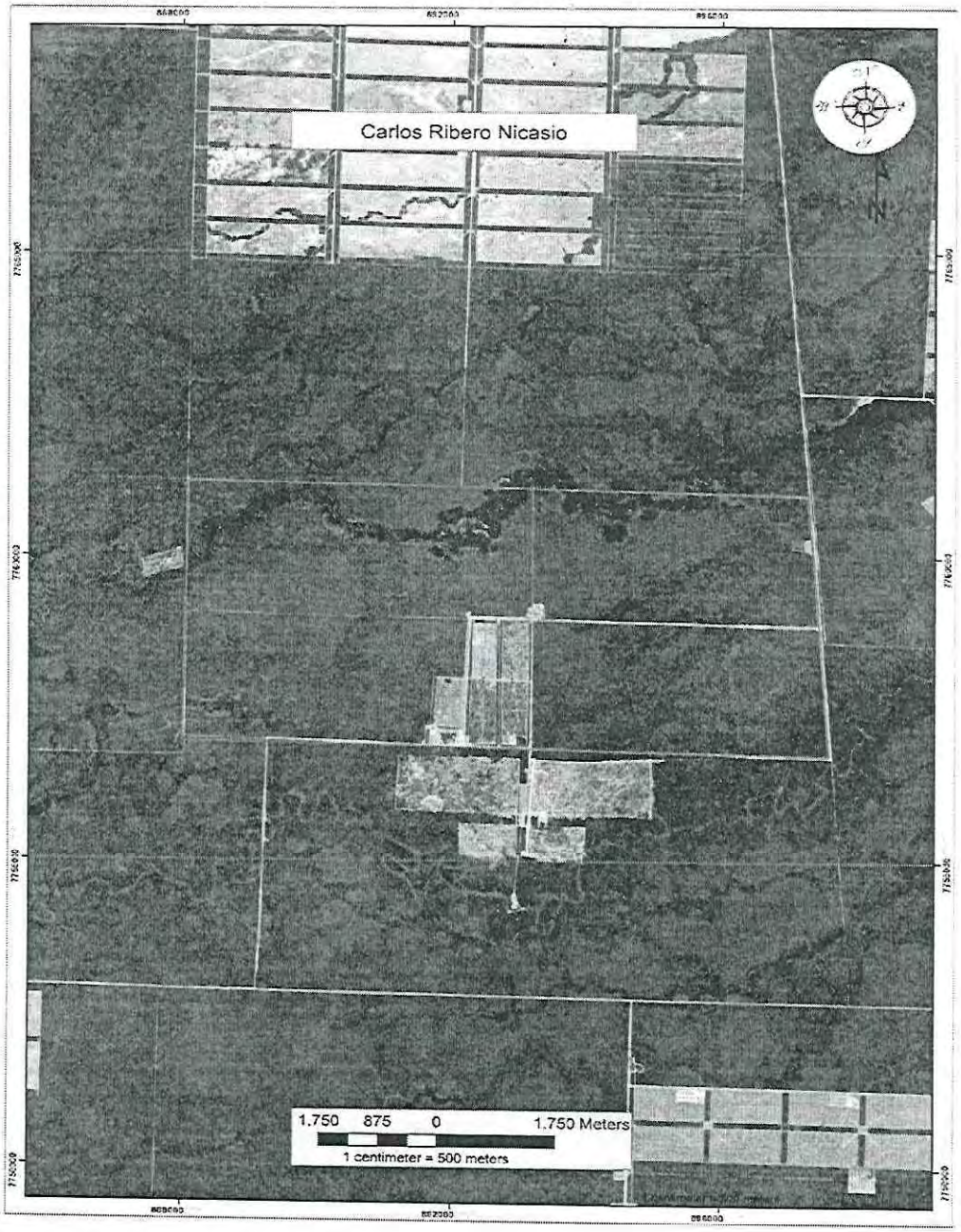
Coordenadas: X: 265.867Y: 7.762.007

Dimensión del inmueble: 3.993,90 Ha.

Bosque de Manejo: 1.536,60 Ha.

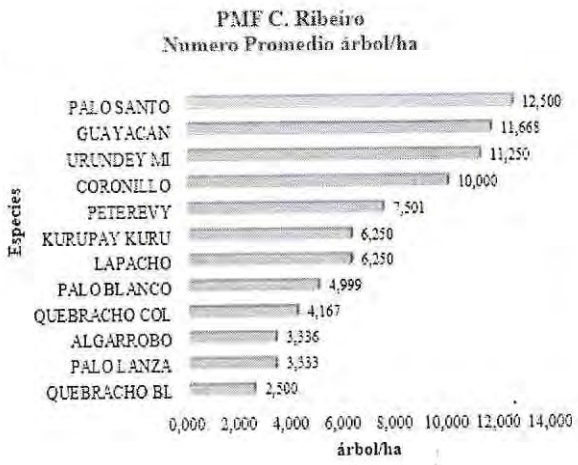
Ecorregión: Pantanal

**Ilustración N° 20.** Propiedad Carlos Ribeiro

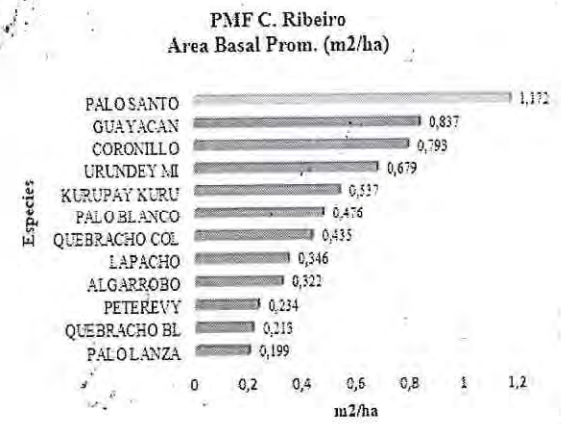



Fuente: V&S Consultora Ambiental Forestal, 2021

| Especie | No. Prom. Arbol/ha |
|---|---|
| PALO SANTO | 12,500 |
| GUAYACAN | 11,668 |
| URUNDEY MI | 11,250 |
| CORONILLO | 10,000 |
| PETEREVY | 7,501 |
| KURUPAY KURU | 6,250 |
| LAPACHO | 6,250 |
| PALO BLANCO | 4,999 |
| QUEBRACHO COL | 4,167 |
| ALGARROBO | 3,336 |
| PALO LANZA | 3,333 |
| QUEBRACHO BL | 2,500 |




| Especies | Area Basal Prom. (m2/ha) |
|---|---|
| PALO SANTO | 1,172 |
| GUAYACAN | 0,837 |
| CORONILLO | 0,793 |
| URUNDEY MI | 0,679 |
| KURUPAY KURU | 0,537 |
| PALO BLANCO | 0,476 |
| QUEBRACHO COL | 0,435 |
| LAPACHO | 0,346 |
| ALGARROBO | 0,322 |
| PETEREVY | 0,234 |
| QUEBRACHO BL | 0,213 |
| PALO LANZA | 0,199 |

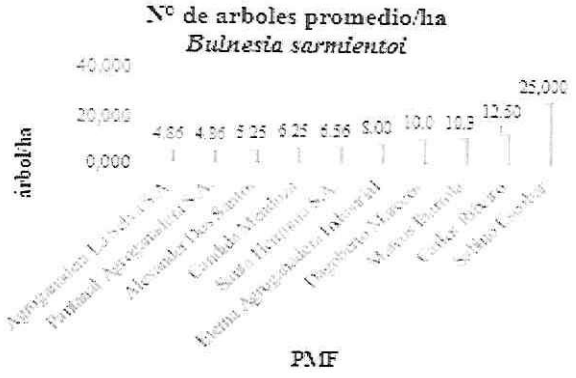



| Especies | Vol. Prom. (m3/ha) |
|---|---|
| PALO LANZA | 12,500 |
| GUAYACAN | 11,668 |
| QUEBRACHO BL | 11,250 |
| KURUPAY KURU | 10,000 |
| ALGARROBO | 7,501 |
| PALO BLANCO | 6,250 |
| CORONILLO | 6,250 |
| QUEBRACHO COL | 4,999 |
| PALO SANTO | 3,282 |
| URUNDEY MI | 2,048 |
| LAPACHO | 1,060 |
| PETEREVY | 0,920 |

## PROMEDIO de los PMF con *Bulnesia sarmientoi* Aprobados por el INFONA

| PMF | N°Prom. Arb.ha |
|---|---|
| Agroganadera La Selva S.A. | 4,857 |
| Pantanal Agroganadera S.A. | 4,857 |
| Alexander Dos Santos | 5,249 |
| Cándida Mendoza | 6,250 |
| Santa Herminia S.A. | 6,564 |
| Eterna Agroganadera Industrial | 8,000 |
| Dagoberto Marecos | 10,000 |
| Marcos Ibarrola | 10,314 |
| Carlos Ribeiro | 12,500 |
| Sabino Escobar | 25,000 |

PROMEDIO: 9,359 arboles

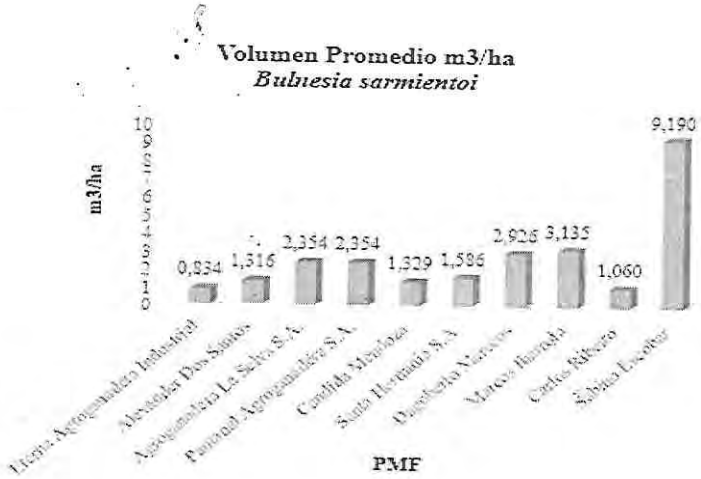



| PMF | Area Bas. Prom. m2/ha |
|---|---|
| Carlos Ribeiro | 1,172 |
| Eterna Agroganadera Industrial | 0,476 |
| Alexander Dos Santos | 0,400 |
| Pantanal Agroganadera S.A. | 0,523 |
| Agroganadera La Selva S.A. | 0,523 |
| Cándida Mendoza | 0,530 |
| Santa Herminia S.A. | 0,613 |
| Marcos Ibarrola | 1,220 |
| Dagoberto Marecos | 1,251 |
| Sabino Escobar | 0,000 |

PROMEDIO: 0.671 m2/ha

(*) Sin datos


| PMF | Vol. Prom. m3/ha |
|---|---|
| Eterna Agroganadera Industrial | 0,834 |
| Alexander Dos Santos | 1,316 |
| Agroganadera La Selva S.A. | 2,354 |
| Pantanal Agroganadera S.A. | 2,354 |
| Cándida Mendoza | 1,329 |
| Santa Herminia S.A. | 1,586 |
| Dagoberto Marecos | 2,926 |
| Marcos Ibarrola | 3,135 |
| Carlos Ribeiro | 1,060 |
| Sabino Escobar | 9,190 |
| PROMEDIO: | 2,608 |



## Diversidad Florística de los Bosques bajo PMF

**Tabla N° 6.** Diversidad Florística de los bosques de los 10 Planes de Manejo Forestal.

| Especies | | PMF | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Nombre común** | **Nombre científico** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| Algarrobo | *Prosopis alba* Griseb. | X | | | X | X | X | X | | X | X |
| Coronillo | *Schinopsis lorentzii* (Griseb.) Engl. | X | X | X | | X | X | X | X | X | X |
| Gauigui pire | *Salta triflora* (Griseb.) Adr. Sanchez | X | X | X | X | X | X | X | X | X | |
| Guajaivi rai | *Sideroxylon obtusifolium* (Roemer&Schultes) Pennington ssp. *obtusifolium* | X | X | X | X | X | | X | | X | |
| Guayacan | *Libidibia paraguarienses* (D. Parodi) G.P. Lewis | X | X | X | X | X | X | X | X | X | X |
| Jukeri | *Senegalia praecox* Griseb. | | | | X | | | | | | |
| Kurupay kuru | *Anadenanthera colubrina* var. *cebil.* (Griseb.) Altschul | | | | | | | | | | X |
| Labon | *Tabebuia nodosa* (Griseb.) Griseb. | X | X | X | X | X | X | | | | |
| Lapacho | *Handroanthus heptaphyllus* (Vell.) Mattos | | | | | | | | | | X |
| Mistol | *Sarcomphalus mistol* (Griseb.) Hauenschild | X | X | X | X | X | X | X | X | X | |
| Palo blanco | *Calycophyllum multiflorum* Griseb. | X | | X | X | X | X | X | X | X | X |
| Palo lanza | *Phyllostylon rhamnoides* (J.Poiss) Taub. | X | X | X | X | X | X | X | | X | X |
| Palo Santo | *Bulnesia sarmientoi* (Lorentz) ex Griseb. | X | X | X | X | X | X | X | X | X | X |
| Peterevy | *Cordia glabrata*.A. DC. | | | | | | | | | | X |
| Q. blanco | *Aspidosperma quebracho-blanco* Schltdl. | | X | X | X | X | X | X | X | X | X |
| Q. colorado | *Schinopsis balansae* Engl. | | X | X | X | X | | X | | X | X |
| Samu'u | *Ceiba chodatii* (Hassl.) Ravenna | | X | X | X | | X | | X | | |
| Tuna | *Cereus stenogonus* K.Schum. | | | | X | | | | | | |
| Urundey mi | *Myracrodruon urundeuva* Allemão | | | | X | | | | | | X |
| Verde olivo | *Parkinsonia praecox* (Ruiz & Pav. ex Hook.) Hawkins | | X | X | X | | X | | X | | |
| Viñal | *Prosopis ruscifolia* Griseb. | | X | X | X | | | | X | | |
| Yvyra ita | *Muellera nudiflora* (Burkart) N.J. Silva & A.M.G. Azevedo | | | | X | | | | | | |

| N° | PMF (aprobados por el INFONA) |
|---|---|
| 1 | Santa Herminia S.A. |
| 2 | Agroganadera La Selva S.A. |
| 3 | Pantanal Agroganadera S.A. |
| 4 | Alexander Dos Santos |
| 5 | Cándida Mendoza |
| 6 | Eterna Agroganadera Industrial |
| 7 | Dagoberto Marecos |
| 8 | Sabino Escobar (Florencia Catalina) |
| 9 | Marcos Ibarrola |
| 10 | Carlos Ribeiro |

## PARCELAS DE MUESTREO

## PARCELAS PERMANENTES de MONITOREO

En el año 2019, el MADES, el INFONA y la UNA/CIF, en colaboración con la Cooperativa Chortitzert Ltda., han acordado evaluar la población de *Bulnesia sarmientoi* en los Departamentos Alto Paraguay, Boquerón y Presidente Hayes y proponer medidas para su conservación sostenible. Para el relevamiento de datos se utilizaron 3 unidades de Parcelas Permanentes de Monitoreo, de 20 x 500 m., cada una, divididas en 25 sub-parcelas de 20 x 20 m., ubicadas a una distancia de 350-500 m, unas de otras. Los datos preliminares se observan en la Tabla N° 7.A.

Céspedes et al (2018), en su publicación "Análisis de estructuras de parcelas para el estudio de los palosantales", dan a conocer informaciones relacionadas con la presencia de rodales puros de Palo Santo en el Chaco Paraguayo; además, definen su área de distribución, sus características, biología e influencia del uso de suelo sobre las poblaciones de la especie. Los muestreos del estudio se realizaron en diferentes sitios seleccionados a través de imágenes satelitales y programas informáticos especiales como Maxent y BIOMOD. Se hicieron 3 tipos de muestreo, uno para estudiar las clases de bosques y determinar los rodales puros, otro para la regeneración y generación de datos biológicos de la especie y, un tercero, para estudiar la dispersión y distribución de la especie. Véase Tabla N° 7.B.

**Tabla N° 7.** "Evaluación Poblacional del Palo santo (*Bulnesia sarmientoi)*

| **Tabla N° 7.A** | **Sitio** | **N° Arb. Palo Santo/ha** | **IVI** |
|---|---|---|---|
| **Proyecto "Evaluación Poblacional del Palo santo (*Bulnesia sarmientoi)*! MADES/INFONA/UNA** | | | |
| 1 | Campo María | 24 | 35 |
| 2 | Rio Verde | 4 | 8 |
| 3 | Estancia 47.000 | 27 | 23 |
| **Tabla N° 7.B** | **Análisis de estructuras de parcelas para el estudio de los palosantales** | | |
| 4 | Estancia Yrenda | s/d | Palo Santo (*Bulnesia sarmientoi* ) |
| 5 | Estancia Tres Marías | s/d | Palo Santo (*Bulnesia sarmientoi* ) |
| 6 | Estancia Loma Pora | 50 | Palo Santo (*Bulnesia sarmientoi* ) |
| 7 | Parque Natural Selva Serena | s/d | Palo Santo (*Bulnesia sarmientoi* ) |
| 8 | Estancia Palmar Quemado | 66 | Palo Santo (*Bulnesia sarmientoi* ) |
| 9 | Estancia Palmar Quemado - Peladar 1 | 109 | Palo Santo (*Bulnesia sarmientoi* ) |
| 10 | Estancia Palmar Quemado - Peladar 2 | 58 | Palo Santo (*Bulnesia sarmientoi* ) |
| 11 | Estancias Tres Palmas | 12 | Palo Santo (*Bulnesia sarmientoi* ) |
| 12 | Estancia 47.000 | 71 | Palo Santo (*Bulnesia sarmientoi* ) |
| 13 | Estancia Pozo Monte | 56 | Palo Santo (*Bulnesia sarmientoi* ) |

Fuente: MADES/INFONA/UNA (2019) & Céspedes et al (2018).

## PARCELAS DEL INVENTARIO FORESTAL NACIONAL

Para la realización del Inventario Forestal Nacional, el INFONA estratificó el territorio nacional en cinco (5) diferentes tipos de estratos o de bosque, a saber:

1. Bosque Húmedo de la Región Oriental
2. Bosque Subhúmedo del Cerrado
3. Bosque Subhúmedo Inundable del Río Paraguay
4. Bosque Seco Chaqueño
5. Bosque Palmar

Según los datos de las parcelas del inventario realizado en el 2018, la especie Palo Santo (*Bulnesia sarmientoi)* se encuentra comúnmente en los estratos o ecosistemas de la Región Occidental (Chaco). La especie habita mayormente el Bosque Seco Chaqueño y el Bosque Subhúmedo Inundable del Río Paraguay. (INFONA/DIFN, 2021).

**Tabla N° 8.** Datos Estadísticos Relevantes de la Presencia de Palo Santo en el Bosque Seco Chaqueño (2018).

| PROMEDIO-PALO SANTO | |
|---|---|
| **Número de árboles por ha:** | 13,41 árb/ha |
| **Área basal/ha:** | 0,29 m²/ha |
| **Volumen total/ha:** | 1,30 m³/ha |
| **Volumen comercial/ha:** (biomasa viva): | 0,75 m³/ha |
| **Carbono/ha:** | 0,95 Tn/ha |
| **Índice de Valor de Importancia:** | 1,65 |

Fuente: INFONA/DIFN, 2021

## 2.7 REFORESTACIÓN

En el 2021, el equipo técnico de V&S Consultora Ambiental Forestal, acompañado de representantes del MADES (Autoridad Científica CITES PY) y del INFONA, realizó un viaje de campo con el objeto de observar la ejecución de los PMF aprobados por el INFONA, para la elaboración de este dictamen. Durante el mismo, se ha constatado la existencia de una pequeña parcela de reforestación, de una 1,0 ha de superficie aproximadamente, en la propiedad de la Cooperativa Chortitzer, usufructuada por el Sr. Levi Schroeder, ubicada en la zona denominada San Antonio (Chamacoco), en el Dpto. de Alto Paraguay, que data de 2008.

La plantación se estableció con una densidad de 4 x 2m., con mínimos trabajos de preparación de suelos (disqueado con 50 cm de profundidad) y un solo mantenimiento al mes de plantación. Al año de la plantación, ésta ha sufrido el ramoneo del ganado vacuno, atendiendo que la misma se encuentra dentro de un área de pastura. Hasta la fecha no ha realizado ninguna intervención silvicultural, y, en función a lo observado, se podría decir que semeja casi a una población natural de *Bulnesia sarmientoi.*

## Área de Reforestación. Propiedad del Sr. Levi Schroeder (Año de plantación 2008)

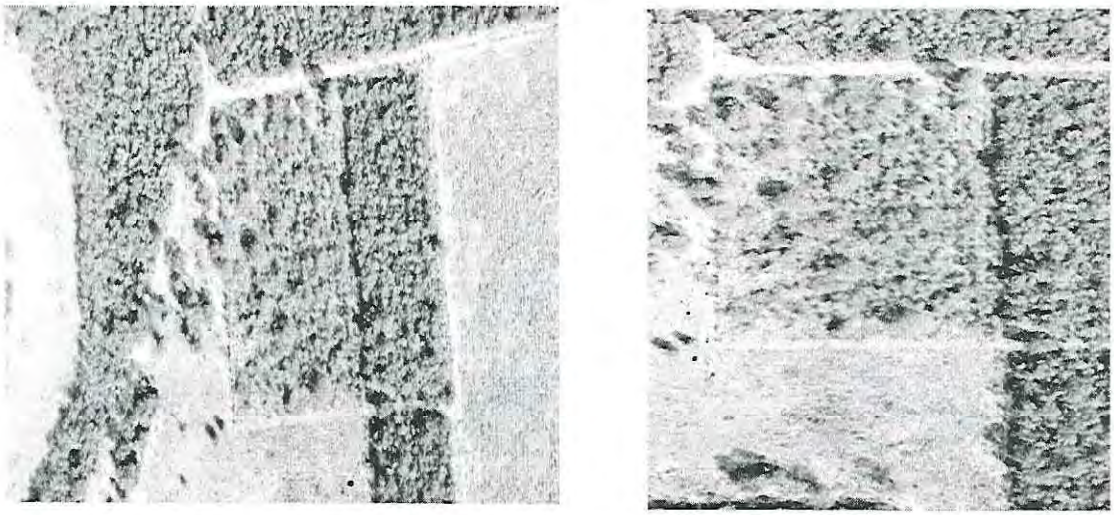


**Imagen** N°12: Fotos aéreas de la plantación (S. Medina, Chortitzer, 2021)

**Imagen N° 13.** Midiendo el árbol

**Imagen N°14.** Altura de los árboles

**Imagen N° 15.** Mediciones dasométricas

**Imagen N° 16.** Condición de la parcela en la actualidad

Asimismo, se visitó una parcela demostrativa en la "***Estación Experimental Cambisol***", perteneciente a la Cooperativa Chortitzer, situada en la localidad de Loma Plata. Dicha parcela se estableció en el año 2020, con 28 plantines de la especie *Bulnesia*, con una densidad de 7 x 4m. Durante la visita se constató el prendimiento de 26 plantines, cuya altura varían entre 35 - 80 cm.

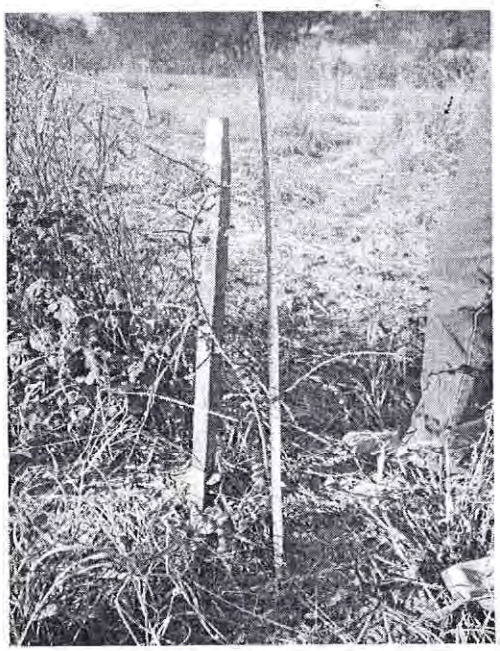


**Imagen N° 17.** Medición de los plantines

**Imagen N° 18.** Parcela Cambisol

## 2.8. ESTIMACIÓN DE VOLUMEN COMERCIAL *Bulnesia sarmientoi*

La estimación de volumen para este Dictamen de Extracción No Perjudicial de *Bulnesia sarmientoi* se sustenta, exclusivamente, en 10 Planes de Manejo Forestal aprobados por el INFONA y vigentes (periodo 2015-2020). Los bosques bajo manejo forestal ascienden a **48.232,10 ha**, ubicados en 10 propiedades que una superficie de **88.974,92 ha.** Estos Planes de Manejo se encuentran distribuidos en distintas ecorregiones que representan características ecológicas y edafológicas diferentes del Chaco.

En la Tabla N° 9 se presentan los resultados de las estimaciones del volumen comercial por cada Plan de Manejo y su ubicación dentro de cada ecorregión. Se debe aclarar que estos volúmenes corresponden a los volúmenes reportados por cada plan y aprobados por el INFONA. De la evaluación realizada, se constató que la intensidad de muestreo no responde al parámetro mínimo legal establecido. Además, los PMF pertenecientes a las empresas Agroganadera La Selva S.A. y Pantanal Agroganadera S.A. presentan valores idénticos en lo que se refiere a Intensidad de Muestreo, N° de árbol, Área Basal y Volumen, resultados inusuales y poco claros en materia forestal.

Por otro lado, se puede observar que el PMF, perteneciente a Sabino Escobar (F Catalina), presenta también valores inusuales en referencia a N° de árboles y Volumen, con relación al promedio de los demás PMF evaluados. En este contexto, de la comparación con los resultados de otros estudios de referencia y datos instituciones públicos sobre la materia, los valores indicados en el referido Plan resultan significativamente más elevados que el promedio para la especie. El INFONA deberá corroborar estos resultados durante su intervenciones de monitoreo.

**Tabla N° 9.** Volumen de existencia por PMF y Ecorregiones

| Ecorregión | N° | PMF | Sup. Bajo manejo (ha) | Sup. Muestreo (ha) | % (Resol SFN 07/02 Muestreo 0,5% | % Muestreo Faltante/PMF | N° arb.(ha) | A. Basal m2/ha | Vol. Total m3r/ha PMF |
|---|---|---|---|---|---|---|---|---|---|
| Chaco Húmedo | 1 | Santa Herminia S.A. | 4.828,2 | 3,2 | 24,14 | 86,74 | 6,6 | 0,613 | 1,586 |
| | 2 | Agroganadera La Selva S.A. | 2.694,4 | 2,8 | 13,5 | 79,22 | 4,9 | 0,523 | 2,354 |
| | 3 | Pantanal Agroganadera S.A. | 5.488,8 | 2,8 | 27,4 | 89,80 | 4,9 | 0,523 | 2,354 |
| | 5 | Cándida Mendoza | 835,4 | 4,0 | 4,2 | 4,24 | 6,3 | 0,530 | 1,329 |
| | | TOTAL | **13.846,8** | **12,8** | **69,2** | | **22,5** | **0,547** | **1,906** |
| Chaco Seco | 4 | Alexander Dos Santos | 22.712,9 | 12,0 | 113,6 | 89,43 | 5,2 | 0,400 | 0,868 |
| | 6 | Eterna Agroganadera Ind. S.A. | 3.387,8 | 4,0 | 16,9 | 76,39 | 8,0 | 0,476 | 0,834 |
| | 7 | Dagoberto Marecos | 1.063,0 | 2,4 | 5,3 | 54,84 | 10,0 | 1,251 | 2,926 |
| | 8 | Sabino Escobar (F. Catalina) | 1.928,5 | 4,8 | 9,6 | 50,22 | 33,0 | 0,000 | 8,020 |
| | 9 | Marcos Ibarrola | 3.756,5 | 3,2 | 18,8 | 82,96 | 10,3 | 1,220 | 3,135 |
| | | TOTAL | **32.848,7** | **26,4** | **164,2** | | **66,6** | **0,669** | **3,157** |
| Pantanal | 10 | Carlos Ribeiro | 1.536,6 | 2,4 | 7,7 | 68,76 | 12,5 | 1,172 | 1,060 |
| | | TOTAL | **48.232,1** | **41,6** | **241,2** | | | | **6,122** |

Fuente: Elaboración Propia en función a los PMF evaluados.

## 2.9. ÁRBOLES DEL FUTURO Y/O SEMILLEROS DE *Bulnesia sarmientoi*

Los Planes de Manejo en estudio tienen como mecanismo para controlar el aprovechamiento de los bosques el Diámetro Mínimo de Corta (DMC).

Cronológicamente, en el año 2000, se reglamentó la corta y aprovechamiento del Palo Santo, a través de la Resolución SFN N° 208. En el año 2002, por Resolución SFN N° 07, "que reglamenta la elaboración y presentación de los Planes de Manejo Forestal" se derogan todas las disposiciones anteriores del SFN, sobre la elaboración y presentación de los Planes de Manejo Forestal y Aprovechamiento Forestal. Por lo tanto, mediante ésta, la Resolución SFN N° 208/00 dejó de existir legalmente. Curiosamente, en el año 2003, se emite la Resolución SFN N° 128/03 para modificar el Artículo 2° de la Resolución N° 208/00, que previamente ya fue derogada por la Resolución SFN N° 07. En estas condiciones, el DMC vigente para el Palo Santo es el establecido según Inciso "e", del Acápite 2.2, del Capítulo VII de los Términos de Referencia para la Elaboración de Planes de Manejo. Por lo tanto, todas las clases diamétricas por debajo de 35 cm, para el caso del Palo Santo, se encuadrarían dentro de los árboles del futuro.

Por otro lado, la legislación vigente no define la metodología para establecer los árboles padres o semilleros, dejando esta responsabilidad al formulador del plan. (TdR para la elaboración de PMF-Resolución SFN N° 07). En función a la prescripción silvicultural que establece la citada resolución que, en ningún caso, la corta podrá implicar más del 80% de la abundancia actual de los árboles seleccionados como comerciales (entendiéndose esto como los arboles con DAP superiores al DMC), se puede entender que el remanente del 20% podría ser considerado como arboles padres o semilleros.

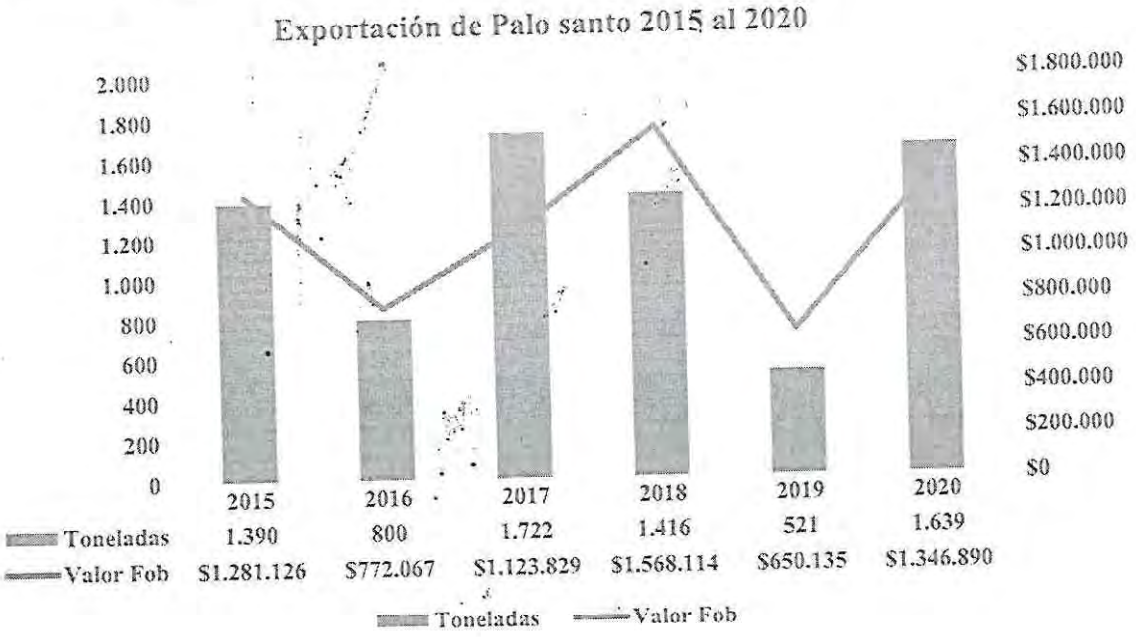
Del análisis realizado a los PMF se pudo comprobar que para la determinación del volumen comercial se consideró un DMC inferior al prescripto por la legislación, por lo tanto, el volumen de corta permisible se puede encontrar sobreestimado y, en ninguno de los casos, los planes establecen metodologías para la distribución de los árboles padres o semilleros.

## 2.10. UTILIZACIÓN Y COMERCIO DE ESPECÍMENES DE *Bulnesia sarmientoi*

La Autoridad Administrativa CITES es la instancia que autoriza la emisión de los Certificados CITES, para los permisos de exportación, teniendo en cuenta los requisitos mencionados en la Resolución SEAM N° 1360/11.

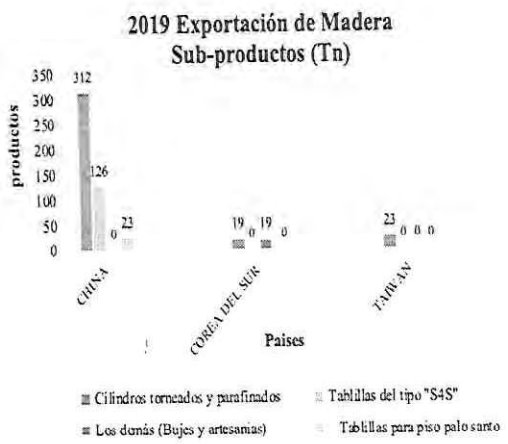
Los productos y sub productos de *Bulnesia sarmientoi* exportados en el periodo 2016 - 2020, totalizan 7.488 toneladas, según la Dirección de Comercio e Industria Forestal del INFONA. Asimismo, y de acuerdo con los permisos CITES emitidos por la Dirección de Vida Silvestre del MADES, se han exportado 1.247 toneladas de extracto.

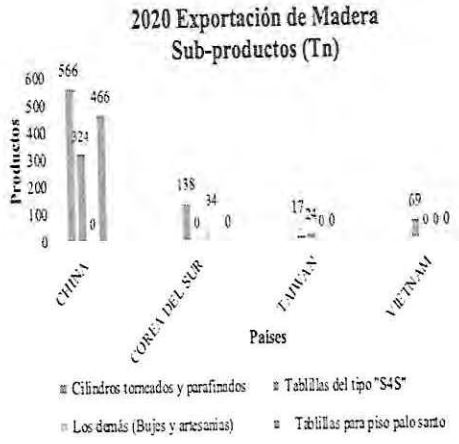
## Cupos emitidos para madera 2016-2020



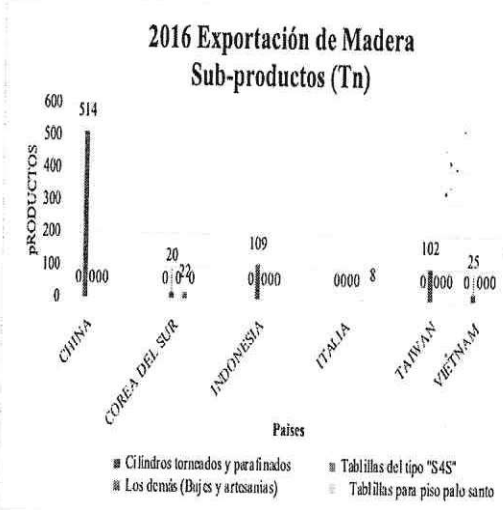

Fuente: INFONA. Dirección de Comercio e Industria Forestal 2021,

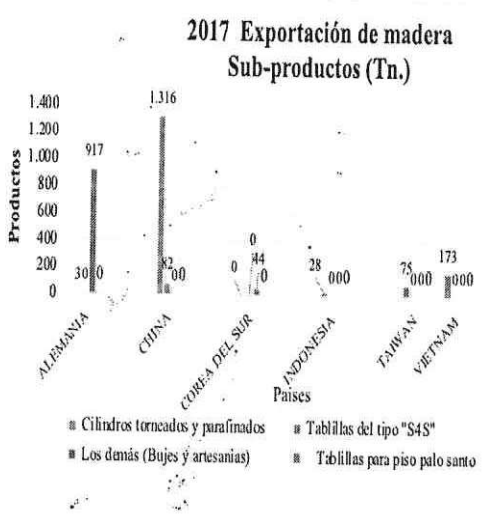
## Exportación de madera por año y sub productos (2019 – 2020)



## Exportación de madera por año y sub productos (2016 – 2018)





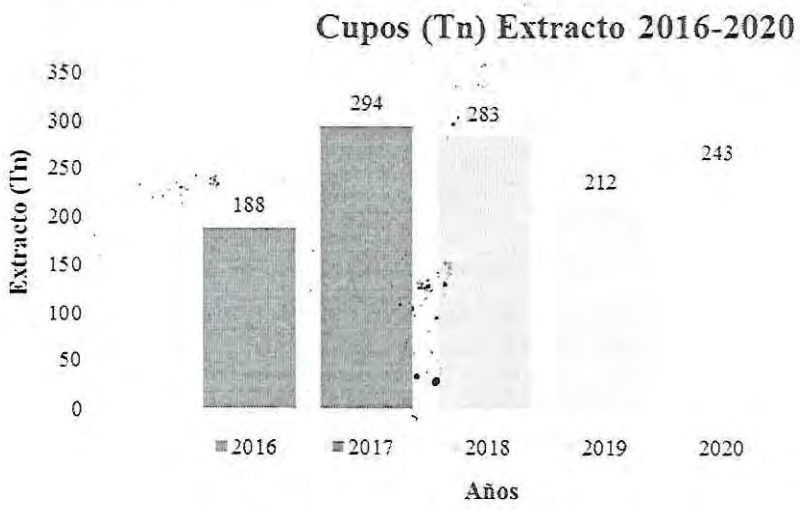
Fuente: INFONA/ Elaboración V&S Consultora Ambiental Forestal, 2021

## Exportación de extracto

Los principales destinos de exportación de extractos de los últimos cinco años son Alemania, Argentina, Australia, Brasil. China. Estados Unidos, Francia, India, Indonesia, Países Bajos, Reino Unido, Suiza, Singapur. Siendo la India el país que mayor cantidad de extracto importa de acuerdo a los permisos CITES emitidos por la Dirección de Vida Silvestre, MADES. (Ver ANEXO N° 6)

**Cupos emitidos de Extracto 2016-2020**

Fuente: Permisos CITES emitidos por DVS/MADES (2021). Elaboración V&S Consultora Ambiental Forestal




## UTILIZACIÓN DE ESPECÍMENES DE *Bulnesia sarmientoi.*

### *Uso Maderable del Palo Santo*

La madera tiene alto valor comercial, es de textura fina y aroma intenso. Posee gran resistencia, siendo una de las maderas más densas del mundo (1100- 1280 kg/m$^3$). Se emplea en la elaboración de muebles, parquét, tornería, fabricación de artículos decorativos, en construcciones rurales, leña, entre otros usos. (Céspedes et al., 2018).

También es muy utilizada en artesanía. Estos usos derivan del conocimiento popular de las culturas indígenas, estudiado y publicado por varios profesionales, como Arenas, P., Schmmeda, G., L. Tortorelli, Martínez Crovetto, R., Scarpa, G., entre otros.

Localmente la madera se utiliza como postes, ya que es prácticamente imputrescible bajo tierra, debido al alto contenido de resinas (CoP15 Prop.42-p.2). También se aprovecha como leña, dado que su humo es fragante y se enciende fácilmente (PC16Doc. 21.2. (Rev.1), y por la poca producción de cenizas (Giménez, 2007).

Los nativos de la región chaqueña utilizan la madera para fabricar garrotes y lanzas, armazones para sus viviendas, herramientas para sus actividades productivas y hasta para cavar la sepultura de sus difuntos, también para ahuyentar mosquitos y otras alimañas. (Mereles, 2007).

El uso de bujes navales de Palo Santo también es muy antiguo. Según Mereles, (2007) se ha observado en Paraguay grandes cantidades de rollos alisados, apilados por diámetros (desde menos de 10 cm de diámetro, medido a unos 1,40 m de altura), con esa finalidad.

La madera también se utiliza como antifebril, sudorífica, depurativa y diurética. Los indígenas Maka utilizan la madera como cicatrizante contra heridas producidas por pirañas. (Pin, 2009).

En la medicina popular se le atribuyen propiedades a la corteza, la madera y a las hojas, para tratar dolores de pecho, de estómago, espalda y de cabeza, para la tos, granos y mordeduras, golpes, reuma, heridas, disolver hemorragias internas (Schulz, 1997), contra la tuberculosis (Filipov, 1997), para la piorrea, como diurética (Arenas, 1981), depurativo orgánico, para afecciones de la piel (Mereles y Degen, 1997) y enfermedades del sistema nervioso (Amat y Yajía, 1991). En la medicina tradicional veterinaria, es utilizada como expectorante en caballos (Scarpa, 2000).

***Uso del extracto del Palo santo***

*Bulnesia sarmientoi*, es una de las especies con mayor importancia dentro del rubro de la producción de aceites esenciales. De su madera, se extrae un aceite esencial conocido como "guayacol", con gran demanda internacional. (Enríquez, 2019).

Paraguay exporta este producto desde 1.965, elaborado en las dos unidades productoras ubicadas en las comunidades de colonos menonitas de Filadelfia y Loma Plata, del Chaco Paraguayo. (Centro de Promoción de Exportaciones, MIC, 1971). En la actualidad se encuentran operativas otras empresas relacionadas a este rubro.

El aceite esencial está compuesto principalmente por Guayacol, Bulnesol y Sesquiterpenos aromáticos (Rempel, 2003). El aceite esencial concentra el 70% de la composición del producto, además de otros componentes como el bulnesol y guaiol, hanamyol, isómero de eudesmol, α-eudesmol, β-eudesmol, epóxido de un guaiene, α-bulneseno, isómero de bulnesol, elemol, a pesar de que algunos estudios demuestran que estos últimos no son componentes importantes. (Enríquez, 2019) El uso del aceite de guaiac o guayacol es antiguo, se registra ya en la época pre-renacentista.

Se utiliza actualmente en la industria cosmética y perfumería, debido a su olor suave y agradable similar al de la rosa y con menor intensidad al de violeta. Debido a esta similitud, suele emplearse en la adulteración del aceite de rosa. (Rodilla, 2011).

La esencia del Palo Santo también es medicinal, ya que es un poderoso cicatrizante y desinfectante de heridas. Se expende la esencia bajo el nombre de "extracto de Palo Santo", también es repelente de insectos, anti fúngico cutáneo y para desinfección de heridas. (Pin, 2009).

Está comprobada la actividad bactericida en el extracto de la madera de la especie. (Salvat, A., et al, 2004). También se utiliza la madera para elaborar una pasta contra el dolor de golpes y hematomas, y se prescribe como anticancerígena y los efectos apoptóticos del extracto acuoso de la planta. (Mollah et al, 2009).

La especie se encuentra con anotación #11 dentro del Apéndice II, lo que excluye al aceite esencial. Como la Conferencia de las Partes aún no ha definido algunos términos utilizados en las anotaciones, la

Secretaría, a fin de ofrecer orientación a las Partes en materia de aplicación, ha acuñado las siguientes definiciones de estos términos utilizados en las anotaciones (Notificación a las partes N° 2010/036):

- *Se entiende por "aceite esencial" el líquido hidrofóbico obtenido a partir del material vegetal natural mediante destilación con agua o vapor. El aceite esencial es ulteriormente separado de la fase acuosa por medios físicos.*

- *Se entiende por "extractos" las substancias extraídas del material vegetal en bruto, a menudo utilizando un disolvente como el etanol o el agua.*

Además, Paraguay comunicó a CITES su decisión de autorizar el comercio del aceite esencial y de madera de *Bulnesia sarmientoi.* (Notificación a las Partes N° 2011/009).

La materia prima que se utiliza para la obtención de este aceite es la madera descortezada, y su extracción con la trituración de la misma, ya que las mayores concentraciones de los aceites esenciales se encuentran en el duramen. Los Colonos Menonitas, generalmente utilizan la madera de calidad 2 (aptos para la elaboración de madera aserrada) y calidad 3 (rollos sanos pero pequeños y poco deformados) que generalmente son ramas, nudos sanos, pequeñas deformaciones, cortas, acanaladas, torcidas, encorvadas, contorneadas, ahorquilladas o con defecto superficiales) del rollo comercial (Hutchinson, I. (1974), lo que permite aprovechar al máximo y evitar pérdidas, debido a la calidad de la madera. El aserrín seco es cargado en pipones donde, por arrastre de vapor, la esencia en estado líquido pasa a los condensadores y finalmente son recogidos en vasos florentinos o esencieros. No se necesita mucha refrigeración, se solidifica a 35 - 40 °C. Al alcanzar la temperatura ambiente, la esencia queda como un líquido viscoso, que se espesa lentamente volviéndose una masa amarilla a verdosa cuando se funde entre 40 a 50 °C, queda en estado líquido por largo tiempo. Esta es la forma en que se la envasa y se vuelve a solidificar en el envase a ser comercializado. (Céspedes, 2011).

Céspedes (2011), en su tesis de maestría, menciona que el procedimiento completo dura en promedio unas 9 horas. El rendimiento promedio oscila entre 2,5 a 2,7%, es decir, se necesitan aproximadamente entre 2.500 a 2.700 kg. de aserrín para obtener 1 kg. de esencia.

Una investigación realizada por la Universidad Nacional de Asunción informa que mediante el macerado de 1,2 kg de madera triturada, en etanol al 95%, durante 24 horas, a temperatura ambiente y, repitiendo el proceso dos veces más, se elimina el disolvente mediante un evaporador rotativo al vacío a 40 °C., resultando 428,6 gr de extracto, lo que corresponde a un rendimiento del 35,7%. Con estas cifras se necesitan aproximadamente 3.5 kg. de madera para hacer un kg. de extracto. (Hiebert, Mickel R. et al., 2012).

Se ha informado que la extracción de esencia de Palo Santo y Cabreuva se realiza a partir de desechos de la industria y de los Planes de Manejo y de Uso de la Tierra. En el caso del Palo Santo, depende de los permisos otorgados por el MADES, al estar esta especie incluida en el Apéndice II de CITES. No existen datos precisos del consumo de leña en la producción de aceites esenciales; sin embargo, se ha podido verificar que el abastecimiento de leña, para las calderas y los hornos rudimentarios, proviene en un 100% del bosque nativo. En principio, la madera residual del proceso de destilación (aserrín exhausto de Palo Santo) es reutilizada como energético. (MOPC, 2019).

## III. PROPUESTA DE MANEJO de *Bulnesia sarmientoi*

Los Planes de Manejo y las Parcelas Permanentes deberán responden las directrices establecidas en los Términos de Referencia en la Resolución SFN N° 07 del 2002, para la Elaboración de PMF por el INFONA. Como los Planes de Manejo aprobados en este contexto no consignan estos criterios y presentan deficiencias que permitan un manejo adecuado de los bosques de la Región Occidental (Chaco). Por lo tanto, el INFONA deberá establecer criterios de manejo forestal para esta Región y así asegurar la perpetuidad y sostenibilidad de la producción forestal, y en especial de la especie *Bulnesia sarmientoi*

Una condición *sine qua non* de los Planes de Manejo Forestal deberá ser que los planes de corta anual adopten la ecuación: *volumen de corta anual = crecimiento anual del bosque*, donde el DMC deberá utilizarse de referencia, apenas como indicador de la madurez de las especies. Cuando se seleccionan solo los mejores fustes de las especies comerciales más valiosas para el aprovechamiento, sin aplicar tratamientos silviculturales para eliminar árboles defectuosos o fustes de especies no comerciales, el bosque puede ser dominado gradualmente por especies no comerciales o invasoras, modificando totalmente la estructura florística del bosque.

De esta manera, es fundamental que se establezca un límite máximo de corta sustentado desde la estructura que presente cada especie en el bosque, es decir, desde el tamaño y la dominancia que ejerzan los árboles en el ecosistema y su distribución al interior del mismo. Los ciclos de corta deben ser apropiados, y establecerse en función al crecimiento de las especies para asegurar que los árboles de las clases diamétricas inferiores alcance el DMC en el periodo de ciclo proyectado.

Se debe entender que la estructura de los bosques de la Región Oriental es significativamente diferente a la de los bosques de la Región Occidental (Chaco) y, por lo tanto, no se pueden seguir utilizando los mismos criterios para ambas regiones, partiendo del mismo diseño de las parcelas permanentes de muestreo, así como la metodología para la toma de las mediciones dasonómicas.

En resumen, la Autoridad de Aplicación deberá suponer esta responsabilidad de introducir los cambios necesarios en los términos de referencia para la elaboración e implementación de los planes de manejo en la Región del Chaco.

En función a los requerimientos del presente Dictamen, cabe la presentación de dos escenarios productivos, en función a los Planes de Manejo Forestal descritos en la Tabla N° 5, tal como han sido concebidos y aprobados posteriormente por el INFONA. En la conversión de metros cúbicos a toneladas se utilizó un peso promedio de la especie equivalente a 1.150 kg/m$^3$ y, para el cálculo del rendimiento de madera, en la producción de aceites esenciales, se utilizó 4%. Y el rendimiento de rollo/fuste del 30%. En el cálculo del volumen (fuste/copa) se utilizó el factor de expansión igual a 30%.

## Primer escenario

**Tabla N° 10.** Primer Escenario Productivo - Volumen promedio ($m^3$) por Plan de Manejo Forestal

| Ecorregión | Nº | PMF | Sup. Bajo manejo (ha) | Sup. Muestreo (ha) | % (Resol SFN 07/02 Muestreo 0,5% | % Muestreo Faltante/PMF | Nº arb. (ha) | Nº Total de arboles/ PMF | A. Basal m2/ha | Vol. Total m3r/ha PMF | Nº arb. Aprov. ( ha) | Vol. Aprov. (m3R/ha) /PMF 35 cm ≥ | Vol. Total (m3r) /PMF | Vol. Total (m3r) (80%)/PMF | Vol.Total Rollo/Fuste (Tn)/PMF | Biomasa Vol. de (Fuste/Copa) (tn) /PMF | Rend. Extracto (Fuste/Copa) (Tn) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chaco Húmedo | 1 | Santa Herminia S.A. | 4.828,2 | 3,2 | 24,14 | 86,74 | 6,6 | 31.692 | 0,613 | 1,586 | 5,3 | 1,100 | 5.309 | 4.246,859 | 4.883,877 | 6.349 | 254 |
| | 2 | Agroganadera La Selva S.A. | 2.694,4 | 2,8 | 13,5 | 79,22 | 4,9 | 13.087 | 0,523 | 2,354 | 4,3 | 2,193 | 5.907 | 4.725,978 | 5.434,874 | 7.065 | 283 |
| | 3 | Pantanal Agroganadera S.A. | 5.488,8 | 2,8 | 27,4 | 89,80 | 4,9 | 26.659 | 0,523 | 2,354 | 2,0 | 2,003 | 10.991 | 8.793,074 | 10.112,035 | 13.146 | 526 |
| | 5 | Cándida Mendoza | 835,4 | 4,0 | 4,2 | 4,24 | 6,3 | 5.221 | 0,530 | 1,329 | 2,0 | 0,872 | 728 | 582,775 | 670,191 | 871 | 35 |
| | | TOTAL | 13.846,8 | 12,8 | 69,2 | | | | 0,547 | 1,906 | 13,6 | 6,167 | 22.936 | 18.348,676 | 21.100,977 | 27.431 | 1.097 |
| Chaco Seco | 4 | Alexander Dos Santos | 22.712,9 | 12,0 | 113,6 | 89,43 | 5,2 | 119.220 | 0,400 | 0,868 | 2,7 | 0,868 | 19.715 | 15.771,838 | 18.137,613 | 23.579 | 943 |
| | 6 | Eterna Agroganadera Ind. S.A. | 3.387,8 | 4,0 | 16,9 | 76,39 | 8,0 | 27.102 | 0,476 | 0,834 | 2,0 | 0,563 | 1.907 | 1.525,865 | 1.754,745 | 2.281 | 91 |
| | 7 | Dagoberto Marecos | 1.063,0 | 2,4 | 5,3 | 54,84 | 10,0 | 10.630 | 1,251 | 2,926 | 10,0 | 2,254 | 2.395 | 1.916,376 | 2.203,833 | 2.865 | 115 |
| | 8 | Sabino Escobar (F. Catalina) | 1.928,5 | 4,8 | 9,6 | 50,22 | 33,0 | 63.641 | 0,000 | 8,020 | 1,0 | 4,489 | 8.640 | 6.911,744 | 7.948,506 | 10.333 | 413 |
| | 9 | Marcos Ibarrola | 3.756,5 | 3,2 | 18,8 | 82,96 | 10,3 | 38.745 | 1,220 | 3,135 | 8,4 | 2,474 | 9.292 | 7.433,362 | 8.548,367 | 11.113 | 445 |
| | | TOTAL | 32.848,7 | 26,4 | 164,2 | | | | 0,669 | 3,157 | 24,1 | 10,638 | 41.949 | 33.559,185 | 38.593,063 | 50.171 | 2.007 |
| Pantanal | 10 | Carlos Ribeiro | 1.536,6 | 2,4 | 7,7 | 68,76 | 12,5 | 19.208 | 1,172 | 1,060 | 6,7 | 2,527 | 3.882 | 3.105,776 | 3.571,642 | 4.643 | 186 |
| | | TOTAL | 48.232,1 | 41,6 | 241,2 | | | 355.204 | | 6,122 | | 19,331 | 68.767 | 55.013,637 | 63.265,683 | 82.245 | 3.290 |
| | | | | | | | | | | | | | | 14 | 14 | | |

Fuente: V&S Consultora Ambiental Forestal, en función a los PMF analizados, 2021.

Los valores que se presentan en la Tabla N° 10 indican el volumen aprovechable por ha-PMF, el volumen total por PMF y las toneladas de extracto de Palo Santo por cada Plan de Manejo. Para la determinación del volumen aprovechable se consideró el 80% del volumen comercial por encima del DMC de 35 cm establecido para la especie por el INFONA.

Del análisis realizado se constata que, individual y colectivamente, los planes han utilizado una intensidad muestreo muy inferior a lo indicado por la Resolución SFN 07/2002, que indica que todos los inventarios forestales deben realizarse respetando una intensidad de muestreo del 0,5%. Puede observarse en la Tabla N° 10 que, en la formulación de los PMF, la superficie total de muestreo fue de apenas 41,6 hectáreas, cuando los requerimientos eran de 241,2 hectáreas, resultando en un déficit que promedia los 68%. En estas condiciones, los resultados pueden implicar en un sesgo superior o inferior de los valores en análisis de los PMF.

Asimismo, se puede observar que, el promedio de los volúmenes aprovechables de los planes establecidos en el Chaco Húmedo, es de 1,542 $m^3$/ha; mientras que, el promedio de los planes en el Chaco Seco, asciende a 2,127 $m^3$/ha. Como puede verse, la región del Chaco Húmedo presenta volúmenes aprovechables relativamente menores a los del Chaco Seco, lo que podría indicar la mejor adaptabilidad de la especie a regiones con menor humedad. Sin embargo, llama la atención el plan ubicado en la región del Chaco Seco, perteneciente a Sabino Escobar (F Catalina), que presenta un volumen significativamente más elevado que los indicados para los PMF de todas las Ecorregiones (8,020 $m^3$/ha), que escapa a los parámetros normales para la especie en cuestión.

En resumen, bajo los parámetros mencionados previamente, el volumen total aprovechable extraíble para todos los PMF en consideración asciende a 55.013,6 $m^3$ para una superficie total bajo manejo de 48.232,1 ha.

**Segundo escenario**

Los valores que se presentan en la Tabla N° 11, que corresponden al segundo escenario se calcularon a partir del promedio ponderado del volumen aprovechable indicado en la Tabla N° 10, excluyendo los valores del PMF del Sr. Sabino Escobar (F Catalina), por considerarse fuera del rango normal para la especie, como explicado precedentemente. Este promedio ponderado, así calculado, asciende a 1.269 $m^3$/ha.

**Tabla N° 11.** Segundo Escenario Productivo - Volumen Promedio Ponderado ($m^3$r/ha) - 10 Planes de Manejo Forestal

| Ecorregión | Nº | PMF | Sup. Bajo manejo (ha) | Sup. Muestreo (ha) | % (Resol SFN 07/02 Muestreo 0,5% | % Muestreo Faltante /PMF | Nº arb. (ha) | A. Basal m2/ha | Vol. Total m3r/ha PMF | Nº arb. Aprov. ( ha) | Vol. Aprov. (m3r/ha) Ponderado | Vol. Total (m3r) /PMF | Vol. Total (m3r) (80%)/PMF | Vol.Total Rollo/Fuste (Tn)/PMF | Biomasa Vol. de (Fuste/Copa) (tn) /PMF | Rend. Extracto (Fuste/Copa) (Tn) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chaco Húmedo | 1 | Santa Herminia S.A. | 4.828,2 | 3,2 | 24,14 | 86,74 | 6,6 | 0,613 | 1,586 | 5,3 | 1,269 | 6.127 | 4.901,5 | 5.636,8 | 7.328 | 293 |
| | 2 | Agroganadera La Selva S.A. | 2.694,4 | 2,8 | 13,5 | 79,22 | 4,9 | 0,523 | 2,354 | 4,3 | 1,269 | 3.419 | 2.735,4 | 3.145,7 | 4.089 | 164 |
| | 3 | Pantanal Agroganadera S.A. | 5.488,8 | 2,8 | 27,4 | 89,80 | 4,9 | 0,523 | 2,354 | 2,0 | 1,269 | 6.965 | 5.572,2 | 6.408,1 | 8.330 | 333 |
| | 5 | Cándida Mendoza | 835,4 | 4,0 | 4,2 | 4,24 | 6,3 | 0,530 | 1,329 | 2,0 | 1,269 | 1.060 | 848,1 | 975,3 | 1.268 | 51 |
| | | TOTAL | 13.846,8 | | 69,2 | | 22,5 | 0,547 | | 13,6 | | 17.572 | 14.057,2 | 16.165,8 | 21.016 | 841 |
| Chaco Seco | 4 | Alexander Dos Santos | 22.712,9 | 12,0 | 113,6 | 89,43 | 5,2 | 0,400 | 0,868 | 2,7 | 1,269 | 28.823 | 23.058,1 | 26.516,9 | 34.472 | 1.379 |
| | 6 | Eterna Agroganadera Ind. S.A. | 3.387,8 | 4,0 | 16,9 | 76,39 | 8,0 | 0,476 | 0,834 | 2,0 | 1,269 | 4.299 | 3.439,3 | 3.955,2 | 5.142 | 206 |
| | 7 | Dagoberto Marecos | 1.063,0 | 2,4 | 5,3 | 54,84 | 10,0 | 1,251 | 2,926 | 10,0 | 1,269 | 1.349 | 1.079,2 | 1.241,0 | 1.613 | 65 |
| | 8 | Sabino Escobar (F Catalina) | 1.928,5 | 4,8 | 9,6 | 50,22 | 33,0 | 0,000 | 8,020 | 1,0 | 1,269 | 2.447 | 1.957,8 | 2.251,5 | 2.927 | 117 |
| | 9 | Marcos Ibarrola | 3.756,5 | 3,2 | 18,8 | 82,96 | 10,3 | 1,220 | 3,135 | 8,4 | 1,269 | 4.767 | 3.813,6 | 4.385,6 | 5.701 | 228 |
| | | TOTAL | 32.848,7 | | 164,2 | | 66,6 | 0,669 | | 24,1 | | 41.685 | 33.348,0 | 38.350,2 | 49.855 | 1.994 |
| Pantanal | 10 | Carlos Ribeiro | 1.536,6 | 2,4 | 7,7 | 68,76 | 12,5 | 1,172 | 1,06 | 6,7 | 1,269 | 1.950 | 1.560,0 | 1.793,9 | 2.332 | 93 |
| | | TOTAL | 48.232,1 | 41,6 | 241,2 | | | | | | | 61.206 | 48.965,2 | 56.310,0 | 73.203 | 2.928 |
| | | | | | | | | | | | | | 12 | 12 | | |

Fuente: V&S Consultora Ambiental Forestal, en función a los PMF analizados, 2021.

Los valores de este segundo escenario indican un volumen total aprovechable que asciende a 48.965,2 $m^3$ para todos los PMF, incluyendo el plan excluido para el cálculo del promedio ponderado. Si lo comparamos con el primer escenario; este segundo, implica un escenario poco más conservador desde el punto de vista de la sostenibilidad en el manejo de la especie, considerando las irregularidades detectadas en los muestreos y los errores asociados a la toma de los datos dasométricos.

## IV. PROPUESTA DE CUPO DE EXPORTACION de *Bulnesia sarmientoi*

**Tabla N° 12.** Propuestas de Cupos de Exportación (1.400 Tn. Madera y 250 Tn. Extracto)

| Ecorregión | N° | PMF | Sup. Bajo manejo (ha) | Sup. Muestreo (ha) | % (Resol SFN 07/02 Muestreo 0,5% | % Muestreo Faltante/PMF | N° arb. (ha) | N° Total de arboles/ PMF | A. Basal m2/ha | Vol. Total m3r/ha PMF | N° arb. Aprov. ( ha) | Vol. Aprov. (m3R/ha) /PMF 35 cm ≥ | Vol. Total (m3r) /PMF | Vol. Total (m3r) (80%)/PMF | Vol.Total Rollo/Fuste (Tn)/PMF | Biomasa Vol. de (Fuste/Copa) (tn) /PMF | Rend Extracto (Fuste/Copa) (Tn) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chaco Húmedo | 1 | Santa Herminia S.A. | 4.828,2 | 3,2 | 24,14 | 86,74 | 6,6 | 31.892 | 0,613 | 1,586 | 5,3 | 1,100 | 5.309 | 4.246,850 | 4.883,877 | 6.349 | 254 |
| | 2 | Agroganadera La Selva S.A. | 2.694,4 | 2,8 | 13,5 | 79,22 | 4,9 | 13.087 | 0,523 | 2,354 | 4,3 | 2,193 | 5.907 | 4.725,978 | 5.434,874 | 7.065 | 283 |
| | 3 | Pantanal Agroganadera S.A. | 5.488,8 | 2,8 | 27,4 | 89,80 | 4,9 | 26.659 | 0,523 | 2,354 | 2,0 | 2,003 | 10.991 | 8.793,074 | 10.112,035 | 13.146 | 526 |
| | 5 | Cándida Mendoza | 835,4 | 4,0 | 4,2 | 4,24 | 6,3 | 5.221 | 0,530 | 1,329 | 2,0 | 0,872 | 728 | 582,775 | 670,191 | 871 | 35 |
| | | TOTAL | 13.846,8 | 12,8 | 69,2 | | | | 0,547 | 1,906 | 13,6 | 6,167 | 22.936 | 18.348,676 | 21.100,977 | 27.431 | 1.097 |
| Chaco Seco | 4 | Alexander Dos Santos | 22.712,9 | 12,0 | 113,6 | 89,43 | 5,2 | 119.220 | 0,400 | 0,868 | 2,7 | 0,868 | 19.715 | 15.771,838 | 18.137,613 | 23.579 | 943 |
| | 6 | Eterna Agroganadera Ind. S.A. | 3.387,8 | 4,0 | 16,9 | 76,39 | 8,0 | 27.102 | 0,476 | 0,834 | 2,0 | 0,563 | 1.907 | 1.525,865 | 1.754,745 | 2.281 | 91 |
| | 7 | Dagoberto Marecos | 1.063,0 | 2,4 | 5,3 | 54,84 | 10,0 | 10.630 | 1,251 | 2,926 | 10,0 | 2,254 | 2.395 | 1.916,376 | 2.203,833 | 2.865 | 115 |
| | 8 | Salomo Escobar (F. Catalina) | 1.928,5 | 4,8 | 9,6 | 50,22 | 33,0 | 63.641 | 0,000 | 8,020 | 1,0 | 4,480 | 8.640 | 6.911,744 | 7.948,506 | 10.333 | 413 |
| | 9 | Marcos Ibarrola | 3.756,5 | 3,2 | 18,8 | 82,96 | 10,3 | 38.745 | 1,220 | 3,135 | 8,4 | 2,474 | 9.292 | 7.433,362 | 8.548,367 | 11.113 | 445 |
| | | TOTAL | 32.848,7 | 26,4 | 164,2 | | | | 0,669 | 3,157 | 24,1 | 10,638 | 41.949 | 33.559,185 | 38.593,063 | 50.171 | 2.007 |
| Pantanal | 10 | Carlos Ribeiro | 1.536,6 | 2,4 | 7,7 | 68,76 | 12,5 | 19.208 | 1,172 | 1,060 | 6,7 | 2,527 | 3.882 | 3.105,776 | 3.571,642 | 4.643 | 186 |
| | | TOTAL | 48.232,1 | 41,6 | 241,2 | | | 355.204 | | 6,122 | | 19,331 | 68.767 | 55.013,637 | 63.265,683 | 82.245 | 3.290 |
| | | | | | | | | | | | | | | 14 | 14 | | |

Fuente: V&S Consultora Ambiental Forestal, en función a los PMF analizados, 2021

**Tabla N° 13.** Propuestas de Cupos de Exportación (1.600 Tn. Madera y 270 Tn. Extracto)

| Ecorregión | N° | PMF | Sup. Bajo manejo (ha) | Sup. Muestreo (ha) | % (Resol SFN 07/02 Muestreo 0,5% | % Muestreo Faltante/PMF | N° arb. (ha) | N° Total de arboles/ PMF | A. Basal m2/ha | Vol. Total m3r/ha PMF | N° arb. Aprov. (ha) | Vol. Aprov. (m3R/ha) /PMF 35 cm≥ | Vol. Total (m3r) /PMF | Vol. Total (m3r) (80%)/PMF | Vol.Total Rollo/Fuste (Tn)/PMF | Biomasa Vol. de (Fuste/Copa) (tn) /PMF | Rend. Extracto (Fuste/Copa) (Tn) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chaco Húmedo | 1 | Santa Herminia S.A. | 4.828,2 | 3,2 | 24,14 | 86,74 | 6,6 | 31.692 | 0,613 | 1,586 | 5,3 | 1,100 | 5.309 | 4.246,850 | 4.883,877 | 6.349 | 254 |
| | 2 | Agroganadera La Selva S.A. | 2.694,4 | 2,8 | 13,5 | 79,22 | 4,9 | 13.087 | 0,523 | 2,354 | 4,3 | 2,193 | 5.907 | 4.725,978 | 5.434,874 | 7.065 | 283 |
| | 3 | Pantanal Agroganadera S.A. | 5.488,8 | 2,8 | 27,4 | 89,80 | 4,9 | 26.659 | 0,523 | 2,354 | 2,0 | 2,003 | 10.991 | 8.793,074 | 10.112,035 | 13.146 | 526 |
| | 5 | Cándida Mendoza | 835,4 | 4,0 | 4,2 | 4,24 | 6,3 | 5.221 | 0,530 | 1,329 | 2,0 | 0,872 | 728 | 582,775 | 670,191 | 871 | 35 |
| | | TOTAL | **13.846,8** | **12,8** | **69,2** | | | | **0,547** | **1,906** | **13,6** | **6,167** | **22.936** | **18.348,676** | **21.100,977** | **27.431** | **1.097** |
| Chaco Seco | 4 | Alexander Dos Santos | 22.712,9 | 12,0 | 113,6 | 89,43 | 5,2 | 119.220 | 0,400 | 0,868 | 2,7 | 0,868 | 19.715 | 15.771,838 | 18.137,613 | 23.579 | 943 |
| | 6 | Elena Agroganadera Ind. S.A. | 3.387,8 | 4,0 | 16,9 | 76,39 | 8,0 | 27.102 | 0,476 | 0,834 | 2,0 | 0,563 | 1.907 | 1.525,865 | 1.754,745 | 2.281 | 91 |
| | 7 | Dagoberto Marecos | 1.063,0 | 2,4 | 5,3 | 54,84 | 10,0 | 10.630 | 1.251 | 2,926 | 10,0 | 2,254 | 2.395 | 1.916,376 | 2.203,833 | 2.865 | 115 |
| | 8 | Sabino Escobar (F. Catalina) | 1.928,5 | 4,8 | 9,6 | 50,22 | 33,0 | 63.641 | 0,000 | 8,029 | 1,0 | 4,486 | 8.640 | 6.911,744 | 7.948,506 | 10.333 | 413 |
| | 9 | Marecos Ibarrola | 3.756,5 | 3,2 | 18,8 | 82,96 | 10,3 | 38.745 | 1,220 | 3,135 | 8,4 | 2,474 | 9.292 | 7.433,362 | 8.548,367 | 11.113 | 445 |
| | | TOTAL | **32.848,7** | **26,4** | **164,2** | | | | **0,669** | **3,157** | **24,1** | **10,638** | **41.949** | **33.559,185** | **38.593,063** | **50.171** | **2.007** |
| Pantanal | 10 | Carlos Ribeiro | 1.536,6 | 2,4 | 7,7 | 68,76 | 12,5 | 19.208 | 1,172 | 1,060 | 6,7 | 2,527 | 3.882 | 3.105,776 | 3.571,642 | 4.643 | 186 |
| | | TOTAL | **48.232,1** | **41,6** | **241,2** | | | **355.204** | | **6,122** | | **19,331** | **68.767** | **55.013,637** | **63.265,683** | **82.245** | **3.290** |
| | | | | | | | | | | | | | | 12 | 12 | | 12 |

Fuente: V&S Consultora Ambiental Forestal, en función a los PMF analizados, 2021

La Tabla N° 12, muestra la situación actual legal de los 10 Planes de Manejo Forestal aprobados por el INFONA, con un Volumen Total aprovechable de 63.265,683 Tn de madera o 3.290 Tn de extracto para las **48.232,1 ha** de superficie bajo manejo. Considerando los cupos de exportación de *Bulnesia sarmientoi,* para el año 2020, establecidos por la Autoridad Administrativa CITES PY, que indican 1.400 Tn/año de madera y 250 Tn/año de extracto, los volúmenes calculados bajo este escenario permitirían atender dichos cupos de la siguiente manera:

- Aproximadamente 14 años, para atender anualmente el cupo de exportación de madera, en sus diferentes productos; o extracto. Con lo cual el volumen total aprovechable considerados de los 10 PMF, es inferior 1 año, por debajo del ciclo de corta de 15 años.

La Tabla N° 13. Considera los cupos de exportación de *Bulnesia sarmientoi,* que indican 1.600 Tn/año de madera y 270 Tn/año de extracto, los volúmenes calculados bajo este escenario permitirían atender dichos cupos de la siguiente manera:

- Aproximadamente 12 años, para atender anualmente el cupo de exportación de madera, en sus diferentes productos; o extracto. Con lo cual el volumen total aprovechable considerados de los 10 PMF, es inferior 3 años, por debajo del ciclo de corta de 15 años.

Queda por considerar que los volúmenes efectivamente cortados pueden tener una merma entre 25-30%, en relación a los volúmenes calculados según los inventarios.

En la misma tabla puede observarse que el número total de árboles por cada PMF, dan un valor de 355.204 individuos, para las 48.232.1 ha.

Se debe entender que, los cupos de exportación de madera de Palo Santo, otorgados por Autoridad Administrativa CITES PY, son sobre la base de productos terminados. Por lo tanto, para llegar a producir 1.400 toneladas de estos productos (cilindros parafinados, tablillas para pisos, pisos, bujes, etc.), serán necesarios más toneladas de madera bruta, atendiendo a los rendimientos para producir esos productos mencionados, que pueden variar entre 25 y 80%.

Por lo expuesto y con el actual universo de 10 PMF, no se cumple el ciclo normal de corta, determinado en 15 años. Para el aprovechamiento posterior a estos cupos se deberá aumentar el área de manejo, es decir adicionar más PMF a los existentes considerando los indicadores dasométricos en los PMF actuales. Si los PMF son considerados de manera individual, la extracción solo abastecería en promedio no más de 5 ó 4 años de no aumentarse las áreas de manejo (Tabla N°: 12 y 13).

**Perspectiva de Planes de Manejo Forestal con presencia de *Bulnesia sarmientoi***

La Ley N° 422/73 en su Artículo 42° *establece que todas estas propiedades rurales deben mantener el 25% de su área total de bosques naturales;* mientras que la Resolución SFN N°. 1.105/07, expresa *que debe conservarse más el 5% del área a deforestar en sitios con presencia de Bulnesia sarmientoi.* Según el INFONA y resultado de la implementación de los planes de uso de la tierra (2015-2020) existen, en el

Chaco, aproximadamente 596.888 ha de bosques, como reserva forestal, que registran la presencia de *Bulnesia sarmientoi*. (Véase Ilustración N° 5).

Estas áreas de reserva forestal podrían, a futuro, ser manejadas con el objetivo de producir sosteniblemente madera de Palo Santo y atender los cupos de exportación establecidos por la Autoridad Administrativa CITES PY. Asumiendo esta posibilidad como una situación que debe incentivarse o, por lo menos, auscultarse entre los propietarios de estas tierras, a continuación, se presentan tres posibles escenarios con PMF sobre estas reservas, considerando el volumen de aprovechamiento ponderado, que se desprende de la Tabla N° 11, equivalente a 1,269 $m^3$/ha.

Estos escenarios son:

1) Toda la extensión de las áreas de reserva (596.888 hectáreas) son manejadas, con lo cual se podrían aprovechar 605.961 $m^3$, suficiente para atender, por poco más de 114 años, los actuales cupos de exportación. Alternativamente, la utilización de este volumen, dentro del actual periodo de ciclo de corta, podría inclusive permitir un aumento de los actuales cupos de forma considerable. También se observa que el N° total de árboles seria de 8.004.268 individuos, tomando como referencia el N° de árboles de la Tabla N° 8. (INFONA). Sin embargo, se debe prever que el INFONA, imperiosamente tendrá que ajustar todos los criterios para el manejo sostenible de los bosques del Chaco. Un resumen de estos escenarios se presenta en la Tabla N°14.

**Tabla N° 14.** Perspectivas de PMF de las Reservas Forestales (100%)

| Sup. Total de Reserva Forestal (ha) | Vol. Prom. Ponderado (m3/ha) /10 PMF | Arboles/ha Tabla N°8. INFONA | N° Total de arboles | Vol. Total (m3r/ha) / Sup Rva. | Vol. Total (80%) Sup Rva. (m3r) | Total (fuste) (Tn)/ Sup Rva. | Biomasa Vol de (Fuste/Copa) (Tn ) | Rend. Extracto 4,5% (Fuste/Copa) (Tn) |
|---|---|---|---|---|---|---|---|---|
| **596.888** | 1,269 | 13,41 | 8.004.268 | 757.451 | 605.961 | 696.855 | 905.911 | 36.236 |
| | | | | Años | **114** | | | |

Fuente: V&S Consultora Ambiental Forestal, en función a los PMF evaluados, 2021

2) El 50% de la superficie de las reservas forestales (298.444 hectáreas) son manejadas con lo cual se podrían aprovechar 302.980 $m^3$, suficiente para atender, por poco más de 57 años, los actuales cupos de exportación. Alternativamente, la utilización de este volumen, dentro del actual periodo de ciclo de corta, podría inclusive permitir el aumento de los actuales cupos de forma moderada. También se observa que el N° total de árboles seria de 4.002.134 individuos, tomando como referencia el N° de árboles de la Tabla N° 8. (INFONA). Un resumen de este escenario se presenta en la: Tabla N° 15.

**Tabla N° 15.** Perspectivas de PMF de las Reservas Forestales (50%)

| Sup. Total de Reserva Forestal (ha) | Vol. Prom. 40% (m3/ha) /10 PMF (**) | Arboles/ha Tabla N°8. INFONA | N° Total de arboles | Vol. Total (m3/ha) / Sup Rva. | Vol. Total (80%) /PMF (m3) | Total (fuste) (Tn)/PMF | Biomasa Arbol (Fuste/Copa)Tn 100% | Rend. Extracto 4,5% (Fuste/Copa) (Tn) |
|---|---|---|---|---|---|---|---|---|
| **298.444** | 1,269 | 13,41 | 4.002.134 | 378.725 | 302.980 | 348.427 | 452.956 | 18.118 |
| | | | | Años | **57** | | | |

Fuente: &S Consultora Ambiental Forestal, en función a los PMF evaluados, 2021

3) El 10% de la superficie total de las reservas forestales (59.689 hectáreas) son manejadas con lo cual se podrían aprovechar 60.596 $m^3$, suficiente para atender, por poco más de 11 años, los actuales cupos de exportación. De todos los escenarios propuestos, éste pareciera el más plausible de implementar, si bien no cubriría el total del ciclo de corta de 15 años, podría utilizarse para complementar las necesidades para los años faltantes de los PMF en estudio. También se observa que el N° total de árboles seria de 800.427 individuos, tomando como referencia el N° de árboles de la Tabla N° 8. (INFONA). Un resumen de este escenario se presenta en la Tabla N° 16:

**Tabla N° 16.** Perspectivas de PMF de las Reservas Forestales (10%)

| Sup. Total de Reserva Forestal (ha) | Vol. Prom. 40% (m3/ha) /10 PMF (**) | Arboles/ha Tabla N°8. INFONA | N° Total de arboles | Vol. Total (m3/ha) / Sup Rva. | Vol. Total (80%) /PMF (m3) | Total (fuste) (Tn)/PMF | Biomasa Arbol (Fuste/Copa)Tn 100% | Rend. Extracto 4,5% (Fuste/Copa) (Kg.) |
|---|---|---|---|---|---|---|---|---|
| 59.689 | 1,269 | 13,41 | 800.427 | 75,745 | 60.596 | 69.685 | 90.591 | 3.624 |
| | | | | Años | 11 | | | |

Fuente: &S Consultora Ambiental Forestal, en función a los PMF evaluados, 2021

## V. CONCLUSIONES

5.1 La especie *Bulnesia sarmientoi* como se observa, **está ampliamente distribuida** en el Chaco paraguayo (ver Ilustración N°.1). Si bien, esta distribución aparenta ser relativamente heterogénea, inclusive dentro y entre los estratos, es una especie que puede ser manejada de forma sostenible, siempre y cuando se adecuen todos los parámetros y criterios establecidos por el INFONA, a las condiciones y características de los bosques de la Región Occidental.

5.2 Es claro que los procesos de implementación de los planes de uso de la tierra en el Chaco pueden afectar la población de Palo Santo. No obstante, siempre que se tomen todos los recaudos técnicos necesarios y determinantes para la conservación de la especie, estos riesgos pueden minimizarse significativamente. Por otro lado, la fragmentación de los bosques podría significar un problema grave para el manejo sostenible.

5.3 Como reiterativamente se ha indicado en el cuerpo de este dictamen, los Términos de Referencia utilizados para la elaboración de los PMF, aprobados por la Resolución SFN N° 07/2002, no son técnicamente apropiados para su aplicación en bosques de la Región Occidental, por las consabidas diferencias que ambas regiones presentan, en lo que se refiere a estructura del boque, composición florística y condiciones bio-edafo-climáticas que condicionan el desarrollo de los bosques. Tal cual como están elaborados, aprobados e implementados los PMF representan un sesgo en cuanto a la sostenibilidad de las operaciones.

5.4 Los PMF en las condiciones actuales, analizados muestran claramente una estructura sucesional de clases diamétricas deficitaria, que necesariamente debe trabajarse técnica y silviculturalmente en campo, como parte de la ejecución de dichos planes. Sobre todo, tomando en consideración que el Palo Santo es una especie de crecimiento muy lento, el periodo de ciclo de corta de 15 años no asegura, la sucesión adecuada de las clases diamétricas.

5.5. La Resolución SFN N° 07/02, de los Términos de Referencias para la elaboración de PMF, de acuerdo a la superficie bajo manejo se deberían realizar 241,2 ha. Se destaca una importante diferencia en el porcentaje muestral de parcelas con una superficie de 41,6 ha con 17,25% lo que implica 199,6 ha, con 82,75% faltantes de parcelas a muestrear. El INFONA, deberá establecer las medidas correctivas de los PMF en las actualizaciones de los Inventarios forestales.

5.6 La sostenibilidad del bosque se sustenta fundamentalmente en el incremento medio anual (IMA) y en el Índice de Valor de Importancia (IVI) que define cuales especies presentes contribuyen en la composición y estructura de un bosque. Tales parámetros de importancia significativa, no se encuentran elaborados en los Planes de Manejo aprobados.

5.7 En ningún PMF analizado se ha constatado el desarrollo de estudios de regeneración natural para la especie y menos para el bosque como un todo. Estudios de esta naturaleza son imprescindibles para asegurar la sostenibilidad del recurso florístico o de los recursos de todo el bosque. Un aspecto fundamental del manejo forestal sostenible, es el mantenimiento de la regeneración natural, pues a corto o

mediano plazo, el aprovechamiento forestal puede ejercer algún tipo de impacto sobre la regeneración natural de las especies nativas, pudiendo modificar la estructura misma del bosque.

5.8 Considerando los 10 PMF sometidos a este estudio, ninguno de los modelos productivos previamente señalados en relación con las necesidades de los cupos de exportación autorizados por la Autoridad Administrativa CITES PY en el periodo del ciclo de corta de 15 años, independiente de que la extracción se realice mediante parcelas anuales de corta o se realice en función a los cupos establecidos.

5.9 El área de los 10 PMF asciende a 48.232,1 hectáreas. Sobre esta superficie, los dos escenarios productivos presentados (Tablas 10 y 11) reportan volúmenes de corta muy similares. El modelo productivo que se sustenta en el promedio por cada PMF, identificado como 1er Escenario, reporta un volumen de corta de 55.013,6 $m^3$; equivalente a 63.265,68 Tn., mientras que el modelo que utiliza un único promedio general aprovechable, aplicable a todos los planes, identificado como 2do escenario, reporta un volumen total de corta de 48.965,2 $m^3$, equivalente a 56.310,0 Tn.

5.10 Para atender estos cupos de exportación, durante el periodo de ciclo de corta de la especie, serán necesarios someter a manejo forestal superficie de bosques adicionales. Tomando en consideración que los PMF analizados han sido aprobados por el INFONA, no existe ningún impedimento legal para su ejecución, con la salvedad de que, en los próximos años, antes de finalizar la ejecución de los mismos, estas áreas adicionales deberán incorporarse al manejo forestal para cumplir con los preceptos de sostenibilidad.

5.11 En cuanto a las propiedades que están bajo el régimen de Servicios Ambientales, de conformidad con la Ley N° 3001/2006, donde la ocurrencia de la especie *Bulnesia sarmientoi*, son importantes áreas de preservación y conservación.

5.12 Por último, se puede concluir que las reservas forestales creadas por la ejecución de los Planes de Uso de la Tierra, constituyen una importante área de bosque remanente conservado y podrá ser utilizado bajo regímenes más apropiados de manejo forestal, para la producción de madera y otros productos no maderables. MADES

## VI. RECOMENDACIONES

De todo el estudio, podrían caber numerosas recomendaciones para apuntalar la ventaja en el otorgamiento de los cupos de exportación de la madera y subproductos del Palo Santo, que a su vez se sustenta en la propia productividad natural de los bosques del Chaco y en los criterios de elaboración, aprobación y ejecución los Planes de Manejo Forestal. Todo esto es sustantivamente complejo, y no todas las variables que conspiran contra el manejo sostenible de los bosques podrán ser solucionados en el corto o mediano plazo. Por lo tanto, si apenas se pudieran corregir algunos elementos claves en todo este régimen, se podrá conseguir el tan ansiado manejo sostenible de los bosques, y asegurar la extracción no-perjudicial del Palo Santo para la exportación, de conformidad con la CITES.

En este contexto las principales recomendaciones emergentes de este dictamen son:

6.1 La Autoridad Administrativa CITES PY deberá gestionar, de forma inmediata, la realización de un estudio para determinar los criterios y procedimientos que deben ser observados para el manejo de los bosques del Chaco, con énfasis en el Palo Santo. Este estudio se sustentará básicamente sobre información secundaria, soportado en la recolección de datos de las parcelas permanentes de los PMF y las establecidas por el INFONA-ONU REDD+ para el Inventario Forestal Nacional. Este estudio se conducirá conjuntamente con el INFONA.

6.2 Uno de los principales productos del estudio indicado precedentemente, debería ser la preparación de nuevos Términos de Referencia para la elaboración, implementación y verificación del cumplimiento de los PMF aplicables a los bosques del Chaco.

6.3 Concluido el estudio, la Autoridad Administrativa CITES PY recomendara al INFONA, la promulgación de una Resolución que apruebe los nuevos Términos de Referencia, los cuales deberán entrar en vigencia de forma inmediata.

6.4 Las revisiones y/o actualizaciones de los PMF ya aprobados y en ejecución, se deberán regir por la nueva la normativa.

6.5 La Autoridad Administrativa CITES PY deberá buscar los medios necesarios para promocionar la ejecución de PMF en las áreas de bosque remanente conservado. Un medio de promoción podría ser el financiamiento para la instalación de PMF modelos en fincas con reservas forestales, con el consentimiento de los propietarios, que sirvan como ejemplo de ejecución, y de los cuales se podrá obtener información técnica valiosísima para mejorar la normativa.

6.6. Se recomienda proseguir la investigación hacia otros temas, como por ejemplo el funcionamiento ecológico del bosque, procesos de regeneración y conocimiento sobre propagación de las especies presentes, así también en reforestación y parcelas permanentes mixtas (en bosques manejados) a fin de poder conocer más el comportamiento de la especie dentro del bosque.

6.7. Se debe definir una codificación interinstitucional única para los productos y sub productos forestales tomando como base las partidas arancelarias de Aduanas. Además, que el MADES forme parte del VUE y VUI.

6.8. La Autoridad Administrativa deberá gestionar que Paraguay mantenga comunicación directa con el Comité Asesor del Programa de la CITES sobre especies arbóreas. Siendo que este Comité tiene por objeto prestar asistencia financiera directa a las Partes en la CITES, para apoyar las medidas de conservación y asegurar el comercio de las especies arbóreas incluidas en los Apéndices de la CITES, para la sostenibilidad y trazabilidad. Además fortalecer la cooperación con la Organización Internacional de las Maderas Tropicales, para el apoyo en la evaluación de los programas encaminados a diferentes estudios de investigación.

## VII. BIBLIOGRAFIA


- Abraham de Noir, F., Bravo, S., & Abdala, R. (2002). Mecanismos de dispersión de algunas especies de leñosas nativas. Quebracho. Revista de Ciencias Forestales (9), 140-150.

- Alonso, J. y Desmarchelier, C. (2005). Plantas medicinales autóctonas de la Argentina. Bases científicas para su aplicación en atención primaria de la salud, Literature of Latin America (L.O.L.A.), Buenos Aires: 663.

- Amat, A. y Yajía, M. (1991). "Plantas medicinales y etnofarmacología de la Provincia de Misiones". Acta Farmacéutica Bonaerense 10(3): 153-159.

- Ana M. Arambarri, María C. Novoa, Néstor D. Bayón, Marcelo P. Hernández, Marta N. Colares y Claudia Monti. (2011) Anatomía foliar de arbustos y árboles medicinales de la región chaqueña semiárida de la Argentina. Dominguezia - Vol. 27(1): 1-24.

- Arano, F., & Egea, J. D. (Edits.). (2014). Experiencias innovadoras de producción sostenible en Paraguay. Asunción: WCS - USAID.

- Arenas, P. (1981) Etnobotánica Lengua-Maskoy. Fundación para la Educación, la Ciencia y la Cultura. Buenos Aires, Argentina.

- Arenas, P. (1983). Nombres y usos de las plantas por los indígenas Maka del Chaco Boreal. Parodiana 2(2):131-229.

- Barstow, M. (2018). *Bulnesia sarmientoi.* La Lista Roja de Especies Amenazadas de la UICN 2018: e.T32028A68085692.
https://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T32028A68085692

- Benítez, J. M. (2013). Cambio estructural de un Bosque Xerofito de la formación "Palosantal y Labonal" en PPMB, Reserva Natural Privada "Laguna Pora", Chaco seco, Dpto. Presidente Hayes, Paraguay. San Lorenzo, Paraguay: Carrera de Ingeniería Forestal. Facultad de Ciencias Agrarias. Universidad Nacional de Asunción.

- Brack, W., & Weik, H. (1994). Bosque nativo del Paraguay. Riqueza subestimada (2 ed.). Proyecto de Planificación del uso de la Tierra, DGB/MAG-GTZ, CE, Proyecto ALA 90 - 24.

- Brassiolo, M. 1996. Determinación del tamaño de parcela para estudios de regeneración natural de quebracho colorado santiagueño y quebracho blanco. Revista Quebracho (4): 5 - 10. Santiago del Estero, Argentina. http://fcf.unse.edu.ar/pdf/Quebracho/q4-01.pdf.

- Careaga, V. (2012). Caracterización de dos formaciones boscosas según parámetros dasométricos en el Dpto. de Alto Paraguay – Chaco Seco. San Lorenzo, Paraguay: Carrera De Ingeniería Forestal. Facultad de Ciencias Agrarias. Universidad Nacional de Asunción.

- Céspedes, G. (2011). Elaboración de un dictamen de extracción no perjudicial del Palo Santo (*Bulnesia sarmientoi* Lorentz ex Griseb.), en Paraguay. Universidad Internacional de Andalucía.

- Céspedes, G., Méreles, F. & Navarro-Cerrillo, R. M. (2018). Método cualitativo para la determinación del estatus de conservación de *Bulnesia sarmientoi* (Zygophyllaceae) en Paraguay con fines de exportación. Collectanea Botánica 37:
https://doi.org/10.3989/collectbot.2018.v37.006.

- Céspedes, G. et al. (2018). Proyecto "Contribución al conocimiento de la biología de *Bulnesia sarmientoi* (palo santo) como base para la planificación de la conservación de los rodales puros o palosantales aún existentes en la Región Occidental del Paraguay" Conacyt. 24 pág. Asunción.

- Chifarelli, V. et al. (2018). Evaluación del Crecimiento de *Bulnesia sarmientoi* en 2 sitios de la región Chaqueña Argentina. Revista CONDINOA N° 4. Investigaciones de Facultades de Ingeniería del NOE, Santiago del Estero, Argentina. (ISSN: 1853-6662 Número 4, Año 2018, UNSE Pág. 347-350).

- Contraloría General de la República, Dirección General de Control de la Gestión Ambiental. (2008). Resumen ejecutivo, Res. CGR N° 375/08.

- CoP15 Prop. 42 – p. 2

- Cozzo, D. (1948). Anatomía del leño de las especies argentinas de la tribu: "Zygophyllae". *Rev. Ins. Nac. Invest. Sci. Cienc. Nat. Cienc. Bot.* 1: 223- 361.

- Degano, W. A., & Zerbatto, M. (2009). Situación de la especie Palo Santo (*Bulnesia sarmientoi* Lorentz ex Griseb) en la provincia de Formosa: estudio de sitios de extracción en los Departamentos Matacos y Bermejo. (T. Waller, Ed.) Formosa, BfN - FBA, Argentina.

- Donoso Zegers, C. 1993. Bosques templados de Chile y Argentina. Variación, estructura y dinámica. Ed. Universitaria. Santiago de Chile. 484 pp

- Duarte, L. (2013). Estudio poblacional de *Bulnesia sarmientoi* Lorentz ex Griseb. (Zygophyllaceae) (Palo santo), en Bosque Xerofito, Chaco Seco, Estancia Santa Herminia S. R. L., departamento de Presidente Hayes y Boquerón. San Lorenzo, Paraguay: Facultad de Ciencias Agrarias. Universidad Nacional de Asunción.

- Duarte, L., Pérez de Molas, L. & Amarilla, E.M. (2018). Estudio poblacional de *Gonopterodendron sarmientoi* (Palo Santo), Departamentos de Presidente Hayes y Boquerón, Paraguay. Rev. Soc. cient. Parag. 2018; 23(2): 275-288. Asunción.

- Enríquez, M. B. & Orrabalis, C. J. (2019). Caracterización química del aceite esencial obtenido de la madera de *Bulnesia sarmientoi* Lorenz ex Griseb. (palo santo) recolectado del departamento Matacos, de la Provincia de Formosa, Argentina. Multequina, vol. 28, pp. 59-66, 2019. Argentina.

- Ferreira, M. (2007). Estudio Madera y Muebles. Asesoría Técnica de la Secretaría del Mercosur. Banco Interamericano de Desarrollo (BID), en el ámbito del Proyecto "Fortalecimiento Institucional del MERCOSUR y Consolidación del Mercado Regional" (ATN/SF-9014-RG), Componente IV "Integración Productiva".

- Ferreira, R. (2012). Estructura diamétrica de un bosque xerofito de la formación "Palosantal y labonal" en la parcela permanente de monitoreo de la biodiversidad, Rva. Nat. Priv. Estancia Salazar, Dpto. Presidente Hayes, Paraguay. San Lorenzo, Paraguay: Carrera de Ingeniería Forestal. Facultad de Ciencias Agrarias. Universidad Nacional de Asunción.

- Filipov, A. (1997). La farmacopea natural en los sistemas terapéuticos de los indígenas Pilagá. Parodiana 10(1-2): 35-74.

- FLORA DEL CONOSUR: http://www.darwin.edu.ar/Proyectos/FloraArgentina/FA.asp

- Friesen Ratzlaff, V. (2004). Una guía para plantas leñosas del Chaco. Ecosistema Chaco: Sano y Productivo. INTTAS. Herborn, Deutschland.

- Galeano López M. B. (2014). GERMINACIÓN IN VITRO Y CRECIMIENTO INICIAL DE PALO SANTO (*Bulnesia sarmientoi* Lorentz ex Griseb.) BAJO ESTRÉS SALINO. (Tesis de Grado). Universidad Nacional de Asunción. San Lorenzo.

- Gamarra, L. M. (2014). Análisis estructural de un Bosque Xerofítico, en PPMB, Parque Nacional Defensores del Chaco, Chaco seco. Dpto. de Boquerón y Alto Paraguay. San Lorenzo, Paraguay: Carrera De Ingeniería Forestal. Facultad de Ciencias Agrarias. Universidad Nacional de Asunción.

- Gill de Villanueva, D., Torres, G., Díaz Lezcano, M., Gauna, M., Gamarra, C., & Santacruz, C. (2014). Composición florística y abundancia de especies forestales en la Ecorregión Chaco Seco. III Congreso Nacional de Ciencias Agrarias.

- Giménez, A. M., y G. Moglia. (2003). Árboles del Chaco Argentino. Guía para el reconocimiento dendrológico. Edit. Secretaría del Ambiente y Desarrollo Sustentable del Ministerio de Desarrollo Social. Facultad de Ciencias Forestales, UNSE. Editorial El Liberal.

- Giménez A. M.; P. Hernández; R. Gerezl y C. Spagarino. (2007). Anatomía de leño y anillos de crecimiento de Palo Santo (*Bulnesia sarmientoi* Lorentz ex. Griseb, Zygophyllaceae). *Revista Quebracho* N° 14 (23-35).

- Giménez A. M.; P. Hernández; C. Spagarino. Moglia, G. y Rios, N. (2008). CALIDAD DE MADERA Y POTENCIALIDAD DE CRECIMIENTO DE PALO SANTO (*Bulnesia sarmientoi* Lorentz ex Griseb.) Yvyrareta Revista Forestal País de Árboles N° 21.

- Giménez, A. M., Hernández, P., Figueroa, M. E., & Barrioneuevo, I. (2011). Diversidad del estrato arbóreo en los bosques. Quebracho. Revista de Ciencias Forestales, 19(1-2), 24-37.

- Godoy-Burki, A. C J. M. Acosta & L. Aagesen. (2018). Phylogenetic relationships within the New World subfamily Larreoideae (Zygophyllaceae) confrim polyphyly of the disjunct genus *Bulnesia*. Syst. Biodivers.16(5): 462 (2018)

- Grulke, M. (1994). Propuesta de manejo silvopastoril en el Chaco Salteño. *Revista Quebracho* (2), 5-13.

- Guyra Paraguay. (2011). Monitoreo Ambiental del Gran Chaco Americano. Periodo de monitoreo del 10 de julio al 13 de agosto del 2011.

- Guyra Paraguay. (2015). Monitoreo Mensual del Cambio de Uso y Cobertura de la Tierra, Incendios y Variación de la Cubierta de Aguas en el Gran Chaco Americano. Asunción.

- Haene, E., & Aparicio, G. (2001). 100 Árboles Argentinos. Buenos Aires, Argentina: Albatros, SACI.

- Hiebert, M., Flores, M., Barua, J., Molina, M., Ferro, E., & Alvarenga, N. (2012). Actividad antimicobacteriana del extracto etanólico de la madera de *Bulnesia sarmientoi* Lorentz ex. Griseb. Revista latinoamericana de química.

- Huespe, H.; Spinzi, L.; Curiel, M.; Henninger, J. (1991). Vegetación y uso de la tierra de la Región Occidental. San Lorenzo, PY. Universidad Nacional de Asunción, Facultad de Ingeniería Agronómica, Carrera de Ingeniería Forestal, Misión Forestal Alemana (GTZ). Py. 22 p.

- Hunzicker, J. H. (1980). Evolución en *Bulnesia*: un enfoque multidisciplinario. *Actas IV Congreso Latinoamericano de Genética*. Vol. 2: 313-324.

- Hutchinson, I. T. (1974). Inventario forestal de reconocimiento. Proyecto de Desarrollo Forestal y de Industrias Forestales. Roma, IT: FAO.

- IBODA (Instituto de Botánica Darwinion, A. (2015). Flora del Cono Sur (en línea). AR. Obtenido de http://www2.Darwin.Edu.ar/proyecto/ Flora. Argentina/FA.asp

- http://www.infona.gov.py/index.php/noticias/plan-de-manejo-forestal

- Inf. 11.3. Autoridades Científicas de CITES. Listado de apoyo para la elaboración de dictámenes de extracción no-perjudicial para las exportaciones del Apéndice II.

- Informe Regional referente a Sudamérica de la representación regional de América Central, del Sur y del Caribe, en el Comité Permanente de CITES, documento presentado en la 50ª reunión del Comité Permanente. Ginebra 2004.

- Isaak, F. S. (2004). Determinación de las propiedades físicas y mecánicas de maderas del Chaco Central del Paraguay. Trabajo de Pasantía I presentado a la Carrera de Ingeniería Forestal. Facultad de Ciencias Agrarias. Universidad Nacional de Asunción. San Lorenzo, Paraguay.

- Lamprecht, H. (1990). Silvicultura en los trópicos: Los ecosistemas forestales en los bosques tropicales y sus especies arbóreas; posibilidades y métodos para un aprovechamiento sostenido. Alemania: GTZ.

- López, J. A., Little E. Junior, E. L., Ritz, J., Rombold, J., & Hahn, W. (2002). Árboles comunes del Paraguay. Ñande yvyra matakuéra (Vol. 2da Ed.). Paraguay: Cuerpo de Paz/Colección e Intercambio de Información.

- Loto, D. & otros. (2018). Estructura y dinámica de bosques de palo santo en el Chaco Seco. Ecología Austral 28:064-073. Asociación Argentina de Ecología.

- MADES (2019) Dictamen de Extracción no Perjudicial de *Bulnesia sarmientoi* Lorenz ex Griseb. en Paraguay 2017. Asunción. DIB/MNHNP.

- MADES/ PNUD/ FCPF (2019). Estrategia Nacional de Bosques para el Crecimiento Sostenible (ENBCS) Paraguay.

- MADES/ INFONA/ CIF/UNA. Estudio Poblacional del Palo Santo (*Gonopterondendron sarmientoi* (Lorentz ex Griseb.) A.C. Godoy Bürki) en localidades de los Departamentos Alto Paraguay, Boquerón y Presidente Hayes. Paraguay. (inédito)

- Martínez, G., Sáenz, A., Rivera, S.M., Cellini, J.M., Moretto, A. Lencinas, M.V., Gallo, E. & Villareal, M. (2004). Aspectos relacionados con la regeneración del bosque intervenido mediante distintos tipos de cortas. Subproyecto 3 - Regeneración PIARFON BAP. Consultada en línea el 10 de marzo de 2016. Disponible en: http://www.ambiente.gov.ar/archivos/web/PBVyAP/File/A3/PIARFON%20BAP/Regeneracion%20lenga.pdf.

- Melo, O., Vargas, R., & Tolima, U. (2003). Evaluación ecológica y silvicultural de ecosistemas boscosos (1 ed.). (O. A. Cruz, Ed.) Ibagué, Colombia: Impresiones Conde.

- Mereles, F y Degen, R. (1997). Contribución al conocimiento de los árboles y arbustos indígenas utilizados como medicinales en el Chaco Boreal (Paraguay). Parodiana 10(1-2): 75-89.

- Mereles, F. A propósito de la distribución de *Bulnesia sarmientoi* Lorentz ex Griseb, (Zygofhyllaceae) en el Chaco paraguayo (inédito).

- Mereles, F. & Pérez de Molas, L. (2007). *Bulnesia sarmientoi* Griseb., (Zygophyllaceae), una especie en peligro de extinción para la flora del Paraguay.

- Mereles, F. (2004). Los humedales del Paraguay: principales tipos de vegetación. In: Salas, D.; Méreles, F. & Yanosky, A. (eds.). Humedales del Paraguay. RAMSAR. Fundación Moisés Bertoni, Dinners Internacional, Departamento de Estado, U.S.A., 67-88.

- Mereles, F. (2005). Una aproximación al conocimiento de las formaciones vegetales del Chaco boreal, Paraguay. *Revista Rojasiana Vol. 6 (2)*: 5-48.

- Mereles, F., & Pérez de Molas, L. (2008). *Bulnesia sarmientoi* Lorentz ex Griseb., (Zygophyllaceae): estudio de base para su inclusión en el Apéndice II de la Convención CITES. Revista de la Sociedad Científica del Paraguay, 8(24), 107-124.

- Ministerio de Industria y Comercio, (1971). Aceites esenciales, Petit grain, Palo santo, Menta, Cedrón. Centro de Promoción de las Exportaciones., Paraguay.
- Ministerio de Obras Públicas y Comunicaciones (MOPC). (2019). PRODUCCIÓN Y CONSUMO DE BIOMASA FORESTAL CON FINES ENERGÉTICOS EN EL PARAGUAY. San Lorenzo, Paraguay.:
- Mitloehner, R. (1990). Die Konkurrenz der Holzgewächse im regengrünen Trockenwald des Chaco Boreal, Paraguay. Göttingen, Deuchland: Erich Goltze Gmbh & Co.
- Molas, Z. B. (2013). Estructura y diversidad de un bosque xeromorfico de *Aspidosperma quebracho blanco* y *Chorisia insignis*, en PPMB, Agroganadera Itaka´avo S.A., Chaco Seco Dpto. de Boquerón, Paraguay. San Lorenzo, Paraguay: Carrera De Ingeniería Forestal. Facultad de Ciencias Agrarias. Universidad Nacional de Asunción.
- Mundy-Taylor, V., Crook. V., Foster, S., Fowler, S., Sant, G. y Rice, J. (2014). Guía sobre los dictámenes de extracción no perjudicial de la CITES para especies de tiburones ***(2ª VERSIÓN REVISADA)***. Marco para ayudar a las Autoridades a formular dictámenes de extracción no perjudicial (DENP) para especies incluidas en el Apéndice II de la CITES. Informe preparado para la Agencia Federal alemana para la Conservación de la Naturaleza (Bundesamt für Naturschutz, BfN).
- Navarro, G. (1997). Contribución a la clasificación ecológica y florística de los bosques de Bolivia. *Rev. Bol. de Ecol. 2:* 3-37.
- Navarro, G.; Pérez de Molas; S. Vega, D.M., Olarte, L.F. (2005). Unidades Ambientales de la Reserva de la Biosfera del Chaco paraguayo. Gran Chaco Bolivia-Paraguay, WCS-Bolivia, DesdelChaco-USAID-Prodechaco. 108p. + 1 Mapa 1:350.000 + 1 CD-Room.
- Neufeld, F. (2003). Determinación de la madera para carbón y leña y la evaluación de los troncos del estrato medio y del estrato superior de 3 parcelas del Chaco Central. San Lorenzo, Paraguay: Carrera De Ingeniería Forestal. Facultad de Ciencias Agrarias. Universidad Nacional de Asunción.
- Nota INFONA No. 389/2013 de octubre de 2013
- Notificación a las Partes Nº 2003/058 CITES.
- Notificación a las Partes Nº 2009/036. CITES.
- Notificación a las partes Nº 2010/036. CITES.
- Notificación a las Partes Nº 2011/009. CITES.
- Palacios, R. A. (1984). Revisión Taxonómica del Género *Bulnesia* (Zygophyllaceae). Darwiniana Vol. 25 (1-4): 299-320).
- Palacios, R. A., & Mom, M. P. (2012). *Flora del Paraguay - 43. Zygophyllaceae.* (L. Ramella, & P. Perret, Edits.) Ginebra: Editions des Conservatoire et Jardin botaniques de la Ville de Genève.
- Parker, G.G. & Brown, M.J. (2000). Forest canopy stratification- is it useful?. *American Naturalist* 155: 473-484
- PC16 Doc. 21.2 (Rev. 1). 16 Reunión del Comité de Flora. CITES.
- PC17 Doc. 5.3 (Rev. 1) – p. 20. 17ª Reunión del Comité de Flora. CITES.
- PC19 Doc. 16.5 – p. 7
- Peña-Chocarro, M.C.; De Egea Juvinel, J.; Vera, M.; Maturo, H. y Knapp, S. (2006). Guía de árboles y arbustos del Chaco húmedo. The Natural History Museum, Guyra Paraguay, Fundación Moisés Bertoni y Fundación Hábitat y Desarrollo, Asunción.

- Pérez de Molas, L et al. (2011). Análisis estructural de un bosque xerófito "Palosantal y Labonal", en parcela permanente de monitoreo de la biodiversidad, Reserva Natural Fortín Salazar, Dpto. de Presidente Hayes, Paraguay. Facultad de Ciencias Agrarias, Carrera de Ingeniería Forestal. Primer Congreso Forestal del Chaco Sudamericano. (Inédito).

- Pérez de Molas, L., & Mereles, F. (2007). *Bulnesia sarmientoi* Lorentz ex Griseb., (Zygophyllaceae): estudio de base para su inclusión en el Apéndice II de la Convención CITES. WWF Paraguay; Carrera de Ingeniería Forestal-FCA-UNA.

- Pérez de Molas, L., & Silva Imas, H. (2012). Caracterización florística de un bosque xerofito transicional en el Chaco Central. Investigaciones y estudios de la UNA, 7(2).

- Pérez de Molas, L., & Silva Imas, H. (2014). Población de *Bulnesia sarmientoi* Lorentz ex Griseb. (Palo santo) en un bosque xerófito transicional en el Chaco Central, Paraguay. Congreso Nacional de Ciencias Agrarias, 3ra. ed., 385-386.

- Pierce, L. & Running, S. (1988). Rapid Estimation of Coniferous Forest Leaf Area Index Using a Portable Integrating Radiometer. Ecology. Volume 69 (6). Pags.1762-1767.

- Pin, A. et al. (2009). Plantas medicinales del Jardín Botánico de Asunción. Asociación Etnobotánica, Municipalidad de Asunción y Jardín Botaniques de la Ville de Gèneve.

- Ramírez, J. D. (2011). Evaluación preliminar de la Regeneración Natural de *Bulnesia sarmientoi* (Palo santo), en la Parcela Permanente de Medición de la Biodiversidad, Reserva Natural Privada Estancia Salazar, Dpto. Presidente Hayes. San Lorenzo, San Lorenzo, Paraguay: Carrera de Ingeniería Forestal. Facultad de Ciencias Agrarias. Universidad Nacional de Asunción.

- Ramírez, J. D. (2018). Distribución espacial de la especie *Gonopterodendron sarmientoi* (Lorentz ex Griseb.) A.C. Godoy-Bürki (Palo santo), en el Distrito de Mcal. Estigarribia, Departamento Boquerón, Paraguay. (Tesis Magister Scientiae) Dirección de Postgrado .Facultad de Ciencias Agrarias. Universidad Nacional de Asunción. 101 pág.

- REDIEX (2009). Atlas Geográfico del Chaco Paraguayo. Asunción, Paraguay.

- Rempel, E. (2003). Áreas de existencia de materia prima, usos, explotación y mercados de productos derivados de *Bulnesia sarmientoi.* Facultad de Ciencias Agrarias, UNA.

- Rempel, E., Pérez de Molas, L. y Bertoni, B.S. (2007). Análisis estructural en Parcela Permanente de Medición de un Bosque semicaducifolio "Palosantal y Labonal", Reserva Natural Privada de la Cooperativa Fernheim "Laguna Pora". Chaco Seco, Dpto. Presidente Hayes, Paraguay. Tesis de grado, Carrera Ingeniería Forestal.

- Rodilla, J.M. (2011). Advances in the identification and agrochemical importance of sesquiterpenoids from *Bulnesia sarmientoi* essential oil. Industrial Crops and Products 33 (2011) 497–503.

- Rosser, A.R. and Haywood, M.J. (Compilers). (2002). *Guidance For CITES Scientific Authorities: Checklist to assist in making non-detriment findings for Appendix II xports*. IUCN, Gland, Switzerland and Cambridge, UK

- Salvat, A. et al. (2004). Antimicrobial activity in methanolic extracts of several plant species from northem Argentina. Phytomedicine 11: 230-234.

- Santacruz, C. (2014a). Análisis de la estructura diamétrica de un bosque xerofito, Estancia Santa Herminia S.R.L. Ecorregión Chaco seco Dpto. Boquerón y Presidente Hayes. Trabajo de Pasantía II. San Lorenzo, Paraguay: Carrera De Ingeniería Forestal. Facultad de Ciencias Agrarias. Universidad Nacional de Asunción.

- Santacruz, C. (2014b). Análisis estructural de un bosque Xerofítico denso Semi Caducifolio, Ecorregión Chaco, Dpto. Boquerón. San Lorenzo, Paraguay: Carrera de Ingeniería Forestal. Facultad de Ciencias Agrarias. Universidad Nacional de Asunción.

- Scarpa, G. (2000). Plants employed in traditional veterinary medicine by the criollos of northwestern Argentine Chaco. Darwiniana Vol. 38 (3-4): 253-265.

- Schulz, A.G. (1997). Algunas plantas usuales del nordeste Argentino. Parodiana 10(1-2): 211-241.

- SEAM. (2016). Dictamen de Extracción no Perjudicial de *Bulnesia sarmientoi* Lorentz ex Griseb. en Paraguay. 2013. Asunción: DIB/MNHNP.

- Serrada, F. (2003). Regeneración natural: Situaciones, Concepto, Factores y Evaluación. (F. Silva-Pando, N. Novo, & P. Álvarez, Edits.) Actas de la III Reunión sobre Regeneración Natural-IV Reunión sobre Ordenación de Montes, 15, 11-15.

- Spichiger, R.; Ramella, L.; Palase, R.; Mereles, F. (1991). Proposición de leyenda para la cartografía de las formaciones vegetales del Chaco paraguayo: Contribución al estudio de la flora y dc la vegetación del Chaco – III. Candollea 46 (2): p. 541 – 564

- Toews, N. (2004). Evaluación de las Condiciones Naturales de *Bulnesia sarmientoi,* Provenientes de Regeneración Natural, en Combinación con *Panicum maximun* en el Chaco Central Paraguayo. Inédito: Informe de Pasantía. Carrera de Ingeniería Forestal FCA/UNA. 10 p.

- Torres, G. A. (2014). Análisis de la estructura diamétrica de un bosque xerofítico, en PPMB, chaco seco, Parque Nacional Defensores del Chaco. Dpto. Alto Paraguay. San Lorenzo, Paraguay: Carrera De Ingeniería Forestal. Facultad de Ciencias Agrarias. Universidad Nacional de Asunción.

- Ulmke, C., & August, L. (2004). Una guía para plantas nativas del Chaco Paraguayo. Ecosistema Chaco: Sano y Productivo. INTTAS. Herborn, Deutschland.

- UNIQUE WOOD. (2007). Informe del Plan de Manejo Forestal Estancia Santa Herminia S.A. San Lorenzo.

- UNIQUE WOOD. (2016). Validación tecnológica en el crecimiento del palo santo para uso sustentable en el Chaco Paraguayo (informe final)

- Villalba, M. (2018). Análisis comparativo de datos muestrales y censales proporcionada por planes de manejo forestal del Departamento de Concepción. San Lorenzo, Paraguay: Tesis Magister Scientiae. Dirección de Dirección Postgrado .Facultad de Ciencias Agrarias. Universidad Nacional de Asunción. 72 p.

- Viveros Cabaña, P. (2005). Gestión de Recursos Nativos para Forestación, Reforestación y Enriquecimiento de Bosque de Palo Santo (*Bulnesia sarmientoi*) en área de distribución de la especie. Campo Ampú y Quenjacloi, Paraguay. USAID & Fundación DesdelChaco.

- WG 1–CASE STUDY 7–p.25. (2008). Non-Detriment Findings report on Guaiacum sanctum in Mexico.

- Wolf, D., Oldfield, T.E.E. & McGough, N. (2018): Dictámenes de Extracción no Perjudicial CITES para la madera. Un proceso de nueve pasos para apoyar a las Autoridades Científicas CITES en la formulación de dictámenes de extracción no perjudicial (DENP) basados en www.cites.org

- www.tropicos.org

- Zerbatto, M. et al (2009). Situación de la especie Palo Santo (*Bulnesia sarmientoi* Lorentz ex Griseb) en la provincia de Formosa: estudio de sitios de extracción en los Departamentos Matacos y Bermejo. Argentina.

# Anexos

**Anexo N°1. Investigaciones consultadas referentes a *Bulnesia sarmientoi***

| Año | Autor | Titulo | Coordenadas X | Coordenadas Y |
|---|---|---|---|---|
| 2007 | Méreles, Fátima | Estancia Érica, Dpto. Boquerón - (WWF) | 693.267 | 7.481.936 |
| 2007 | Méreles, Fátima | Estancia San Benito, Dpto. Boquerón - (WWF) | 758.380 | 7.413.597 |
| 2006 | Benítez B., María Elisa | Análisis de la Estructura Vertical de un bosque semicaducifolio en Parcela Permanente de Medición Rva. Nat. Priv. De la Coop. Multiactiva Ltda. deFernheim "Laguna Pora" Dpto. de Pte. Hayes, Paraguay (CIF/UNA) | 259.844 | 7.517.403 |
| 2011 | Ramírez,Jorge D. | Evaluación preliminar de la regeneración natural de *Bulnesia sarmientoi* (Palo Santo), en la parcela permanente de medición de la biodiversidad, Reserva Natural Privada Estancia Salazar, Dpto. Pdte. Hayes (CIF/UNA) | 272.741 | 7.458.414 |
| 2012 | Gill, Evelyn Janina | Estimación preliminar de stock de carbono en bosque meso xerofítico alto y bosque meso xerofítico bajo, Dpto. Alto Paraguay, Chaco (CIF/UNA) | 336.698 | 7.755.492 |
| 2012 | Careaga P. Víctor M. | Caracterización de dos formaciones boscosas según parámetros dasométricos en el Dpto. de Alto Paraguay – Chaco Seco (CIF/UNA) | 245.924 | 7.826.469 |
| 2013 | Benítez P., Jorge M. | Cambio estructural de un bosque xerófito de la formación "Palosantal y Labonal" en PPMB, Rva. Nat. Priv. "Laguna Pora", Chaco seco, Dpto. Pdte. Hayes, Paraguay (CIF/UNA) | 259.844 | 7.517.403 |
| 2013 | Molas Pérez Zoraida B. | Estructura y diversidad de un bosque xeromórfico de *Aspidosperma quebracho-blanco* y *Chorisiainsignis*, en PPMB, Agro ganadera ItaKa´avo S.A, Chaco Seco, Dpto. de Boquerón, Paraguay (CIF/UNA) | 733.157 | 7.425.718 |
| 2014 | Santacruz Martínez, Celso | Análisis estructural de un bosque Xerofítico denso Semi Caducifolio, Ecorregión Chaco, Dpto. Boquerón (CIF/UNA) | 735.228 | 7.402.394 |
| 2014 | Villalba G., Hermelinda | Perfil estructural de un bosque xerofítico, en PPMB, Parque Nacional Defensores del Chaco, Chaco Seco, Dpto. Alto Paraguay y Boquerón (CIF/UNA) | 208.278 | 7.787.789 |
| 2014 | Torres B., Gustavo A. | Análisis de la estructura diamétrica de un bosque | 208.278 | 7.787.789 |

| | | | | |
|---|---|---|---|---|
| | | xerofítico, en PPMB, Chaco Seco, Parque Nacional Defensores del Chaco. Dpto. Alto Paraguay (CIF/UNA) | | |
| 2014 | Gamarra R. D., Lila M. | Análisis estructural de un bosque xerofítico, en PPMB, Parque Nacional Defensores del Chaco, Chaco Seco. Dpto. de Boquerón y Alto Paraguay (CIF/UNA) | 208.278 | 7.787.789 |
| 2014 | Santacruz. Celso | Análisis de la estructura diamétrica de un bosque xerofítico con énfasis en el perfil estructural, Estancia Santa Herminia S.R.L., Ecorregión Chaco Seco, Dptos. de Boquerón y Pte. Hayes - (CIF) | 734.931 | 7.383.933 |
| 2014 | Santacruz. Celso | Análisis de la estructura diamétrica de un bosque xerofítico, Estancia Santa Herminia S.R.L., Ecorregión Chaco Seco, Dptos. de Boquerón y Pte. Hayes (CIF/UNA) | 734.931 | 7.383.933 |
| 2012 | Silva Imas, Haroldo N. & Pérez de Molas, Lidia F. | Caracterización florística de un bosque xerofito transicional en el Chaco Central (CIF/UNA) | 266.277 | 7.446.009 |
| 2012 | Ferreira Roció R. | Estructura diamétrica de un bosque xerofito de la formación "Palosantal y labonal" en la parcela permanente de monitoreo de la biodiversidad, Rva. Nat. Priv. Estancia Salazar, Dpto. Presidente Hayes, Paraguay (CIF/UNA) | 266.277 | 7.446.009 |
| 2011 | Molas Pérez Zoraida B. | Análisis estructural de un bosque xerofítico de la formación "Palosantal y Labonal", con énfasis en la estructura horizontal, en PPMB, Rva. Nat. Priv. Estancia Salazar, Dpto. Presidente Hayes, Paraguay - (CIF/UNA) | 273.444 | 7.458.419 |
| 2018 | Duarte, Lorenzo, | Estudio poblacional de *Gonopterodendron sarmientoi* (Palo Santo), Departamentos de Presidente Hayes y Boquerón, Paraguay (CIF/UNA) | 644.452 | 7.559.131 |
| 2018 | Ramírez,Jorge D. | Distribución espacial de la especie Gonopterodendron sarmientoi (Lorentz ex Griseb.) A.C. Godoy-Bürki (Palo santo), en el Distrito de Mcal. Estigarribia, Departamento Boquerón, Paraguay (CIF/UNA) | 605.004 | 7.613.237 |

**Anexo N° 2.** Localidades donde se registró la presencia del *Bulnesia sarmientoi* según registro de los herbario Jardín Botánico de Missouri, Instituto Darwinion (SI), Herbario de la DIB/MNHNP (PY)

**Datos** extraídos de la página web de los herbarios

| Año | País | Departamento / Provincia / Estado | Coordenadas x | Coordenadas y |
|---|---|---|---|---|
| 1999 | Argentina | Chaco | 614.245 | 7.219.808 |
| 2000 | Argentina | Chaco | 571.125 | 7.330.834 |
| 1994 | Argentina | Formosa | 609.101 | 7.206.930 |
| 1994 | Argentina | Formosa | 726.157 | 7.279.354 |
| 1938 | Bolivia | Santa Cruz | 573.778 | 7.924.845 |
| 1991 | Bolivia | Santa Cruz | 611.429 | 8.057.448 |
| 1994 | Bolivia | Santa Cruz | 611.429 | 8.057.448 |
| 1991 | Bolivia | Santa Cruz | 561.427 | 7.908.292 |
| 1993 | Bolivia | Santa Cruz | 636.503 | 8.103.400 |
| 1903 | Paraguay | Paraguay | 643.209 | 7.558.035 |
| 1992 | Paraguay | Alto Paraguay | 636.238 | 7.819.350 |
| 1938 | Paraguay | Boquerón | 702.831 | 7.446.958 |
| 1994 | Paraguay | Boquerón | 646.151 | 7.594.176 |
| 1981 | Paraguay | Boquerón | 752.306 | 7.396.158 |
| 1984 | Paraguay | Chaco | 636.106 | 7.588.729 |
| 1993 | Paraguay | Chaco | 636.106 | 7.588.729 |
| 2003 | Paraguay | | 471.021 | 7.514.612 |
| 1989 | Paraguay | Chaco | 207.626 | 7.555.230 |
| 2006 | Paraguay | Alto Paraguay | 259.244 | 7.556.105 |
| 1984 | Paraguay | Presidente Hayes | 294.952 | 7.455.020 |
| 1994 | Brasil | Minas Gerais | 466.711 | 7.877.013 |

**Anexo N° 3. Localidades de *Bulnesia sarmientoi* según Libro de Flora del Paraguay**

**Localidades del Libro Flora del Paraguay - 43. Zygophyllaceae de Palacios &Mom.**

| Departamento | Descripción | Coordenadas X | Coordenadas Y |
|---|---|---|---|
| Boquerón | "Boquerón. Fortín Infante Rivarola" [21°42' S 62°26' W], 12.X.1987, Spichiger, R., L. Ramella, F. Méreles, N. Soria & L. Spinzi 2275 (G). | 558.615 | 7.600.271 |
| Alto Paraguay | "Chaco. Cerro Cnel. F. Cabrera" [19°39' S 61°44' W], 20.VI.1988, Ramella, L. 2273 (FCQ, G) ; | 631.226 | 7.826.767 |
| Alto Paraguay | "Alto Paraguay. 1.5 km al S de la línea 3 y la pista de Aviación. 19°43'S 61°42'W" [19°42' S 61°43'W], 4.XI.1992, Fortunato, R., L. Ramella& R. Palese 3771 (G); | 634.505 | 7.821.208 |
| Alto Paraguay | "Chaco. Cap. Pablo Lagerenza, orillas del cauce del Río Timane" [19°58' S 60°46' W], 24.X.1987, Spichiger, R., L. Ramella, F. Méreles, N. Soria, L. Spinzi& P. Arenas 2520 (G). | 733.713 | 7.790.651 |
| Presidente Hayes | "Tinfunque, Retiro Tres Marías" [23°45' S 60°8'W], 28.X.1985, Méreles, F. 699 (FCQ, G) ; | 792.215 | 7.370.506 |
| Presidente Hayes | "Tres Marías a Tinfunque" [23°45' S 60°8' W], [s.f.?], Méreles, F. & P. Geissler 3329[?] (FCQ); | 792.215 | 7.370.506 |
| Presidente Hayes | "Presidente Hayes. Estancia Tinfunque, Picada de Pozo Carmen 1, a 3 km del camino al Retiro 3 Marías" [23°45' S 60°8' W], 23.IX.1987, Spichiger, R., L. Ramella, F. Méreles, N. Soria & L. Spinzi 2149 (G). | 792.215 | 7.370.506 |
| Presidente Hayes | "Estancia Tinfunque, Pozo Arias" [23°39' S 60°6' W], XII.1989, Méreles, F. & P. Geissler 3328 (FCQ, G); | 795.841 | 7.381.517 |
| Boquerón. | "40 km SE de Filadelfia" [22°41' S 60°7' W], 26.I.1984, Little, E. L. Jr 40087 (CTES, G, PY) ; | 796.262 | 7.488.658 |
| Boquerón | "15 km E de Filadelfia" [22°21' S 60°3' W], [s.f.?], Molas, L. & J. Facetti 636 (FCQ) ; | 803.845 | 7.525.456 |

| | | | |
|---|---|---|---|
| Boquerón | "Inter castrum Ten. Montanía et castrum Ten. Martínez, Chaco (N de Filadelfia)" [22°2' S 59°57' W], 12.III.1980, Bernardi, L. 20282 (G); | 195.472 | 7.560.541 |
| Boquerón | "Misión Santa Marta" [22°36' S 59°50' W], [s.f.?], Arenas, P. 1676 (CTES, SI) ; | 208.703 | 7.497.990 |
| Boquerón | "Paratodo, Col. Menno" [22°21' S 59°49' W], [s.f.?], Arenas, P. 449 (CTES); | 209.896 | 7.525.719 |
| Presidente Hayes | "Tte. Esteban Martínez y alrededores" [24°6' S 59°50' W], 28.XI.2000, Méreles., F. González Parini& M. J. López 8290 (G); | 211.963 | 7.331.792 |
| Presidente Hayes | "Transchaco y cruce a Loma Plata" [22°40' S 59°45' W], [s.f.?], Peña, E. & L. Molas 351 (FCQ) ; | 217.412 | 7.490.765 |
| Alto Paraguay: | "Tyto. Lagerenza'í - 4 de Mayo. 20°11'17" S 60°54'54" W" [20°6' S 61°5' W], 16.V.1996, Méreles, F. & R. Degen 6313 (G); | 292.487 | 7.432.909 |
| Presidente Hayes: | "Gran Chaco: Loma Clavel. Latit. S. 23°20' ad marginessilvarum" [23°20' S 57°32' W], XI.1903, Hassler, E. & T. Rojas 2574 (G); | 445.478 | 7.419.479 |

**Anexo N° 4. Planes de Manejo Forestal en el Chaco que cuentan con *Bulnesia sarmientoi***

| N° | Nombre | Sup. (Ha.) | Superficie (Ha.) Bajo M. Forestal | Distrito | Departamento |
|---|---|---|---|---|---|
| 1 | Santa Herminia S.A. | 12.254,30 | 4.828,16 | Mcal. Estigarribia | Boquerón |
| 2 | Agro. La Selva S.A. | 9.401,60 | 2.694,40 | Mcal. Estigarribia | Boquerón |
| 3 | Pantanal Agro. S.A. | 6.491,26 | 5.488,81 | Mcal. Estigarribia | Boquerón |
| 4 | Alexandre Dos Santos | 30.501,60 | 22.712,90 | Mcal. Estigarribia | Boquerón |
| 5 | Cándida Mendoza | 892,30 | 835,40 | Mcal. Estigarribia | Boquerón |
| 6 | Eterna Agro. Ind. S.A. | 12.386,20 | 3.387,80 | Mcal. Estigarribia | Boquerón |
| 7 | Dagoberto Marecos | 1.074,80 | 1.063,00 | Mcal. Estigarribia | Boquerón |
| 8 | Sabino Escobar(Florencia Catalina) | 3.978,96 | 1.928,50 | Mcal. Estigarribia | Boquerón |
| 9 | Marcos Ibarrola | 8.000,00 | 3.756,50 | Bahia Negra | Alto Paraguay |
| 10 | Carlos Ribeiro | 3.993,90 | 1.536,60 | Bahía Negra | Alto Paraguay |
| **TOTAL** | | **88.974,92** | **48.232,10** | | |

**Anexo N° 5. Marco Legal de *Bulnesia sarmientoi.* (Palo santo)**

| Año | Número | Título |
|---|---|---|
| 1966 | Ley N° 1183 | Que establece el gravamen y medidas de fiscalización sobre la explotación de bosques naturales |
| 1973 | Ley N° 422 | Forestal |
| 1975 | Decreto N° 11.681 | Por el cual se reglamenta la Ley N° 422 - Forestal |
| 1976 | Ley N° 583 | Que aprueba y ratifica la Convención CITES |
| 1986 | Decreto N° 18.831 | Por el cual se establecen normas de protección del medio ambiente |
| 1991 | Decreto N° 10.655 | Por el cual se crean organismos, se le asignan funciones, se dictan medidas de conservación, se regula la caza o recolección, exportación, importación y reexportación de las especies incluidas en los apéndices de la CITES |
| 1992 | Ley N° 96 | Vida silvestre: de las definiciones generales y Autoridad de Aplicación |
| 1993 | Ley N° 253 | Que aprueba el convenio sobre diversidad biológica, adoptado durante la conferencia de las Naciones Unidas sobre el medio ambiente y desarrollo –la Cumbre para la Tierra- celebrada en la ciudad de Río de janeiro, Brasil |
| 1993 | Resolución MAG N° 18.105 | Por el cual se restringe la corta y aprovechamiento de Palo Santo (*Bulnesia sarmientoi*) |
| 1994 | Ley N° 352 | De Áreas Silvestres Protegidas |
| 1994 | Ley N° 515 | Que prohíbe la exportación y tráfico de rollos, trozos y vigas de madera |
| 1995 | Ley N° 751 | Que aprueba el acuerdo sobre cooperación para el combate al tráfico ilícito de madera |
| 1996 | Ley N° 716 | Que sanciona delitos contra el medio ambiente |
| 1997 | Ley N° 1.160 | Código penal |
| 1998 | Decreto N° 789 | Por el cual se reglamenta parcialmente la Ley N° 751/95 "Que aprueba el acuerdo sobre cooperación para el combate al tráfico ilícito de madera" |
| 1999 | Ley N° 1.508 | Que aprueba la enmienda de Gaborone a la convención sobre el Comercio Internacional De Especies Amenazadas De Fauna Y Flora Silvestre (CITES) |

| | | |
|---|---|---|
| 2000 | Ley N° 1.561 | Que crea el Sistema Nacional de Medio Ambiente, el Consejo Nacional del Ambiente y la Secretaria del Ambiente |
| 2000 | Resolución SFN N° 729 | Por la cual se reglamentan las normas de protección del medio ambiente en la Región Occidental o Chaco |
| 2000 | Resolución MAG/SFN N°208 | Por la cual se reglamenta la corta y aprovechamiento de Palo Santo |
| 2001 | Resolución SEAM N° 200 | Por la cual se asignan y reglamentan las categorías de manejo; la zonificación, usos y actividades (SINASIP) |
| 2001 | Resolución SFN N° 224 | Por la cual se reglamenta la elaboración y reglamentación de Planes de Uso de la Tierra |
| 2001 | Resolución SFN N° 230 | Por la cual se establece procedimientos de entrega de productos forestales decomisados a instituciones públicas o privadas para uso sin fines de lucro |
| 2001 | Decreto N° 13202/01 | POR EL CUAL SE DECLARA LA RESERVA DE BIOSFERA DEL CHACO, LOCALIZADA EN EL DEPARTAMENTO DE ALTO PARAGUAY Y EL DEPARTAMENTO DE BOQUERÓN. Declarase como Área Silvestre Protegida ¡a "Reserva de Biosfera el Chaco ", con una superficie de 4.707.250 has., ubicada en los distritos Mayor Pablo Lagerenza" Fuerte Olimpo del Departamento de Alto Paraguay, y en Distrito de Mariscal Estigarribia en el Departamento de Boquerón, dentro el siguiente perímetro y de acuerdo al mapa que se adjunta |
| 2002 | Resolución SFN N° 007 | Por la cual se reglamenta la elaboración y presentación de Planes de Manejo Forestal |
| 2003 | Resolución SFN N° 596 | Por la cual se reglamenta el canje de guías de productos forestales emitidos por el Servicio Forestal Nacional para la especie Palo Santo y se habilita un registro especial para las industrias procesadoras del producto mencionado |
| 2003 | Resolución SFN N° 128 | Que modifica el Art 2° de la Resolución N°128/00 y establece un DAP mínimo de corta de *Bulnesia sarmientoi* |
| 2003 | Resolución SEAM N° 129 | Por la cual se deja sin efecto la Resolución N° 828/03, de fecha 27 de agosto de 2003 y se designan a las Autoridades Administrativa Y Científica CITES de Paraguay |

| | | |
|---|---|---|
| 2003 | Resolución SEAM Nº 949 | Por la cual se establece una pausa voluntaria para la exportación de fauna y flora de especies CITES con fines no comerciales y especies del Apéndice III de CITES |
| 2005 | Resolución SFN Nº 243 | Por la cual se adoptan como definiciones oficiales del Servicio Forestal Nacional |
| 2005 | Ley Nº 2.848 | Que deroga los Artículos 2º y 3º de la Ley Nº515/94 "Que prohíbe la exportación y tráfico de rollos, trozos y vigas de madera" |
| 2006 | Resolución SEAM Nº 2.531 | Por la cual se modifica parcialmente la Resolución SEAM Nº 2.243/06 Por la cual se actualiza el listado de las especies protegidas de la vida silvestre en peligro de extinción |
| 2006 | Resolución SEAM Nº 1.690 | Por la cual se aprueba el listado preliminar de especies de la flora silvestre nativa amenazada utilizada en la medicina popular del Paraguay |
| 2006 | Resolución SEAM Nº 2.243 | Por la cual se actualiza el listado de las especies de Vida Silvestre en peligro de en extinción – Derogación de las Resoluciones Nº 701/96 y Nº 59/04 |
| 2007 | Resolución SFN Nº 797 | Por la cual se suspende temporalmente la exportación de productos forestales de maderas de la especie forestal Palosanto (*Bulnesia sarmientoi*) |
| 2007 | Resolución SFN Nº 1.105 | Por la cual se establecen normas técnicas para la protección y el racional aprovechamiento de la especie Palosanto (*Bulnesia sarmientoi*) |
| 2008 | Ley Nº 3.464 | Que crea el Instituto Forestal Nacional (INFONA) |
| 2008 | Decreto Nº 3.929 | Que reglamenta la Ley que crea el INFONA |
| 2009 | Resolución SEAM Nº 1.532 | Por la cual se deja sin efecto la resolución 129/03 de fecha 12 de diciembre de 2003 y se asignan las Autoridades Científica y Administrativa de CITES en Paraguay |
| 2009 | Resolución SEAM Nº1.533 | Por la cual se deja sin efecto la pausa voluntaria para la exportación de fauna y flora de especies CITES con fines no comerciales y especies del apéndice III de CITES |
| 2009 | Resolución INFONA Nº 561 | Por el cual se suspende el periodo de vigencia de la Resolución Nº 313/09, del 25 de febrero del 2009 por término de 30 días por única vez |
| 2009 | Decreto Nº 2.438 | Por el cual se establece el periodo de validez de las guías de productos y subproductos forestales y se autoriza al INFONA a establecer su |

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| | | formato |
| 2011 | Resolución INFONA N°1.136 | Por la cual se establecen los parámetros de referencia para la habilitación anual de superficies con cobertura forestal en la Región Occidental |
| 2011 | Resolución SEAM N°1.360 | Por el cual se aprueban los modelos de solicitudes y requisitos que deben adjuntarse para la emisión de permisos CITES de exportación de Palo Santo (esencia y madera) |
| 2012 | Decreto N°9.701 | Por el cual se reglamenta el comercio de especies incluidas en la CITES |
| 2012 | Resolución INFONA N° 348 | Por la cual se modifica la Resolución SFN INT. N° 224/01 "Por la cual se reglamenta la elaboración y presentación de los Planes de Uso de la Tierra" de fecha 7 de diciembre de 2001, y la Resolución SFN INT. N° 07/2002 "Por la cual se reglamenta la elaboración y presentación de los Planes de Manejo Forestal" |
| 2012 | Resolución INFONA N° 1.616 | Por la cual se aprueba el procedimiento para la autorización de exportación de productos de la especie *Bulnesia sarmientoi* (Palo Santo) |
| 2013 | Resolución SEAM N° 500 | Por la cual se aprueba el dictamen de extracción no perjudicial para la especie de *Bulnesia sarmientoi* (Palo Santo) |
| 2013 | Resolución SEAM N° 614 | Por la cual se establecen las Ecorregiones para las Regiones Occidental y Oriental del Paraguay |
| 2013 | Resolución SEAM N° 544 | Por la cual se establecen los cupos de exportación para el año 2014 de madera y extracto de la especie *Bulnesia sarmientoi* (Palo Santo) |
| 2014 | Resolución INFONA N° 1.067 | Por la cual se autoriza a la Dirección General de Bosques a discriminar los saldos de subproductos forestales: leña de Palo Santo de los Planes de Uso de la Tierra |
| 2014 | Resolución SEAM N° 631 | Por la cual se deja sin efecto la pausa voluntaria para la importación, exportación y reexportación de fauna y flora de especies CITES nativas |
| 2014 | Resolución SEAM N° 1.296 | Por la cual se establece el procedimiento de exportación de madera y de extracto de la especie *Bulnesia sarmientoi* (Palo Santo), conforme a los criterios técnicos establecidos |
| 2015 | Resolución INFONA N°360 | Por la cual se actualizan los precios de varios rubros, fijados en las Resoluciones N° 205/10 de fecha 10 de abril de 2010; 1271/10 y |

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| | | 1272/10de fecha 24 de noviembre de 2010, respectivamente, y la Resolución Nº 1565/12 de fecha 7 de diciembre de 2012 |
| 2015 | Resolución SEAM Nº 311 | Por la cual se establecen los cupos de exportación para el año 2015 de madera y extracto de la especie *Bulnesia sarmientoi* (Palo Santo) |
| 2015 | Resolución SEAM Nº 396 | Por la cual se rectifica el Artículo 3º de la Resolución Nº 311/15 de fecha 31 de julio de 2015, por la cual se establecen los cupos de exportación para el año 2015 de madera y extracto de la especie *Bulnesia sarmientoi* (Palo Santo) |
| 2016 | Resolución SEAM Nº 34 | Por la cual se establecen los cupos de exportación para el año 2016 de madera y extracto de la especie *Bulnesia sarmientoi* (Palo santo) |
| 2016 | Resolución INFONA Nº 280 | Por la cual se amplía el Artículo 1º de la Resolución SFN Nº 243/05, de fecha 4 de mayo de 2005 |
| 2016 | Resolución SEAM N° 34 | POR LA CUAL SE ESTABLECEN LOS CUPOS DE EXPORTACIÓN DE MADERA Y DE EXTRACTO DE LA ESPECIE *Bulnesia sarmientoi* (Palo Santo), PARA EL AÑO 2016 |
| 2016 | Resolución INFONA N° 280 | POR LA CUAL SE AMPLÍA EL ARTÍCULO 1° DE LA RESOLUCIÓN SFN N° 243/05 DE FECHA 4 DE MAYO DEL 2005 A fin de oficializar las siguientes definiciones: cilindro torneado y parafinado para buje, Buje, Chips y astillas de madera, tablero de partículas, tablero de fibras, laminas rebobinados; |
| 2016 | Resolución SEAM N° 284 | "POR LA CUAL SE AMPLÍA LA RESOLUCIÓN SEAM N° 1360/11 DE FECHA 10 DE AGOSTO DE 2011 "POR LA CUAL SE APRUEBAN LOS FORMULARIOS DE SOLICITUDES Y REQUISITOS QUE DEBEN ADJUNTARSE A LA EMISIÓN DE PERMISOS CITES DE EXPORTACIÓN DE MADERA Y/O EXTRACTO DE LA ESPECIE *Bulnesia sarmientoi* (Palo Santo)" |
| 2017 | Resolución SEAM N° 121 | POR LA CUAL SE ESTABLECEN LOS CUPOS DE EXPORTACIÓN DE MADERA Y DE EXTRACTO DE LA ESPECIE *Bulnesia sarmientoi* (Palo Santo), PARA EL AÑO 2017 |
| 2018 | Decreto N° 175 | POR EL CUAL SE DEROGA EL DECRETO 7702 DEL 14 DE SETIEMBRE DE 2017, SE INSTRUYE A LA PRESIDENTA DEL INSTITUTO FORESTAL NACIONAL (INFONA) A PROPONER UNA NUEVA REGLAMENTACIÓN, Y SE ESTABLECE UN |

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| | | RÉGIMEN PROVISORIO QUE REGLAMENTA EL ARTÍCULO 42 DE LA LEY 422/1973 "FORESTAL". Que el Decreto 7702, establece en su Artículo 5° "A partir de la vigencia del presente Decreto, los que realicen habilitaciones en las propiedades rurales identificadas como áreas de reserva legal de bosques naturales sin autorización correspondiente, se encuentran obligados a reforestar restaurando la totalidad de la superficie habilitada o adquiriendo certificados de servicios ambientales hasta el equivalente a su obligación (25%) mediante el régimen establecido en la Ley 3001/2006 y sus reglamentaciones; sin perjuicio de las sanciones que correspondieren por el incumplimiento de las normas que rigen la materia".<br>Que se observan en el decreto 7702 del 14 de setiembre de 2017 graves discordancias con lo que dispone el Artículo 42, de la Ley N° 422/73, entre otras normas relacionadas, por lo que el Poder Ejecutivo considera pertinente su derogación, instruyendo a la Presidente del INFONA, a proponer una nueva reglamentación acorde al marco jurídico forestal vigente en la República.. |
| 2019 | Resolución MADES N° 293 | Por el cual se aprueba la Estrategia Nacional de bosques para el crecimiento Sostenible (ENBCS) |
| 2019 | Resolución INFONA N° 537 | Por el cual se aprueba el procedimiento para la autorización de exportación de productos de la especie *Gonopterodendron sarmientoi* (Palo santo) y se abroga la Resolución INFONA N° 1616/2012. |
| 2020 | Decreto 3312 | POR EL CUAL SE REGLAMENTA EL ARTICULO 53 DE LA LEY n°422/1973 "FORESTAL", Y SE OTORGAN FACULTADES ADMINISTRATIVAS AL INSTITUTO FORESTAL NACIONAL (INFONA) A LOS EFECTOS DE ESTABLECER GARANTIAS EN MATERIA DE PROCEDIMIENTOS SUMARIALES |
| 2020 | Decreto 3246 | POR EL CUAL SE REGLAMENTA EL SISTEMA NACIONAL DE MONITOREO FORESTAL DEL PARAGUAY. |

**Anexo N° 6. Países importadores de extracto de *Bulnesia sarmientoi* (2016-2020)**

| País | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|
| Alemania | X | X | X | X | X |
| Argentina | X | X | X | X | X |
| Australia | X | X | X | X | X |
| Brasil | X | X | X | X | X |
| China | X | X | X | X | X |
| Colombia | X | X | X | - | X |
| Corea | - | - | X | - | - |
| Emiratos Árabes Unidos | X | X | - | X | X |
| España | X | X | X | X | |
| Estados Unidos De América | X | X | X | X | X |
| Filipinas | - | - | - | X | - |
| Francia | X | X | X | X | X |
| Holanda | X | - | - | - | - |
| India | X | X | X | X | X |
| Hong Kong | - | - | - | - | X |
| Indonesia | X | X | X | X | X |
| Italia | - | - | - | X | - |
| Japón | X | X | X | X | X |
| México | X | X | X | X | X |
| Países Bajos | X | X | X | X | X |
| Pakistán | X | - | X | - | X |
| Reino Unido | X | X | X | X | X |
| Singapur | X | X | X | X | X |
| Suiza | X | X | X | X | X |
| Turquía | X | - | X | X | X |

**Anexo N° 7. Propiedades con de Planes de Uso de la Tierra, vigentes y aprobados por el INFONA, con sus Reservas Forestales donde se constata la presencia de *Bulnesia sarmientoi*. (2015 – 2020)**

**Resoluciones - Año 2015**

| N° | N° Resolución | Departamento | N° | N° Resolución | Departamento |
|---|---|---|---|---|---|
| 1 | 2 | Boquerón | 44 | 679 | Boquerón |
| 2 | 6 | Boquerón | 45 | 683 | Alto Paraguay |
| 3 | 8 | Boquerón | 46 | 684 | Boquerón |
| 4 | 9 | Boquerón | 47 | 698 | Boquerón |
| 5 | 49 | Boquerón | 48 | 705 | Alto Paraguay |
| 6 | 50 | Boquerón | 49 | 779 | Alto Paraguay |
| 7 | 92 | Alto Paraguay | 50 | 796 | Boquerón |
| 8 | 93 | Boquerón | 51 | 807 | Boquerón |
| 9 | 130 | Boquerón | 52 | 849 | Alto Paraguay |
| 10 | 158 | Boquerón | 53 | 867 | Boquerón |
| 11 | 159 | Alto Paraguay | 54 | 925 | Boquerón |
| 12 | 161 | Boquerón | 55 | 940 | Boquerón |
| 13 | 216 | Presidente Hayes | 56 | 943 | Boquerón |
| 14 | 227 | Boquerón | 57 | 947 | Boquerón |
| 15 | 241 | Alto Paraguay | 58 | 957 | Alto Paraguay |
| 16 | 243 | Alto Paraguay | 59 | 958 | Presidente Hayes |
| 17 | 306 | Alto Paraguay | 60 | 961 | Alto Paraguay |
| 18 | 317 | Boquerón | 61 | 962 | Alto Paraguay |
| 19 | 318 | Boquerón | 62 | 1034 | Boquerón |
| 20 | 321 | Boquerón | 63 | 1089 | Presidente Hayes |
| 21 | 332 | Boquerón | 64 | 1102 | Alto Paraguay |
| 22 | 333 | Boquerón | 65 | 1116 | Boquerón |
| 23 | 342 | Boquerón | 66 | 1131 | Alto Paraguay |
| 24 | 354 | Boquerón | 67 | 1159 | Boquerón |

| | | | | | |
|---|---|---|---|---|---|
| 25 | 403 | Alto Paraguay | 68 | 1162 | Alto Paraguay |
| 26 | 442 | Boquerón | 69 | 1169 | Alto Paraguay |
| 27 | 446 | Alto Paraguay | 70 | 1192 | Boquerón |
| 28 | 523 | Presidente Hayes | 71 | 1193 | Boquerón |
| 29 | 525 | Boquerón | 72 | 1202 | Presidente Hayes |
| 30 | 528 | Presidente Hayes | 73 | 1205 | Presidente Hayes |
| 31 | 529 | Presidente Hayes | 74 | 1208 | Alto Paraguay |
| 32 | 537 | Alto Paraguay | 75 | 1217 | Presidente Hayes |
| 33 | 573 | Alto Paraguay | 76 | 1218 | Alto Paraguay |
| 34 | 576 | Alto Paraguay | 77 | 1219 | Alto Paraguay |
| 35 | 604 | Boquerón | 78 | 1220 | Presidente Hayes |
| 36 | 606 | Boquerón | 79 | 1221 | Alto Paraguay |
| 37 | 609 | Alto Paraguay | 80 | 1239 | Presidente Hayes |
| 38 | 611 | Alto Paraguay | 81 | 1242 | Alto Paraguay |
| 39 | 613 | Boquerón | 82 | 1244 | Alto Paraguay |
| 40 | 618 | Boquerón | 83 | 1245 | Presidente Hayes |
| 41 | 640 | Presidente Hayes | 84 | 1252 | Alto Paraguay |
| 42 | 642 | Boquerón | 85 | 1253 | Boquerón |
| 43 | 656 | Boquerón | 86 | 1261 | Presidente Hayes |

## Resoluciones - Año 2016

| N° | N° Resolución | Departamento | N° | N° Resolución | Departamento |
|---|---|---|---|---|---|
| 1 | 641 | Boquerón | 32 | 623 | Boquerón |
| 2 | 1 | Boquerón | 33 | 625 | Alto Paraguay |
| 3 | 6 | Boquerón | 34 | 639 | Presidente Hayes |
| 4 | 13 | Boquerón | 35 | 672 | Boquerón |
| 5 | 93 | Boquerón | 36 | 673 | Alto Paraguay |
| 6 | 102 | Boquerón | 37 | 674 | Boquerón |
| 7 | 106 | Boquerón | 38 | 690 | Boquerón |
| 8 | 137 | Alto Paraguay | 39 | 688 | Boquerón |
| 9 | 190 | Alto Paraguay | 40 | 691 | Alto Paraguay |
| 10 | 191 | Boquerón | 41 | 689 | Boquerón |
| 11 | 263 | Boquerón | 42 | 733 | Boquerón |
| 12 | 269 | Alto Paraguay | 43 | 734 | Alto Paraguay |
| 13 | 271 | Boquerón | 44 | 785 | Boquerón |
| 14 | 292 | Boquerón | 45 | 816 | Boquerón |
| 15 | 293 | Alto Paraguay | 46 | 822 | Presidente Hayes |
| 16 | 306 | Alto Paraguay | 47 | 838 | Alto Paraguay |
| 17 | 364 | Boquerón | 48 | 931 | Boquerón |
| 18 | 365 | Boquerón | 49 | 977 | Presidente Hayes |
| 19 | 383 | Alto Paraguay | 50 | 991 | Presidente Hayes |
| 20 | 424 | Boquerón | 51 | 1001 | Boquerón |
| 21 | 425 | Boquerón | 52 | 1064 | Alto Paraguay |
| 22 | 439 | Presidente Hayes | 53 | 1066 | Boquerón |
| 23 | 472 | Boquerón | 54 | 1107 | Alto Paraguay |

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|---|---|---|---|---|---|
| 24 | 488 | Alto Paraguay | 55 | 1141 | Boquerón |
| 25 | 489 | Boquerón | 56 | 1174 | Alto Paraguay |
| 26 | 490 | Alto Paraguay | 57 | 1216 | Alto Paraguay |
| 27 | 1225 | Boquerón | 58 | 268 | Boquerón |
| 28 | 534 | Boquerón | 59 | 603 | Boquerón |
| 29 | 541 | Boquerón | 60 | 758 | Boquerón |
| 30 | 535 | Boquerón | 61 | 24 | Alto Paraguay |
| 31 | 574 | Boquerón | 62 | 353 | Boquerón |

**Resoluciones - Año 2017**

| N° | N° Resolución | Departamento | N° | N° Resolución | Departamento |
|---|---|---|---|---|---|
| 1 | 68 | Boquerón | 25 | 312 | Boquerón |
| 2 | 85 | Boquerón | 26 | 317 | Alto Paraguay |
| 3 | 94 | Alto Paraguay | 27 | 318 | Boquerón |
| 4 | 95 | Boquerón | 28 | 337 | Alto Paraguay |
| 5 | 104 | Alto Paraguay | 29 | 344 | Alto Paraguay |
| 6 | 113 | Presidente Hayes | 30 | 350 | Boquerón |
| 7 | 140 | Boquerón | 31 | 362 | Alto Paraguay |
| 8 | 168 | Boquerón | 32 | 413 | Presidente Hayes |
| 9 | 172 | Alto Paraguay | 33 | 414 | Boquerón |
| 10 | 181 | Presidente Hayes | 34 | 427 | Boquerón |
| 11 | 204 | Alto Paraguay | 35 | 449 | Boquerón |
| 12 | 208 | Boquerón | 36 | 508 | Alto Paraguay |
| 13 | 217 | Alto Paraguay | 37 | 510 | Boquerón |
| 14 | 222 | Boquerón | 38 | 582 | Boquerón |
| 15 | 237 | Boquerón | 39 | 584 | Boquerón |
| 16 | 241 | Presidente Hayes | 40 | 589 | Boquerón |

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|---|---|---|---|---|---|
| 17 | 248 | Alto Paraguay | 41 | 599 | Alto Paraguay |
| 18 | 249 | Boquerón | 42 | 616 | Presidente Hayes |
| 19 | 255 | Boquerón | 43 | 649 | Boquerón |
| 20 | 269 | Boquerón | 44 | 665 | Presidente Hayes |
| 21 | 272 | Alto Paraguay | 45 | 666 | Boquerón |
| 22 | 276 | Alto Paraguay | 46 | 739 | Boquerón |
| 23 | 277 | Boquerón | 47 | 740 | Boquerón |
| 24 | 284 | Presidente Hayes | 48 | 174 | Boquerón |
| | | | 49 | 188 | Boquerón |

**Resoluciones - Año 2018**

| N° | N° Resolución | Departamento | N° | N° Resolución | Departamento |
|---|---|---|---|---|---|
| 1 | 7 | Alto Paraguay | 39 | 517 | Alto Paraguay |
| 2 | 31 | Alto Paraguay | 40 | 534 | Presidente Hayes |
| 3 | 39 | Boquerón | 41 | 539 | Boquerón |
| 4 | 70 | Boquerón | 42 | 546 | Presidente Hayes |
| 5 | 93 | Boquerón | 43 | 559 | Boquerón |
| 6 | 111 | Boquerón | 44 | 564 | Boquerón |
| 7 | 112 | Presidente Hayes | 45 | 567 | Boquerón |
| 8 | 126 | Boquerón | 46 | 569 | Alto Paraguay |
| 9 | 128 | Presidente Hayes | 47 | 595 | Alto Paraguay |
| 10 | 130 | Boquerón | 48 | 609 | Alto Paraguay |
| 11 | 132 | Alto Paraguay | 49 | 675 | Boquerón |
| 12 | 145 | Boquerón | 50 | 796 | Boquerón |
| 13 | 168 | Boquerón | 51 | 824 | Presidente Hayes |
| 14 | 170 | Alto Paraguay | 52 | 835 | Boquerón |
| 15 | 171 | Alto Paraguay | 53 | 837 | Alto Paraguay |

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|---|---|---|---|---|---|
| 16 | 175 | Boquerón | 54 | 861 | Boquerón |
| 17 | 179 | Presidente Hayes | 55 | 862 | Boquerón |
| 18 | 182 | Alto Paraguay | 56 | 915 | Presidente Hayes |
| 19 | 214 | Alto Paraguay | 57 | 974 | Boquerón |
| 20 | 216 | Presidente Hayes | 58 | 975 | Presidente Hayes |
| 21 | 247 | Boquerón | 59 | 978 | Boquerón |
| 22 | 251 | Boquerón | 60 | 998 | Boquerón |
| 23 | 287 | Boquerón | 61 | 1025 | Boquerón |
| 24 | 292 | Alto Paraguay | 62 | 1072 | Boquerón |
| 25 | 351 | Presidente Hayes | 63 | 1092 | Boquerón |
| 26 | 363 | Boquerón | 64 | 1093 | Alto Paraguay |
| 27 | 364 | Alto Paraguay | 65 | 1095 | Alto Paraguay |
| 28 | 365 | Alto Paraguay | 66 | 1103 | Presidente Hayes |
| 29 | 366 | Boquerón | 67 | 1145 | Boquerón |
| 30 | 387 | Alto Paraguay | 68 | 1149 | Alto Paraguay |
| 31 | 388 | Alto Paraguay | 69 | 1152 | Boquerón |
| 32 | 403 | Boquerón | 70 | 1158 | Boquerón |
| 33 | 459 | Alto Paraguay | 71 | 1190 | Presidente Hayes |
| 34 | 473 | Alto Paraguay | 72 | 1191 | Presidente Hayes |
| 35 | 482 | Boquerón | 73 | 1192 | Presidente Hayes |
| 36 | 495 | Alto Paraguay | 74 | 1199 | Boquerón |
| 37 | 496 | Boquerón | 75 | 1200 | Boquerón |
| 38 | 503 | Alto Paraguay | 76 | 1209 | Alto Paraguay |

## Resoluciones - Año 2019

| N° | N° Resolución | Departamento | N° | N° Resolución | Departamento |
|---|---|---|---|---|---|
| 1 | 79 | Boquerón | 13 | 353 | Boquerón |
| 2 | 85 | Alto Paraguay | 14 | 355 | Boquerón |
| 3 | 158 | Boquerón | 15 | 357 | Boquerón |
| 4 | 171 | Alto Paraguay | 16 | 447 | Alto Paraguay |
| 5 | 172 | Presidente Hayes | 17 | 452 | Alto Paraguay |
| 6 | 173 | Boquerón | 18 | 453 | Boquerón |
| 7 | 175 | Presidente Hayes | 19 | 471 | Boquerón |
| 8 | 187 | Alto Paraguay | 20 | 472 | Alto Paraguay |
| 9 | 205 | Boquerón | 21 | 488 | Alto Paraguay |
| 10 | 254 | Alto Paraguay | 22 | 539 | Boquerón |
| 11 | 297 | Boquerón | 23 | 581 | Boquerón |
| 12 | 299 | Alto Paraguay | 24 | 579 | Boquerón |

## Resoluciones - Año 2020

| N° | N° Resolución | Departamento | N° | N° Resolución | Departamento |
|---|---|---|---|---|---|
| 1 | 23 | Boquerón | 29 | 504 | Boquerón |
| 2 | 34 | Alto Paraguay | 30 | 514 | Boquerón |
| 3 | 143 | Alto Paraguay | 31 | 497 | Boquerón |
| 4 | 165 | Boquerón | 32 | 517 | Boquerón |
| 5 | 168 | Boquerón | 33 | 521 | Presidente Hayes |
| 6 | 173 | Boquerón | 34 | 543 | Boquerón |

| | | | | | |
|---|---|---|---|---|---|
| 7 | 176 | Boquerón | 35 | 527 | Boquerón |
| 8 | 199 | Presidente Hayes | 36 | 569 | Boquerón |
| 9 | 201 | Boquerón | 37 | 589 | Boquerón |
| 10 | 257 | Alto Paraguay | 38 | 608 | Alto Paraguay |
| 11 | 132 | Presidente Hayes | 39 | 609 | Boquerón |
| 12 | 339 | Boquerón | 40 | 611 | Boquerón |
| 13 | 365 | Alto Paraguay | 41 | 631 | Boquerón |
| 14 | 381 | Boquerón | 42 | 629 | Boquerón |
| 15 | 399 | Boquerón | 43 | 625 | Boquerón |
| 16 | 379 | Presidente Hayes | 44 | 637 | Boquerón |
| 17 | 363 | Boquerón | 45 | 638 | Boquerón |
| 18 | 400 | Alto Paraguay | 46 | 639 | Alto Paraguay |
| 19 | 409 | Boquerón | 47 | 649 | Alto Paraguay |
| 20 | 415 | Boquerón | 48 | 686 | Alto Paraguay |
| 21 | 434 | Alto Paraguay | 49 | 684 | Boquerón |
| 22 | 454 | Presidente Hayes | 50 | 702 | Alto Paraguay |
| 23 | 460 | Presidente Hayes | 51 | 700 | Boquerón |
| 24 | 461 | Alto Paraguay | 52 | 730 | Boquerón |
| 25 | 495 | Boquerón | 53 | 703 | Boquerón |
| 26 | 498 | Boquerón | 54 | 733 | Boquerón |
| 27 | 500 | Boquerón | 55 | 752 | Alto Paraguay |
| 28 | 496 | Boquerón | 56 | 750 | Boquerón |

**Nota DIB/MNHNP Nª 09/2021**

San Lorenzo, 14 de octubre del 2021

Señor
**Lic. Rafael Sosa,** Director General
Dirección General de Protección y Conservación de la Biodiversidad-DGPCB
Ministerio del Ambiente y Desarrollo Sostenible (MADES)

Me dirijo a Usted, y por su intermedio a la Autoridad Administrativa CITES PY, a los efectos de remitir el Dictamen de Extracción No Perjudicial (DENP) de *Bulnesia sarmientoi* Lorentz ex Griseb. (Palo santo), en Paraguay año 2021, elaborado por V&S Consultora Ambiental Forestal; para su posterior envío a la Auditoría Externa Internacional para su evaluación.

Cabe destacar que, durante el proceso de elaboración del documento, los profesionales del Dpto. Botánica de la Dirección de Investigación Biológica/Museo Nacional de Historia Natural del Paraguay acompañaron el proceso de elaboración del DENP in situ y ex situ.

En relación al documento presentado por la Consultora mencionada, considero que cumple con todos los requisitos establecidos para la elaboración del DENP, el mismo ha sido revisado, consensuado y aprobado por los profesionales del Dpto. Botánica de la DIB/MNHNP.

Sin otro particular me despido de Usted.

Atentamente,

**Ing. Agr. Luis A. Morán A., Director**
Dirección de Investigación Biológica/
Museo Nacional de Historia Natural del Paraguay
Autoridad Científica CITES PY

DIRECCION GENERAL DGPCB
SECRETARÍA
D.A.S.P.
D.V.S.
D.I.B./MUSEO
D.P. y A.
Observ.
14-10-21

cc Archivo: DIB/MNHNP

Dirección de Vida Silvestre
Mesa de Entrada
Nº 528
Fecha: 14/10/2021 13:30

MADES
Dirección General de Protección y Conservación de la Biodiversidad
MESA DE ENTRADA
DGPCB Nº: 2497 Fecha: 14-10-21
Hora: 10:57 Firma:
Aclaración:

DIRECCION DE INVESTIGACIÓN BIOLOGICA/MUSEO NACIONAL DE HISTORIA NATURAL DEL PARAGUAY
Ruta Mariscal Estigarribia Km. 10,5, Casilla de Correo 19004, San Lorenzo, Central, Paraguay
Teléfono: 021 585-208 - Correo: museoseam@gmail.com

**Recommendations of the Plants Committee concerning *Pterocarpus erinaceus***

**Benin**

Short term recommendations

Within 30 days:

a) Establish a zero export quota for all trade in *Pterocarpus erinaceus* and communicate the quota to the Secretariat for publication on the national export quota section of the CITES website. This quota shall remain in place and be renewed annually until such time as applicable recommendations have been implemented.

b) Prior to revising the zero export quota, communicate the basis for the non-detriment finding taking into account the concepts and non-binding guiding principles in Resolution Conf. 16.7 (Rev. CoP17) and in line with paragraph c), to the Secretariat and members of the Plants Committee through its Chair, for their agreement. No exports should occur until the quota has been published on the Secretariat's website.

Long term recommendations

Within two years

c) With the support of the Secretariat, in consultation with the Plants Committee, and taking account of regional and other expertise and experience, establish a science-based non-detriment finding taking into account the concepts and non-binding guiding principles in Resolution Conf. 16.7 (Rev. CoP17).

   The non-detriment finding could, *inter alia* include the following elements:

   - science-based studies on the status of the species (e.g. population size/ stem density, trends, DBH distribution, annual increment rates), for example as part of a national forestry assessment;

   - national/and or local management plans (that include harvest management considerations) with clear monitoring requirements;

   - adaptive management to ensure that further decisions about the harvesting and management of the species are based on monitoring results (regular review of harvest records and the impact of harvesting, and adjustment of harvest instructions as necessary);

   - estimated sustainable harvest taking into account the population data and harvest pressure resulting from legal and illegal trade relative to the vulnerability of the species (intrinsic and extrinsic factors that increase the risk of extinction of the species);

   - calculation of a proposed country-specific sustainable export quota including how the quota shall be allocated among management areas and information on the location and extent of those areas; and,

   - clearly defined management measures (e.g., minimum rotation periods, minimum exploitable diameter, harvest maximums, best management practices for harvesting), as well as details of a locally appropriate traceability and effective monitoring system, including the development or sharing of identification materials.

d) Before making any increase to export quotas, communicate the scientific basis for such change to the Plants Committee, through its Chair, annually for a period of three years after exiting the Review of Significant Trade. No increases in export should occur until the quota has been published on the Secretariat's website.

**Burkina Faso**

Short term recommendations

Within 30 days:

a) Establish a zero export quota for all trade in *Pterocarpus erinaceus* and communicate the quota to the Secretariat for publication on the national export quota section of the CITES website. This quota shall remain in place and be renewed annually until such time as applicable recommendations have been implemented.

b) Prior to revising the zero export quota, communicate the basis for the non-detriment finding taking into account the concepts and non-binding guiding principles in Resolution Conf. 16.7 (Rev. CoP17) and in line with paragraph c), to the Secretariat and members of the Plants Committee through its Chair, for their agreement. No exports should occur until the quota has been published on the Secretariat's website.

Long term recommendations

Within two years

c) With the support of the Secretariat, in consultation with the Plants Committee, and taking account of regional and other expertise and experience, establish a science-based non-detriment finding taking into account the concepts and non-binding guiding principles in Resolution Conf. 16.7 (Rev. CoP17).

   The non-detriment finding could, *inter alia* include the following elements:

   - science-based studies on the status of the species (e.g. population size/ stem density, trends, DBH distribution, annual increment rates), for example as part of a national forestry assessment;

   - national/and or local management plans (that include harvest management considerations) with clear monitoring requirements;

   - adaptive management to ensure that further decisions about the harvesting and management of the species are based on monitoring results (regular review of harvest records and the impact of harvesting, and adjustment of harvest instructions as necessary);

   - estimated sustainable harvest taking into account the population data and harvest pressure resulting from legal and illegal trade relative to the vulnerability of the species (intrinsic and extrinsic factors that increase the risk of extinction of the species);

   - calculation of a proposed country-specific sustainable export quota including how the quota shall be allocated among management areas and information on the location and extent of those areas; and,

   - clearly defined management measures (e.g., minimum rotation periods, minimum exploitable diameter, harvest maximums, best management practices for harvesting), as well as details of a locally appropriate traceability and effective monitoring system, including the development or sharing of identification materials.

d) Before making any increase to export quotas, communicate the scientific basis for such change to the Plants Committee, through its Chair, annually for a period of three years after exiting the Review of Significant Trade. No increases in export should occur until the quota has been published on the Secretariat's website.

**The Gambia**

Short term recommendations

Within 30 days:

a) Establish a zero export quota for all trade in *Pterocarpus erinaceus* and communicate the quota to the Secretariat for publication on the national export quota section of the CITES website. This quota shall remain in place and be renewed annually until such time as applicable recommendations have been implemented.

b) Prior to revising the zero export quota, communicate the basis for the non-detriment finding taking into account the concepts and non-binding guiding principles in Resolution Conf. 16.7 (Rev. CoP17) and in line with paragraph c), to the Secretariat and members of the Plants Committee through its Chair, for their agreement. No exports should occur until the quota has been published on the Secretariat's website.

Long term recommendations

Within two years

c) With the support of the Secretariat, in consultation with the Plants Committee, and taking account of regional and other expertise and experience, update and establish a science-based non-detriment finding taking into account the concepts and non-binding guiding principles in Resolution Conf. 16.7 (Rev. CoP17).

   The updated non-detriment finding could, *inter alia* include the following elements:

   - science-based studies on the status of the species (e.g. population size/ stem density, trends, DBH distribution, annual increment rates), for example as part of a national forestry assessment;

   - national/and or local management plans (that include harvest management considerations) with clear monitoring requirements;

   - adaptive management to ensure that further decisions about the harvesting and management of the species are based on monitoring results (regular review of harvest records and the impact of harvesting, and adjustment of harvest instructions as necessary);

   - estimated sustainable harvest taking into account the population data and harvest pressure resulting from legal and illegal trade relative to the vulnerability of the species (intrinsic and extrinsic factors that increase the risk of extinction of the species);

   - calculation of a proposed country-specific sustainable export quota including how the quota shall be allocated among management areas and information on the location and extent of those areas; and,

   - clearly defined management measures (e.g., minimum rotation periods, minimum exploitable diameter, harvest maximums, best management practices for harvesting), as well as details of a locally appropriate traceability and effective monitoring system, including the development or sharing of identification materials.

d) Before making any increase to export quotas, communicate the scientific basis for such change to the Plants Committee, through its Chair, annually for a period of three years after exiting the Review of Significant Trade. No increases in export should occur until the quota has been published on the Secretariat's website.

**Ghana**

Short term recommendations

Within 30 days:

a) Establish a zero export quota for all trade in *Pterocarpus erinaceus* and communicate the quota to the Secretariat for publication on the national export quota section of the CITES website. This quota shall remain in place and be renewed annually until such time as applicable recommendations have been implemented.

b) Prior to revising the zero export quota, communicate the basis for the non-detriment finding taking into account the concepts and non-binding guiding principles in Resolution Conf. 16.7 (Rev. CoP17) and in line with paragraph c), to the Secretariat and members of the Plants Committee through its Chair, for their agreement. No exports should occur until the quota has been published on the Secretariat's website.

Long term recommendations

Within two years

c) With the support of the Secretariat, in consultation with the Plants Committee, and taking account of regional and other expertise and experience, establish a science-based non-detriment finding taking into account the concepts and non-binding guiding principles in Resolution Conf. 16.7 (Rev. CoP17).

   The non-detriment finding could, *inter alia* include the following elements:

   - science-based studies on the status of the species (e.g. population size/ stem density, trends, DBH distribution, annual increment rates), for example as part of a national forestry assessment;

- national/and or local management plans (that include harvest management considerations) with clear monitoring requirements;

- adaptive management to ensure that further decisions about the harvesting and management of the species are based on monitoring results (regular review of harvest records and the impact of harvesting, and adjustment of harvest instructions as necessary);

- estimated sustainable harvest taking into account the population data and harvest pressure resulting from legal and illegal trade relative to the vulnerability of the species (intrinsic and extrinsic factors that increase the risk of extinction of the species);

- calculation of a proposed country-specific sustainable export quota including how the quota shall be allocated among management areas and information on the location and extent of those areas; and,

- clearly defined management measures (e.g., minimum rotation periods, minimum exploitable diameter, harvest maximums, best management practices for harvesting), as well as details of a locally appropriate traceability and effective monitoring system, including the development or sharing of identification materials.

d) Before making any increase to export quotas, communicate the scientific basis for such change to the Plants Committee, through its Chair, annually for a period of three years after exiting the Review of Significant Trade. No increases in export should occur until the quota has been published on the Secretariat's website.

**Guinea Bissau**

Short term recommendations

Within 30 days:

a) Establish a zero export quota for all trade in *Pterocarpus erinaceus* and communicate the quota to the Secretariat for publication on the national export quota section of the CITES website. This quota shall remain in place and be renewed annually until such time as applicable recommendations have been implemented.

b) Prior to revising the zero export quota, communicate the basis for the non-detriment finding taking into account the concepts and non-binding guiding principles in Resolution Conf. 16.7 (Rev. CoP17) and in line with paragraph c), to the Secretariat and members of the Plants Committee through its Chair, for their agreement. No exports should occur until the quota has been published on the Secretariat's website.

Long term recommendations

Within two years

c) With the support of the Secretariat, in consultation with the Plants Committee, and taking account of regional and other expertise and experience, establish a science-based non-detriment finding taking into account the concepts and non-binding guiding principles in Resolution Conf. 16.7 (Rev. CoP17).

   The non-detriment finding could, *inter alia* include the following elements:

   - science-based studies on the status of the species (e.g. population size/ stem density, trends, DBH distribution, annual increment rates), for example as part of a national forestry assessment;

   - national/and or local management plans (that include harvest management considerations) with clear monitoring requirements;

   - adaptive management to ensure that further decisions about the harvesting and management of the species are based on monitoring results (regular review of harvest records and the impact of harvesting, and adjustment of harvest instructions as necessary);

   - estimated sustainable harvest taking into account the population data and harvest pressure resulting from legal and illegal trade relative to the vulnerability of the species (intrinsic and extrinsic factors that increase the risk of extinction of the species);

- calculation of a proposed country-specific sustainable export quota including how the quota shall be allocated among management areas and information on the location and extent of those areas; and,

- clearly defined management measures (e.g., minimum rotation periods, minimum exploitable diameter, harvest maximums, best management practices for harvesting), as well as details of a locally appropriate traceability and effective monitoring system, including the development or sharing of identification materials.

d) Before making any increase to export quotas, communicate the scientific basis for such change to the Plants Committee, through its Chair, annually for a period of three years after exiting the Review of Significant Trade. No increases in export should occur until the quota has been published on the Secretariat's website.

**Mali**

Short term recommendations

Within 30 days:

a) Establish a zero export quota for all trade in *Pterocarpus erinaceus* and communicate the quota to the Secretariat for publication on the national export quota section of the CITES website. This quota shall remain in place and be renewed annually until such time as applicable recommendations have been implemented.

b) Prior to revising the zero export quota, communicate the basis for the non-detriment finding taking into account the concepts and non-binding guiding principles in Resolution Conf. 16.7 (Rev. CoP17) and in line with paragraph c), to the Secretariat and members of the Plants Committee through its Chair, for their agreement. No exports should occur until the quota has been published on the Secretariat's website.

Long term recommendations

Within two years

c) With the support of the Secretariat, in consultation with the Plants Committee, and taking account of regional and other expertise and experience, establish a science-based non-detriment finding taking into account the concepts and non-binding guiding principles in Resolution Conf. 16.7 (Rev. CoP17).

   The non-detriment finding could, *inter alia* include the following elements:

   - science-based studies on the status of the species (e.g. population size/ stem density, trends, DBH distribution, annual increment rates), for example as part of a national forestry assessment;

   - national/and or local management plans (that include harvest management considerations) with clear monitoring requirements;

   - adaptive management to ensure that further decisions about the harvesting and management of the species are based on monitoring results (regular review of harvest records and the impact of harvesting, and adjustment of harvest instructions as necessary);

   - estimated sustainable harvest taking into account the population data and harvest pressure resulting from legal and illegal trade relative to the vulnerability of the species (intrinsic and extrinsic factors that increase the risk of extinction of the species);

   - calculation of a proposed country-specific sustainable export quota including how the quota shall be allocated among management areas and information on the location and extent of those areas; and,

   - clearly defined management measures (e.g., minimum rotation periods, minimum exploitable diameter, harvest maximums, best management practices for harvesting), as well as details of a locally appropriate traceability and effective monitoring system, including the development or sharing of identification materials.

d) Before making any increase to export quotas, communicate the scientific basis for such change to the Plants Committee, through its Chair, annually for a period of three years after exiting the Review of Significant Trade. No increases in export should occur until the quota has been published on the Secretariat's website.

**Nigeria**

Short term recommendations

Within 30 days:

a) Establish a zero export quota for all trade in *Pterocarpus erinaceus* and communicate the quota to the Secretariat for publication on the national export quota section of the CITES website. This quota shall remain in place and be renewed annually until such time as applicable recommendations have been implemented.

b) Prior to revising the zero export quota, communicate the basis for the non-detriment finding taking into account the concepts and non-binding guiding principles in Resolution Conf. 16.7 (Rev. CoP17) and in line with paragraph c), to the Secretariat and members of the Plants Committee through its Chair, for their agreement. No exports should occur until the quota has been published on the Secretariat's website.

Long term recommendations

Within two years

c) With the support of the Secretariat, in consultation with the Plants Committee, and taking account of regional and other expertise and experience, update and establish a science-based non-detriment finding taking into account the concepts and non-binding guiding principles in Resolution Conf. 16.7 (Rev. CoP17).

   The updated non-detriment finding could, *inter alia* include the following elements:

   - science-based studies on the status of the species (e.g. population size/ stem density, trends, DBH distribution, annual increment rates), for example as part of a national forestry assessment;

   - national/and or local management plans (that include harvest management considerations) with clear monitoring requirements;

   - adaptive management to ensure that further decisions about the harvesting and management of the species are based on monitoring results (regular review of harvest records and the impact of harvesting, and adjustment of harvest instructions as necessary);

   - estimated sustainable harvest taking into account the population data and harvest pressure resulting from legal and illegal trade relative to the vulnerability of the species (intrinsic and extrinsic factors that increase the risk of extinction of the species);

   - calculation of a proposed country-specific sustainable export quota including how the quota shall be allocated among management areas and information on the location and extent of those areas; and,

   - clearly defined management measures (e.g., minimum rotation periods, minimum exploitable diameter, harvest maximums, best management practices for harvesting), as well as details of a locally appropriate traceability and effective monitoring system, including the development or sharing of identification materials.

d) Before making any increase to export quotas, communicate the scientific basis for such change to the Plants Committee, through its Chair, annually for a period of three years after exiting the Review of Significant Trade. No increases in export should occur until the quota has been published on the Secretariat's website.

**Sierra Leone**

Short term recommendations

Within 30 days:

a) Establish a zero export quota for all trade in *Pterocarpus erinaceus* and communicate the quota to the Secretariat for publication on the national export quota section of the CITES website. This quota shall remain in place and be renewed annually until such time as applicable recommendations have been implemented.

b) Prior to revising the zero export quota, communicate the basis for the non-detriment finding taking into account the concepts and non-binding guiding principles in Resolution Conf. 16.7 (Rev. CoP17) and in line with paragraph c), to the Secretariat and members of the Plants Committee through its Chair, for their agreement. No exports should occur until the quota has been published on the Secretariat's website.

Long term recommendations

Within two years

c) With the support of the Secretariat, in consultation with the Plants Committee, and taking account of regional and other expertise and experience, establish a science-based non-detriment finding taking into account the concepts and non-binding guiding principles in Resolution Conf. 16.7 (Rev. CoP17).

   The non-detriment finding could, *inter alia* include the following elements:

   - science-based studies on the status of the species (e.g. population size/ stem density, trends, DBH distribution, annual increment rates), for example as part of a national forestry assessment;

   - national/and or local management plans (that include harvest management considerations) with clear monitoring requirements;

   - adaptive management to ensure that further decisions about the harvesting and management of the species are based on monitoring results (regular review of harvest records and the impact of harvesting, and adjustment of harvest instructions as necessary);

   - estimated sustainable harvest taking into account the population data and harvest pressure resulting from legal and illegal trade relative to the vulnerability of the species (intrinsic and extrinsic factors that increase the risk of extinction of the species);

   - calculation of a proposed country-specific sustainable export quota including how the quota shall be allocated among management areas and information on the location and extent of those areas; and,

   - clearly defined management measures (e.g., minimum rotation periods, minimum exploitable diameter, harvest maximums, best management practices for harvesting), as well as details of a locally appropriate traceability and effective monitoring system, including the development or sharing of identification materials.

d) Before making any increase to export quotas, communicate the scientific basis for such change to the Plants Committee, through its Chair, annually for a period of three years after exiting the Review of Significant Trade. No increases in export should occur until the quota has been published on the Secretariat's website.