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

Twenty-sixth meeting of the Plants Committee
Geneva (Switzerland), 5 – 9 June 2023

Compliance

Review of Significant Trade in specimens of Appendix-II species

ONGOING CASES OF SPECIES SELECTED FOLLOWING COP18 (*PTEROCARPUS ERINACEUS* AS AN EXCEPTIONAL CASE)

1. This document has been prepared by the Secretariat.

Background

2. At the 25th meeting of the Plants Committee (PC25; online, June 2021), the Secretariat submitted document PC25 Doc. 15.5 and its Addendum, outlining the inclusion of *Pterocarpus erinaceus* from all range States in the Review of Significant Trade (RST) process as an exceptional case pursuant to paragraph 1 c) (Stage 1) of Resolution Conf. 12.8 (Rev. CoP18) on *Review of Significant Trade in specimens of Appendix-II species*.

3. At PC25, the Plants Committee agreed an indicative timeline and procedure for the consideration of the species *Pterocarpus erinaceus* under Resolution Conf. 12.8 (Rev. CoP18). Recognizing the urgency of the matter, this included an agreement for the Plants Committee to proceed via intersessional decision-making in accordance with Rule 19 of its Rules of Procedure.

4. At its 74th meeting (SC74; Lyon, March 2022) the Standing Committee called upon the Plants Committee to expedite its Review of Significant Trade of *Pterocarpus erinaceus* in order for the Standing Committee to receive a progress report from the Plants Committee at SC75.

5. 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. The Plants Committee agreed on 24 June 2022, 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.

6. The Plants Committee further agreed 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.

7. 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 1 to the present document.

8. In accordance with paragraph 1 j) of Resolution Conf. 12.8 (Rev. CoP18), the Secretariat is monitoring progress of the range States concerned against the recommendations contained in Annex 1.

9. In accordance with paragraph 5 of Resolution Conf. 12.8 (Rev. CoP18), the Secretariat takes the opportunity of the present meeting to inform the Plants Committee on the progress achieved by the selected *Pterocarpus*

erinaceus range States mentioned in paragraph 5 above in the implementation of relevant RST recommendations, and to seek inputs from the Committee.

10. The outcomes of the present meeting will serve as a basis for upcoming intersessional consultations the Secretariat will undertake with Members of the Plants Committee through its Chair, in accordance with paragraph 1 k) of Resolution Conf. 12.8 (Rev. CoP18). Following post-PC26 intersessional consultations, the Secretariat will report to the Standing Committee at its 77th meeting (SC77; Geneva, November 2023) on the determination of the implementation of RST recommendations, in accordance with paragraph 1 l) of Resolution Conf. 12.8 (Rev. CoP18).

Recapitulation of simultaneous Article XIII and RST procedures relevant to *Pterocarpus erinaceus*

11. In considering the present document, the Plants Committee might wish to be reminded that there are two ongoing compliance procedures for *Pterocarpus erinaceus*: the Article XIII procedure and the RST process for selected range States.

12. The present section serves as a summary of the relevant RST and Article XIII procedures for range States of *Pterocarpus erinaceus*.

13. Amongst the eight *Pterocarpus erinaceus*/country combinations selected under the RST process, there are four that are also undergoing recommendations under the Article XIII procedure, these are starred in the table below and throughout the document. The eight cases listed in the table below are the focus of the recommendations in the present document for consideration at PC26. Any inputs from the Plants Committee related to NDF on the starred cases will be coordinated by the Secretariat ahead of its reporting to the Standing Committee at its 77th meeting.

***Pterocarpus erinaceus* range State** (*) countries undergoing both Article XIII and RST processes	**RST process (i.e. species/country combinations reported in the present document)**	**Article XIII compliance procedure**
Benin	See recommendations in Annex 1 to the present document.	
Burkina Faso		
Gambia (the)*		The trade suspension recommendation shall remain in place until the conditions of paragraph 10 of Notification to the Parties No. 2022/045 are met.
Ghana		
Guinea Bissau*		The trade suspension recommendation shall remain in place until the conditions of paragraph 10 of Notification to the Parties No. 2022/045 are met.
Mali*		The trade suspension recommendation shall remain in place until the conditions of paragraph 10 of Notification to the Parties No. 2022/045 are met.
Nigeria*		The trade suspension recommendation shall remain in place until the conditions of Notification to the Parties No. 2018/084 are met.
Sierra Leone		

14. Additionally, four *Pterocarpus erinaceus*/country combinations are undergoing recommendations *only* under the Article XIII procedure. Any inputs from the Plants Committee on these cases will be coordinated by the Secretariat ahead of its reporting to the Standing Committee at its 77th meeting.

Pterocarpus erinaceus range State	Applicable condition under the Article XIII procedure
Cameroon	The trade suspension recommendation shall remain in place until the conditions of paragraph 10 of Notification to the Parties No. 2022/045 are met.
Central African Republic	
Chad	
Togo	

15. The remaining four *Pterocarpus erinaceus*/country combinations are not undergoing recommendations under the Article XIII procedure as explained in the table below, nor under the RST process:

Pterocarpus erinaceus range State	Article XIII procedure
Côte d'Ivoire	Not applicable (see paragraph 8 of Notification to the Parties No. 2022/045).
Guinea	Not applicable to pre-Convention stock of specimens of *Pterocarpus erinaceus* for the reasons explained in paragraph 13 of Notification to the Parties No. 2022/045.
Niger	Not applicable (see paragraph 8 of Notification to the Parties No. 2022/045).
Senegal	

Progress in the implementation of RST recommendations by selected range States of *Pterocarpus erinaceus*[1]

Benin/*Pterocarpus erinaceus*

16. In accordance with short-term recommendation a), Benin has requested a zero-export quota for all trade in *Pterocarpus erinaceus* for the years 2022 and 2023, as reflected in the quota's webpage. This is also in accordance with the outcomes of the expedited application of Article XIII for *Pterocarpus erinaceus* for all range States (see also Notification to the Parties No. 2022/045).

17. Additionally, in the framework of the CITES Tree Species Programme, Benin has produced a non-detriment finding for *Pterocarpus erinaceus*, as found in Annex 2 to the present document and in this link.

18. The Secretariat notes that the output in paragraph *supra* could serve as a basis for Benin to report progress in the implementation of the long-term recommendations of the RST process, and therefore recommends assessing it as such as per Annex 1.

19. To facilitate consideration of this case at the present meeting, the Secretariat has produced a short summary of the NDF report produced by Benin.

    a) The NDF report provides updated information on the distribution and conservation status of *Pterocarpus erinaceus* in Benin, framed in terms of eleven phytogeographical districts. According to the information of the report, the population trends for the species are increasing in the majority of the phytogeographical districts described.

    b) The abundance data of the NDF is based on a 2008 national inventory, which might require updating. At the time of said inventory, the average density of the species was 13.92 individuals per hectare, with a potential of 8,444,061 m^3 of harvestable timber.

    c) In terms of harvest and international trade of timber of *P. erinaceus*, the report includes an analysis corresponding to the years 2013 to 2017, according to which the trends in harvest were decreasing, and in particular, a significant decrease in the exports of timber (from 104,928 m^3 in 2013 to 22,996 m^3 in 2016).

[1] *Species/country combinations that are also undergoing Article XIII recommendations are starred (*).*

d) The report also contains a case study of one of the 35 forestry concessions in Benin (FC Ouéme Bouku), as a representation of the typical forests of Benin. The report mentions that this case study could serve as a basis of projections at a national level and of future management plans of *P. erinaceus*.

e) In terms of threats for the populations of *P. erinaceus*, the report acknowledges that anthropocentric pressures, in particular demand from the international market is of particular concern for the species not only in Benin, but throughout its range.

f) The report also devotes a section to describe the institutional framework for the management and trade of *P. erinaceus* at the national level. This includes an analysis of the strengths, weaknesses, and opportunities to strengthen the implementation of CITES regulations for *P. erinaceus* in the country.

20. The Secretariat welcomes the Plants Committee's views in advising Benin on the effective implementation of the long-term RST recommendations (Annex 1) based on the report submitted.

Burkina Faso/*Pterocarpus erinaceus*

21. In accordance with short-term recommendation a), Burkina Faso has requested a zero-export quota for all trade in *Pterocarpus erinaceus* for the years 2022 and 2023, as reflected in the quotas webpage. This is also in accordance with the outcomes of the expedited application of Article XIII for *Pterocarpus erinaceus* for all range States (see also Notification to the Parties No. 2022/045).

22. According to paragraph 8 of Notification to the Parties No. 2022/045, the expedited compliance procedure pursuant to Article XIII is not applicable to Burkina Faso for the period of the duration of the zero-export quota published by the Secretariat.

23. Since the establishment of the voluntary zero-export quota, and further since the Secretariat communicated to Burkina Faso the outcomes of the RST recommendations (Annex 1), at the time of writing there are no further updates available regarding progress in the implementation of long-term RST recommendations for this species/country combination. The Secretariat will continue to engage with Burkina Faso to provide updates in preparation for the intersessional consultations with the Plants Committee ahead of SC77.

Gambia (the)/*Pterocarpus erinaceus**

24. At the time of writing, the Secretariat has not received any response from the Gambia in the implementation of the recommendations for which the deadline has already passed (i.e., the short-term recommendations, see Annex 1).

25. The Secretariat reminds the Plants Committee that this species/country combination is also under a recommendation to suspend trade on the basis of Article XIII of the Convention, as communicated to the Parties on 8 June 2022 via Notification to the Parties No. 2022/045, and according to which, the recommendation will remain in place until the following conditions are met:

"a) The Party makes scientifically based non-detriment findings for trade in the species in their countries to the satisfaction of the Secretariat and the Chair of the Plants Committee, having regard to Resolution Conf. 16.7 (Rev. CoP17) and based on the outcomes of the Review of Significant Trade process for this species; and

b) The Party provides evidence of adequate legal acquisition findings to the satisfaction of the Secretariat and the Chair of the Standing Committee, having regard to Resolution Conf. 18.7 (Rev. CoP18)."

26. The Secretariat notes that the condition a) above under the Article XIII process is closely aligned to the long-term recommendations under the RST process for this species/country combination (see Annex 1). Therefore, the Secretariat will consult the Plants Committee on any updates relating to non-detriment findings for *P. erinaceus* by the Gambia in preparation for its reporting to the Standing Committee in accordance with relevant recommendations of both compliance processes (i.e. Article XIII and RST).

Ghana/*Pterocarpus erinaceus*

27. In accordance with short-term recommendation a), Ghana has requested a zero-export quota for all trade in *Pterocarpus erinaceus* for the years 2022 and 2023, as reflected in the quotas webpage. This is also in

accordance with the outcomes of the expedited application of Article XIII for *Pterocarpus erinaceus* for all range States (see also Notification to the Parties No. 2022/045).

28. According to paragraph 8 of Notification to the Parties No. 2022/045, the expedited compliance procedure pursuant to Article XIII is not applicable to Ghana for the period of the duration of the zero-export quota published by the Secretariat.

29. Since the establishment of the voluntary zero-export quota, and further since the Secretariat communicated to Ghana the outcomes of the RST recommendations (Annex 1), at the time of writing there are no further updates available regarding progress in the implementation of long-term RST recommendations for this species/country combination. The Secretariat will continue to engage with Ghana to provide updates in preparation for the intersessional consultations with the Plants Committee ahead of SC77.

Guinea-Bissau/*Pterocarpus erinaceus**

30. At the time of writing, the Secretariat has not received any response from Guinea-Bissau in the implementation of the recommendations for which the deadline has already passed (i.e. the short-term recommendations, see Annex 1).

31. The Secretariat reminds the Plants Committee that this species/country combination is also under a recommendation to suspend trade on the basis of Article XIII of the Convention, as communicated to the Parties on 8 June 2022 via Notification to the Parties No. 2022/045, and according to which, the recommendation will remain in place until the following conditions are met:

    "a) The Party makes scientifically based non-detriment findings for trade in the species in their countries to the satisfaction of the Secretariat and the Chair of the Plants Committee, having regard to Resolution Conf. 16.7 (Rev. CoP17) and based on the outcomes of the Review of Significant Trad e process for this species; and

    b) The Party provides evidence of adequate legal acquisition findings to the satisfaction of the Secretariat and the Chair of the Standing Committee, having regard to Resolution Conf. 18.7 (Rev. CoP18)."

32. At the time of writing, there are no further updates available regarding progress in the implementation of long-term RST recommendations for this species/country combination. The Secretariat will continue to engage with Guinea-Bissau to provide updates in preparation for the intersessional consultations with the Plants Committee ahead of SC77.

Mali/*Pterocarpus erinaceus**

33. Regarding progress in the implementation of the short-term recommendations, since both the expedited Article XIII and RST processes initiated, Mali is still yet to request a voluntary zero-export quota for *Pterocarpus erinaceus*.

34. The Secretariat reminds the Plants Committee that this species/country combination is under a recommendation to suspend trade on the basis of Article XIII of the Convention, as communicated to the Parties on 8 June 2022 via Notification to the Parties No. 2022/045, and according to which, the recommendation will remain in place until the following conditions are met:

    "a) The Party makes scientifically based non-detriment findings for trade in the species in their countries to the satisfaction of the Secretariat and the Chair of the Plants Committee, having regard to Resolution Conf. 16.7 (Rev. CoP17) and based on the outcomes of the Review of Significant Trade process for this species; and

    b) The Party provides evidence of adequate legal acquisition findings to the satisfaction of the Secretariat and the Chair of the Standing Committee, having regard to Resolution Conf. 18.7 (Rev. CoP18)."

35. Regarding progress in the implementation of the long-term recommendations, on 6 April 2023, Mali submitted an NDF for *Pterocarpus erinaceus*, including original data tables in excel format, to the Secretariat, which are available in Annex 3 to the present document. The Secretariat welcomes Mali's commitment in preparation for the timely implementation of the long-term recommendations under the RST process as outlined in Annex 1, a step which could also prove relevant in assessing progress in the implementation of relevant recommendations under the Article XIII process.

36. To facilitate consideration of this case at the present meeting, the Secretariat has produced a short summary of the information submitted by Mali:

    a) The NDF identifies populations of *P. erinaceus* in four regions of the country (Kayes, Koulikoro, Ségou, Sikasso), with the highest densities observed in the Kayes region. The principal data sources for the NDF are national forest inventories undertaken in 2014, which surveyed 669 ha as sample plots of 12,108 km^2 potential harvest area. The NDF describes a systematic sampling design, where trees exceeding 10cm breast height diameter were surveyed in circular sampling plots of 20 m radius.

    b) The distribution of specimen diameter (population structure) reflects large proportions of younger trees, which Mali interprets as indicator of healthy regeneration. Average density of individuals exceeding 50 cm breast height diameter is variably reported as 23.5 or 25 per hectare. Common harvest criteria in Mali are described to include a minimum harvesting diameter of 25 cm, and rotation times of 6-10 years. Considering that *P. erinaceus* enters its reproductive stage upon reaching ca. 25cm diameter, and that its average annual diameter growth approximates 0.4cm, the NDF considers these criteria to be insufficient for population regeneration. The proposed export quota is thus calculated using a higher minimum harvesting diameter and a rotation time of 12.5 years.

    c) Overall, the NDF suggests that 103 out of 148 "massifs" (there seems to be no definition of this term in the NDF) are able to regenerate if harvested according to these criteria. Anticipating harvest in the "massifs" that can regenerate under the proposed criteria, the NDF proposes an export quota of 55,384.8 m^3. The NDF also suggests that adaptive management will be implemented, as only populations will be retained in harvest, if they show at least 50% regeneration after two rotation cycles.

37. The Secretariat welcomes the Plants Committee's views in advising Mali on the effective implementation of the long-term RST recommendations (Annex 1) on the basis of the report they have submitted thus far. In particular, the Secretariat welcomes views from the Committee on what revisions (if any) are required from Mali to produce a revised NDF, together with any amendments to proposed harvest and export quotas for *Pterocarpus erinaceus*.

38. At the time of writing, the Secretariat is in the process of consulting with Mali if there are any further updates it would wish the Plants Committee to consider on this matter during the present meeting. The Secretariat will provide any updates on this orally and will make available any substantial updates via an information document.

Nigeria/*Pterocarpus erinaceus**

39. The Secretariat reminds the Plants Committee that this species/country combination is also under a recommendation to suspend trade on the basis of Article XIII of the Convention, as communicated to the Parties on 5 October 2018 (see also Notification to the Parties No. 2018/084).

40. According to the Notification to the Parties No. 2018/084, the trade suspension recommendation for Nigeria/*Pterocarpus erinaceus* is to remain in place until Nigeria *"…makes scientifically based non-detriment findings for trade in the species in the country to the satisfaction of the Secretariat and the Chair of the Plants Committee"*.

41. The Secretariat notes that the above condition under the Article XIII process is closely aligned to the long-term recommendations under the RST process for this species/country combination (see Annex 1). Therefore, the Secretariat will consult the Plants Committee on any updates relating to non-detriment findings by Nigeria in preparation for its reporting to the Standing Committee in accordance with relevant recommendations of both compliance processes (i.e. Article XIII and RST).

42. Progress by Nigeria in developing an NDF was last reported by the Secretariat to the Plants Committee through document PC25 Doc. 15.5 Add. In that document, the Secretariat reported *inter alia* that it was exploring possibilities to support Nigeria through an externally funded project. Since PC25, the development of an NDF on *Pterocarpus erinaceus* by Nigeria has been taken up by the Compliance Assistance Programme (CAP) in the framework provided by Resolution Conf. 14.3 (Rev. CoP18) on *CITES compliance procedures*.

43. As last reported by the Secretariat in its comments to document CoP19 Doc. 30, Nigeria has developed a work plan for its CAP project, and the budget and terms of reference of the associated Small-Scale Funding

Agreement (SSFA) with the Secretariat are being formalized. The Secretariat will provide any updates on this at the present meeting.

Sierra Leone/*Pterocarpus erinaceus*

44. In accordance with short-term recommendation a), Sierra Leone has requested a zero-export quota for all trade in *Pterocarpus erinaceus* for the years 2022 and 2023, as reflected in the quotas webpage. This is also in accordance with the outcomes of the expedited application of Article XIII for *Pterocarpus erinaceus* for all range States (see also Notification to the Parties No. 2022/045).

45. Regarding progress in the implementation of the long-term recommendations under the RST process (and NDF-related recommendations under the Article XIII process), on 10 March 2023, Sierra Leone submitted a draft NDF on *Pterocarpus erinaceus* to the Secretariat a roadmap towards an NDF. This was produced by international experts, and for which Sierra Leone sought guidance from the Secretariat. Alongside the draft NDF, Sierra Leone also submitted a request to export 160,000m^3 of stockpiles of the species that were harvested before the expedited application of Article XIII for *Pterocarpus erinaceus* (see also Notification to the Parties No. 2022/021). The Secretariat notes that this request is for the Standing Committee to follow up on and will communicate this accordingly in their review of the implementation of Article XIII recommendations. Both documents are available in Annex 4 to the present document.

46. The Secretariat welcomes Sierra Leone's commitment in preparation for the timely implementation of the long-term recommendations under the RST process as outlined in Annex 1, a step which could also prove relevant in assessing progress in the implementation of relevant recommendations under the Article XIII process.

47. To facilitate consideration of this case at the present meeting, the Secretariat has produced a short summary of the information submitted by Sierra Leone:

    a) The draft NDF draws on standards defined in information document Inf. 11.3 and the 9-Steps process. Four regions comprising eight districts and 52 chiefdoms were visited for surveying *P. erinaceus* populations. Collectively, surveyed regions and chiefdoms comprise ca. 40% of the national land area. Drones and GIS mapping tools were used to produce vegetation maps of *P. erinaceus* habitats. At least 10 plots of 20x50 m (0.1 ha) each were randomly chosen and sampled in each chiefdom, and their number varied by the size of woodland present in each. The total number of surveyed plots is reported to be 606. In each plot, seedlings and saplings were enumerated. Life trees exceeding 10cm diameter at breast height (DBH) were recorded in size classes of 10cm. Tree stumps were also enumerated to generate data on cuts since logging activities started. Various additional observations were recorded. The data is presented in dedicated chapters for each district.

    b) The survey documents extensive logging, and additional threats include cutting for charcoal production; slash and burn agriculture; grazing; debarking for medicinal use; land use change; and fungus infestations. Densities of live individuals exceeding 10 cm DBH vary between districts (34-205 individuals per ha). The information shows that a large proportion of remaining *Pterocarpus erinaceus* trees are young. In some districts, less than 10% of the standing stock occur in commercially exploitable size classes that exceed 30cm DBH, and few or no specimen exceeding 50 cm DBH are identified. Substantial stands of mature and exploitable stock reportedly remain in certain districts, notably in the Koinadugu district. The number of stumps (up to 130 cm DBH) differs between districts and chiefdoms, but stump densities up to several hundred individuals per hectare are reported, and in some districts, stump numbers exceed the remaining live trees in commercially exploitable DBH size classes. However, the regeneration potential is overall described as encouraging, as many stumps are coppicing, and the number of coppicing stumps, seedlings and saplings combined reportedly equal the number of mature trees >10 cm DBH in many districts.

    c) Sierra Leone interprets this information as an indicator that commercially viable and exportable stock in most of its districts is relatively low; traces of previous exploitation are substantial; wild populations have seriously declined in many locations where surveys were done; and in many of the affected places, the woodland is now small and fragmented. Yet, good stock can be found in certain chiefdoms in some districts. Key actions to address issues of illegal harvest and unsustainable exploitation are to develop an effective management system for *Pterocarpus erinaceus,* including a traceability and chain of custody mechanism that will monitor the entire process from licensing to harvest and exportation. The draft NDF provides some information and steps towards establishing such a traceability system. Additional measures taken include the appointment of a Sole Timber Agent in June 2018, charged with the responsibility to facilitate all timber exportation from the country in collaboration with the CITES

Management Authority, which yielded positive results on the trade due to its well-coordinated structure, insulating it from illegal dealings along the supply chain. Sierra Leone also reports periodical annual harvesting bans and reforestation programmes. Based on these considerations, Sierra Leone suggests that positive NDFs are possible in twenty-two of the studied chiefdoms (table 8.4.1, page 144-145).

48. At the time of writing, the Secretariat is in the process of consulting with Sierra Leone if there are any further updates it would wish the Plants Committee to consider on this matter during the present meeting. The Secretariat will provide any updates on this orally and will make available any substantial updates via an information document.

Resource mobilization in support of the implementation of RST recommendations for *Pterocarpus erinaceus*

49. The Secretariat notes that the RST recommendations contained in Annex 1 for all the range States are similar if not identical for all eight cases. In anticipation of range States requesting financial assistance in accordance with paragraph 3 of Resolution Conf. 12.8 (Rev. CoP18), the Secretariat is in the process of securing external funds to support a range-State approach in the implementation of any outstanding recommendations under the Article XIII and RST processes. Any updates on this will be reported by the Secretariat at the present meeting.

50. The Secretariat also brings to the attention of the Plants Committee that, should external funds be identified in support of a range-State approach for the implementation of compliance processes for *Pterocarpus erinaceus*, the Secretariat has suggested that this could be managed as part of the selection of cross-cutting processes of the Convention that could be labelled as flagship initiatives under a CITES and forests programmatic approach for the period between CoP19 to CoP20 (see Annex 1 to document PC26 Doc. 13).

Recommendations

51. The Plants Committee is invited to:

    a) consider the present document and the progress by range States on the relevant RST recommendations as contained in Annex 1;

    b) in preparation for the Secretariat's coordination with relevant range States ahead of SC77, provide feedback and advice to assist range States in the timely and effective implementation of the RST recommendations in Annex 1;

    c) support the Secretariat in monitoring and facilitating the implementation of the RST recommendations by relevant *Pterocarpus erinaceus* range States by providing specific inputs on the progress achieved thus far; and

    d) make any additional recommendations for the Secretariat to consider in preparation for the intersessional consultations that will take place ahead of its reporting to the Standing Committee at SC77.

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:

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- national/and or local management plans (that include harvest management considerations) with clear monitoring requirements;

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Guinea Bissau

Short term recommendations

Within 30 days:

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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.

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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).

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Mali

Short term recommendations

Within 30 days:

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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).

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Nigeria

Short term recommendations

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Long term recommendations

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Sierra Leone

Short term recommendations

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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).

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MINISTÈRE DU CADRE DE VIE
ET DU DÉVELOPPEMENT DURABLE
RÉPUBLIQUE DU BÉNIN

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Avis de Commerce Non Préjudiciable (ACNP) sur *Pterocarpus erinaceus*, Poir au Bénin

Année 2022

"Ce travail a été financé par l'Union Européenne à travers le Programme CITES sur les espèces d'arbres."

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SIGLES ET ACRONYMES

ACNP:	Avis de Commerce Non Préjudiciable
ATDA	Agence Territoriale de Développement Agricole
BEF	Brigade Economique et Financière
BPLP	Brigade de Protection du littoral et de la lutte anti-pollution
CAAT	Cellule Aéroportuaire Anti Trafic
CENAGREF	Centre National de Gestion des Réserves de Faune
CITES :	Convention sur le Commerce International des Espèces de Faune et de Flore Sauvages menacées d'Extinction
CTSP :	espèces d'arbres et l'éléphant d'Afrique
DGEFC :	Direction Générale des Eaux, Forêts et Chasse au Bénin
DGFRN	Direction Générale des Forêts et des Ressources Naturelles
FAO	Organisation pour l'alimentation et l'agriculture
FCFA :	Franc des Communautés Financières d'Afrique
INSAE :	Institut National de la Statistique et de l'Analyse Economique
LABEF	Laboratoire de Biomathématiques et d'Estimations Forestières
LEA	Laboratoire d'Ecologie Appliquée
MCVDD	Ministère du Cadre de Vie et du Développement Durable
OIBT	Organisation Internationale pour les Bois Tropicaux
ONG	Organisation Non Gouvernementale
RGPH4 :	Quatrième Recensement de la Population et de l'Habitat
SRG	Groupe d'examen scientifique
UAC :	Université d'Abomey-Calavi
UICN :	Union Internationale pour la Conservation de la Nature
UMCC	Unité Mixte de Contrôle des Conteneurs
USPFM	Unité Spéciale de la Police Fluviale et Maritime
USSF	Unité Spéciale de la Surveillance des Frontières

REMERCIEMENTS

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Nous tenons pour finir, à exprimer notre profonde gratitude au Laboratoire de Biomathématiques et d'Estimations Forestières ainsi qu'à tous les consultants et cadres mobilisés dans le cadre de ce travail.

RESUME

La formulation d'un Avis de Commerce Non Préjudiciable (ACNP) pour l'importation et l'exportation dans le cadre de la convention sur le commerce international des espèces de faune et de flore sauvages menacées extinction (CITES) répond à des dispositions statutaires. L'Avis de Commerce Non Préjudiciable est du ressort des autorités scientifiques des Etats.

Bien qu'ayant amélioré le cadre législatif de mise en œuvre de la CITES par l'adoption de la loi n° 2021-04 du 08 juillet 2021 portant protection et règles relatives au commerce international des espèces de faune et de flore sauvages menacées d'extinction en République du Bénin, le Bénin n'a pas encore pris le texte réglementaire mettant en place formellement l'Autorité scientifique. Pour pallier cette insuffisance, un comité d'experts scientifiques a été mis en place par note de service N°029/DGEFC/DSIME/DLPFC/DFBCN/DPESE/PF CITES/SA du 30 mars 2022, du Directeur Général des Eaux, Forêts et Chasse, portant mise en place et fonctionnement du comité d'experts pour la formulation d'un avis non préjudiciable (ACNP) de *Pterocarpus erinaceus* au Bénin. Les données nécessaires à la rédaction du présent ACNP sont issues d'une part des études réalisées dans le cadre de la mise en œuvre des activités du Programme CITES pour les espèces d'arbres et l'éléphant d'Afrique (CTSP) et d'autre part de l'exploitation des rapports et des travaux scientifiques conduits sur l'espèce.

Du fait de sa surexploitation dans son aire de distribution naturelle, *P. erinaceus* est une espèce devenue de plus en plus rare dans les écosystèmes et est menacée de disparition à cause de sa gestion non durable dans son habitat. En effet, *P. erinaceus* présente l'un des bois les plus recherchés des forêts sèches d'Afrique de l'Ouest, tant pour sa couleur (variant du rose-rouge au brun foncé, avec des stries sombres) que pour ses qualités technologiques qui en font un bois idéal pour la fabrication de meubles, lambris décoratifs, parquets et ustensiles variées. L'espèce est surexploitée afin de satisfaire aux besoins de plus en plus croissants en produits des centres urbains. Elle représente donc un bois d'œuvre de grande valeur économique, une source importante de bois-énergie et aussi de fourrage pour le bétail des communautés pastorales de son aire de répartition. Pour limiter les conséquences de ces utilisations, des mesures adéquates sont indispensables pour sa conservation et sa gestion durable. C'est pour cela que la communauté internationale a inscrit l'espèce en annexe II de la CITES pour éviter que le commerce international ait des répercussions négatives graves sur l'espèce, sur

l'écologie des forêts sèches d'Afrique de Ouest et sur les populations humaines qui en dépendent. Dans ce contexte, il est indispensable de disposer des données actualisées au plan socio-économique et dynamique des peuplements de l'espèce à travers son aire de répartition afin de prendre les décisions justes pour sa conservation et son utilisation durable. De nombreux travaux scientifiques ont été réalisés sur l'espèce dans son aire de répartition, mais la plupart de ces travaux ont été conduits de façon éparse et assez localisée. Aussi, la forte exploitation connue par l'espèce ces dernières années, et qui a d'ailleurs contraint plusieurs pays de l'aire de répartition à suspendre l'exploitation et la commercialisation du bois de l'espèce, a surement impacté les potentialités offertes par l'espèce. Il est donc urgent de disposer de données actualisées pour définir un plan de gestion efficace qui garantira la conservation et l'utilisation durable de l'espèce.

Dans une approche combinant les données de l'inventaire forestier de 2007 et les informations relatives à la présence effective de groupes d'individus de l'espèce dans son aire de répartition au Bénin, la forêt classée de Ouémé-Boukou a été retenue comme site de présence relativement importante de l'espèce. L'inventaire forestier réalisé dans cette forêt a révélé que les individus de *P. erinaceus* présentent une distribution erratique à l'échelle de la forêt avec une tendance de grégarité par endroits. Ces zones ont été considérées comme des peuplements de l'espèce et ont été décrites. Les individus de l'espèce sont quasi-inexistant dans les forêts galeries et simplement inexistant dans les zones de culture et jachères. En forêt claire et surtout en savane, l'espèce est relativement mieux représentée (4,92 individus/ha) avec un diamètre moyen (20,34 cm) et une hauteur (13,31 m) appréciables. Toutefois, sa contribution à la surface terrière globale du peuplement est assez faible en forêt galerie (1,12 %) et forêt claire (1,2 %) mais mieux en savane (4,25 %). La structure en diamètre observée pour l'espèce dans la forêt est irrégulière avec une valeur du paramètre de forme « c » de 1,67, caractéristique des formations multi-spécifiques avec dissymétrie droite, ce qui indique une non stabilité des populations de *P. erinaceus* dans la forêt de Ouémé-Boukou.

En ce qui concerne l'importance socioéconomique de l'espèce, au total, vingt-deux (22) usages sont théoriquement connus sur l'espèce parmi les enquêtés dont treize (13) sont effectivement pratiqués. En termes d'importance économique, 42,5% des enquêtés ont eu à commercialiser au moins un organe de l'espèce.

Sur la base de ces informations, des actions concrètes ont été proposées pour la conservation et la gestion durable de l'espèce au Bénin. Il s'agit entre autres de : i) la mise en défens des

peuplements contenant l'espèce dans les forêts claires et savanes arborées pour garantir sa conservation stricte ; ii) la mise en œuvre des opérations de restauration écologique intensive de l'espèce dans les savanes arbustives et forêt galerie (enrichissement par voie sexuée et/ou par voie végétative, régénération assistée) ; iii) l'élaboration d'un mécanisme de suivi écologique de long terme des populations de référence qui doit être réalisée pour servir de cas d'école pour des séances d'éducation-information et communication à l'endroit des communautés locales ; iv) la conduite d'une série d'activités de recherche (génétique, sylvicole) afin de développer des paquets technologiques spécifiques à *P. erinaceus* à l'endroit des acteurs de la conservation; v) la mise en œuvre de programmes de renforcement des capacités des acteurs à divers niveaux. Ces actions ont servi de base à la proposition de quelques éléments pour l'élaboration d'un projet de conservation et de gestion durable de *P. erinaceus* au Bénin.

Mots-clés : *Pterocarpus erinaceus* ; plan de gestion ; conservation ; Bénin

INTRODUCTION

Les ressources forestières ont toujours joué un rôle primordial dans le bien-être des populations. Les écosystèmes forestiers africains sont reconnus comme étant les plus importants et les plus riches en termes d'abondance et de diversité d'espèces de plantes. Ainsi, ils assurent d'importantes fonctions écologiques et socio-économiques pour les populations rurales et urbaines. Ces écosystèmes sont pour la plupart constitués de ressources phytogénétiques qui subissent de grandes pressions qui finissent par les menacer de disparition. Parmi ces ressources, les espèces ligneuses sont les plus convoitées compte tenu de leur importance économique. Toutefois, avec les pressions démographiques de plus en plus prononcées, elles sont menacées de disparition (Glèlè Kakaï et al., 2009). C'est le cas du Vène ou bois de rose (*P. erinaceus* Poir), une espèce légumineuse arborescente des forêts claires et savanes arborées d'Afrique (Adjonou et al., 2010). *P. erinaceus* est une espèce de bois de valeur originaire des forêts naturelles semi-arides de la savane soudano-guinéenne d'Afrique de l'Ouest. Elle est répandue dans la zone des savanes qui s'étend du Sénégal et de la Gambie jusqu'au Tchad et en Centrafrique (Bonkoungou, 1999). L'espèce est retrouvée en peuplements naturels dans les zones soudaniennes et zones guinéennes au Bénin. *P. erinaceus* représente un bois d'œuvre de grande valeur économique, une source importante de bois-énergie et de fourrage pour le bétail des communautés pastorales de son aire de répartition. La préférence de *P. erinaceus* pour le bois énergie est due à son excellente propriété calorifique. La valeur énergétique du bois est d'environ 21.000 kJ/kg (PROTA, 2008). Elle est utilisée en pharmacopée et surtout comme aliment pour le bétail en fin de saison sèche lorsque le couvert herbacé devient indisponible. Les éleveurs ont le plus souvent recours à son émondage pour l'alimentation des bovins. Son fourrage permettrait selon certains éleveurs à revigorer les animaux faibles ou malades. Ses feuilles sont en effet riches en protéines et constituent un bon fourrage pour les herbivores et favorisent une bonne santé et la croissance pondérale des animaux d'une part et d'autre part la production laitière (Segla et al., 2015). Elle a également d'énormes potentialités en médecine traditionnelle (Arbonnier, 2004). Ces dernières années, le commerce du bois de *P. erinaceus* a connu une augmentation significative. D'importants volumes de bois de l'espèce ont été exportés de l'Afrique de l'Ouest en direction de l'Asie notamment en Chine. Par exemple, la Chine a importé plus 830.000 m^3 de bois de rose en 2014 et 387.000 m^3 en 2015 en provenance d'Afrique de l'Ouest. Les plus grands exportateurs de bois de rose d'Afrique de l'Ouest vers la Chine en 2014 étaient le Nigeria, le Ghana, le Bénin, la Côte d'Ivoire, la Guinée-Bissau, la Gambie et le Togo (Lawson, 2015). Cet état de chose a eu pour conséquence la fragilisation des populations de l'espèce dans son milieu naturel. En

effet, la destruction de l'habitat de l'espèce à la faveur des activités incontrôlées et consommatrices de l'espace comme l'agriculture et l'exploitation forestière anarchique, à la commercialisation du bois, à l'influence de l'élevage des animaux et à l'allumage des feux de végétation non maîtrisés ont conduit à la réduction du nombre d'individus adultes, à la réduction de la possibilité de régénération naturelle et ainsi à l'augmentation du risque d'érosion génétique au niveau de l'espèce (Agbahungba et al., 2001 ; Adjonou et al., 2010 ; Dumenu, 2019).

Selon la CITES (2018), les données disponibles sur les tendances démographiques de *P. erinaceus* montrent des indices de rareté croissante, accentués par l'exploitation liée au commerce international. En effet, dans toute l'aire de répartition de l'espèce, la densité moyenne se situe entre 1 et 111 arbres/ha selon les estimations du Burkina Faso, du Niger et du Togo (Segla et al., 2016). Au Bénin, l'espèce se retrouve avec une densité moyenne variable en fonction des zones climatiques. Elle varie de 5 (zone soudanienne) à 26 arbres/ha (zone guinéenne) (Aboua, 2008 ; Akpona, 2016). En raison de ses diverses utilisations locales et en dépit de la plasticité de l'espèce, l'impact de l'exploitation et les premiers signes de surexploitation des populations de *P. erinaceus* ont été décrits dans plusieurs pays de la sous-région, notamment au Bénin (Glèlè Kakaï et al., 2008). Entre 2013 et 2016, d'importantes quantités de bois de *P. erinaceus* ont été exploitées au Bénin pour satisfaire aussi bien le marché local que le marché international (CITES, 2018). Les données disponibles sur l'exploitation officielle de l'espèce au Bénin révèlent qu'entre 2013 et 2016, le nombre de pieds de *P. erinaceus* exploités évolue de façon décroissante en passant de 682 à 172. Sur la même période, les volumes des exportations du bois de l'espèce par le Port Autonome de Cotonou passent de 104.928 à 16.287 m^3 (DGFRN, 2014, 2016). Du fait de sa surexploitation dans son aire de distribution naturelle, l'espèce devient de plus en plus rare dans les écosystèmes et est menacée de disparition à cause de la gestion non durable dans son habitat.

C'est sur la base de ces constats reconnus par la communauté internationale, que l'espèce a été inscrite en annexe II de la CITES pour éviter que le commerce international ait des répercussions négatives graves sur l'espèce, sur l'écologie des forêts sèches d'Afrique de l'Ouest et sur les populations humaines qui en dépendent. Aussi, l'IUCN classe *P. erinaceus* dans la Liste Rouge des espèces en danger (Endangered A3d) à cause de la réduction ($\geq$ 50 %) de la population prévue, déduite ou supposée dans le futur en se basant sur les niveaux d'exploitation réels ou potentiels de l'espèce (IUCN, 2022).

De nombreux travaux scientifiques ont été réalisés sur l'espèce dans son aire de répartition, mais la plupart de ces travaux ont été conduits de façon éparse et assez localisée. Aussi, la forte exploitation connue par l'espèce ces dernières années, et qui a d'ailleurs contraint plusieurs pays de l'aire de répartition à suspendre l'exploitation et la commercialisation du bois de l'espèce, a surement impacté les potentialités offertes par l'espèce. Dans ce contexte, il est indispensable de disposer des données actualisées et probantes sur l'espèce à travers son aire de répartition afin de prendre les décisions judicieuses pour sa conservation et son utilisation durable.

1. GENERALITES

1.1. Présentation du Bénin

La République du Bénin avec une superficie totale de 114 763 km² est située entièrement dans la zone intertropicale, entre les parallèles 6°25' et 12°30' de latitude Nord et les méridiens 1° et 3°40' de longitude Est (FAO, 1998). Elle est limitée au Nord par les Républiques du Niger et du Burkina Faso, au Sud par l'océan Atlantique, à l'Ouest par la République du Togo et à l'Est par la République du Nigeria. En dehors de la zone Nord-Ouest dans les chaînes de l'Atacora, le centre dans le Département des Collines, le Bénin présente un relief peu accidenté.

Par son extension entre la côte du Golfe du Bénin et la vallée du Niger, la République du Bénin est sous l'influence de deux climats : tropical à deux saisons et subéquatorial à quatre saisons. Les précipitations annuelles y varient de 900 à 1300 mm par an du Nord au Sud. La combinaison de ces différentes saisons a donné naissance à trois zones biogéographiques étalées du Sud au Nord : la zone guinéo-congolaise au Sud, la zone de transition soudano-guinéenne et la zone soudanienne au Nord (Sinsin et al., 2004).

La zone guinéo-congolaise connaît quatre saisons et s'étend de la côte (6°25 N) à la latitude de 7°30 N. Elle a une pluviométrie moyenne de 1200 mm par an avec en moyenne 250 jours de pluies. La grande saison de pluie court de mars à fin juillet et la petite de septembre à mi-novembre. Ces périodes de pluies sont alternées de 2 saisons sèches : une grande, de mi-novembre à mi-mars et une petite d'août à septembre. On y enregistre une température moyenne journalière qui varie de 25° à 29°C. L'humidité de l'air varie entre 69% et 97%. La zone guinéenne est le domaine des sols ferrallitiques, profonds et peu fertiles (7000 km²), des sols alluviaux et vertisols (3600 km²) localisés dans les vallées des fleuves Mono, Couffo et Ouémé, et dans la dépression de la Lama. Ces sols sont riches en argile, en matière organique et en éléments minéraux. On distingue plusieurs types d'écosystèmes dans cette zone que sont : (i) les formations des sols bien drainés, c'est-à-dire des cordons sableux (anciens ou récents) ; ii) les formations des zones humides (lagunes et vasières) et (iii) la formation originelle des plateaux constituée par la forêt dense humide semi-décidue où on trouve les vestiges sous forme de lambeaux (forêt de réserve botanique de Pobè, forêts sacrées ou forêts reliques). Les principales espèces végétales rencontrées dans la zone guinéo-congolaise sont entre autres *Ceiba pentandra, Afzelia africana, Diospyros mespiliformis, Anogeissus leiocarpa, Antiaris toxicaria, Milicia excelsa, Mimusops andongensis, Triplochyton scleroxylon, Piptadeniastrum africanum et Terminalia superba.*

La zone soudano-guinéenne est située entre 7°30' N et 9°45' N. Le régime pluviométrique dans la zone soudano-guinéenne est unimodal (mai octobre) et la pluviométrie moyenne annuelle varie de 900 mm à 1110 mm répartie le plus souvent sur 113 jours en moyenne. L'humidité relative varie de 31 % à 98 % dans cette zone. L'insolation moyenne s'élève à 2305 heures par an. Les températures varient entre 25° et 29°C dans cette zone. La zone de transition soudano guinéenne prolongeant la zone à affinité guinéenne, est le domaine des mosaïques de forêts claires, avec éventuellement des forêts denses sèches, parsemées de savanes arborées et arbustives et traversées par des galeries forestières. On trouve dans cette zone les sols minéraux peu évolués et peu fertiles et les sols ferrugineux sur socle cristallin de fertilité variable. Dans cette zone, on rencontre *Daniellia oliveri, Parkia biglobosa, Terminalia glaucescens* etc. sur les sols bien drainés, *Mitragyna inermis, Acacia campylacantha* et *Terminalia macroptera* sur les sols hydromorphes, *Isoberlinia doka* (en peuplement quasi monospécifique), *Burkea africana* et *Detarium microcarpum* sur les sols sur cuirasses ou roches peu profondes. La zone soudanienne est située entre 9°45 N et 12°30 N. La pluviométrie dans cette zone varie de 900 à 1100 mm par an, répartie en moyenne sur 145 jours. L'humidité de l'air varie de 18 % pendant l'harmattant (décembre à février) à 99 % en août pendant la saison des pluies. La température moyenne mensuelle varie de 24° à 31°C dans cette zone. Le nombre total d'heures ensoleillées est de 2862 par an. La zone soudanienne est le domaine des sols hydromorphes, des sols drainés, des cuirasses ferrallitiques et des lithosols. La zone soudanienne est constituée de savanes et de galeries forestières avec des arbres recouvrant faiblement le sol. Dans la partie sud de cette zone, la végétation est analogue à celle de la zone de transition. On rencontre des peuplements d'*Isoberlina doka* et d'*I. tomentosa* et ensuite des espèces comme *Adansonia digitata, P. erinaceus, Afzelia africana, Erythrophleum africana, Amblygonocarpus andongensis, Swartzia madagascariensis* etc.

Sur le plan hydrographique, le Bénin possède plusieurs cours d'eau dont les plus importants sont le fleuve Niger au nord et au nord-est (135 km), la rivière Pendjari au nord-ouest (380 km), le fleuve Ouémé au centre et au sud (450 km), le fleuve Couffo au sud-est (170 km) et enfin, le fleuve Mono à l'ouest (100 km). Certains de ces cours d'eau ont d'importants affluents. Il s'agit du Niger avec la rivière Mékrou (410 km), l'Alibori (338) et la Sota (250 km), et l'Ouémé avec le Zou (150 km). En outre, le territoire béninois dispose dans la zone littorale, d'un important réseau lacustre et lagunaire d'environ 270 km2. Les principaux lacs et lagunes, sont d'Ouest en Est, le lac Toho, le lac Togbadji, le lac Ahémé (78 km2), le lac Nokoué (135 km2) et la lagune de Porto-Novo (30 km²). Plus au Nord de cette chaîne, se trouvent de

petits lacs de barrage dans les plaines de l'Ouémé et du Mono. Ces différents éléments morpho-pédologiques et fluviaux participent à la formation des sols exploitables pour l'agriculture.

Estimée à 10008749 habitants, il se dégage une densité de 87,2 habitants au kilomètre carré en 2013 (INSAE, 2013). D'une manière générale, on note une très forte concentration de la population béninoise sur les formations sédimentaires côtières dans la zone climatique guinéenne où, sur une superficie d'à peine 10 % du total national, vivent environ 60 % de la population. Les 40 % restants occupent les 90 % du territoire national. Les groupes socio-culturels du Bénin ont engendré des entités linguistiques homogènes dont les plus importantes sont (i) au sud : Adja, Wachi, Fon, Xuéda, Mina, Xwla, Aïzo, Tori; (ii) au sud-est : Yoruba et Goun; (iii) : au centre: Mahi et Yoruba; (iv) au nord : Bariba, Fulani, Monkolé, Fulbé, Senka, Hausa, Betammaribè, Waaba, Bêlbêlbê, Natimba, Yowa et Lokpa. Des mouvements migratoires récents ont conduit à l'établissement de quelques dizaines de milliers d'étrangers au Bénin.

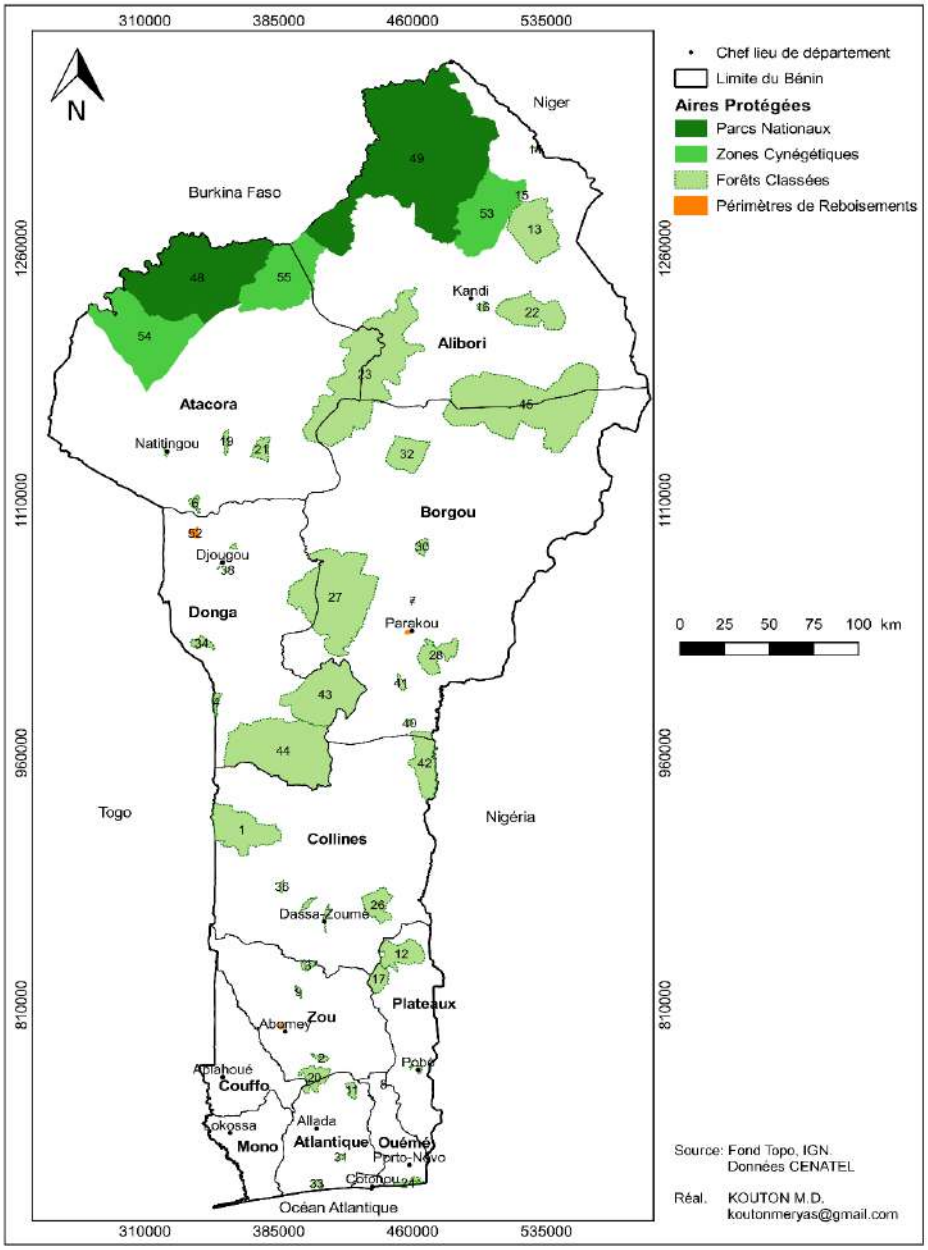

Figure 1 : Carte du Bénin présentant les aires protégées

1.2. Cadre de mise en œuvre de la CITES

Le cadre institutionnel de mise en œuvre de la CITES, du contrôle de l'exploitation et du commerce des espèces de flore et de faune sauvages au Bénin est marqué par la présence de divers acteurs dont :

1.2.1. Organe de Gestion CITES

Au Bénin, l'Organe de Gestion de la CITES est représenté par la Direction Générale des Eaux, Forêts et Chasse (DGEFC) qui est une force paramilitaire obéissant à une organisation hiérarchique placée sous l'autorité du Ministre du Cadre de Vie et du Développement Durable. C'est la structure nationale chargée de la mise en œuvre de la politique de l'État en matière de gestion durable des ressources forestières et d'autres ressources naturelles (sol, eau). Elle a pour mission d'assurer le développement, la gestion rationnelle et la protection des ressources naturelles (forestières, fauniques, pédologiques, hydrologiques) sur toute l'étendue du territoire à travers la coordination des actions de toutes les structures étatiques intervenant dans le secteur. La DGEFC assure la police forestière et a donc en charge l'application des lois relatives à la lutte contre la criminalité liée aux espèces sauvages. Sur le plan opérationnel en matière de lutte contre la criminalité liée aux espèces sauvages, la DGEFC s'est dotée d'une organisation administrative permettant la présence des agents forestiers dans toutes les 77 Communes du pays. Les structures déconcentrées principales de la DGEFC sont appelées Inspections forestières regroupant plusieurs unités opérationnelles. Par ailleurs, la DGEFC est dotée d'une brigade forestière mobile nationale et des brigades forestières spéciales directement rattachées au Directeur général. La compétence de la Brigade Forestière Nationale Mobile couvre toute l'étendue du territoire national, y compris les espaces frontaliers, les zones marine et côtière ainsi que les aires fluvio-lacustres où elle peut opérer seule ou de concert avec d'autres brigades spécialisées.

1.2.2 Autorité scientifique

La loi 2021-04 du 8 juillet 2021 portant protection et règles relatives au commerce international des espèces de faune et de flore sauvages menacées d'extinction en République du Bénin a consacré la création d'une autorité scientifique nationale au Bénin dénommé Conseil Scientifique CITES. Le siège du Conseil Scientifique CITES est le Laboratoire d'Ecologie Appliquée (LEA) de la Faculté des Sciences Agronomiques de l'Université d'Abomey-Calavi. Il est composé de cinq (5) membres :

- un président : enseignant-chercheur titulaire, spécialiste en écologie et biodiversité ;
- un vice-président : enseignant-chercheur ou directeur de recherche, spécialiste en écologie et biodiversité ;
- un rapporteur, enseignant-chercheur ou chercheur, spécialiste de la faune terrestre;

- un rapporteur, enseignant-chercheur ou chercheur, spécialiste de la faune aquatique et marine ;
- un rapporteur, enseignant-chercheur ou chercheur, spécialiste de la flore ;

L'autorité scientifique est chargée de :

a. émettre des avis sur la délivrance des permis d'exportation ou des certificats d'introduction en provenance de la mer pour les spécimens d'espèces de première et de deuxième catégories, en indiquant si ces transactions nuiraient ou non à la survie des espèces concernées ;
b. émettre des avis sur la délivrance des permis pour l'importation des spécimens d'espèces de première catégorie en indiquant si les objectifs de l'importation nuiraient ou non à la survie de ces espèces ;
c. émettre un avis sur la délivrance de tout autre certificat relevant, en vertu de la présente loi, de la compétence de l'Administration des Eaux, Forêts et Chasse ;
d. surveiller de façon continue et appropriée la situation des spécimens d'espèces de deuxième catégorie et les données relatives aux exportations et si nécessaire, recommander les mesures correctives à prendre pour limiter l'exportation de spécimens d'espèces afin de conserver chaque espèce, dans toute son aire de répartition à un niveau qui soit à la fois conforme à son rôle dans les écosystèmes et nettement supérieur à celui qu'entraînerait son appartenance à la première catégorie ;
e. conseiller l'Administration des Eaux, Forêts et Chasse sur la destination finale des spécimens d'espèces vivantes saisis ou confisqués et sur toute matière qu'elle considère pertinente dans la sphère de protection des espèces de faune et de flore sauvages.

L'autorité scientifique collabore et coopère avec les institutions scientifiques nationales et internationales, les ministères sectoriels, les structures compétentes et les organisations non gouvernementales intervenant dans la gestion de la faune et de la flore.

1.2.3 Les autres structures impliquées

1.2.3.1. Centre National de Gestion des Réserves de Faune (CENAGREF)

Le CENAGREF est l'autorité chargée de coordonner la gestion des réserves de faune et Parcs nationaux du Bénin.

Depuis 2016, le Parc national de la Pendjari est en délégation-gestion, confié à l'ONG African Parks Network (APN) ; le Parc national du W est en délégation de gestion sous tutelle de APN récemment en 2020.

Depuis lors, avec une volonté politique forte et soutenue du point de vue financier, d'importants moyens techniques et opérationnels mis en place ont permis de réduire considérablement le braconnage dans les Parcs nationaux à travers la mise en place de brigade de lutte anti-braconnage avec des moyens de communication modernes.

Les patrouilles sont aussi pédestres qu'aériennes avec des acquisitions importantes d'ULM (4 actuellement) et d'hélicoptères (2 actuellement).

Les agents chargés de la lutte anti-braconnage que sont les rangers sont recrutés et formés et leur nombre s'accroit au fur et à mesure que les moyens financiers sont disponibles.

1.2.3.2. La Direction Générale des Douanes

L'administration des douanes obéit à une organisation hiérarchique. Elle est placée sous l'autorité du ministre en charge des finances. Nonobstant la tutelle du ministre en charge des finances, les fonctionnaires des douanes qui exécutent des missions de police judiciaire sont soumis, à l'occasion, à l'autorité du pouvoir judiciaire. Les douanes béninoises exercent traditionnellement trois missions : tout d'abord, une mission fiscale, une mission économique et une mission d'assistance à d'autres administrations par l'application de réglementations particulières pour leur compte. A ces missions s'ajoute une quatrième mission, celle de la facilitation, de la sécurisation et de la chaîne logistique internationale qui implique un contrôle rigoureux des marchandises à tous les stades, de la fabrication à la destination finale, en passant par le transport. Parallèlement aux activités fiscale et économique qui constituent l'essentiel de sa mission, mais aussi de par sa présence permanente aux frontières, la douane joue un rôle d'avant-garde dans la lutte contre le blanchiment des revenus illicites, la protection des espèces menacées d'extinction et la lutte contre le trafic illicite des stupéfiants.

1.2.3.3. La Police Républicaine

La Police Républicaine est une force paramilitaire de sécurité publique qui a pour mission la prévention et la répression des infractions à la loi. Elle comporte des unités spéciales telles que la Cellule Aéroportuaire Anti Trafic (CAAT), la Brigade Economique et Financière (BEF), l'Interpol, l'Unité Spéciale de la Surveillance des Frontières (USSF), l'Unité Spéciale de la Police Fluviale et Maritime (USPFM), l'Unité Mixte de Contrôle des Conteneurs (UMCC), la

Brigade Criminelle, la Brigade Canine, la Brigade de Protection du littoral et de la lutte anti-pollution (BPLP). Tous les commissariats de sécurité publique et les unités de police judiciaire ont diversement compétence d'intervention dans le même cadre.

1.2.3.4. Les forces navales

Les forces navales constituent une composante des forces armées béninoises. Elles ont pour mission d'assurer la sécurité et la sûreté de l'espace maritime le long des 125 km de côtes Béninoises. Les Forces Navales se composent de formations constituées pour accomplir les missions qui leur sont confiées. Les unités spécialisées sont constituées d'unité de protection des bases navales et des installations portuaires. Elles luttent contre les intrusions illégales dans l'espace maritime et appuie la direction de la production halieutique dans la lutte contre la pêche non autorisée.

1.2.3.5. La Direction de la Production Halieutique

La Direction de la Production Halieutique est l'organe de conception et de suivi évaluation des politiques et stratégies de l'Etat visant à garantir la diversité et la qualité de la production halieutique. Elle est chargée de : mener des études sectorielles, diagnostiques et prospectives sur les chaines de valeurs des filières halieutiques, définir les stratégies de développement de systèmes innovants de production halieutiques et d'assurer la surveillance, la protection, l'inspection, le contrôle et la gestion de la pêche et de l'aquaculture. Dans ce cadre la direction de la production halieutique collabore avec les forces navales dans la lutte contre la pêche illégale et le trafic des espèces marines protégées.

1.2.3.6. Le judiciaire

Au Bénin, la reconnaissance législative de l'environnement est faite dans l'article 27 de la loi n° 90-32 du 11 décembre 1990 portant constitution de la République du Benin, telle que modifiée par la loi n° 2019-40 du 07 novembre 2019 « Toute personne a droit à un environnement sain, satisfaisant et durable et a le devoir de le défendre. L'Etat veille à la protection de l'environnement ». La législation prévoit à la fois des mesures d'incitation en faveur des objectifs fixés par les politiques et des sanctions pour décourager les activités qui vont à l'encontre de ces objectifs. Dans le cadre de la lutte contre la criminalité liée aux espèces

de faune et de flore sauvages, les juges et les procureurs jouent un important rôle dans l'application des textes à travers les amendes et les peines infligées aux coupables d'infractions.

1.2.3.7. Les Organisations Non Gouvernementales

Les ONG sont des organisations à but non lucratif qui jouent un rôle très important dans la sensibilisation et l'amélioration des conditions de vie des populations à travers la mise en œuvre de divers projets. Dans le domaine de la conservation des ressources naturelles, elles assurent la réhabilitation et la gestion à long terme de la biodiversité en partenariat avec les communautés locales et l'administration publique. Elles ont pour rôle l'information, l'éducation et la communication pour un comportement respectueux vis-à-vis des espèces sauvages. Elles apportent leur soutien technique et leur expertise lors des actions de lutte anti-braconnage.

1.2.3.8. Les autorités locales décentralisées

L'avènement de la décentralisation a permis de décentraliser la gestion des ressources forestières dans une approche participative avec les communautés locales. On note un peu partout des forêts communautaires qui sont sous la gestion directe des autorités locales. Par ailleurs, les forêts du domaine classé de l'Etat sont également gérées avec la participation des des autorités locales dans la gestion des ressources naturelles. Ces autorités locales constituent des acteurs importants dans la lutte contre la criminalité liée aux espèces sauvages.

1.2.3.9. Les communautés

Les dignitaires de cultes, les chasseurs, les tradi-thérapeutes sont des exploitants des ressources de flore et de faune sauvages. Ils sont garants de la tradition et détiennent beaucoup de connaissances valorisables dans la gestion durable des ressources naturelles. Ils sont également des informateurs clé dans le trafic lié aux espèces sauvages menacées d'extinction. Ce sont donc des acteurs clé dans la mise en œuvre des actions de conservation.

2. DEMARCHE METHODOLOGIQUE

2.1. Présentation du choix de la méthode de formulation du présent ACNP

La formulation d'un Avis de Commerce Non Préjudiciable (ACNP) pour l'importation et l'exportation dans le cadre de la convention sur le commerce international des espèces de faune et de flore sauvages menacées extinction (CITES) répond à des dispositions statutaires. En effet, l'Article III de la convention stipule que l'importation de spécimens

d'une espèce inscrite à l'Annexe I nécessite des permis d'importation qui ne sont délivrés que lorsqu'une autorité scientifique de l'État d'importation a émis l'avis que les objectifs de l'importation ne nuisent pas à la survie de ladite espèce. L'article IV alinéa 2.a, dispose que l'exportation d'un spécimen d'une espèce inscrite aux annexes 1 et 2, nécessite la délivrance d'un permis d'exportation qui n'est délivré que lorsqu'une autorité scientifique a émis l'avis que cette exportation ne nuise pas à la survie de l'espèce considérée.

Il existe plusieurs méthodes de formulation des ACNP. Parmi les schémas ou guides de formulation des documents d'ACNP déjà développés, l'on distingue :

- Les orientations de l'atelier de Cancun (2008)
- Le guide d'orientation élaboré lors de la réunion des experts organisée par TRAFFIC en 2012 à Mexico au Mexique
- Les schémas et documents d'ACNP développés lors de la première phase du programme OIBT-CITES, 2008-2011
- Guide de formulation issu de l'atelier de Hanoï (Octobre 2012)
- Le schéma d'ACNP proposé par l'autorité scientifique CITES de l'Allemagne et adopté par le Groupe d'examen scientifique (SRG) de la Commission de l'Union européenne (Leeman et Oldfield, 2014)

Pour formuler l'Avis de Commerce Non Préjudiciable (ACNP) de *P. erinaceus*, le Comité d'Experts Scientifique du Bénin a opté pour la méthode proposée à l'issue de l'atelier des experts sur les ACNP tenu à Cancun, au Mexique en 2008. Cette méthode a été préférée du fait de son efficacité. Elle intègre déjà l'essentiel des points proposés par d'autres schémas et notamment le schéma proposé par la Commission Européenne (coopération allemande, BFN) et aussi du fait de la disponibilité des données requises.

Le guide de Cancun propose de formuler l'ACNP sur la base des cinq points suivants : (i) biologie et aire de distribution de l'espèce, (ii) informations sur la population, (iii) mesures de gestion et régime de récolte, (iv) le contrôle et le suivi, (v) conservation et principe de précaution.

2.2. Mise en place du cadre favorable à l'élaboration de l'ACNP

Bien qu'ayant amélioré le cadre législatif de mise en œuvre de la CITES par l'adoption de la loi n 2021-04 du 08 juillet 2021 portant protection et règles relatives au commerce international des espèces de faune et de flore sauvages menacées d'extinction en République du Bénin, le Bénin n'a pas encore pris le texte réglementaire mettant en place formellement l'Autorité scientifique. Pour pallier cette insuffisance, un comité d'experts scientifiques a

été mis en place par note de service N°029/DGEFC/DSIME/DLPFC/DFBCN/DPESE/PF CITES/SA du 30 mars 2022, du Directeur Général des Eaux, forêts et Chasse, portant mise en place et fonctionnement du comité d'expert pour la formulation d'un avis non préjudiciable (ACNP) de *P. erinaceus* au Bénin.

Ainsi, des sessions du Comité ont été organisées pour valider les termes de référence des études, les rapports provisoires et les rapports définitifs des consultants. En outre il a été nécessaire de collecter les données complémentaires dans le but d'améliorer la qualité des résultats attendus. Le Comité d'Experts scientifiques a eu la charge de l'élaboration de l'ACNP sur la base des différents documents mis à sa disposition.

2.3. Méthodologie de réalisation des études thématiques

Les données nécessaires à la rédaction du présent ACNP sont issues d'une part des études réalisées dans le cadre de la mise en œuvre des activités du Programme CITES pour les espèces d'arbres et l'éléphant d'Afrique (CTSP) et d'autre part de l'exploitation des rapports et des travaux scientifiques conduits sur l'espèce. Pour le compte du projet «Renforcement des capacités pour l'élaboration d'un Avis de Commerce Non Préjudiciable sur *P. erinaceus* (fabaceae) au Bénin et au Togo» intervenu à la suite d'un premier projet ayant permis de réaliser l'état des lieux de la conservation de *P. erinaceus* au Bénin dans le cadre du CTSP, trois (3) études thématiques ont été commanditées. Il s'agit de :

- étude socio-économique,
- évaluation du potentiel de l'espèce
- élaboration d'un plan de gestion.

La démarche méthodologique adoptée pour ces différentes missions a consisté à :

- l'élaboration des termes de référence de chacune des études validés par le Comité d'Experts scientifiques,
- l'identification et la contractualisation avec les consultants,
- l'organisation de cadrages méthodologiques,
- l'organisation de séances de restitution d'étapes,
- la validation des rapports provisoires,
- la mise à disposition des rapports définitifs par les consultants après prise en compte des observations formulées par le Comité d'Experts scientifiques.

2.4. Méthodologie de l'élaboration de l'ACNP

Dans le processus d'élaboration de l'ACNP, le Comité d'Experts scientifiques a procédé à :

- une appropriation du module de formation sur les ACNP disponible sur le site de la CITES,
- une revue des informations nécessaires pour l'élaboration des ACNP,
- un point des données disponibles pour l'élaboration de l'ACNP de *P. erocarpus erinaceus* au Bénin,
- l'adoption d'un plan de rédaction fondé sur la méthode de Cancun,
- une mobilisation des données complémentaires.

Tenant compte de tout ce qui précède, le Comité d'Experts scientifiques a procédé à travers plusieurs séances de travail, à l'élaboration et la finalisation de l'ACNP de *P. erinaceus* au Bénin.

3. DESCRIPTION ET ECOLOGIE DE *P. Erinaceus*

3.1. Description botanique de *P. erinaceus*

P. erinaceus Poir appartient au règne végétal, embranchement des Spermaphytes, classe des Dicotylédones, ordre des Fabales, famille des Fabaceae, genre *Pterocarpus* et espèce *Pterocarpus erinaceus* (Cronquist, 1981).

Selon Duvall (2008) *P. erinaceus* est un arbre caducifolié atteignant 15-25 m de haut. Le fût est droit, cylindrique et dépourvu de branches sur une hauteur atteignant parfois 10 m dans de bonnes conditions de station. Le fût est souvent tordu, cannelé et à ramification basse dans de moins bonnes conditions (émondage). Le diamètre peut atteindre 75-100 cm avec de légers contreforts (Photo 1).

Photo 1: Pieds de *P. erinaceus* dans son milieu naturel (Adjonou et al., 2010)

La surface de l'écorce est brune grisâtre à noirâtre, fissurée et écailleuse. L'écorce interne est brune jaunâtre, à veines rougeâtres, sécrétant une gomme translucide rougeâtre lorsqu'on l'entaille. La cime est de forme arrondie et ouverte. Les rameaux sont densément couverts de poils courts à l'état jeune.

Les feuilles sont alternes, composées imparipennées à 5-7 ou 11-15 folioles avec des stipules linéaires (jusqu'à 9 mm de long), poilues, tombant précocement. Le pétiole, poilu, est de 3-7 cm de long et le rachis de 7-10 ou 17-22 cm de long. Les pétiolules sont de 3-8 mm de long alors que les folioles habituellement alternes sont de forme ovale à elliptique. La feuille comporte 12-20 paires de nervures latérales (Photo 2).

Photo 2 : Feuille de *P. erinaceus* (PROTA, 2008)

L'inflorescence est en panicule axillaire ou terminale de 7-20 cm de long (Photo 3). Elle est densément couverte de poils bruns. Les fleurs ont des bractées avec 6 mm de long. L'inflorescence tombe précocement. Les fleurs sont bisexuées et papilionacées. Les pédicelles sont de 4-8 mm de long et poilues. Le calice campanulé est d'environ 7 mm de long et densément poilu. Il comporte 5 dents triangulaires de 1-2,5 mm de long. Les deux dents supérieures sont de forme plus ou moins conique. La corolle est constituée de pétales pourvus d'onglet, jaune doré, avec un étendard presque circulaire atteignant 15 mm x 13 mm. Les ailes et la carène atteignent respectivement 13 mm et 10 mm de long. Les étamines au nombre de 10 sont soudées en une gaine atteignent 8,5 mm de long. L'étamine supérieure est parfois libre. L'ovaire supère presque glabre est stipité, poilu et peut atteindre 5 mm de long.

Photo 3 : Inflorescence de *P. erinaceus* (PROTA, 2008)

Le fruit est une gousse circulaire, aplatie, indéhiscente, de 4-7 cm de diamètre, sur un stipe atteignant 1 cm de long et pourvu d'une aile papyracée (Photo 4). L'aile est finement nervurée à bord ondulé ou plissé, garnie d'aiguillons sur la partie qui porte les graines, de couleur paille. Le fruit comporte 1 ou 2 graines.

Photo 4 : Fruits de *P. erinaceus* (PROTA, 2008)

Les graines réniformes sont plates à légèrement épaissies (Photo 5). Elles sont lisses, rouges à brun foncé et mesurent environ 10 mm x 5 mm. La plantule est à germination épigée et les cotylédons sont foliacés. Les graines sont récalcitrantes.

Photo 5 : Graine sans péricarpe et gousse de *P. erinaceus* (Houndjo, 2018)

3.2. Phénologie de *P. erinaceus*

P. erinaceus est une espèce qui perd ses feuilles de décembre à janvier, juste avant la floraison. Les fleurs sont progressivement remplacées par les fruits avant même l'apparition de nouvelles feuilles. Chez certains pieds, un retard de chute de feuilles, un blocage des bourgeons qui n'évolueront qu'après les premières pluies induisent la non formation de fruits (Touré, 2001).

3.3. Ecologie et aire de répartition de l'espèce

3.3.1. Ecologie de P. erinaceus

Comme toute espèce, *P. erinaceus* a des exigences écologiques sur le plan aussi bien climatique que pédologique.

- Facteurs climatiques

P. erinaceus est une légumineuse des savanes africaines et des forêts sèches soudano-guinéennes. Elle affectionne de ce fait les régions ayant une saison sèche longue (jusqu'à 9 mois) avec une précipitation moyenne annuelle variant entre 600 et 1500 mm, et une température moyenne annuelle entre 15° et 35ºC. Elle tolère toutefois des températures élevées atteignant 40ºC. *P. erinaceus* est retrouvée jusqu'à 1600 m d'altitude.

- Facteurs pédologiques

P. erinaceus est retrouvé sur tous les types de sols, mais elle préfère les sols acides à neutres, légers à moyens, drainant librement. *P. erinaceus* pousse sur des sols moyennement lourds, sableux ou graveleux. Elle prospère même sur des sols peu profonds.

- Tempérament

L'espèce est assez tolérante aux feux de végétation, mais sa régénération naturelle par graine est fortement affectée par les feux de végétation répétés. C'est un arbre qui résiste à la

sécheresse et aux feux de végétation. *P. erinaceus* est parfois perçue comme l'espèce de survie des anciennes forêts denses sèches de la zone soudanienne (Traoré, 2009).

3.3.2. Aire de répartition

P. erinaceus est une espèce endémique des zones sahélienne, soudanienne et soudano-guinéenne (Habou et al., 2015). L'espèce est inféodée aux forêts sèches des régions semi-arides et subhumides d'Afrique de l'Ouest et d'Afrique centrale. Son aire de répartition couvre l'Afrique occidentale et une partie de l'Afrique centrale, allant du Sénégal à l'Ouest à la République Centrafricaine à l'Est (Figure 1). Son aire de répartition inclut ainsi le Burkina Faso, le Cameroun, la Côte d'ivoire, la Gambie, le Ghana, la Guinée, la Guinée-Bissau, le Mali, le Niger, le Nigeria, le Sénégal, le Bénin, le Togo et, probablement, la République centrafricaine, le Tchad, le Libéria et la Sierra Léone (Groves, 2016 ; Rutherford, 2016).

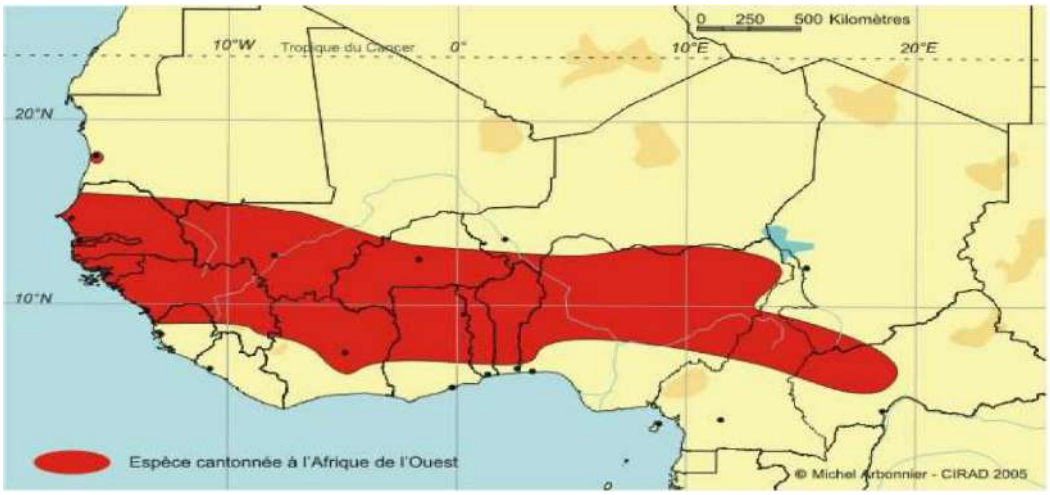

Figure 2 : Aire de répartition de *P. erinaceus*

(Source : Arbonnier, 2004)

3.3.3. Distribution de *P. erinaceus* au Bénin

L'espèce est retrouvée dans 8 phytodistricts au Bénin (Adomou et al., 2006) à savoir : Mékrou-Pendjari, chaîne de l'Atacora, Borgou Nord, Borgou Sud, Bassila, Zou, Plateau et Vallée de l'Ouémé (Figure 2).

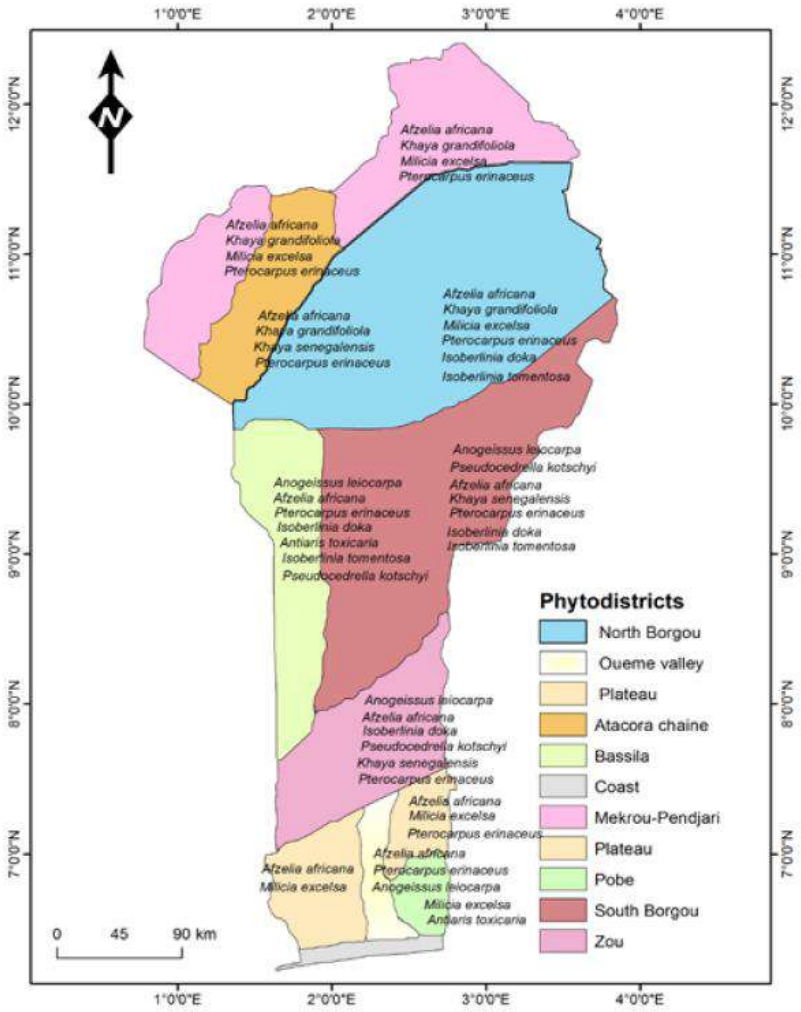

Figure 3 : Présence de *P. erinaceus* dans les phytodistricts du Bénin

(Source : Adomou et al., 2006)

Dans les conditions actuelles, l'aire favorable à l'espèce au Bénin montre les zones soudano-guinéenne et soudanienne comme favorables (Figures 3 et 4).

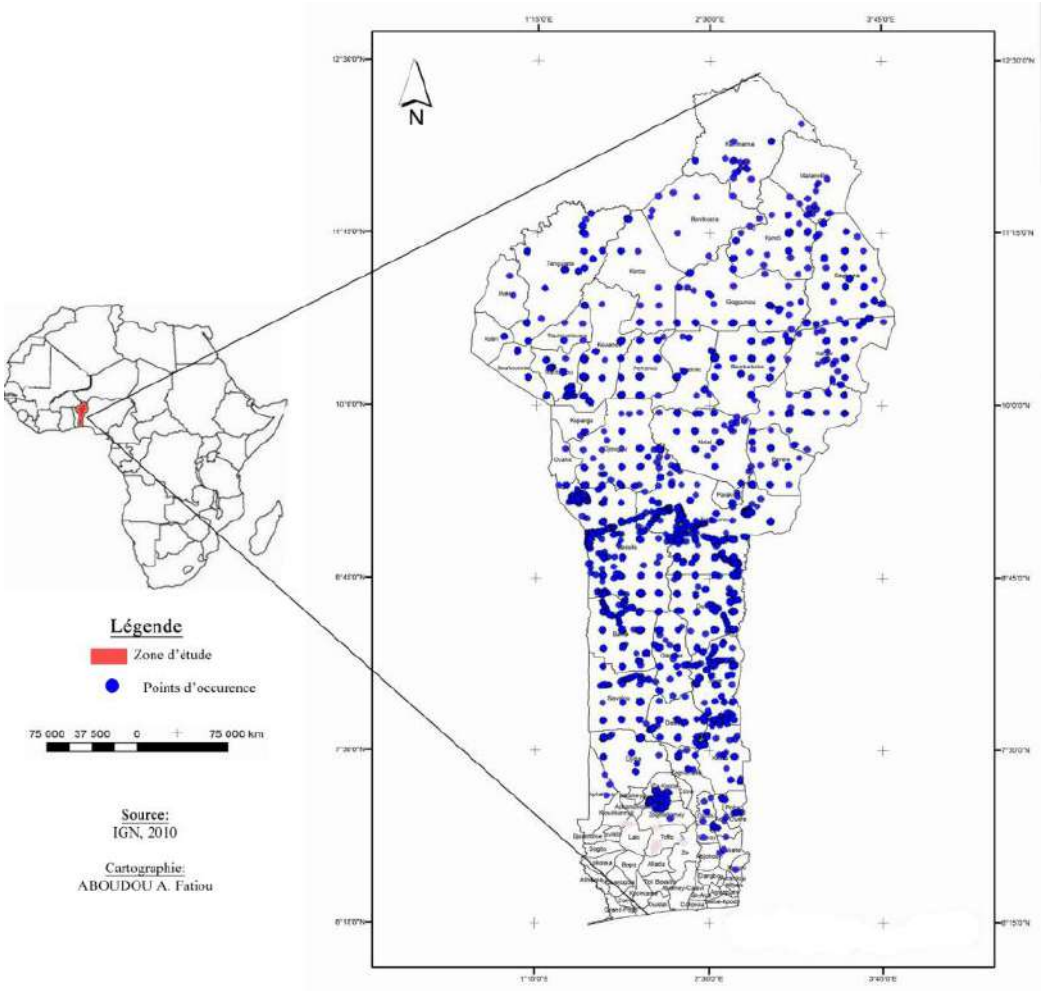

Figure 4 : Points d'occurrence de *P. erinaceus* au Bénin

(Source : Aboudou, 2017)

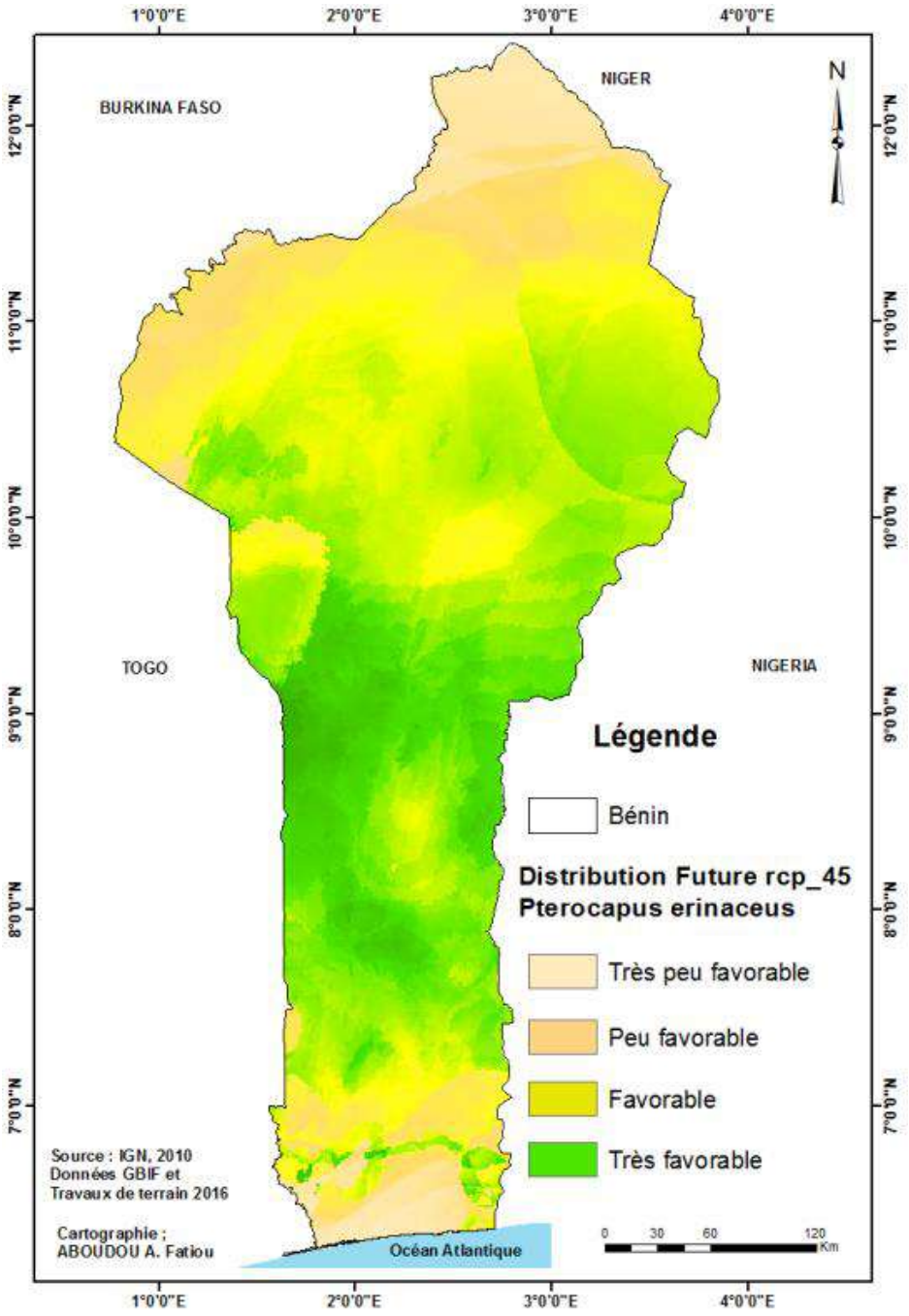

Figure 5 : Habitats potentiels de distribution future de *P. erinaceus* sous le scénario 4.5 (Source : Aboudou, 2017)

Selon Aboudou (2017), le scénario 4.5 prédit une augmentation des aires très favorables (+7,67%), une forte progression des aires favorables (+16,74%) et une réduction des aires peu favorables (-19,45%) et très peu favorables (-4, 96%) (Figure 5).

3.4. Sylviculture et caractérisation structurale de l'espèce

3.4.1. Sylviculture

Peu de données sont disponibles sur la sylviculture du *P. erinaceus* au Bénin (Kakpa, 2013). Pionnière des jachères, *P. erinaceus* prospère peu dans les aires à strate herbacée dense ou à sol nu. Elle n'impose pas une compétition manifeste aux autres espèces pour son installation. Son exploitation réduit, voire rompt, sa production semencière. Son principal mode de régénération est le semis. Les graines ont un taux de germination entre 48% et 72 % sans prétraitement (Houndjo, 2018). La germination est de type épigé à cotylédons foliacés. Le pivot racinaire atteint sur des substrats argileux, gravillonnaires et sableux respectivement à des profondeurs de 3 à 6 cm, 5 ou 6 cm et 5 à 7 cm en conditions tassées. A la même période et sur les mêmes substrats de sol non tassé, il atteint des profondeurs respectives de 9 à 11 cm, 11 à 13 cm et 12 ou 13 cm. A cet âge, les nodules sont déjà abondants et visibles à l'œil nu. Son système racinaire, de type pivotant avec une forte nodulation, est le siège d'une intense activité de micro-organismes. Plusieurs auteurs ont mis en évidence la bonne capacité de germination des graines de *P. erinaceus* et l'incapacité des plantules à franchir les différents stades de développement jusqu'à l'âge adulte à cause des agents perturbateurs tels que les facteurs climatiques, l'herbivorie, les feux de végétation et le défrichement (Bationo et al., 2001 ; Ouédraogo et al., 2006 ; Nacoulma, 2012, Adjonou et al., 2019). La répartition de la régénération autour des arbres-mères est agrégative pour les arbres de diamètre compris entre 10 et 25 cm et aléatoire pour les arbres de plus grands diamètres (Glèlè et al., 2009).

Les essais sur le bouturage ont donné un taux de bourgeonnement entre 70 et 80% (Ouinsavi et al., 2019). Le temps minimum de bourgeonnement des boutures est de 8 jours. Le traitement des boutures à l'aide de l'acide acétique indolique (IAA) peut permettre d'améliorer le bouturage des tiges de *P. erinaceus* (Ouinsavi et al., 2019). Les résultats des travaux de Denakpon (2018) au bout de deux mois ont montré que *P. erinaceus* n'a pas été apte au drageonnage, contrairement au marcottage qui a donné un taux global de réussite de 56,66%.

3.4.2. Caractérisation structurale de *P. erinaceus* au Bénin

3.4.2.1 Densité de peuplement de *P. erinaceus* au niveau de ses habitats

L'étude dendrométrique effectuée par Aboua (2018) sur les peuplements naturels de *P. erinaceus* a révélé que la densité des pieds de l'espèce augmente suivant le gradient pluviométrique. La densité moyenne (5 pieds/ha) en zone soudanienne, zone à forte exploitation (coupes abusives, surpâturage, …) est significativement inférieure à celle de la

zone de transition soudano-guinéenne (13 pieds/ha), et inférieure à la densité moyenne (26 pieds/ha) de la zone guinéenne, zone à exploitation quasi inexistante. En revanche la zone soudanienne affiche les densités de régénération de *P. erinaceus* les plus élevée (486,73 plants/ha) comparativement à celles de la zone guinéenne (187,3 plants/ha) Akpona (2016).

3.4.2.2 Structures en diamètre

La structure par classe de diamètre des populations de *P. erinaceus* présente une allure désaxée vers la gauche, suivant les trois zones climatiques (Figure 6). Les graphes des distributions diamétriques des populations des zones guinéo-congolaise, soudano-guinéenne et soudanienne présentent une distribution asymétrique positive ou asymétrique gauche, caractéristique des peuplements monospécifiques avec prédominance d'individus jeunes ou de faibles diamètres (Aboua 2018). Cela témoigne de la destruction des populations de *P. erinaceus* dans ces zones où les individus les plus gros sont exploités (Djinadou, 2013).

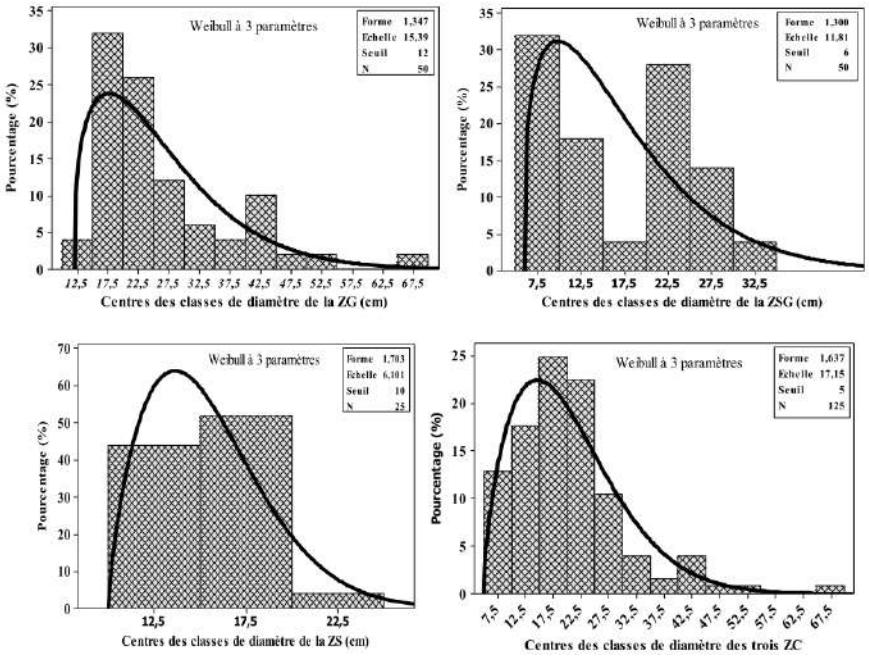

Figure 6 : Structure en diamètre des populations de P. erinaceus dans les trois zones climatiques du Bénin

ZG = zone guinéenne ; ZSG = zone soudano-guinéenne ; ZS = zone soudanienne

3.4.2.3 Caractéristiques morphologiques des feuilles et des fruits

Les travaux de Aboua (2018) ont montré que la zone climatique a un effet hautement significatif sur la longueur des feuilles, la longueur des folioles, la longueur des pétioles et la longueur des pétiolules. La zone soudano-guinéenne présente des individus ayant en moyenne les plus longues feuilles (29,64 cm) avec un coefficient de variation de 16,95 %. La zone

guinéo-congolaise présente des individus ayant en moyenne les plus petites feuilles (27,83 cm) avec un coefficient de variation de 12,56 %.

La zone biogéographique a un effet hautement significatif sur la longueur du fruit, l'épaisseur du fruit et le poids du fruit de *P. erinaceus*. Les fruits mesurent en moyenne 51,73 mm de longueur en zone guinéo-congolaise ; 55,26 mm en zone soudanienne et 50,12 mm en zone soudano-guinéenne avec un coefficient de variation atteignant 16%. Le poids et l'épaisseur du fruit sont en moyenne plus élevés en zone soudanienne (0,27 g et 52,02 mm respectivement) comparativement aux zones guinéo-congolaise et soudano-guinéenne. La présence ou non d'une ou de plusieurs graines dans un fruit dépend de l'épaisseur, du poids et de la longueur du fruit. Ainsi, plus d'une graine est souvent obtenue dans les fruits de la zone soudanienne. Par rapport au poids du fruit, la zone guinéenne présente une plus grande variation (cv = 184,07%) contre un coefficient de variation de 139,61% en zone soudano-guinéenne.

4. CONNAISSANCES ETHNOBOTANIQUES ET DIFFÉRENTS USAGES DE *P. ERINACEUS* AU BÉNIN

4.1. Appellations de l'espèce au Bénin

P. erinaceus porte diverses appellations. Ainsi en français, elle est appelée Palissandre du Sénégal, Vène, teck africain, bois de rose. En Anglais, elle est dénommée African rosewood ou barwood. Dans les langues nationales, elle est appelée Kosso en Fongbé, Kpakpa en Nagot, Araakpèkpè en Yoruba, Tolo en Dendi, Tonan en Bariba et Banuhi en Peulh (Aboua, 2018 ; Akoegninou et al., 2006).

4.2. Catégories d'usage de l'espèce

Selon Sokpodou (2018), les principales catégories d'usages de l'espèce sont l'artisanat, le bois de feu, le bois d'œuvre et de service, le pâturage et la médecine traditionnelle (Tableau 4).

Tableau 1 : Principales catégories d'usages de *P. erinaceus*

Catégories d'usages	Organes utilisés	Usages spécifiques
Artisanat	Tronc	Fabrication de mortier et cross de fusils
Bois de feu et Charbon	Tronc, branches	Feu pour la cuisine
Médecine traditionnelle	Feuilles, écorce, racines, sève	Traitement de diverses maladies
Pâturage	Feuilles	Alimentation des animaux

Source : Sokpodou (2018)

4.3. Niveau d'utilisation des organes

De façon générale, les organes les plus utilisés sont le tronc (48,71 %), les feuilles (23,84 %) et les écorces (20,07 %) (Figure 9).

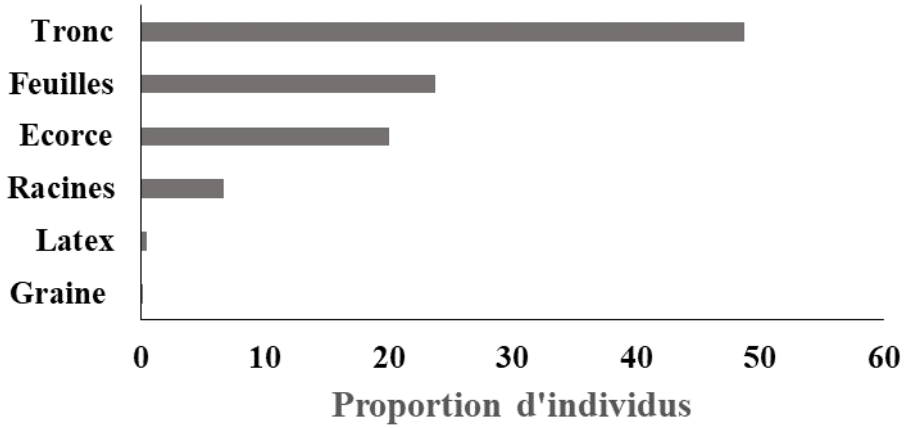

Figure 7 : Niveau d'utilisation des organes

Les formes d'utilisation les plus pratiquées sont le bois de feu, le bois d'œuvre et de service et la médecine traditionnelle qui ont tous une fréquence relative de citation (FRC) de 100 %

Tableau 2 : Fréquence relative de citation des catégories d'usage

Catégories d'usages	Fréquence relative de citation (%)
Bois d'œuvre et de service	100
Bois de feu	100
Médecine traditionnelle	100
Pâturage	80
Artisanat	10,15
Charbon	16,40

Source : Sokpodou (2018)

4.4. Utilisations médicinales

P. erinaceus utilisée dans le traitement de plus de 70 maladies. Le tableau 6 présente les utilisations médicinales de l'espèce par les principales ethnies du Bénin (Donhouedé, 2018 ; Sokpodou, 2018). Les organes les plus utilisés sont l'écorce, la racine, la feuille et la sève avec l'écorce étant l'organe le plus utilisé. Son usage pour le traitement de l'anémie est très connu par la population locale. Il est également très utilisé pour traiter les règles douloureuses et irrégulières, les problèmes de vision, le paludisme, les maux de ventre, les malaises des bœufs, l'hémorroïde, l'hémorragie interne des bœufs et la faiblesse des bœufs (Annexe 1).

4.5. Utilisations du bois

P. erinaceus est une espèce très utilisée dans la menuiserie pour la confection des meubles. Son bois est très apprécié par les menuisiers et par la population à cause de sa résistance et sa couleur. Les meubles souvent confectionnés à l'aide du bois de *P. erinaceus* sont les lits, les chaises, les armoires, les objets d'art (Photo 6).

Photo 6 : Meubles fabriqués à base du bois de *P. erinaceus*

Source : Donhouede (2018) ; www.bft.cirad.fr

Malgras (1992) indiquait le vène comme un des meilleurs bois d'artisanat. Giffard (1974) note que son bois est dense et très dur, à grain fin, de tournage et ponçage facile, fournissant des feuilles de qualité au déroulage et au tranchage. Le vène, facile à travailler, est recherché pour la confection des manches de pioches, de houes, des poutres, des traverses de maisons et de terrasses, des lames de balafon, des tabourets, des pirogues, en ébénisterie, en sculpture, des pilotis et pilonnes, des traverses de chemin de fer. Il fournit également du bon bois de feu et de charbon de bois.

L'espèce est en outre sollicitée en pharmacopée. Il est surtout utilisé comme aliment pour le bétail en fin de saison sèche lorsque le couvert herbacé devient indisponible, les éleveurs ont le plus souvent recours à l'émondage du *P. erinaceus* pour l'alimentation des bovins. C'est l'un des arbres fourragers des zones soudaniennes. Son fourrage permettrait selon certains éleveurs le rétablissement d'animaux faibles ou malades.

4.6. Commercialisation des produits

Le *P. erinaceus* est commercialisé principalement sous forme de bois d'œuvre scié en madriers de dimensions variables pour alimenter les scieries et les menuiseries. Le coût du madrier varie d'une région à une autre et peut atteindre une valeur de 35000FCFA à Cotonou.

Ces dernières années la commercialisation du bois de *P. erinaceus* a pris une grande ampleur à travers son exportation vers les pays comme l'Inde et la Chine. Outre le bois d'œuvre, l'écorce

est par ailleurs commercialisée par les femmes vendeuses de tisanes dans les marchés. Les vendeuses s'approvisionnent auprès des grossistes. Le prix d'achat varie de 4000 FCFA à 6000 FCFA la bassine d'écorce. L'écorce est revendue en détail à 300 FCFA, 500 FCFA et 1000 FCFA le tas.

L'espèce est également utilisée pour produire le charbon de bois. Ce charbon est très apprécié pour son fort pouvoir calorifique et dans les petites unités de production car il produirait un feu très ardent. La plupart des charbonniers utilisent les restes de tronc et branches laissés par les scieurs sur les sites d'exploitation. Ce grand intérêt de l'espèce pour la carbonisation constitue un risque majeur pour la survie de l'espèce en dépit des mesures prises pour interdire son exploitation et sa commercialisation (Sokpodou, 2018).

5. SITUATION DE REFERENCE, D'EXPLOITATION ET DE LA COMMERCIALISATION ET PREDICTION DE L'EVOLUTION DU POTENTIEL DE *PTEROCARPUS ERINACEUS* AU BENIN

5.1. Zone d'abondance de l'espèce

Les données les plus exhaustives et d'envergure nationale sur le potentiel de l'espèce (zone et volume) sont celles du dernier inventaire forestier national réalisé en 2008. Selon les résultats de cet inventaire, *P. erinaceus* fait partie des espèces les plus rencontrées dans les placettes avec une fréquence de 42,9%. Selon ces résultats (Tableau 4), l'espèce se retrouve sur le plan national à une densité moyenne de 4,38 individus/ha, avec un volume total estimé de bois de 14.988.482 m^3. En forêt dense, la densité moyenne de l'espèce est de 13,92 individus/ha pour un volume total de bois de 340.081 m^3. La savane arborée et arbustive avec une densité moyenne de 4,78 individus/ha offre un potentiel de 8.444.061 m^3 de bois.

Tableau 3 : Paramètres structuraux de *P. erinaceus* dans les formations végétales

Paramètres	National	Forêt dense	Forêt galerie	Forêt claire et savane boisée	Savane arborée et arbustive	Plantations	Mosaïque de cultures et de jachères
Régénération totale (N/ha)	11,34	0,00	0,00	33,30	3,18	19,89	18,95
Sous-bois (N/ha)	6,04	0,00	0,00	9,13	8,14	4,97	1,72
G (m^2/ha)	0,20	0,73	0,47	0,32	0,22	0,04	0,11
Dg (cm)	24,29	25,91	39,00	23,26	24,12	23,56	23,26
Densité (N/ha)	4,38	13,92	3,97	7,52	4,79	0,98	2,57
Hauteur totale (m)	12,37	12,09	16,10	11,91	12,36	11,05	11,52

Hauteur fut (m)	4,52	4,49	5,39	4,42	4,51	4,35	4,32
Volume fut (m^3/ha)	0,64	2,31	1,79	0,99	0,69	0,13	0,33
Volume total (m^3/ha)	1,38	4,88	4,20	2,09	1,49	0,26	0,69
Volume fut (m^3)	6.965.752	160.796	502.860	1.459.692	3.918.604	30.970	892.829
Volume total (m^3)	14.988.482	340.081	1.179.805	3.092.507	8.444.061	61.786	1.870.243

Source : Inventaire Forestier National 2008

En se référant au domaine forestier selon la Loi n° 93-009 du 2 juillet 1993 portant régime des forêts en République du Bénin, les résultats de l'inventaire forestier national de 2008 montrent que *P. erinaceus* se retrouve aussi bien dans le domaine classé que dans le domaine protégé avec une densité d'environs 4 individus/ha (Tableau 5). En termes de volume de bois à l'hectare, le domaine classé a un potentiel de 2,16 m^3/ha contre 1,12 m^3/ha dans le domaine protégé.

Tableau 4: Paramètres structuraux de *P. erinaceus* dans le domaine classé et protégé

Paramètres	**National**	**Domaine classé**	**Domaine protégé**
Régénération totale (N/ha)	11,34	0,00	14,50
Sous-bois (N/ha)	6,04	2,97	6,65
G (m^2/ha)	0,20	0,29	0,18
Dg (cm)	24,29	28,32	22,86
Densité (N/ha)	4,38	4,53	4,28
Hauteur totale (m)	12,37	13,77	11,65
Hauteur fut (m)	4,52	4,81	4,37
Volume fut (m^3/ha)	0,64	0,96	0,54
Volume total (m^3/ha)	1,38	2,16	1,12
Volume fut (m^3)	6.965.752	2.514.290	4.412.087
Volume total (m^3)	14.988.482	5.652.164	9.249.775

Source : Inventaire Forestier National 2008

5.2. Dynamique de l'exploitation, de la consommation et de la commercialisation du bois de *P. erinaceus*

Les données disponibles sur l'exploitation officielle de l'espèce au Bénin montrent que de 2013 à 2016, le nombre de pieds de *P. erinaceus* exploités évolue de façon décroissante en passant de 682 à 172 (Tableau 7). Le volume de bois obtenu de ces exploitations passe ainsi de 7.132 à 3.799 m^3 durant la même période. Les exportations de bois par le Port Autonome de Cotonou montrent aussi une régression du volume (104.928 à 16.287 m^3) pour la même période. Il faut noter que les volumes de bois exportés sont largement au-delà des volumes obtenus de l'exploitation officielle de l'espèce au Bénin. L'écart observé correspond aux volumes de bois provenant en grand partie des pays limitrophes (Togo et Nigeria) pour alimenter l'offre de bois de *P. erinaceus* dédié à l'exportation. Il convient de ne pas occulter dans l'analyse de ces statistiques l'incidence des exploitations irrégulières ou clandestines de *P. erinaceus* qui échappent à l'administration forestière.

Tableau 5: Dynamique de l'exploitation et de l'exportation du bois de *P. erinaceus* au Bénin de 2013 à 2017

Année	Nombre de pieds autorisés	Nombre de pieds exploités	Exploitation (m^3)	Exportation (m^3)
2013	682	682	7132	104.928
2014	655	655	5550	39.146
2015	505	505	3798.9	28.866
2016	172	172	3799	16.287
2017	-	-	-	22.996

Source : Rapports annuels d'activités DGEFC

5.3. Menaces sur les populations de l'espèce

Différentes études ont rapporté les pressions sur l'espèce au Bénin. Dans la majorité des études consultées (90,48 %) les pressions anthropiques sont les plus évoquées (Figure 7). Akpona (2016) a souligné que *P. erinaceus* fait partie des espèces ligneuses rares selon les populations locales et qu'elle est parmi les cinq premières espèces prioritaires pour la restauration et la conservation. La

conservation active de ces espèces nécessite d'allouer plus d'efforts pour la mise au point des techniques sylvicoles.

Les différentes pressions anthropiques exercées sur l'espèce sont la coupe des arbres, le fourrage et les feux de végétation. La coupe des arbres concerne essentiellement l'abattage des arbres pour l'installation des champs, le commerce du bois, l'utilisation du bois pour la construction et pour la fabrication du charbon.

Le bois de vène est très prisé par les exploitants nationaux mais le marché est difficilement contrôlé, ce qui engendre des coupes abusives de l'espèce. L'abattage massif des arbres pour le bois d'œuvre, le prélèvement de l'écorce et l'émondage sont les principaux facteurs qui menacent le développement et la survie de l'espèce. Les travaux de Duvall (2008) et ceux de Adjonou et al. (2010 ; 2019) ont montré que les mauvaises pratiques d'exploitation et de prélèvement des organes de la ressource par les différents acteurs (exploitants, bouviers et paysans) impactent sur le développement et la régénération de l'espèce. Le prélèvement de l'écorce et l'émondage des individus de *P. erinaceus* sont des facteurs occasionnant le retard de développement et la croissance branchue de l'espèce. Ceci est soutenu par Segla et al. (2015) qui montrent que les branches coupées ou rabattues par les éleveurs pour l'exploitation des feuilles constituent une porte d'entrée pour les bactéries et champignons. Le développement de nouvelles machines plus sophistiquées dont les tronçonneuses a permis d'amplifier le phénomène d'abattage car il est devenu plus facile de couper et de transporter.

Le bois de *P. erinaceus* présente des qualités technologiques exceptionnelles qui font de lui un bois idéal pour la fabrication de meubles. L'augmentation spectaculaire des flux commerciaux autour de *P. erinaceus* a commencé à partir du moment où l'espèce est formellement reconnue comme l'une des espèces de « bois rouge » selon la norme nationale chinoise en vigueur pour la fabrication des meubles. Ainsi, à partir de 2010, les prix élevés et les quantités limitées des espèces traditionnelles du bois de rose d'Asie du Sud-Est ont entraîné une augmentation fulgurante des importations en provenance d'Afrique de l'Ouest. La Chine seule a importé plus 830.000 m^3 de bois de rose en 2014 et 387.000 m^3 en 2015 en provenance d'Afrique de l'Ouest. Les plus grands exportateurs de bois de rose d'Afrique de l'Ouest vers la Chine en 2014 étaient le Nigeria, le Ghana, le Bénin, la Côte d'Ivoire, la Guinée-Bissau, la Gambie et le Togo (Lawson, 2015).

A l'échelle nationale, bien que les différents usages de l'espèce soient bien connus par les populations, il existe peu de données sur le commerce intérieur des produits de *P. erinaceus*.

Tous ces facteurs précités ont conduit à la réduction du nombre d'individus adultes, à la réduction de la possibilité de régénération naturelle et ainsi l'augmentation du risque d'érosion génétique au niveau de l'espèce.

Certains auteurs dont Onibon (1999) évoque également l'influence de l'élevage dans la dégradation des ligneux fourragers comme *P. erinaceus*. Les menaces semblent s'accentuer en allant vers les latitudes élevées avec une très faible régénération (Sinsin and Owolabi, 2001). Cette situation est aggravée par le fait que l'espèce n'existe jusqu'aujourd'hui qu'en peuplements naturels (Sokpon, 2000).

6. CADRE INSTITUTIONNEL, JURIDIQUE, SOCIO-ÉCONOMIQUE ET ENVIRONNEMENTAL DE LA GESTION DE *P. ERINACEUS* AU BÉNIN

6.1. Cadre institutionnel de la gestion de *P. erinaceus* au Bénin

Il n'existe pas de cadre institutionnel dédié spécifiquement à la gestion de *P. erinaceus* au Bénin. Cependant, sa gestion se fait dans le cadre institutionnel global s'occupant des ressources forestières du Bénin. Dans ce cadre global, la gestion des ressources forestières est assurée institutionnellement par six principaux groupes d'acteurs à savoir :

- L'Etat, représenté au sein du Ministère du Cadre de Vie et du Développement Durable (MCVDD) par la Direction Générale des Eaux, Forêts et Chasse (DGEFC) et ses unités spécialisées ;
- Les Collectivités Territoriales Décentralisées, représentées par les Communes ;
- Les communautés à la base parfois organisées en Structures Locales de Gestion (SLG) et Organisations Communautaires de Base (OCB) ;
- Les opérateurs du secteur privé qui constituent le maillon le plus important de l'exploitation et de la commercialisation des produits forestiers ;
- Les Organisations Non Gouvernementales qui en dehors de leurs propres initiatives peuvent, sur sollicitation, assurer une intermédiation sociale entre acteurs ou apportent leur appui en renforcement des capacités des autres acteurs dans leurs rôles ;
- Les Partenaires Techniques et Financiers (PTF) qui accompagnent l'Etat béninois dans ses efforts pour l'amélioration de la gouvernance du secteur forestier.

La Direction Générale des Eaux, Forêts et Chasse (DGEFC) est la structure nationale centrale chargée de la mise en œuvre de la politique de l'Etat en matière de gestion rationnelle et durable des forêts et des ressources naturelles. Elle interagit avec tous les autres acteurs.

6.2. Cadre juridique de la gestion de *P. erinaceus* au Bénin

Le cadre juridique de la gestion de *P. erinaceus* au Bénin est marqué par un certain nombre de conventions ratifiées, de lois, de décrets et d'arrêtés d'application. Au total, 20 textes ont été inventoriés comme éléments de l'arsenal juridique réglementant la gestion des ressources forestières au Bénin. Parmi ces textes se trouvent les lois de finances prises chaque année et qui définissent les conditions d'exploitation ou non de certaines essences forestières. C'est le cas de la loi Nº 2017-40 du 29 décembre 2017 portant loi de finances pour la gestion 2018 et des lois de finances successives depuis cette date qui interdisent l'exploitation du vène, du lingué, de l'iroko, du bété même à des fins de consommation locale. La mise en œuvre effective de ces textes législatifs et règlementaires devrait en principe favoriser la gestion durable des populations de *P. erinaceus* au Bénin. La liste des instruments juridiques favorisant la conservation de l'espèce est présentée en annexe 2.

6.3. Cadre socio-économique et environnemental de la gestion de *P. erinaceus* au Bénin

La gestion de l'espèce bénéficie du mécanisme commun régissant la gestion des ressources forestières car ne disposant pas d'un cadre socio-économique et environnemental spécifique à sa gestion. Ainsi, dans la mesure du possible, la gestion participative des ressources forestières permet de consulter et d'impliquer les populations rurales notamment celles qui sont riveraines aux massifs forestiers. En effet, les orientations de la politique forestière suggèrent :

(i) L'intégration des populations dans la gestion des ressources forestières pour la lutte contre la pauvreté, le développement de la foresterie rurale, la création d'activités génératrices de revenus, l'implication de la femme et la promotion de l'agroforesterie

(ii) La création d'un cadre de concertation intersectoriel, la promotion de la participation des ONG et autres structures d'appui au monde rural.

L'une des stratégies développées au niveau national pour assurer une gestion économique durable des ressources en bois est la création des marchés ruraux de bois (MRB). Ils sont mis en place et

gérés avec la participation des Communes et les Communautés organisées. Les espaces destinés à approvisionner les MRB sont dotés d'outil de planification appelés Schémas Directeurs d'Approvisionnement (SDA) en bois qui permettent d'échelonner l'exploitation des ressources de façon durable. Cependant, les conditions difficiles de délimitation, de suivi de l'exploitation et de la surveillance des parcelles de coupe constituent une menace permanente du respect des quotas et de l'interdiction de l'exploitation de certaines essences indiquées dans les SDA.

6.4. Analyse diagnostique du cadre institutionnel, juridique, réglementaire, socio-économique et environnemental de la gestion de *P. erinaceus* au Bénin

Le diagnostic du cadre institutionnel, juridique, réglementaire, socio-économique et environnemental de la gestion de *P. erinaceus* au Bénin (Tableau 9) révèle que :

- Il n'existe pas un cadre spécifique pour la gestion de l'espèce malgré son importance dans le commerce international du bois ;
- La politique forestière nationale nécessite une actualisation pour une meilleure prise des enjeux nouveaux de gestion durable des ressources.
- Le mécanisme de traçabilité de l'exploitation et de la commercialisation des produits et sous-produits des espèces forestières est peu performant ;
- Les sanctions et les peines prévues dans les textes en vigueur sont peu dissuasives.

Tableau 6: Matrice des Force, Faiblesses, Opportunités et Menace de l'espèce

Forces	**Faiblesses**	**Opportunités**	**Menaces**
Cadre institutionnel et stratégique			
-Bonne déconcentration de l'administration forestière représentée jusqu'au niveau arrondissement, -Approche de gestion participative des ressources forestières, -Recours au partenariat public-privé dans la gestion des aires protégées, -Mise en œuvre de projets structurants relatifs aux ressources forestières dans	-Insuffisance de personnel, -Insuffisance de capacités opérationnelles (équipements, formations...), -Insuffisance de synergie dans les interventions du secteur forestier	-Existence d'une facilité collaboration avec les autres forces militaires et paramilitaires dans la protection des ressources forestières,	Insécurité grandissante autour des forêts (djihadisme) -Instabilité institutionnelle

la Programme d'Actions du Gouvernement (PAG)			
Cadre juridique			
-Ratification des accords et conventions au plan international, -Existence de textes législatifs et règlementaires relatifs à la gestion des ressources forestières, - Politique forestière en cours de révision, -La prise de la Loi n°2021-04 du 08 juillet 2021 portant protection et règles relatives au commerce international des espèces de faune et de flore sauvage menacées d'extinction en République du Bénin, -Renforcement des capacités des acteurs impliqués dans la gestion des infractions forestières,	-Caducité de certains textes, -Non prise de certains textes d'application, - Manque de rigueur dans l'application des textes juridiques, -Faible niveau de vulgarisation des textes juridiques et réglementaires	-Disponibilité des magistrats à accompagner l'administration dans l'élaboration des textes et leur application, -Elaboration d'un nouveau code sur la flore te la faune au Bénin en cours de rédaction	
Cadre socio-économique et environnemental			
-Prise de conscience sur le statut de menace de disparition de l'espèce, - Prise de mesures d'interdiction de l'exploitation et la commercialisation de son bois, - Suspension de l'exportation du bois de vène sous forme brute semi-transformé,	-Manque de mécanisme de traçabilité des produits et sous-produits de l'exploitation des espèces forestières comme *P. erinaceus*	Existence de conditions favorables pour le développement d'un grand nombre d'espèces ligneuses de valeur dont *P. erinaceus*	- Empiètement des terres agricoles sur les réserves forestières,

7. ANALYSES DES CONTRAINTES LIÉES À LA GESTION ET À LA CONSERVATION DE L'ESPÈCE

7.1. Effets des perturbations humaines sur les populations de *P. erinaceus*

Du fait de la forte dégradation due à la destruction des populations de l'espèce par les feux de végétation, l'agriculture et l'exploitation forestière anarchique, il est espéré une réduction des populations de l'espèce et la fragmentation de son habitat, ce qui conduira à des populations de faibles densités et de plus en plus isolées. Or l'un des facteurs majeurs qui provoque la perte de la diversité génétique au sein d'une espèce est la fragmentation de son habitat. Ainsi donc l'espèce reste sous la menace permanente de la déforestation et les feux de végétation à court terme ; le manque de flux de gènes intraspécifiques à long terme rendant alors difficiles son adaptabilité et sa capacité de régénération.

7.2. Système de reproduction, mécanisme de dissémination des graines et de dispersion du pollen de l'espèce

La connaissance de la biologie de reproduction et du mécanisme de dissémination des graines et de dispersion du pollen de l'espèce au Bénin est capitale. En effet, la dissémination des graines et la dispersion du pollen participent à la structuration génétique des espèces à travers les flux de gènes au sein et entre les populations. Pour *P. erinaceus*, ces informations sont indispensables pour évaluer les mécanismes de dispersion naturelle de l'espèce et par conséquent pour aider à sa meilleure conservation. Il est donc nécessaire de mettre en place un mécanisme de suivi des populations de l'espèce à travers la mise en place d'un dispositif de collecte et d'analyses des données dans le temps.

7.3.Variation génétique et sa répartition entre les populations

Sur la base des paramètres dendrométriques et morphologiques de *P. erinaceus,* des différences sont observées au niveau des populations de l'espèce dans les différentes zones climatiques du Bénin (Akpona, 2016 ; Aboudou, 2018). Sur cette base, il est probable qu'un niveau de diversité génétique élevé existe au sein ou entre les populations de l'espèce. La connaissance de la variation génétique intraspécifique permet de comprendre la diversité génétique au sein des populations, la différenciation génétique entre les populations et la distribution de la diversité génétique

intraspécifique dans l'espace afin de mieux apprécier le gap de conservation par rapport aux aires protégées. Ces informations sont indispensables pour évaluer les zones de diversité de l'espèce qui sont susceptibles d'être conservées. A ce jour, ces informations manquent et méritent d'être comblées pour contribuer à une meilleure optimisation des stratégies de conservation de l'espèce au Bénin.

7.4. Facteurs limitant la conservation de l'espèce

Les facteurs limitant la conservation de l'espèce sont d'ordre social, économique et organisationnel. Il s'agit essentiellement des pressions anthropiques sur les forêts, spécifiquement sur les individus et les populations de *P. erinaceus* pour le bois et pour la quête d'espace pour les activités agricoles. Les structures en charge de la politique forestière, de la recherche et autres parties prenantes doivent alors se montrer plus engagées afin de relever les défis relatifs à la conservation de l'espèce.

7.5. Identification des méthodes de conservation à adopter

La conservation *in situ* dans les aires protégées et *ex situ* sont les méthodes envisageables. Il convient cependant d'évaluer la variation génétique intraspécifique, la démographie et la structuration géographique de l'espèce pour y parvenir.

7.6. Informations utiles et mécanismes de diffusion

Les programmes de sensibilisation sont nécessaires pour les populations locales dans la lutte contre la carbonisation incontrôlée et les coupes anarchiques d'arbres de *P. erinaceus*. Cela passe par l'utilisation des moyens de communication comme les dépliants, les affiches, les émissions radios et télévisées en vue de réduire les pressions sur la ressource. Durant ces sensibilisations, il faut rappeler l'importance de l'espèce, les menaces qui pèsent sur elle et les actions à mettre en œuvre pour sa restauration et sa conservation.

7.7. Identification des acteurs à impliquer dans la conservation

Les activités de conservation doivent impliquer les acteurs que sont : les élus locaux, les dignitaires des forêts sacrées, les dignitaires religieux, les têtes couronnées, les populations locales, les ONG mais aussi l'administration (forestière, douanière, policière) et les institutions de recherche. Cela

permettra de réunir ces acteurs autour d'une même cause. L'élaboration de documents d'aménagement spécifiant les interventions appropriées ainsi que les acteurs de mise en œuvre pour la sauvegarde des écosystèmes forestiers abritant l'espèce doit être une priorité. L'approche participative dans le contrôle des respects des interdictions est à mettre en place. La collecte des semences doit être entreprise mais aussi la mise en place des plantations *in situ* et *ex situ* en collaboration avec les autorités compétentes et les collectivités locales.

8. ETUDE DE CAS : ETAT DE CONSERVATION DE *P. erinaceus* DANS LA FC OB

8.1. Choix de la forêt à étudier

Dans une approche combinant les données de l'inventaire forestier de 2007 (données assez caduques aux regards de la structure et de la composition floristique actuelle des forêts du Bénin) et les informations relatives à la présence effective de groupes d'individus de l'espèce dans son aire de répartition au Bénin, cinq (5) aires protégées de présence effective de peuplements naturels de l'espèce ont été identifiées. Il s'agit de la (i) forêt classée de l'Alibori Supérieur, (ii) forêt classée des Trois Rivières, (iii) forêt classée d'Agoua, (iv) forêt classée de Ouémé-Boukou, et (v) forêt classée de Logozohè (Partie Sud de la forêt).

La forêt classée identifiée a été choisie sur la base des critères suivants :

La FC Ouémé Boukou est localisée au centre du pays, zone d'occurrence de *P. erinaceus* et constitue un écosystème représentatif des formations plus au Nord et celles plus au Sud où l'espèce est observée.

Par ailleurs, la FC de l'Ouémé Boukou est un exemple typique de forêts exposées aux facteurs de dégradation qui affectent l'ensemble des formations forestières du pays. Les données collectées dans cette forêt pourront donc refléter la situation de l'espèce au plan national.

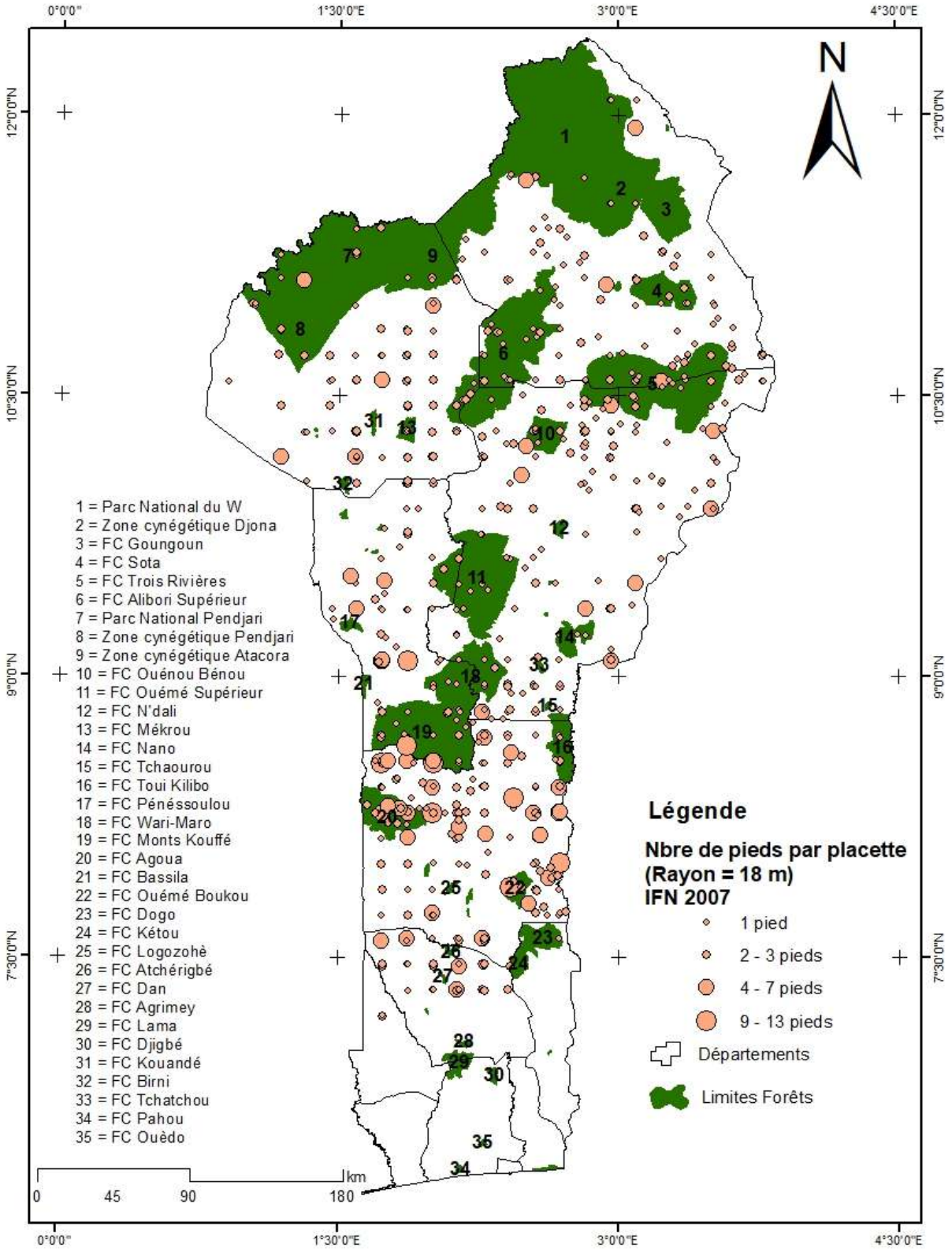

Figure 8. Carte de distribution de *P. erinaceus* au Bénin

8.2. Description de la forêt classée Ouémé-Boukou

La forêt classée de l'Ouémé-Boukou est située au centre du Bénin, dans la Commune de Savè (Département des Collines), entre les coordonnées géographiques 7°47'00" et 7°57'00" de latitude Nord, 2° 22'00" et 2°31'30" longitude est (Figure 2). Elle couvre une superficie totale de 20763 hectares et est délimitée au Nord par la rivière Atchakpa, à environ 7,20 kilomètres de Gobi (village riverain de la route inter-Etat Cotonou-Parakou (Bénin) - Gaya (Niger). En outre, il est limité au Sud par la rivière Boukou, à l'est par la rivière Besse et à l'ouest par le fleuve Ouémé (Tchibozo et al., 2014).

Long de 11,7 km, le réseau hydrographique est constitué de plusieurs cours d'eau qui collectent les eaux vers le fleuve Ouémé dont le principal affluent est l'Okpara (Odjougbere et al., 2022). La rencontre du fleuve Ouémé et de la rivière Boukou a donné le nom de Ouémé-Boukou à la forêt (Guédou, 2001). La disponibilité de l'eau favorise le développement des forêts galeries qui sont malheureusement exploitées par les populations à des fins diverses.

La végétation de la forêt est constituée en grande partie de savane arborée-arbustive, des zones de cultures et jachère, de forêt galerie, de forêt claire et de plantations forestières et fruitières (Tableau 2 ; DGEFC, 2018).

Tableau 7: Superficie des différentes modes d'occupation des terres dans la forêt classée de Ouémé-Boukou

Unités d'occupation	Superficie (ha)	Pourcent
Forêt galerie et formation ripicole	613	2,65%
Forêt claire et savane boisée	261	1,13%
Savane arborée et arbustive	14285	61,65%
Plantations forestières et fruitières	818	3,53%
Cultures et jachères	7193	31,04%
Total	23170	100%

Source : Données extraites à partir des cartes occupations de sol du CENATEL et de OSFACO (2015)

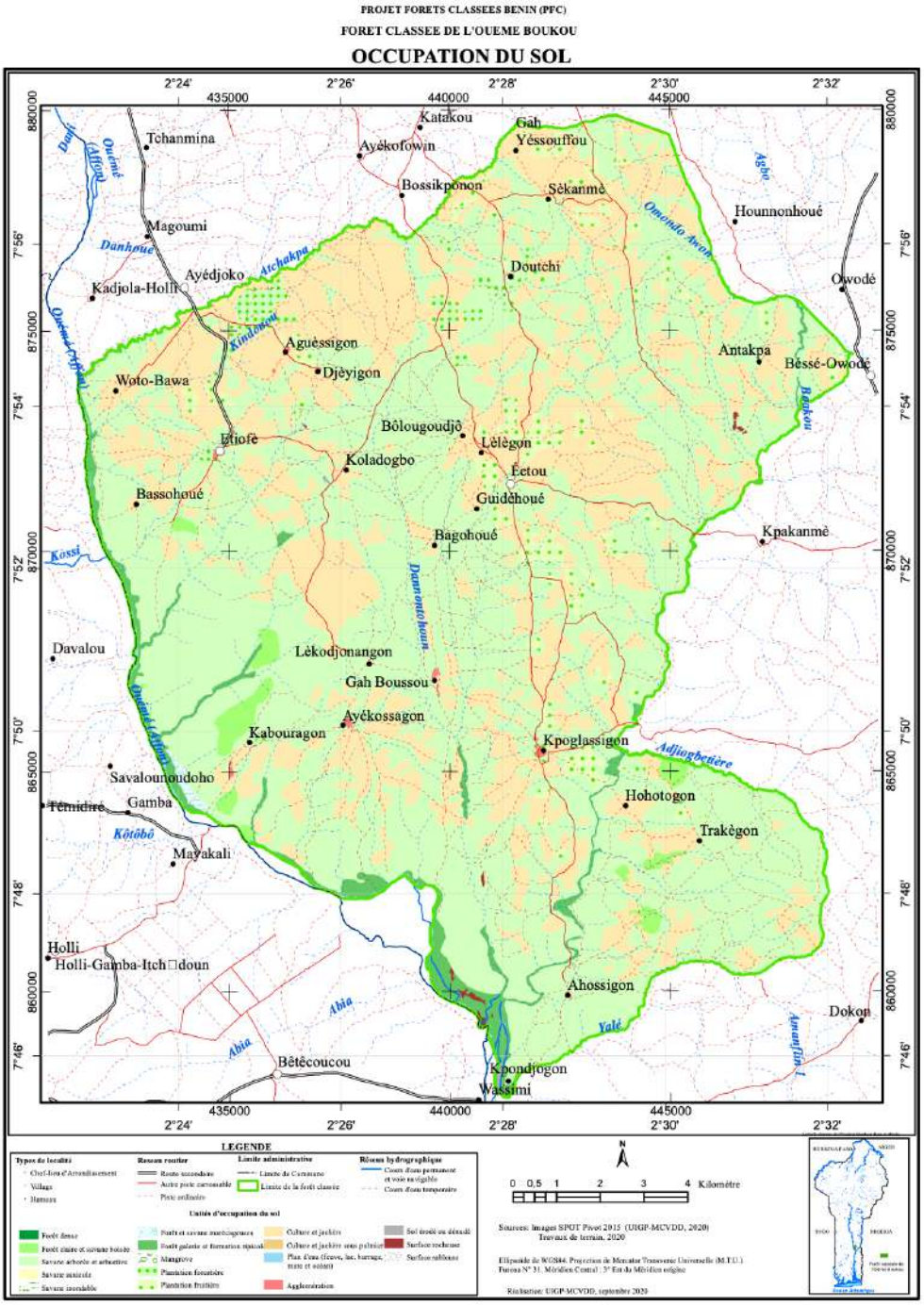

Figure 9. Carte d'occupation du sol de la forêt classée de Ouémé-Boukou

8.3. Méthodologie de l'inventaire

L'analyse de la carte d'occupation du sol montre cinq types d'unités d'occupation à savoir (i) Forêt galerie et formation ripicole ; (ii) Forêt claire et savane boisée ; (iii) Savane arborée et arbustive ; (iv) Cultures et jachères et (v) Plantations forestières et fruitières. Cependant, en tenant compte de la richesse spécifique et de la présence effective de l'espèce, les cultures et jachères, plantations forestières et fruitières n'ont pas été prises en compte dans le dispositif d'inventaire. Ainsi, un échantillonnage aléatoire stratifié des points-échantillons a été effectué tenant compte des 3 principaux types d'occupation du sol de la forêt à savoir : forêt galerie, forêt claire/savane boisée et savane arbustive/arborée. Le nombre total n de points-échantillons à inventorier est calculé en utilisant l'approximation normale de la loi t de Student :

$$n = \frac{CV^2 t^2}{d^2}$$

CV est le coefficient de variation de la surface terrière des arbres de *P. erinaceus* (CV=64,15 %; IFN 2007) ; t est la valeur de la variable aléatoire de Student pour un risque α=0.05 ($t_{1-\frac{\alpha}{2}} \approx 2.04$) ; d est la marge d'erreur voulue (d=8%). Avec ces données, le nombre n de points-échantillons à inventorier est égal à 257 placeaux. Ce nombre a été porté à 270 pour tenir compte d'une meilleure répartition des unités d'observation sur les différentes strates de formations forestières naturelles. Les placeaux sont en effet répartis de manière aléatoire dans chacun des trois types d'occupation du sol (forêt claire/savane boisée, forêt galerie, savane arborée/arbustive).

Les placettes sont de forme carrée de dimensions 50mx50m.

A l'intérieur de chaque placeau, les arbres du peuplement principal (d≥10 cm) ont été identifiés et leur diamètre à 1,30 m (d130) mesuré. La régénération (d130 < 5 cm) de l'espèce est évaluée dans cinq quadrats (5 x 5 m2) installés dans chaque placeau de 50 mx 50 m2 et positionnés au niveau des quatre sommets et au centre du placeau.

Pour les galeries, en raison de leurs formes étirées, des placeaux de dimensions rectangulaires 250mx10m ont été adoptés.

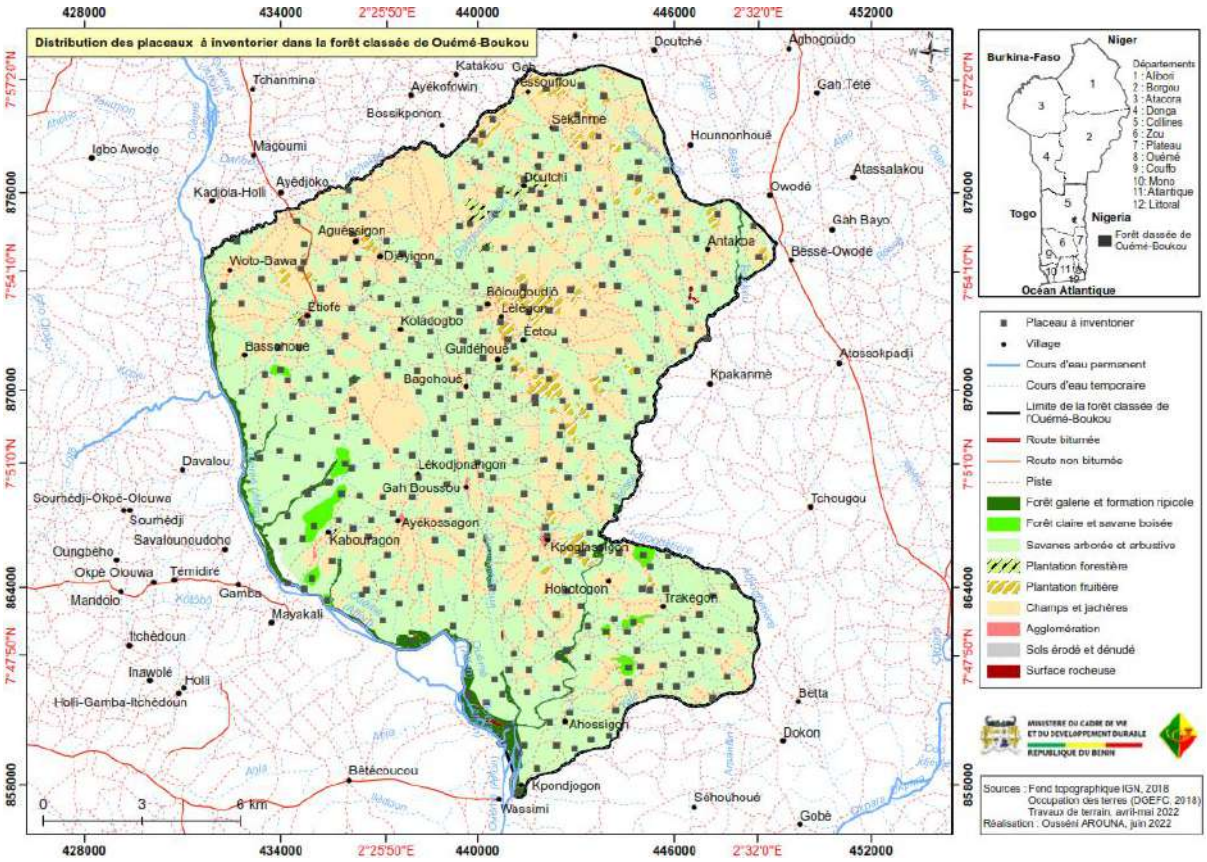

Figure 10. Carte des distributions des placettes d'inventaire dans la forêt classée de l'Ouémé-Boukou

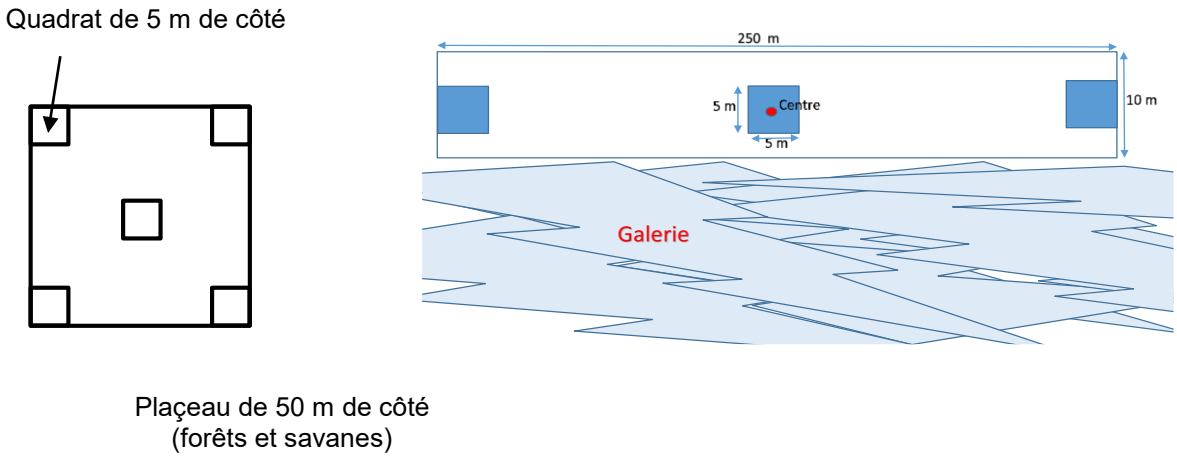

Figure 11. Représentation schématique des placeaux considérés

8.4. Résultats de l'inventaire

8.4.1. Diversité biologique et valeur d'indice écologique des espèces

Au total 125 espèces appartenant à 88 genres et 30 familles ont été inventoriées dans la FC de l'Ouémé-Boukou. Les espèces les plus importantes du point de vue écologique dans les différents types de formations végétales sont présentées au Tableau 4 avec *Anogeissus leiocarpa* comme l'espèce la plus caractéristique de la forêt claire. Dans les forêts galeries, *Daniellia oliveri* est l'espèce la plus caractéristique, suivi de *Raphia hookeri* et *Anogeissus leiocarpa* dans une moindre mesure. Le cortège floristique de la galerie traduit une importante dégradation avec l'intrusion d'espèces de savane comme *A. leiocarpa*, *Daniellia oliveri*, *Lannea microcarpa* ou encore *Piliostigma thonningii*. Dans les formations de savane, ce sont *Anogeissus leiocarpa* et *Vitellaria paradoxa* qui sont les espèces les plus caractéristiques.

Les valeurs des paramètres de diversité présentées au Tableau 3 indique une richesse spécifique intéressante en savane, formation dominante de la forêt classée de Ouémé-Boukou. La diversité de Shannon est relativement faible au niveau des forêts claires qui indiquent des signes des perturbations élevées au regard de la valeur de l'équitabilité de Piélou. En revanche, l'équitabilité de Piélou est similaire dans les zones de culture et dans les savanes mais plus élevée dans les forêts galeries suggérant une plus grande stabilité de cette formation.

Tableau 8: Diversité des communautés végétales de la forêt de Ouémé-Boukou

	Formation végétale			**Global**
	FC	FG	Sa	
Nombre de placeaux	10	15	245	270
	Paramètre de diversité			
Richesse (S)	24	27	130	136
Diversité de Shannon (H)	2,72	4,02	4,51	4,59
Equitabilité de Pielou (Eq)	0,59	0,85	0,64	0,65

FC: Forêt claire/savane boisée ; FG : Forêt galerie/formations ripicoles ; Sa : Savane arborée/arbustive

8.4.2 Structures et caractéristiques dendrométriques des formations végétales

La structure en diamètre du peuplement global présente l'allure caractéristique en « J renversé » des formations relativement stables (Figure 4). Toutefois, on note une fréquence très faible voire nulle des individus de diamètre supérieur à 55 cm.

En ce qui concerne la structure en hauteur, la hauteur des arbres du peuplement global présente une allure en cloche avec une dissymétrie droite révélant de très faibles fréquences des individus de hauteur supérieure à 27 m. Les classes de hauteur les plus représentées sont celles qui concentrent les individus de hauteur comprise entre 9 et 13 m.

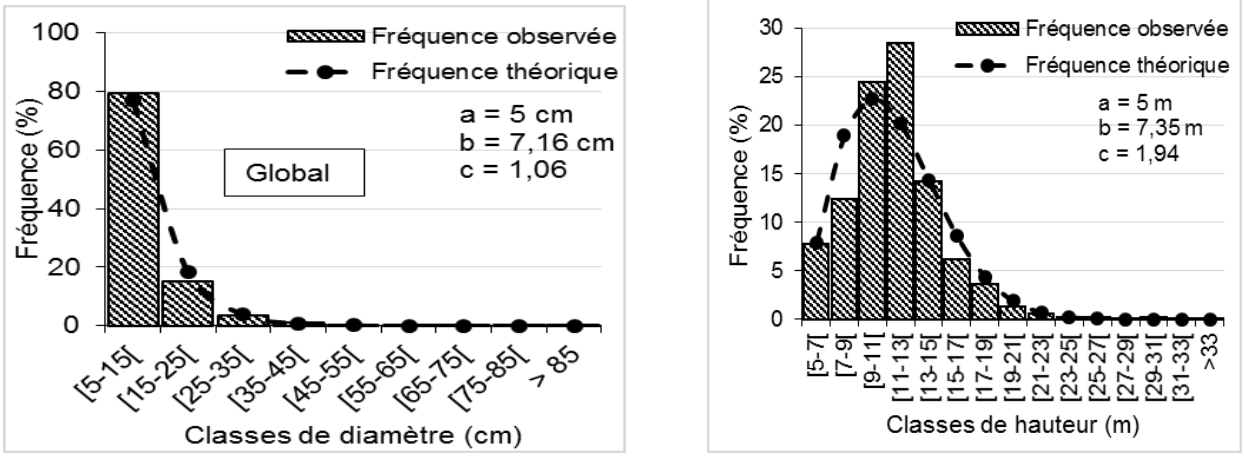

Figure 12 : Distribution en classe de diamètre des arbres du peuplement global avec ajustement à la distribution de Weibull à 3 paramètres

a : paramètre de position ; b : paramètre d'échelle et c : paramètre de forme.

Les données du tableau 5 indiquent une densité relativement plus élevée d'arbres dans les formations de forêt claire (227 tiges/ha) et de savane (221 tiges/ha) que dans les galeries forestières (197 tiges/ha). La surface terrière moyenne est la plus élevée en forêt galerie (10,92 m^2/ha), suivi des formations de savane (3,81 m^2/ha). La densité de régénération des espèces forestières est plus élevée en savane (5781,4 plants/ha) et dans les forêts claires (5360 plants/ha).

Tableau 9: Paramètres structuraux et contribution de *P. erinaceus* selon les communautés végétales

Paramètres	*FC*		*FG*		*Sa*		*Prob*	*Global*	
	m	se	m	se	m	se		m	se
Peuplement Global									
Densité, N (ind/ha)	227,00	48,13	197,00[b]	39,02	221,34[a]	11,78	0,001	215,23	11,31
Diamètre moyen, Dg (cm)	16,63	3,29	26,44[a]	3,57	14,48[c]	0,45	0,001	15,05	0,47
Surface terrière, G (m²/ha)	3,16	0,88	10,92[a]	1,92	3,81[b]	0,19	0,001	3,90	0,22
Hauteur de Lorey, H (m)	11,63	0,65	16,82 [c]	0,61	14,05[b]	0,10	0,020	14,15	0,11
Densité de régénération, Nr (ind/ha)	5360,00	969,95	4300,00[b]	1914,0	5781,37[a]	346,29	0,001	5603,10	331,15
P. erinaceus									
Densité (ind/ha)	4,00	1,41	2,00[b]	1,73	5,56[a]	0,54	0,001	5,26	0,78
Diamètre moyen (cm)	26,06	0,65	25,50[a]	0,00	20,34[b]	0,88	0,001	20,69	0,83
Surface terrière (m²/ha)	0,04	0,01	0,10[b]	0,01	0,20[a]	0,04	0,017	0,19	0,03
Hauteur de Lorey (m)	11,02	0,68	15,2	0	13,31	0,50	-	13,24	0,44

m : valeur

Densité de régénération (ind/ha)	320,00	209,76	0,00[c]	0,00	4,81[a]	1,10	0,024	45,87	11,77
Contribution en surface terrière, Cs (%)	1,20	0,49	1,12	0,97	4,25	0,63	0	3,96	0,59
Volume fût de bois (m^3/ha)	2,86	0,87	0,276	0,239	0,537	0,099	0,001	0,579	0,100

se : erreur type sur la moyenne, - : valeur non calculée ; FG: Forêt galerie ; Sa : Savane arborée/arbustive ; CJ : Culture et Jachère ; FC : Forêt claire/Savane boisée.

8.4.3. Analyse structurale des peuplements de *P. erinaceus* dans la forêt classée de Ouémé-Boukou

Structure du peuplement de P. erinaceus

Les individus de *P. erinaceus* sont plus représentés en forêt claire et surtout en savane (5,56 individus/ha) avec un diamètre (20,34 cm) et une hauteur (13,31 m) appréciables. Ils sont quasi-inexistants dans les forêts galeries. Toutefois, sa contribution à la surface terrière globale du peuplement est assez faible (6,57 %). Le volume en bois de l'espèce est estimé à environ 0,58 m3/ha dans la forêt classée de Ouémé-Boukou.

La structure en diamètre observée pour *P. erinaceus* est irrégulière avec une valeur du paramètre de forme « c » de 1,67 ; caractéristique des formations multispécifiques avec dissymétrie droite différente de la forme « en cloche » attendue. Ceci indique une instabilité des populations de *P. erinaceus* dans la forêt de Ouémé-Boukou. La classe modale de diamètre est celle qui comprend les individus de 15 à 25 cm de DBH.

Pour ce qui concerne la structure en hauteur de *P. erinaceus*, elle est peu régulière avec une distribution en cloche présentant une légère dissymétrie à gauche traduisant un déplacement de la classe modale vers des classes de petites hauteurs d'arbres (9-11 m et 11-13 m).

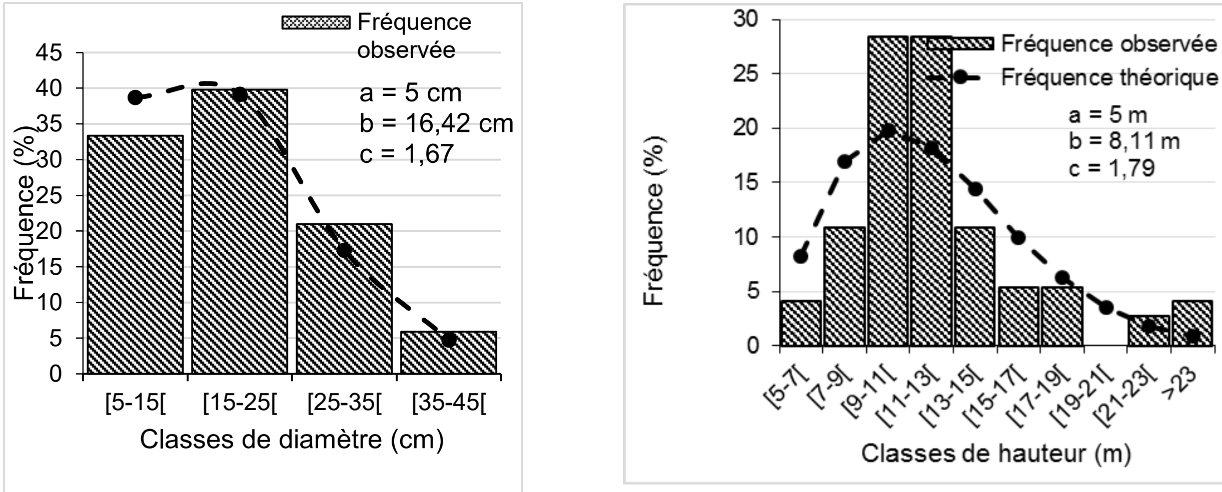

Figure 13. Distribution en classe de diamètre et de hauteur de *P. erinaceus* avec ajustement à la distribution de Weibull à 3 paramètres

a : paramètre de position ; b : paramètre d'échelle et c : paramètre de forme.

8.4.4. Distribution spatiale de *P. erinaceus* dans la forêt classée de Ouémé-Boukou

Les arbres de *P. erinaceus* présentent une distribution erratique à l'échelle de la forêt classée de Ouémé-Boukou. Toutefois, des tendances grégaires de l'espèce sont notées à maints endroits de la forêt (Figure 12).

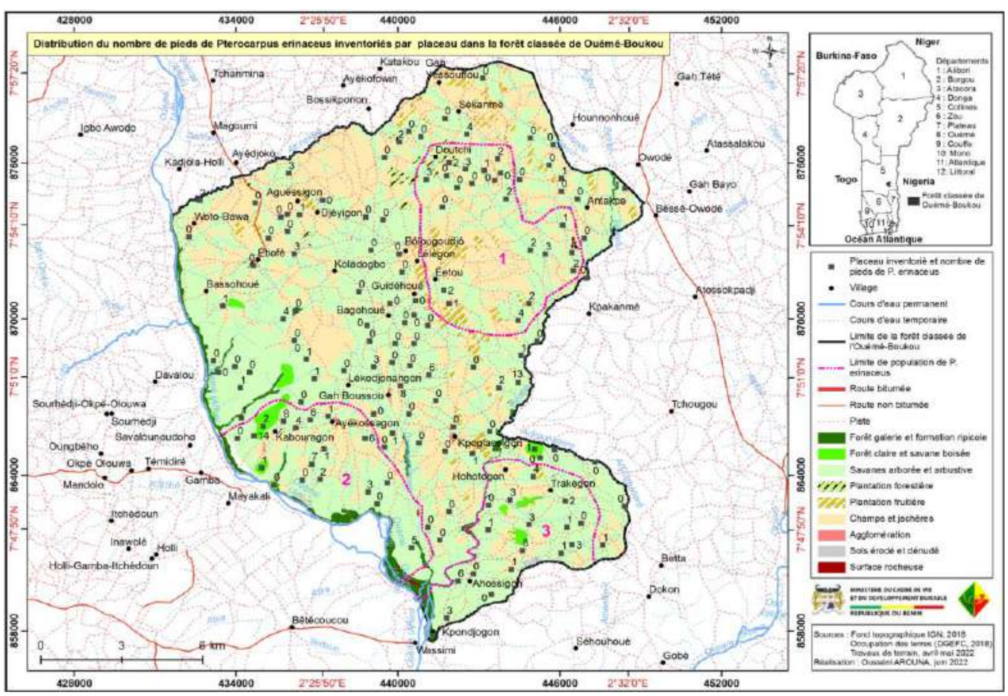

Figure 14 : Distribution spatiale de *P. erinaceus* dans la forêt classée de Ouémé-Boukou

Trois zones de concentrations relatives de peuplement de *P. erinaceus* ont été identifiées à l'échelle de toute la forêt sur la base des fréquences observées pour les individus de *P. erinaceus* dans les placettes.

8.5. Résultats de l'étude socioéconomique en lien avec l'exploitation de l'espèce

En termes d'importance économique de *P. erinaceus*, 42,5% des enquêtés dans le terroir de la FC de Ouémé Boukou avouent avoir commercialisé au moins un organe de l'espèce. L'espèce *P. erinaceus* est exploitée principalement sous forme de bois d'œuvre. Les rémanents d'exploitation sont utilisés pour la production du charbon. L'exploitation du vène sous forme du bois d'œuvre est opérée suivant deux modalités que sont : la vente de tronc sur pieds ou la vente de bois scié en équarris (madriers). La Figure 15 présente les proportions desdites modalités d'exploitation pratiquées par les enquêtés.

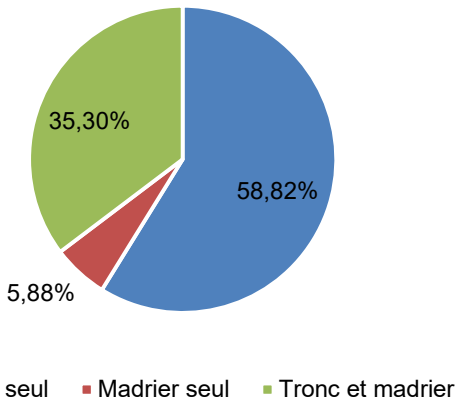

Figure 15. Proportion des formes d'exploitation du bois de *P. erinaceus*

Parmi les enquêtés commercialisant les produits de *P. erinaceus*, près de 59% commercialisent le tronc seulement soit sur pieds ou soit après abattage et façonnage. Environ 6% vendent le madrier, et 35% vendent le tronc et le madrier (Figure 4).

Figure 4. Proportion des produits commercialisés de *P. erinaceus*

Les quantités de tronc commercialisés varient de 2 à 10 unités de tronc par an par enquêté avec des prix oscillants entre 3000 et 6000 FCFA par tronc d'arbre. Ces prix sont fixés en fonction des dimensions des troncs (longueur et grosseur) mais le plus souvent à l'issue d'un consensus entre l'acheteur et le vendeur. Pour ce qui concerne la commercialisation du madrier, les quantités

annuellement vendues par enquêté varient de 1,5 à 8 unités avec des prix allant de 7000 à 10000 FCFA par unité bord champ.

La forte demande en bois de *P. erinaceus* au regard de son importance économique entraine une forte pression sur l'espèce dans son milieu naturel.

9. AVIS SUR L'EXPLOITATION ET LE COMMERCE DE *P. erinaceus*

La décision de l'exploitation ou non de l'essence *P. erinaceus* au Bénin pour satisfaire aussi bien aux besoins de consommation nationale que de commerce extérieur doit être motivée principalement par l'analyse de l'état du potentiel actuel de l'espèce dans les peuplements forestiers du Bénin et les mesures mises en place pour assurer sa durabilité.

A la lumière des études et des données collectées sur l'espèce, on retient que le potentiel en *P. erinaceus* dans les forêts du Bénin est à un niveau assez critique traduit par une densité moyenne et une surface terrière moyenne faibles. On note également la rareté des gros sujets de diamètre supérieur à 20 cm qui ont été écrémés des formations forestières ces dernières années. La qualité du bois de *P. erinaceus* prisé dans l'industrie du bois et les multiples utilisations de l'espèce en tant que fourrages et produits de pharmacopée ont exacerbé le prélèvement de l'espèce et la déstructuration de ses peuplements. De l'analyse des résultats des études, l'espèce *P. erinaceus* subit une forte menace qui compromet la reproduction et la survie de l'espèce si des mesures particulières de conservation ne sont pas prises.

Le Gouvernement du Bénin ayant compris l'ampleur des menaces qui pèsent sur l'espèce a pris en 2017, un décret interdisant l'exploitation et l'exportation des espèces de forêts naturelles en dehors des quotas établis. En tout état de cause, cette décision interdit toute exportation de bois brut issu des forêts naturelles du Bénin. Pour raffermir cette décision, les lois de finances successives depuis 2018, interdisent spécifiquement l'exploitation et la commercialisation de quatre espèces à savoir : *P. erinaceus, Afzelia africana, Milicia excelsa* et *Mansonia altissima*.

Après cinq années de mise en œuvre des mesures gouvernementales au profit de *P. erinaceus* et des multiples actions de conservations des forêts en général, les études réalisées sur le cas de la forêts classée de Ouémé Boukou ne témoignent guère d'une amélioration significative de l'état du potentiel de *P. erinaceus*.

Au regard de ce qui précède, l'exploitation **et le commerce international du *P. erinaceus*, dans l'état actuel du potentiel, seront préjudiciables à la survie de l'espèce au Bénin**. Il est recommandé le maintien des mesures de conservation en faveur de *P. erinaceus* et le renforcement des actions de protection et de restauration des peuplements de l'espèce.

*Le Comité d'Experts scientifique émet donc un **Avis de Commerce Non Préjudiciable défavorable pour P. erinaceus au Bénin** jusqu'à ce qu'une nouvelle évaluation de l'espèce soit entreprise pour apprécier l'effet de la mise en œuvre des actions proposées dans ce document.*

10. PLAN DE GESTION

10.1. Analyse situationnelle de *P. erinaceus*

P. erinaceus est de nos jours l'une des espèces autochtones de bois d'œuvre les plus recherchées et convoitées dans la sous-région ouest africaine y compris le Bénin. L'espèce est à usages multiples et fait l'objet d'un trafic commercial exponentiel de l'Afrique vers l'Asie et autres destinations occidentales. En conséquence, elle est actuellement en danger d'extinction dans son habitat naturel au Bénin et classée en l'Annexe II de la CITES. Les études ethnobotaniques et écologiques effectuées dans le cadre de l'élaboration de l'ACNP au Bénin ont confirmé qu'il s'agit d'une espèce à usages multiples, recherchée pour son bois (bois d'œuvre et de feu), son écorce (pharmacopée), ses feuilles (fourrage). Les valeurs d'usage calculées pour ces différentes activités sont élevées et témoignent d'une forte pression sur l'espèce. La recherche de l'espèce pour son bois d'œuvre est un facteur de dégradation massive engendrant la disparition des grands individus des peuplements naturels tels que observés à travers les structures en diamètre générées. De plus, l'absence de ces grands arbres traduit également l'absence des semenciers potentiels et donc minimise la régénération naturelle potentielle attendue de l'espèce dans ses habitats naturels. Dans le même temps, *P. erinaceus* est quasi absente dans les champs, jachères et systèmes agroforestiers. Ceci traduit au regard des études ethnobotaniques une quasi-absence d'initiatives au niveau local pour la conservation participative de l'espèce, une méconnaissance des techniques de propagation de l'espèce et/ou une absence de perception de l'importance cultuelle de l'espèce qui par conséquent ne bénéficie d'aucun privilège pour la conservation. Les communautés locales préfèrent donc se rabattre sur les populations naturelles de l'espèce qu'elles déciment témoignant davantage du concept de la tragédie des biens communs. Dans la forêt classée de Ouémé Boukou

(site pilote de l'étude), *P. erinaceus* semble avoir une bonne représentativité, une densité et dominance relatives plus élevées dans les forêts claires et savanes boisées comparativement aux autres espèces du milieu contrairement aux forêts galeries et aux savanes arbustives où elle est écologiquement moins importante.

10.2. Proposition d'aménagement pour une conservation et régénération de *P. erinaceus*

Au vu des informations disponibles actuellement sur l'espèce au Bénin, les actions de conservation *in situ* doivent être privilégiées pour une plus grande chance de viabilité à long terme.

En effet, tenant compte de l'analyse situationnelle de *P. erinaceus* au Bénin, les actions de conservation devront se focaliser sur la mise en défens au niveau de certains sites, la restauration écologique intensive des peuplements dégradés. Les techniques de régénération assistée et/ou d'enrichissement peuvent s'appliquer à ces opérations. Sur le plan opérationnel, les actions de terrain seront associées à :

-L'identification et la délimitation des populations de référence *P. erinaceus* à mettre en défens,

-la sensibilisation et la formation des différentes parties prenantes,

-l'élaboration de diverses fiches techniques sur la production de l'espèce, la restauration écologiques, la mise en défens, etc.

- des études sur la diversité génétique des populations de l'espèce,

- l'intensification des actions d'enrichissement des peuplements à grande échelle,

- la mise en place d'un cadre opérationnel de concertation multi acteurs pour la conservation des espèces.

10.3. Orientations stratégiques

En se référant aux résultats de l'étude réalisée sur l'espèce dans la zone de la forêt de Ouémé Boukou et sur la base de l'état des lieux des connaissances sur *P. erinaceus* au Bénin, les orientations stratégiques pour la conservation et la gestion durable de *P. erinaceus* au Bénin porteront sur :

- ✓ L'amélioration des connaissances sur le potentiel écologique, génétique, économique, la sylviculture et la dynamique des peuplements de l'espèce au Bénin ;
- ✓ La restauration écologique de l'espèce dans son habitat ;

- ✓ Le renforcement des capacités des parties prenantes pour la conservation et la gestion durable de *P. erinaceus* et autres espèces de valeur menacées d'extinction au Bénin.

Les tableaux suivants déclinent les activités préconisées, les résultats escomptés et les acteurs potentiels identifiés pour chacune des orientations stratégiques.

Orientation stratégiques 1 : Cet axe stratégique est proposé afin de servir de mécanisme pour générer des informations indispensables pour une meilleure connaissance des peuplements de l'espèce sur le plan national.

Tableau 10: Orientation stratégique 1

Activités	**Résultats attendus**	**Acteurs potentiels**
A1. Réaliser/Actualiser l'inventaire forestier national afin d'estimer le potentiel de *P. erinaceus* dans les autres aires protégées.	**RA1.1.** Les données écologiques actualisées sont disponibles sur l'espèce au Bénin **RA1.2.** Le potentiel de disponibilité (Occurrence, volume, abondance) de *P. erinaceus* est connu	- DGEFC - Laboratoires de recherche
A2. Suivre la dynamique des peuplements naturels de l'espèce (collecte régulière des données au sein des placettes permanentes, télédétection)	**RA2.1.** Des peuplements de référence sont identifiés avec la participation des communautés locales **RA2.2.** Un réseau d'unités permanentes de collecte de données est installé et suivi dans les peuplements de référence sur le plan national **RA2.3.** Un système d'information écologique et forestier national sur l'espèce est établi	- DGEFC - Laboratoires de recherche - Collectivités locales
A3. Evaluer la diversité génétique de l'espèce en	**RA3.1.** La structuration morphologique et génétique des	- DGEFC - Laboratoires de recherche

relation avec les processus de fragmentation au Bénin	populations de *P. erinaceus* est connue **R3.2.** Les sources de diversité et de provenances des graines pour la restauration écologique de l'espèce sont identifiées **RA3.3.** La viabilité des populations de l'espèce est évaluée et cartographiée	
A4. Evaluer le potentiel économique et les services écosystémiques des peuplements naturels de l'espèce	**RA4.1.** La valeur économique et les services écosystémiques des peuplements de *P. erinaceus* sont évalués **RA4.2.** Le compte type d'exploitation d'une entreprise de bois de vène est établi	- DGEFC - Laboratoires de recherche - Collectivités locales
A5. Capitaliser/étudier la sylviculture de l'espèce	**RA5.1.** Les techniques de collecte des semences, de germination et de propagation végétative et autres opérations sylvicoles sont mises au point **RA5.2.** Les stratégies modernes de mycorhization susceptibles de booster le développement des plantules sont mises au point. **RA5.3.** Les techniques de restauration et conservation de l'espèce dans ses habitats naturels sont mises au point.	- DGEFC - Laboratoires de recherche

	RA5.4. Un modèle de croissance est développé pour l'espèce	

Orientation stratégique 2 : Cet axe est proposé dans l'optique d'améliorer la disponibilité de l'espèce.

Tableau 11: Orientation stratégique 2

Activités	**Résultats attendus**	**Acteurs potentiels**
B1. Appuyer les pépiniéristes dans la production de plants contrôlés de *P. erinaceus*	**RB1.1.** Les pépiniéristes sont organisés et appuyés sur le plan technique et matériel pour la production de plants contrôlés de *P. erinaceus* **RB1.2.** Les plants contrôlés de *P. erinaceus* sont disponibles auprès du réseau des pépiniéristes	- DGEFC - ATDA / Faitières des pépiniéristes agréés - Uuniversités
B2. Installer des plantations expérimentales de *P. erinaceus* dans les zones favorables	**RB2.1.** Les sites favorables pour l'installation des plantations sont identifiés de façon participative **RB2.2.** Des plantations expérimentales de *P. erinaceus* sont installées dans les zones favorables **RB2.3.** Les communautés locales sont incitées à installer des plantations privées de *P. erinaceus*	- DGEFC - ATDA - ONGs - Collectivités locales - Universités
B3. Développer des actions de restauration intensive des peuplements dans les massifs forestiers favorables à l'espèce	**RB3.1.** Les peuplements sont identifiés et reboisés dans les massifs forestiers favorables dégradés avec la collaboration des communautés locales **RB3.2.** Les techniques de propagation végétative notamment de bouturage sont	- DGEFC - *UNIVERSITÉS*

	promues pour la restauration à grande échelle des peuplements **RB3.3.** La régénération naturelle assistée est promue dans les zones favorables	
B4. Vulgariser le paquet technologique développé sur la sylviculture de *P. erinaceus*	**RB4.1.** Le paquet technologique (compilation des fiches techniques) est édité **RB4.2.** Le paquet technologique développé est vulgarisé au sein de la communauté	- DGEFC - Laboratoires de recherche - ATDA - ONGs
B5. Etablir une base de données sur le suivi des plantations	**RB5.1.** Une base de données est élaborée et est périodiquement renseignée pour le suivi des plantations **RB5.2.** Les données actualisées de croissance sont disponibles sur chacune de ces plantations	- DGEFC - Collectivités locales - ONGs - Laboratoires de recherche

Orientation stratégique 3 : Renforcement de capacités

Tableau 12: Orientation stratégique 3

Activités	**Résultats attendus**	**Acteurs potentiels**
C1. Renforcer les capacités opérationnelles des agents de contrôle	**RC1.1.** Des sessions de formation sont organisées à l'endroit des agents de contrôle pour le renforcement de leurs capacités opérationnelles **RC1.2.** Les agents de contrôle sont mieux équipés pour contribuer à la gestion durable et la conservation de l'espèce	- DGEFC - Laboratoires de recherche
C2. Appuyer la mise en place et le fonctionnement d'un cadre de concertation	**RC2.1.** Les acteurs œuvrant pour la gestion durable et la conservation de l'espèce sont identifiés	- DGEFC - Collectivités locales - ONGs

multi acteurs pour la conservation des espèces menacées d'extinction	**RC2.2.** Un cadre de concertation multi-acteurs est mis sur place et appuyé pour fédérer les actions de gestion durable et de conservation de l'espèce	- Laboratoires de recherche
C3. Appuyer la mise en œuvre d'un programme d'Information d'Education et de Communication (IEC) pour la conservation des espèces menacées d'extinction	**RC3.2.** Des supports de communication sont élaborés et diffusés pour la conservation des espèces menacées d'extinction **RC3.3.** Une plateforme dynamique d'échange entre les parties prenantes est mise en place	- DGEFC - Organes de presse - Collectivités locales - ONGs
C4. Mettre en place un mécanisme de suivi-évaluation pour la durabilité des actions de conservation et de gestion de *P. erinaceus*	**RC4.** Un mécanisme de suivi-évaluation est mis en place pour la durabilité des actions de conservation et de gestion de *P. erinaceus*	- DGEFC - Collectivités locales - ONGs - Laboratoires de recherche
C5. Valoriser les acquis de recherche au profit de la gestion de *P. erinaceus*	**RC5.** Les supports de diffusion des acquis du projet sont confectionnés et disponibles	- DGEFC - Collectivités locales - ONGs - Laboratoires de recherche

10.4. Plan d'action et budget estimatif

Le plan d'action proposé est présenté dans le tableau qui précise pour chacun des axes stratégiques les résultats attendus, les moyens et sources de vérification, les responsables d'exécution et les budgets indicatifs. Le coût total de mise en œuvre du plan d'action est estimé à la somme de cinq milliards cent dix millions (5.110.000.000) de francs CFA, sur une période de 10 ans (2022-2032). Le plan d'action détaillé est présenté en annexe 3 du document.

10.5. Mécanisme de financement des actions de conservation

Compte tenu de l'importance des fonds nécessaires aux actions de la stratégie de conservation de *P. erinaceus*, il faudra rechercher des financements auprès des institutions qui opèrent dans le domaine de l'environnement et de la conservation de la biodiversité. Il faudra également envisager un mécanisme de financement durable de conservations des espèces de flore menacées à l'instar des fonds existant au niveau de la faune (Eléphant et les grands carnivores). En attendant l'effectivité de ce mécanisme de financement, certaines actions peuvent être prévues sur des lignes budgétaires au plan national pour le financement de certaines actions.

Enfin, d'autres espèces à croissance rapide et offrant des opportunités économiques peuvent être promues afin de générer des ressources financières pour la conservation d'autres espèces menacées d'extinction. En effet, il existe pour certaines espèces comme le baobab des modèles de croissance associés à des modèles économiques qui peuvent offrir de grandes opportunités de financements durables des actions de conservation.

CONCLUSION ET RECOMMANDATIONS

P. erinaceus est une espèce de valeur à fortes potentialités biologiques, socio-économiques et culturelles non négligeables, qui mérite d'être conservée. En l'absence d'une réponse rapide et plus adaptée, il est à craindre que l'exploitation illégale et non durable de l'espèce au Bénin conduise à des conséquences négatives extrêmement dommageables voire irréversibles. Elle est recherchée pour tous ses organes vitaux notamment son bois d'œuvre (commercialisation), son écorce (pharmacopée traditionnelle), ses feuilles (pharmacopée et fourrage) et ses branches (bois de feu et fourrage). En dépit de l'importance socioéconomique prouvée et la prise de conscience des communautés sur les menaces qui entravent la gestion durable de l'espèce, il est noté une quasi-absence d'initiatives au niveau local pour la conservation participative de l'espèce, une méconnaissance des techniques de propagation de l'espèce et/ou une absence de perception de l'importance cultuelle de l'espèce qui par conséquent ne bénéficie d'aucun privilège pour la conservation. Les communautés locales préfèrent donc se rabattre sur les populations naturelles de l'espèce qu'elles déciment au sens de la tragédie des biens communs. Pour une gestion durable de l'espèce, il faudra alors que des initiatives locales soient encouragées dans le sens de la conservation de l'espèce.

L'évaluation de l'état des populations de *P. erinaceus* dans la forêt classée de Ouémé-Boukou reconnue comme un site de présence relativement importante de *P. erinaceus* au Bénin a révélé que l'espèce présente une distribution erratique en général mais avec une tendance de grégarité par endroits. En forêt claire et surtout en savane, l'espèce est relativement mieux représentée avec des paramètres dendrométriques appréciables. Toutefois, sa structure en diamètre dans la forêt est irrégulière et caractéristique des formations multispécifiques avec dissymétrie droite indiquant une non stabilité de ses populations dans la forêt.

Pour assurer la survie de l'espèce et sur la base des informations générées au cours du processus d'élaboration de l'ACNP, les propositions d'actions urgentes suivantes sont suggérées à l'organe de gestion CITES : i) la mise en défens des peuplements contenant l'espèce dans les forêts claires et savanes arborées ; ii) la mise en œuvre des opérations de restauration écologique intensive de l'espèce dans les savanes arbustives et forêt galerie (enrichissement par voie sexuée et/ou par voie végétative, régénération assistée) ; iii)

l'élaboration d'un mécanisme de suivi écologique de long terme des populations de référence; iv) la conduite d'une série d'activités de recherche (génétique, sylviculture) afin de développer des paquets technologiques spécifiques à *P. erinaceus* ; v) la mise en œuvre de programmes de renforcement des capacités des acteurs à divers niveaux.

A travers la mise en œuvre de ces actions, l'espèce sera rétablie dans son milieu naturel. Mais, le succès des actions préconisées dépend de l'implication de tous les acteurs à divers niveaux et de la mise sur pied d'un plan de suivi rigoureux. A l'issue de la mise en œuvre de chaque phase, l'exécution devra être évaluée, et l'ordre des priorités devra être actualisé.

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Annexe 1 : Utilisations médicinales *de P. erinaceus*

Groupes socioculturels	Organes utilisés	Maladies traitées
Bariba	Ecorce	Abcès, anémie, avortement, blessures internes des bœufs (ventre), folie, hémorragie interne des bœufs, hémorroïde, infections, infections cutanées, maladies des bœufs, maux de ventre, œdème, paludisme, paralysie des membres inférieurs, pieds enflés, problèmes de vision, règles douloureuses et irrégulières, stérilité, teigne, ulcère gastrique, vers intestinaux
	Feuilles	Guérit les bœufs mourants, difficulté pour uriner, paludisme, règles douloureuses et irrégulières, Fièvre typhoïde
	Racines	Anémie, crâne du bébé faible et qui bat parfois, œdème, gonococcie, maux des reins, saignement
	Sève	Blessures, teigne
Dendi	Ecorce	Anémie, corps chaud des enfants, faiblesse des bébés, hémorragie interne des bœufs, hémorroïde, infections, infections cutanées, infections des bœufs, maux de ventre, morsure de serpent chez les bœufs, paludisme, problèmes de vision, règles douloureuses et irrégulières, ulcère gastrique
	Feuilles	Infections des bœufs, maladies des bœufs, paludisme
	Racine	Maux de ventre
	Sève	Morsure de serpent chez les bœufs, piqûres de scorpion, problèmes de vision
Peulh	Ecorce	Anémie, blessures des bœufs, constipation des bœufs, diarrhée des bœufs, difficulté pour la mise bas, envoutement, faiblesse des bœufs, gonflement du ventre des bœufs, hémorragie interne des bœufs, hémorroïde, hypertension, infections des bœufs, mal de dent, maladies des bœufs, maladies des enfants, maux de ventre, morsure de serpent chez les bœufs, paludisme, plaie des animaux, plaies internes des bœufs, problèmes de vision, règles douloureuses et irrégulières, toux des bœufs, ventre bombé des vaches après accouchement
	Feuilles	Faiblesse corporelle, faiblesse de l'homme, faiblesse des animaux, faiblesse des bœufs, fatigue extrême, maigreur des bœufs, maladies des bœufs, facilite la marche des bébés, maux de ventre, paludisme
	Racines	Courbatures, faiblesse des bœufs, hémorroïde, mal de dent, maux d'yeux, traitement des volailles
	Sève	Abcès, blessures, infections cutanées, problèmes de vision, teigne
Otamari	Ecorce	Hémorroïde, maux de ventre, métrorragie, paludisme, fatigue, corps chaud, anémie, choléra, règle douloureuse, diarrhée, cancer, peste porcine
	Racine	Corps chaud, maux de ventre, rhume, maux de tête, douleur musculaire, paludisme,
	Feuille	Douleur du corps, maintien la santé, corps chaud, lutte biologique, rhume, paludisme, diarrhée
	Sève	Teigne
Lokpa	Ecorce	Fatigue, corps chaud, anémie, règle douloureuse, diarrhée, démangeaison, paludisme
	Racine	Paludisme, rhume, maux de ventre, fatigue
	Feuille	Maintien de santé, rend fort, paludisme, diarrhée

Groupes socioculturels	Organes utilisés	Maladies traitées
	Sève	Teigne
Boo	Ecorce	Anémie, diarrhée, fatigue extrême, hémorroïde, maux de ventre, morsure de serpent, perte d'appétit des bœufs, règles douloureuses et irrégulières, toux
	Feuilles	Contraceptif, envoutement, paludisme, saignement sans arrêt des femmes lors des menstrues
	Racines	Faiblesse corporelle, fatigue extrême, impuissance, piqûres de scorpion
	Sève	Abcès, acné, brûlures, panaris, piqûres de scorpion
Nagot	Ecorce	Anémie, infections, protection contre les mauvais esprits, règles douloureuses et irrégulières, ulcère gastrique
	Feuilles	Lutte contre les mauvais esprits, paludisme
	Racines	Corps chaud des enfants, manque de force et faiblesse chez les enfants, protection contre les mauvais esprits
	Sève	Infections cutanées, problèmes de vision
Fon	Ecorce	Anémie, fièvre, faiblesse musculaire, malaise de grossesse, infertilité femme, maux de ventre, paludisme
	Feuilles	Fatigue, fièvre, malaise de grossesse, hémorroïde externe, paludisme
	Graines	Surmenage
	Racines	Diabète, virilité, drépanocytose, maux de ventre, dentition, hémorroïde Interne
Mahi	Branches	Maux de dent, dentition
	Ecorce	Anémie, complication des règles, fièvre, infection, lavage de bébé, lèpre, maux de ventre, rougeole, stérilité
	Feuilles	Fatigue, gonococcie, hypertension, lavage de bébé, paludisme
	Latex	Blessure
	Racines	Maux de ventre, maux de bas ventre, abcès
Goun	Ecorce	Anémie, croissance de bébé, démangeaison, diabète, envoutement, fièvre, faiblesse de bébé, malaise de grossesse, plaie, règle douloureuse, rougeole
	Feuilles	Paludisme, démangeaison, fièvre, malaise de grossesse, hémorroïde externe
	Latex	Teigne
	Racines	Croissance du bébé, force, stérilité

Source : Donhouedé, 2018 ; Sokpodou, 2018 ; Tokponwe, 2018

Annexe 2 : Conventions et textes juridiques relatifs à la gestion des ressources forestières

N°	Textes	Année de ratification/Signature	Observations
Conventions			
1	Convention sur la Diversité Biologique	30 juin 1994	
2	Convention sur la protection du patrimoine mondial, culturel et naturel	14 septembre 1982	
3	Convention sur le commerce international des espèces de faune et de flore sauvages menacées d'extinction (CITES)	28 mai 1984	Régulation des transactions commerciales sur les espèces menacées d'extinction comme *P. erinaceus*
Lois			
4	Loi n° 93-009 du 2 Juillet 1993 portant régime des forêts en République du Bénin	02 juillet 1993	Fondement du cadre réglementaire du secteur forestier
5	Lois de Finances	Chaque année	Ces lois fixent le diamètre minimum d'exploitabilité (Dme) pour les essences forestières. Elles retirent aussi certaines espèces de l'exploitation en ne fixant ni taxes, ni Dme pour elles (Exemple de celle de 2017 pour la gestion 2018)
6	Loi n°2021-04 du 08 juillet 2021 portant protection et règles relatives au commerce international des espèces de faune et de flore sauvage menacées d'extinction en République du Bénin	08 juillet 2021	Régulation des transactions commerciales sur les espèces menacées d'extinction comme *P. erinaceus*
Décrets			
7	Décret n°83-205 du 31 mai 1983, portant adhésion de la République Populaire du Bénin à la Convention sur le Commerce International des Espèces de faune et de flore menacées d'extinction (CITES)	31 mai 1983	Régulation des transactions commerciales sur les espèces menacées d'extinction comme *P. erinaceus*
8	Décret 93-305 du 13 décembre 1993, portant ratification de la convention sur la Diversité Biologique	13 décembre 1993	
9	Décret n° 96-271 du 02 juillet 1996, portant modalités d'application de la loi n° 93-009 du 02 juillet 1993	02 juillet 1996	Fondement du cadre réglementaire du secteur forestier
10	Décret n° 2005-708 du 17 novembre 2005 portant modalités d'exploitation, de transport, de commerce, d'industrie et de contrôle des produits forestiers en République du Bénin	17 novembre 2005	Favorable à la conservation de *P. erinaceus*
11	Décret n° 2017-200 du 29 mars 2017, portant nouvelles mesures d'exploitation, de	29 mars 2017	Régulation des transactions commerciales sur les espèces menacées

	commercialisation et d'exportation de bois et produits de bois en République du Bénin		d'extinction comme *P. erinaceus*
Arrêtés			
12	Arrêté n°601/MR/DC/DFRN/SA du 08 octobre 1992 portant application en République du Bénin de la convention sur le contrôle International des Espèces de Faune et de Flore sauvage menacées d'extinction	08 octobre 1992	Régulation des transactions commerciales sur les espèces menacées d'extinction comme *P. erinaceus*
13	Arrêté n°2005-589 du 24 mars 2005 portant nouvelle vision du reboisement	24 mars 2005	
14	Arrêté 036/MEPN/MEF/DC/SGM/DGFRN/SA du 16 mai 2008 portant modalités de recouvrement, de répartition des taxes et redevances perçues en matière d'exploitation, de transport, de commerce, d'industrie et de contrôle des produits forestiers en République du Bénin	16 mai 2008	
15	Arrêté interministériel 0040 / MEPN / MDGLAAT / DC / SGM / DGFRN / SA du 29 juillet 2009 déterminant les types, modèles et modalités de délivrance et de contrôle des coupons de transport du bois en République du Bénin	29 juillet 2009	Favorable à la conservation de *P. erinaceus*
16	Arrêté interministériel 0041 / MEPN / MDGLAAT / DC / SGM / DGFRN / SA du 29 juillet 2009 portant conditions d'agrément et modalités d'organisation et de fonctionnement des marchés ruraux de bois	29 juillet 2009	Favorable à la conservation de *P. erinaceus*
17	Arrêté interministériel n°0121 / MEHU / MDGLAAT / DC / SGM / DGFRN / SA du 16 novembre 2012 fixant les conditions de gestion durable de la forêt sacrée en République du Bénin	16 novembre 2012	Favorable à la conservation de *P. erinaceus*
18	Arrêté interministériel n°053 / MEPN / MIC / DC / SGM / DGFRN / DGCE du 04 septembre 2007 portant modalités d'importation et d'exportation de bois en République du Bénin	04 septembre 2007	Favorable à la conservation de *P. erinaceus*
19	Arrêté n°054/MCVDD/SP du 15 avril 2016 portant suspension de la délivrance d'agrément relatif à l'exploitation et l'exportation de bois au Bénin	15 avril 2016	Favorable à la conservation de *P. erinaceus*
20	Arrêté n°006/2016/MCVDD/DGFRN/SA du 18 mai 2016 portant mesures provisoires de transport et de commerce des produits forestiers en République du Bénin	18 mai 2016	Favorable à la conservation de *P. erinaceus*

Annexe 3 : Plan d'action d'un projet pour la conservation et la gestion durable de P. erinaceus au Bénin

Activités	Résultats attendus	Indicateurs	Sources de vérification	Responsables	Partenaires	Période de mise en œuvre	Budget estimatif (FCFA)
Axe stratégique 1 : Amélioration des connaissances sur le potentiel écologique, génétique et économique, la sylviculture et la dynamique des peuplements de *P. erinaceus* au Bénin							
A1. Réaliser/Actualiser l'inventaire forestier national afin d'estimer le potentiel de *P. erinaceus*	**RA1.1.** Les données écologiques actualisées sont disponibles sur l'espèce au Bénin **RA1.2.** Le potentiel de disponibilité (Occurrence, volume, abondance) de *P. erinaceus* est connu	- Nombre de placettes - Carte actualisée des potentialités de l'espèce	-Liste des coordonnées des centres de placettes -Rapports d'étude / mission de collecte -Base de données	MCVDD/DGEFC	Universités / Laboratoires	2022-2024	800 millions
A2. Suivre la dynamique des peuplements naturels de l'espèce (collecte régulière des données au sein des placettes permanentes, télédétection)	**RA2.1.** Des peuplements de référence sont identifiés avec la participation des communautés locales **RA2.2.** Un réseau d'unités permanentes de collecte de données est installé et suivi dans les peuplements de référence sur le plan national **RA2.3.** Un système d'information écologique et forestier	- Cartes de distribution des peuplements - Nombre de placettes permanentes	-Rapports d'étude -Base de données -Coordonnées des placettes permanentes -Rapports de terrain / mission de collecte	MCVDD/DGEFC	- Universités / Laboratoires - Collectivités locales	2022-2032	1200 millions

Activités	Résultats attendus	Indicateurs	Sources de vérification	Responsables	Partenaires	Période de mise en œuvre	Budget estimatif (FCFA)
	national sur l'espèce est établi						
A3. Evaluer la diversité génétique de l'espèce en relation avec les processus de fragmentation au Bénin	**RA3.1.** La structuration morphologique et génétique des populations de *P. erinaceus* est connue **R3.2.** Les sources de diversité et de provenances des graines pour la restauration écologique de l'espèce sont identifiées **RA3.3.** La viabilité des populations de l'espèce est évaluée et cartographiée	- Nombre de populations identifiées et caractérisées - Carte de la spatialisation des populations de l'espèce	-Rapports d'étude / de mission de collecte de données -Base de données	MCVDD/DGEFC	-Universités / Laboratoires	2023-2025	160 millions
A4. Evaluer le potentiel économique et les services écosystémiques des peuplements naturels de l'espèce	**RA4.1.** La valeur économique et les services écosystémiques des peuplements de *P. erinaceus* sont évalués **RA4.2.** Le compte type d'exploitation d'une entreprise de bois de vène est établi	-Nombre et catégories de services écosystémiques -Compte type d'exploitation de l'espèce	-Rapports d'étude / mission de collecte -Bases de données	MCVDD/DGEFC	- Universités / Laboratoires - Collectivités locales	2023-2025	100 millions
A5. Capitaliser/étudier la sylviculture de l'espèce	**RA5.1.** Les techniques de collecte des semences, de germination et de propagation végétative et autres opérations sylvicoles sont mises au point	- Nombre d'itinéraires techniques mises au point - Modèle de croissance développé	-Rapports d'étude / mission de collecte	MCVDD/DGEFC	-Universités / Laboratoires	2023-2028	300 millions

Activités	Résultats attendus	Indicateurs	Sources de vérification	Responsables	Partenaires	Période de mise en œuvre	Budget estimatif (FCFA)
	RA5.2. Les stratégies modernes de mycorhization susceptibles de booster le développement des plantules sont mises au point. **RA5.3.** Les techniques de restauration et conservation de l'espèce dans ses habitats naturels sont mises au point. **RA5.4.** Un modèle de croissance est développé pour l'espèce						
Budget de l'axe 1 : 2.560.000.000 FCFA							
Axe stratégique 2 : Restauration écologique de *P. erinaceus* dans son habitat							
B1. Appuyer les pépiniéristes dans la production de plants contrôlés de *P. erinaceus*	**RB1.1.** Les pépiniéristes sont organisés et appuyés sur le plan technique et matériel pour la production de plants contrôlés de *P. erinaceus* **RB1.2.** Les plants contrôlés de *P. erinaceus* sont disponibles auprès du réseau des pépiniéristes	-Nombre de pépiniéristes appuyés -Nombre de plants produits	- Rapport d'activités - Rapports de mission de terrain	MCVDD/DGEFC	- ATDA / Faitières des pépiniéristes agréés - Universités / Laboratoires	2023-2032	250 millions
B2. Installer des plantations expérimentales de *P. erinaceus* dans les zones favorables	**RB2.1.** Les sites favorables pour l'installation des plantations sont	-Carte des sites favorables -Nombre de plantations installées	- Rapport d'activités - Rapports d'étude / mission de collecte	MCVDD/DGEFC	- ATDA - ONGs - Collectivités locales	2023-2032	300 millions

Activités	Résultats attendus	Indicateurs	Sources de vérification	Responsables	Partenaires	Période de mise en œuvre	Budget estimatif (FCFA)
	identifiés de façon participative **RB2.2.** Des plantations expérimentales de *P. erinaceus* sont installées dans les zones favorables **RB2.3.** Les communautés locales sont incitées à installer des plantations privées de *P. erinaceus*	-Superficie totale des plantations installées			- Universités / Laboratoires		
B3. Développer des actions de restauration intensive des peuplements dans les massifs forestiers favorables à l'espèce	**RB3.1.** Les peuplements sont identifiés et reboisés dans les massifs forestiers favorables dégradés avec la collaboration des communautés locales **RB3.2.** Les techniques de propagation végétative sont promues pour la restauration à grande échelle des peuplements **RB3.3.** La régénération naturelle assistée est promue dans les zones favorables	-Carte des massifs forestiers dégradés favorables -Superficie totale enrichie dans les massifs -Superficie totale restaurée par propagation végétative -Superficie totale restaurée avec la régénération naturelle	- Rapport d'activités - Rapports d'étude / mission de collecte	MCVDD/DGEFC	-Universités / Laboratoires -ONGs	2023-2032	500 millions
B4. Vulgariser le paquet technologique développé sur la sylviculture de *P. erinaceus*	**RB4.1.** Le paquet technologique (compilation des fiches techniques) est édité **RB4.2.** Le paquet technologique	-Nombre de copies du paquet technologique	- Rapport d'activités - Rapports d'atelier	MCVDD/DGEFC	-Universités / Laboratoires -ONGs	2024-2026	150 millions

Activités	Résultats attendus	Indicateurs	Sources de vérification	Responsables	Partenaires	Période de mise en œuvre	Budget estimatif (FCFA)
	développé est vulgarisé au sein de la communauté	-Nombre d'acteurs atteints					
B5. Etablir une base de données sur le suivi des plantations	**RB5.1.** Une base de données est élaborée et est périodiquement renseignée pour le suivi des plantations **RB5.2.** Les données actualisées de croissance sont disponibles sur chacune de ces plantations	-Nombre de plantations suivies -Nombre de missions de collecte	-Rapports d'étude / mission de collecte -Base de données	MCVDD/DGEFC	- Collectivités locales - ONGs - Universités / Laboratoires	2023-2032	800 millions
Budget de l'axe 2 : 2.000.000.000 FCFA							
Axe stratégique 3 : Renforcement des capacités pour la conservation et la gestion durable de *P. erinaceus* et autres espèces de valeur menacées d'extinction							
C1. Renforcer les capacités opérationnelles des agents de contrôle	**RC1.1.** Des sessions de formation sont organisées à l'endroit des agents de contrôle pour le renforcement de leurs capacités opérationnelles **RC1.2.** Les agents de contrôle sont mieux équipés pour contribuer à la gestion durable et la conservation de l'espèce	-Nombre de sessions de formation -Nombre d'agents formés	-Rapports des sessions de formation -Rapports d'activités	MCVDD/DGEFC	-Universités / Laboratoires -ONGs	2023-2025	150 millions
C2. Appuyer la mise en place et le fonctionnement d'un cadre de concertation multi acteurs pour la conservation des espèces menacées d'extinction	**RC2.1.** Les acteurs œuvrant pour la gestion durable et la conservation de l'espèce sont identifiés **RC2.2.** Un cadre de concertation multi-acteurs est mis sur	- Nombre d'acteurs identifiés - Nombre de sessions de travail du cadre	-Répertoire des acteurs -Rapport de sessions de travail	MCVDD/DGEFC	- Collectivités locales - ONGs - Universités / Laboratoires	2023-2032	50 millions

Activités	Résultats attendus	Indicateurs	Sources de vérification	Responsables	Partenaires	Période de mise en œuvre	Budget estimatif (FCFA)
	place et appuyé pour fédérer les actions de gestion durable et de conservation de l'espèce						
C3. Appuyer la mise en œuvre d'un programme Information Education et communication (IEC) pour la conservation des espèces menacées d'extinction	**RC3.2.** Des supports de communication sont élaborés et diffusés pour la conservation des espèces menacées d'extinction **RC3.3.** Une plateforme dynamique d'échange entre les parties prenantes est mise en place	-Nombre de supports de communication élaborés et diffusés -Existence et fonctionnement de la plateforme d'échanges	- Répertoire des documents produits - Rapport de sessions de travail	MCVDD/DGEFC	- Organes de presse - Collectivités locales - ONGs	2022-2032	100 millions
C4. Mettre en place un mécanisme de suivi-évaluation pour la durabilité des actions de conservation et de gestion de *P. erinaceus*	**RC4.** Un mécanisme de suivi-évaluation est mis en place pour la durabilité des actions de conservation et de gestion de *P. erinaceus*	Existence et fonctionnement du mécanisme	-Répertoire des rapports d'évaluation -Base de données	MCVDD/DGEFC	-Collectivités locales -ONGs -Universités / Laboratoires	2023-2032	150 millions
C5. Valoriser les acquis de recherche au profit de la gestion de *P. erinaceus*	**RC5.** Les supports de diffusion des acquis du projet sont confectionnés et disponibles	Nombre de supports de diffusion élaborés	-Répertoire des supports -Base de données	MCVDD/DGEFC	-Universités / Laboratoires -ONGs -PTFs	2025-2032	100 millions
Budget de l'axe 3 : 550.000.000 FCFA							

Annexe 4 : Note de service portant mise en place du Comité d'Experts Scientifique

REPUBLIQUE DU BENIN
MINISTERE DU CADRE DE VIE ET DU DEVELOPPEMENT DURABLE
@@@@@@@@@@@@@@@@@@
DIRECTION GENERALE DES EAUX, FORETS ET CHASSE
TEL. : (229) 21-33-06-62 FAX : 21-33-21-92/21-33-04-21 BP. 393 COTONOU (R. BENIN),
E-mail : dgefc_mcvdd@cadredevie.bj

N°029/DGEFC/DSIME/DLPFC/DFCBN/DPESE/PF-CITES/SA Cotonou, le 30/03/2022

NOTE DE SERVICE

(Portant mise en place et fonctionnement du Comité d'Experts pour la formulation d'un Avis de Commerce Non Préjudiciable (ACNP) de *Pterocarpus erinaceus* au Bénin)

Dans le cadre de la mise en œuvre des activités du projet « Renforcement de Capacités pour l'élaboration de l'Avis de Commerce Non Préjudiciable sur *Pterocarpus erinaceus* au Bénin (PRC-ACNP) », il est mis en place un Comité d'Experts composé comme suit :

Président : Professeur Brice SINSIN
Vice-Président : Lieutenant-Colonel Enock SEKO N'GOYE
Rapporteur : Dr Sylvestre DJAGOUN

Membres:
- Lieutenant-Colonel Robert MISSIKPODE
- Lieutenant-Colonel Simon AWOKOU
- Dr Pierre AGBANI

En collaboration avec l'Equipe Technique chargée de la mise en œuvre du Projet PRC-ACNP, le Comité d'Experts est chargé de :

- approuver les termes de références et valider les résultats des études ;
- produire un rapport de synthèse pour la formulation de l'Avis de Commerce Non Préjudiciable ;
- élaborer l'Avis de Commerce Non Préjudiciable pour *Pterocarpus erinaceus* au Bénin ;
- élaborer un document de projet consolidé pour la conservation et la gestion durable de *Pterocarpus erinaceus* au Bénin.

La fonction de membre du Comité d'Experts ne donne droit à aucun avantage matériel ou financier. Toutefois, des frais d'entretien et de déplacement sont accordés aux membres lors des sessions ou lorsqu'ils accomplissent des missions pour le compte du projet, conformément aux dispositions nationales en vigueur.

Le Comité d'Experts peut faire appel à toute personne jugée nécessaire à la réussite de sa mission. Il est d'office et de plein droit dissout au terme de l'élaboration du rapport de l'ACNP de *Pterocarpus erinaceus* pour le Bénin dans le cadre du projet « Renforcement de Capacités pour l'élaboration de l'Avis de Commerce Non Préjudiciable sur *Pterocarpus erinaceus* au Bénin (PRC-ACNP) ».

La présente note de service prend effet pour compter de la date de sa signature

Le Directeur Général des Eaux, Forêts et Chasse pi,

Conservateur Principal Rémi HEFOUME

MINISTERE DE L'ENVIRONNEMENT
DE L'ASSAINISSEMENT ET DU
DEVELOPPEMENT DURABLE
****

DIRECTION NATIONALE
DES EAUX ET FORETS
****

REPUBLIQUE DU MALI
Un Peuple - Un But - Une Foi
****

Bamako,le 06 AVR 2023

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(Organe de Gestion CITES du Mali)
B.P. 275 Bamako, Mali

A

Madame la Secrétaire de la CITES
Email: info@cites.org // sofie.11ensborg/à:un.org
Genève, Suisse

E--0 '3 \ 11 /MEADD-DNEF

Objet: Avis de commerce non préjudiciable (ACNP) lié à l'espèce Pterocarpus erinaceus.

Madame,

J'ai l'honneur de vous transmettre pour toutes fins utiles, le rapport relatif à l'Avis de Commerce non préjudiciable lié à l'espèce ***Pterocarpus erinaceus,*** élaboré sur la base d'une étude scientifique.

En vous souhaitant bonne réception, veuillez recevoir Madame, l'expression de ma franche collaboration.

La Directrice,

Insp. Gal. KANOUTE Fatoumata KONE
Chevalier de l'Ordre National

MINISTERE DE L'ENVIRONNEMENT
DE L'ASSAINISSEMENT ET DU
DEVELOPPEMENT DURABLE
* * * * * * * *

DIRECTION NATIONALE
DES EAUX ET FORETS

REPUBLIQUE DU MALI
Un Peuple – Un But – Une Foi

AVIS DE COMMERCE NON PREJUDICIABLE DE *PTEROCARPUS ERINACEUS* AU MALI

Rapport progressif

Table des matières

RESUME EXECUTIF

L'objet de la Convention sur le Commerce International des espèces de faune et flore sauvages menacées d'extinction (CITES) est de réglementer le commerce international des espèces rares ou en danger d'extinction. Dans ce sens, la CITES est à la fois un système régulateur, qui atténue le principe de la liberté absolue du commerce international décrété par l'Organisation Mondiale du Commerce (OMC) ; et un système de protection des ressources fauniques et floristiques pour la promotion de la durabilité. Parmi les propositions présentées et validées lors de la dernière Conférence des Parties (CoP 19) organisée en Novembre 2022 au Panama, deux genres d'espèce d'arbres productrices de bois d'œuvre et faisant partie des bois exploités/exportés au Mali ont été rangées dans l'annexe II de la CITES à savoir : *Afzelia* (Doussier) et *Pterocarpus* (Padouk/Kosso).Une des obligations fondamentales des pays membres de la CITES est la production avant toute exportation d'un produit listé en annexe II de cette convention, d'un avis de commerce non préjudiciable 'ACNP).L'Organe de gestion CITES représentée par l'administration en charge des forêts au Mali s'est donné pour objectif de développer dans le premier semestre 2023 un document d'ACNP pour chacune des deux espèces de bois d'œuvre inscrites dans l'annexe II de la CITES au Mali : *Afzelia africana* et *Pterocarpus erinaceus.Le présent document fait état de l'ACNP pour Pterocarpus erinaceus connu sous l'appelation de bois de veine ou Kosso*. Ce premier rapport, progressif se limite sur la détermination du Quota de récolte et d'exportation. Les données présentées dans ce document ont été collectées essentiellement dans le cadre des inventaires de reconnaissance (nationaux), d'aménagement et des entretiens conduits avec les exploitants et le personnel forestier actif sur le terrain. Le taux ou indice de reconstitution (%Re) a été calculé pour s'assurer de la reconstitution de l'espèce après le passage de l'exploitation. C'est un indice qui donne le nombre de tiges exploitables après une rotation par rapport à ceux récoltés. Les résultats de l'Inventaire forestier National réalisé en 2014 révèlent que le bois de vène (*Pterocarpus erinaceus*) est présent principalement dans quatre Régions du mali (Figures 4-7) à savoir : Kayes (KY), Koulikoro (KK), Ségou (SG) et Sikasso SK). Son aire de répartition naturelle couvre en général les savanes soudaniennes et soudano-guinéenne. La densité moyenne des tiges de plus de 50 cm de diamètre est de 25 tiges/ha. Dans l'ensemble, 103 massifs sur les 148 étudiés peuvent se reconstituer après la rotation de 12,5 ans selon les critères fixés. Les 103 massifs totalisent un quota annuel de récolte de **65 302,4 m^3** et un quota en produit madrier de **55 384,8 m^3**. Des recommandations ont été faite pour s'assurer

que le commerce international des madriers n'est pas préjudiciable à la conservation de *Pterocarpus erinaceus* ans son milieu naturel au Mali.

0. CHAPITRE 0. INTRODUCTION

La République du Mali a ratifié plusieurs Conventions internationales, à l'instar de la Convention sur la diversité biologique, la Convention sur les changements climatiques, la Convention sur les zones humides, la Convention sur le Commerce International des espèces de faune et flore sauvages menacées d'extinction (CITES).

L'objet de la CITES est de réglementer le commerce international des espèces rares ou en danger d'extinction. Dans ce sens, la CITES est à la fois un système régulateur, qui atténue le principe de la liberté absolue du commerce international décrété par l'Organisation Mondiale du Commerce (OMC) ; et un système de protection des ressources fauniques et floristiques pour la promotion de la durabilité. Á cet effet, le système juridique de la CITES s'articule autour des techniques spécifiques prévues dans le corps du texte conventionnel et des standards pratiques que l'on peut extraire dans de nombreuses résolutions et décisions prises lors des Conférences des Parties : d'où une certaine complexité reconnue audit système juridique (Sand, 2008). Le système juridique CITES comprend les normes et les mécanismes de mise en œuvre émanant des décisions et résolutions des Conférences des Parties. La technique des listes/annexes est une méthode d'interdiction générale d'exercer des activités préalablement visées, à moins d'obtenir au préalable des autorités compétentes un permis d'exercer. Les permis ou certificats sont délivrés selon le régime de protection des espèces de faune et de flore menacées d'extinction réparties en trois annexes ou catégories. La protection suggérée concerne aussi bien les spécimens vivants que des spécimens morts, tout ou partie de ces spécimens et les produits qui en sont issus. Le niveau le plus élevé de la protection est l'Annexe 1 relative au commerce **interdit/autorisé** ; le deuxième niveau de protection est l'Annexe 2 relative au commerce **réglementé** ; et le troisième niveau de protection est l'Annexe 3 relative au commerce **contrôlé.**

Tous les trois ans, la CITES organise une réunion de la Conférence des Parties (CoP). C'est l'organe décisionnel ultime de la Convention et la CoP 19 s'est déroulée au Panama du 14 au 25 novembre 2022. La Convention bénéficie d'une adhésion quasi universelle de la part des pays du monde. Il y a maintenant 184 Parties (y compris l'Union Européenne) et chacune d'entre elles est habilitée à soumettre des propositions à la CoP pour l'ajout d'une espèce aux listes CITES (annexes) ou le déplacement d'une espèce au sein des annexes.

Pour la CoP 19 tenue à Panama city/Panama, 52 propositions ont été présentées et le Secrétariat les a examinées et analysées. Les experts du Secrétariat ont également consulté des

experts externes afin de rendre leurs recommandations finales aussi informatives que possible pour les Parties lors de l'examen de leurs positions. Parmi les propositions présentées et validées, deux genres d'espèce d'arbres productrices de bois d'œuvre et faisant partie des bois exploités/exportés au Mali ont été rangées dans l'annexe II de la CITES à savoir : *Afzelia* (Doussier) et *Pterocarpus* (Padouk/Kosso).

Le genre *Afzelia* Smith (Fabaceae, Caesalpinioideae) … comporte sept espèces en Afrique dont deux se retrouvent dans les forêts claires de la région zambézienne (*A. quanzensis* Welw. et *A. peturei* De Wild.) ; quatre autres sont endémiques des forêts denses humides de la région guinéo-congolaise (*A. bella* Harms, *A. bipindensis* Harms, *A. pachyloba* Harms et *A. parviflora* [Vahl] Hepper) et la dernière se retrouve essentiellement dans les savanes soudaniennes (A. africana Sm. ex Pers.) et donc au Mali.

Une vingtaine d'espèces de *Pterocarpus* est présente dans les forêts tropicales africaines. Les espèces du Padouk ont été classée en septième position des espèces de bois d'œuvre les plus exportées. L'espèce du Padouk concernée pour le Mali est *Pterocarpus erinaceus,* connu sous le nom de Kosso oubois de veine.

Une des obligations fondamentales des pays membres de la CITES est la production avant toute exportation d'un produit listé en annexe II de cette convention, d'un avis de commerce non préjudiciable 'ACNP). Le défaut de rédiger pour chacune de ces espèces un document d'ACNP peut avoir des conséquences graves dans l'économie du Mali (compression du personnel ou alors fermeture tout cour des sociétés forestières dont l'activité économique est essentiellement liée à ces espèces nobles) des du fait des blocages pouvant survenir des suspensions d'exportation ou encore de l'adoption des quota zéro.

L'Organe de gestion CITES représentée par l'administration en charge des forêts au Mali s'est donné pour objectif de développer dans le premier semestre 2023 un document d'ACNP pour chacune des deux espèces de bois d'œuvre inscrites dans l'annexe II de la CITES au Mali : *Afzelia africana* et *Pterocarpus erinaceus.*La méthode ou le schéma utilisé est celle issue de l'atelier des experts sur les ACNP tenu à Cancun, au Mexique en 2008. Cette méthode propose de formuler l'ACNP sur base des cinq points présentés dans la suite logique suivante :

(1) Biologie et aire de distribution de l'espèce ;
(2) Les informations sur la population ;
(3) Mesures de gestion et régime de récolte ;
(4) contrôle et suivi;
(5) Conservation et principe de précaution.

CHAPITRE I. METHODOLOGIE

0.1. Présentation du Mali

1.2. Méthodologie

1.2.1. Choix de la méthode de formulation de l'ACNP

Il existe une multitude d'approches méthodologiques pour formuler un ACNP. Le choix d'une méthode précise dépend du type des données disponibles et de la capacité des acteurs (autorité scientifique) commis à cette tâche. Parmi les schémas ou guides de formulation des documents d'ACNP déjà développés, l'on distingue :

(1) L'atelier international des experts en ACNP organisé du 17 au 22 Novembre 2008 à Cancun au Mexique. Cet atelier a proposé le tout premier draft de formulation des ACNP ;

(2) La réunion des experts pour le développement des guides et la formation sur les ACNP pour les plantes, organisée du 1er au 03 Février 2012 à Mexico/Mexique. Cette réunion organisée par TRAFFIC International a testé l'utilisation du guide développé à Cancun et a développé la deuxième version de ce guide ;

(3) Les schémas et documents d'ACNP développés lors de la première phase du programme OIBT-CITES, 2008-2011 ;

(4) L'atelier de formation organisé en Octobre 2012 à Hanoi au Vietnam, organisé par l'organe de gestion CITES du Vietnam. Cet atelier a testé la seconde version du schéma de Cancun et proposé la troisième version ;

(5) La Résolution Conf. 16.7 sur les ACNP (http://www.cites.org/eng/16...) comme résultat des tests faits sur les versions précédentes ;

(6) Le schéma d'ACNP proposé par l'autorité scientifique CITES de l'Allemagne et adopté par le Groupe d'examen scientifique (SRG) de la Commission de l'Union européenne (**Leeman et Oldfield, 2014**) ;

(7) Le document PC21. Inf.4 sur les ACNP pour l'exportation des bois d'Afrique Centrale, proposé par l'autorité scientifique CITES de Belgique ;

(8) Et la réunion internationale des experts sur le développement des guides pratiques sur les ACNP organisée du 16 au 19 Septembre 2015 au Guatemala city/Guatemala financée par le Programme OIBT-CITES, seconde phase (2011-2015) et organisé par

l'organe de gestion CITES du Guatemala en synergie avec l'Université d'Andalousie en Espagne.

Les trois principaux schémas de formulation d'ACNP qui découlent des différents travaux cités plus haut sont les suivants :

- le schéma de Cancun (2008) ;
- la Résolution Conf.16.7 adoptée par la CoP en 2013 ;
- le schéma des Allemands adopté par la Commission de l'Union Européenne.

Dans ce travail, nous avons opté pour la méthode ou le schéma initialement proposé à l'issue de l'atelier des experts sur les ACNP tenu à Cancun, au Mexique en 2008.

Cette méthode propose de formuler l'ACNP sur base des cinq points présentés dans la suite logique suivante :

(6) Biologie et aire de distribution de l'espèce ;
(7) Les informations sur la population ;
(8) Mesures de gestion et régime de récolte ;
(9) contrôle et suivi;
(10) Conservation et principe de précaution.

1.2.2. Collecte des données

Les données présentées dans ce document ont été collectées essentiellement dans le cadre des inventaires de reconnaissance (nationaux), d'aménagement et des entretiens conduits avec les exploitants et le personnel forestier actif sur le terrain.

1.2.2.1. Inventaires nationaux

Les derniers inventaires forestiers nationaux (IFN) encore appelés inventaires de reconnaissance ont été conduits au Mali en 2014. Cet inventaire a été réalisé plus de 25 ans après les inventaires de référence du **PIRL** – *Projet d'inventaire des ressources ligneuses* (*1985-1989 ; 5 régions*) – et 7 ans après les inventaires des 3 régions sahéliennes du paysdans le cadre du **PEALCD –** *Programme environnemental d'appui à la lutte contre la desertification*(*2006-2007*).Un total de 669 ha de forêt a été sondée en plein pour une superficie totale de 12 108 km^2, représentant un taux de sondage de 1,95 pour 1000. Ce taux est largement supérieur aux normes prescrites qui est d'au moins 1 ha pour 1000. Les données collectées ont été présentées jusqu'au niveau des cercles (deuxième unité administrative du Mali après les Régions).

1.2.2.2. Inventaires d'aménagement

Les forêts du Mali peuvent être distinguées en deux grands domaines : le domaine classé et le domaine protégé. Les forêts du domaine classé sont constituées essentiellement des Aires protégées, où l'Etat assure l'essentiel du contrôle. Les forêts protégées sont celles qui servent de forêts de production pour : bois de chauffe, gomme, fruits, bois de service, bois d'œuvre, …

Les inventaires d'aménagement ont été conduits dans des massifs forestiers relevant du domaine protégé. Le dispositif d'inventaire consiste en un échantillonnage systématique où les données -diamètre à hauteur de poitrine, hauteur, …) des tiges de diamètre ≥ 10 cm sont collectées dans des parcelles circulaires de 20 m de rayon.

1.2.2.3. Entretiens

Ils ont été menés à plusieurs niveaux : administration en charge des forêts, exploitants forestiers, autorités CITES du Mali.

1.2.3. Analyse et traitement des données

1.2.3.1. Etude de la structure des populations de *Pterocarpus erinaceus*

1.2.3.1.1. Densité

La densité (D) est définie comme étant le nombre d'individus par unité de surface. Elle traduit l'occupation du sol par les espèces. Elle s'exprime en nombre d'individus par hectare (individus. ha^{-1}). Cet indice a été calculé pour chaque massif grâce à la formule:

D = N/S

N = nombre de tiges recensées et S = surface totale exprimée en hectare.

1.2.3.1.2. Structure démographique

Pour rendre compte de la structure démographique des peuplements ligneux, la distribution des individus par classe de diamètre a été effectuée. C'est une caractéristique fondamentale de la forêt qui donne une indication sur l'état équilibré d'un peuplement (**Nshimba, 2008 ; Yalanga, 2012**). Elle renseigne donc sur le mode de répartition des espèces selon les classes de diamètre. À partir d'un seuil de 5 cm, des classes de diamètre d'amplitude 5 cm ont été constituées.

1.2.3.1.3. Reconstitution des peuplements exploitables

Le taux ou indice de reconstitution (%Re), encore appelé taux de renouvellement est un indice donnant le nombre de tiges exploitables après une rotation par rapport à ceux récoltés. C'est une fonction de tous les paramètres qui rentrent dans l'aménagement (**Ngoma, 2016**).

Le Taux ded Reconstitution (Re) exprime la proportion en effectif, d'une essence au bout d'une rotation par rapport à l'effectif de cette même essence avant l'exploitation. D'après **Madron (1998)**, le taux de reconstitution (% Re) est donné par :

$$\% Re = 100 [No (1- \Delta) (1- \alpha)] T/Np$$

Où : % Re : Pourcentage de reconstitution du nombre de tige exploitée

No : Effectif reconstitué après le temps de rotation

No est encore l'effectif de quelques classes de diamètre immédiatement en-dessous du diamètre minium d'exploitabilité (DME), susceptibles de passer au-dessus du DME après la rotation. Ces effectifs dépendent du Diamètre de la borne inférieure (Dbi) qui s'obtient par la formule suivante :

$$Dbi = DME – (AAM \times T)$$

Δ = Taux des dégâts d'exploitation forestière fixés à 7% du peuplement résiduel (Jahiel *et al.*, 1998).

α = est le taux de mortalité. Elle représente la mortalité naturelle et normale des essences forestières et doit varier par classe de diamètre. En effet elle est plus élevée chez les jeunes tiges que chez les tiges surannées. Toutefois, elle a été fixée à 1% tout diamètre confondu.

T = C'est la rotation. Elle est l'espace de temps entre (deux) passages successifs de l'exploitation au même endroit. Dans les pays du Bassin du Congo, elle varie entre 25 et 30 ans. L'appréciation du taux de reconstitution a été faite en considérant un accroissement annuel moyen en diamètre (AAM) de 0,4 cm. La ressource se reconstitue lorsque le Taux de Reconstitution est $\geq 50\%$.

Np = L'effectif total initialement exploitable par essence.

CHAPITRE II : BIOLOGIE, ECOLOGIE ET DISTRIBUTION DE *PTEROCARPUS ERINACEUS*

2.1. Taxonomie de *Pterocarpuserinaceus* Poir

Pterocarpus erinaceus est une espèce de bois de rose originaire des forêts semi-arides de la savane soudano-guinéenne d'Afrique de l'Ouest. C'est une espèce appréciée d'abord dans les zones de savane de l'Afrique sub-saharienne, où elle pousse naturellement. Sa position systématique selon **Cronquist (1981)** peut être résumée comme suit : règne Végétal, embranchement des Spermaphytes, classe des Dicotylédones, ordre des Fabales, famille des Fabaceae, genre *Pterocarpus* et espèce *erinaceus*.

De nom scientifique *Pterocarpuserinaceus*, l'espèce est désignée sous divers noms communs dans les ethnies du terroir en Côte d'Ivoire : *Gbin* en Malinké, en Koyaka, en Djimini, *Nafirame*ou *Fognana-die* en Sénoufo, *Plon* en Gouro, *Modja-waka* en Baoulé-Gôdê, *Kpassèrèkè* en Agni, *Djihè* en Lobi, *Nangni-lanhan* en Tagbana et *Tonkô* en Koulango. Dans la langue française, il est appelé *Palissandre du Sénégal*, *Bois de vène* ou *Vène*. En anglais, l'espèce est désignée sous le nom de *West African rose wood*, *African bar wood West*, *Africankino*, *Modobia*, (**Barstow, 2018**). La Chine, premier Pays importateur de *P. erinaceus*, l'appelle *Kosso.*

La position systématique de *Pterocarpuserinaceus*selon APG IV (2016) peut être résumée comme suit :

Domaine : BiotaEndl. (D.Don)

Règne : Plantae Haeckel, 1866

Sous-Règne : Viridaeplantae

Infra-Règne : Streptophyta John, Williamson &Guiry, 2011

Classe : EquisetopsidaC.Agardh, 1825

Clade : TracheophytaSinnott ex Cavalier-Smith, 1998

Clade : Spermatophyta

Sous-Classe : MagnoliidaeNovák ex Takht., 1967

Super-Ordre : RosanaeTakht., 1967

Ordre : FabalesBromhead, 1838

Famille : FabaceaeLindl., 1836

Sous-Famille : Papilionoideae DC., 1825

Super-Tribu : Dalbergioids

Tribu : DalbergieaeBronn ex DC., 1825

Sous-Tribu : PterocarpinaeBenth., 1860
Genre : *Pterocarpus*Jacq., 1763 [nom. cons.]
Espèce : *Pterocarpuserinaceus*Poir., 1796

2.2. Caractères botaniques de *Pterocarpus erinaceus*

*Pterocarpuserinaceus*est un arbre caducifolié atteignant 15-25 m de haut **(Duvall, 2008)**. Le fût est droit, cylindrique et dépourvu de branches sur une hauteur atteignant parfois 10 m dans de bonnes conditions. Par contre, le fût est souvent tordu, cannelé et à ramification basse dans de moins bonnes conditions. Le diamètre peut atteindre 75-100cm avec de légers contreforts.
La surface de l'écorce est brune grisâtre à noirâtre, fissurée et écailleuse, écorce interne brun jaunâtre, à veines rougeâtres, sécrétant une gomme translucide rougeâtre lorsqu'on l'entaille. La cime est de forme arrondie et ouverte. Les rameaux sont densément couverts de poils courts à l'état jeune.
Les feuilles sont alternes, composées imparipennées à 5-7 ou 11-15 folioles avec des stipules linéaires (jusqu'à 9 mm de long), poilues, tombant précocement (**Figure 3d**). Le pétiole poilu, est de 3-7 cm de long et le rachis de 7-10 ou 17-22 cm de long. Les pétiolules sont de 3-8 mm de long. Les folioles habituellement alternes sont de forme ovale à elliptique. La feuille comporte 12-20 paires de nervures latérales.
L'inflorescence est en panicule axillaire ou terminale de 7-20 cm de long et tombe précocement.
Les fleurs sont bisexuées et papilionacées. Les pédicelles sont de 4-8 mm de long et poilues.
Le calice campanulé est d'environ 7 mm de long et densément poilu. Il comporte 5 dents triangulaires de 1-2,5 mm de long. Les deux supérieures sont plus ou moins de forme conique.
La corolle est constituée de pétales pourvus d'onglet, jaune doré, avec un étendard presque circulaire atteignant 15 mm x 13 mm. Les ailes et la carène atteignent respectivement 13 mm et 10 mm de long. Les étamines au nombre de 10 sont soudées en une gaine atteignant 8,5 mm de long. L'étamine supérieure est parfois libre. L'ovaire supère presque glabre est stipité, poilu et peut atteindre 5 mm de long.
Le fruit est une gousse circulaire, aplatie, indéhiscente, de 4-7 cm de diamètre, sur un stipe atteignant 1 cm de long et pourvu d'une aile papyracée. Il comporte 1 à 2 graines réniformes mesurant environ 10 mm x 5 mm. La plantule est à germination épigée et les cotylédons sont foliacés.

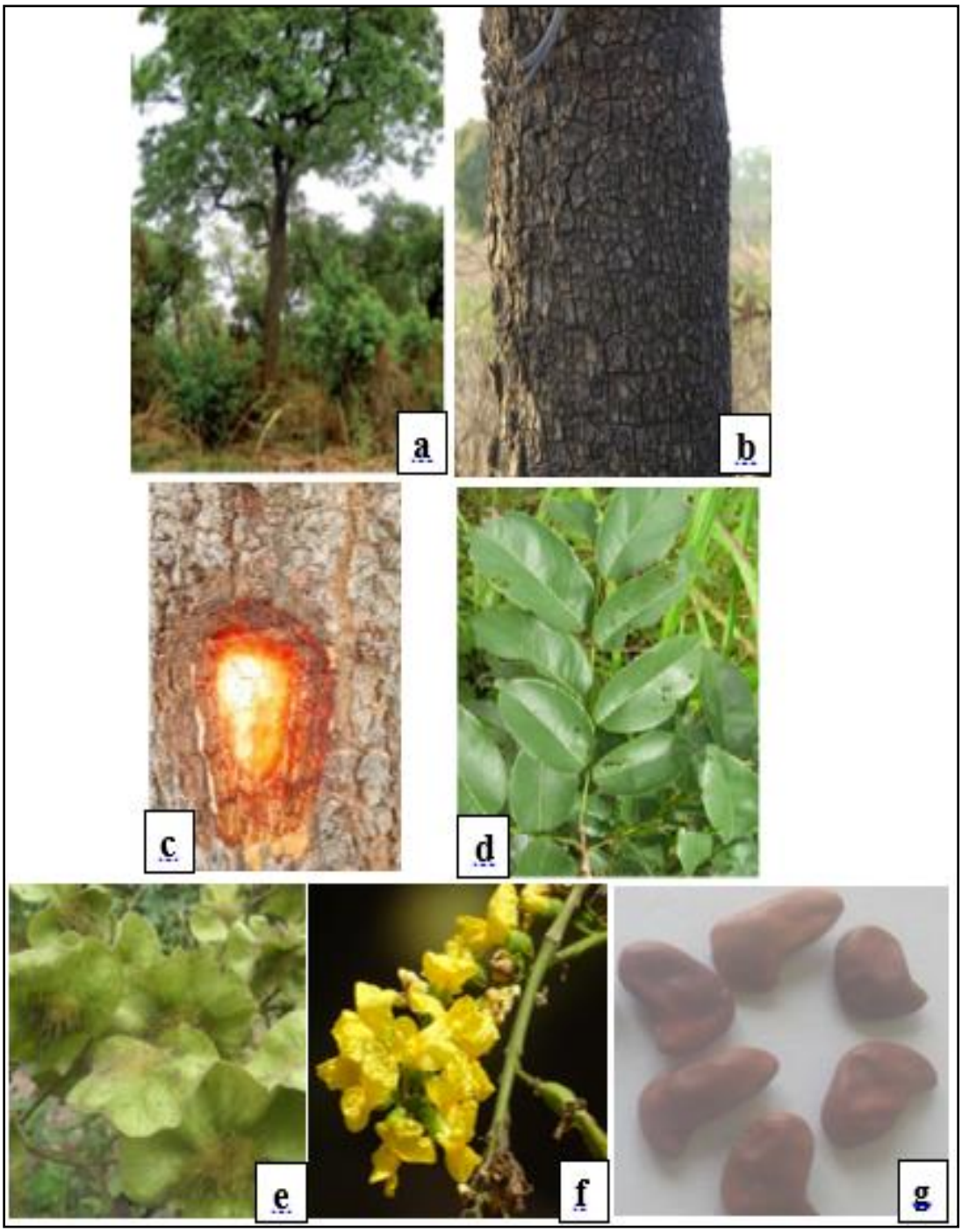
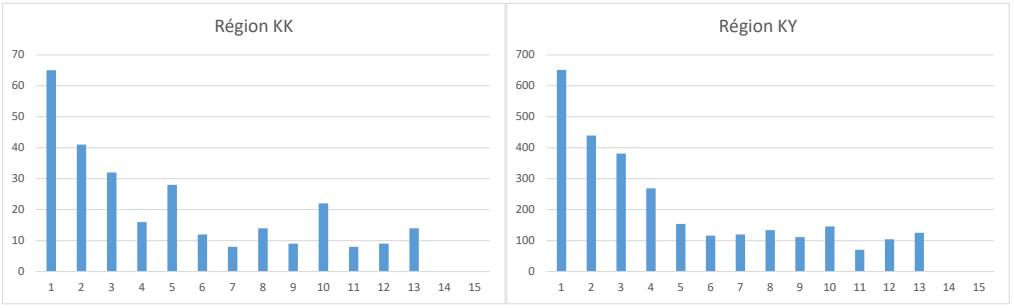


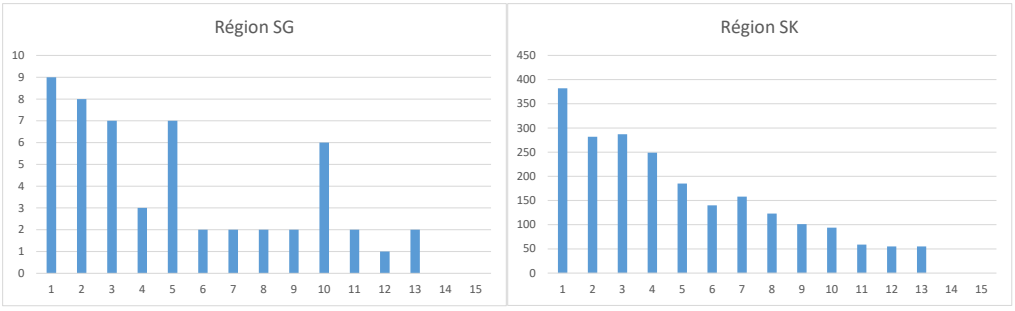
Figure 1 Aspect du fût (a), de l'écorce (b), de l'entaille de l'écorce (c), des feuilles (d), des fruits (e), de l'inflorescence (f) et des graines (g) de *Pterocarpus erinaceus*. (Source : ACNP, Côte d'Ivoire 2022).

2.3. Distribution de *Pterocarpuserinaceus*au Mali

Selon l'Inventaire Forestier National (IFN) conduit en 2014, le bois de vène (*Pterocarpuserinaceus*) est présent principalement dans quatre Régions du mali (Figures 4-7)

à savoir : Kayes (KY), Koulikoro (KK), Ségou (SG) et Sikasso SK). Son aire de répartition naturelle couvre en général les savanes soudaniennes et soudano-guinéenne.





2.4. Phénologie

D'après des études phénologiques effectuées en Afrique occidentale, *Pterocarpus erinaceus* fait partie du groupe des espèces décidues qui observent dans l'année une courte période de défeuillaison pendant la saison sèche (**Petit et Mallet 2001 ; Salifou*et al.*, 2007**). Cette période est généralement de deux à trois mois selon la localisation, mais est toujours située entre décembre et février. Elle correspond aussi à la période de floraison des arbres. Les premières fleurs jaunes apparaissent ainsi en janvier quand l'arbre est complètement dénudé. Elles sont progressivement remplacées par les fruits avant même l'apparition de nouvelles feuilles. Quant à la feuillaison, elle va de mars à novembre et fait l'objet d'un émondage intense entre les mois de mars et mai. L'arbre peut produire tellement de fruits que lorsque ceux-ci sont verts, cela donne l'impression qu'il est couvert de feuilles.

2.5. Régénération

La distribution spatiale des jeunes plantules de *P. erinaceus* est grégaire. Elles ont besoin des milieux plus ou moins ouverts pour croître. Cette espècea une bonne capacité de régénération par semis, rejets de souches et drageonnage (**Adjonou*et al.*, 2010**). Des essais de germination des graines au Mali,au Burkina Faso, et en Côte d'Ivoire indiquent une bonne capacité de germination, avec des taux de germination compris entre 65 % et 95 % si les graines sont décortiquées (**Bamba *et al.*, 2018**). Ceci devrait présenter de bonnes perspectives pour la production de plants en pépinière destinés aux reboisements. Malheureusement, si le taux de germination est très encourageant, cela n'est pas le cas pour la croissance initiale des jeunes pousses qui sont vulnérables vis-à-vis des feux de végétation, des ravageurs, du piétinement des animaux et des conditions climatiques défavorables empêchant ainsi la plupart d'entre elles de franchir les premières années de vie (**Ouédraogo *et al.*, 2006 ; Ouédraogo et Thiombiano, 2012**).

Dans la dynamique de la régénération naturelle de *P. erinaceus*, les jeunes plants proviennent presque uniquement de rejets de tubercules ligneux souterrains. Pour surmonter les contraintes liées à la croissance initiale des plantules, **Duvall (2008)** préconise le taillis avec une coupe à 10 cm du sol comme meilleure technique de reconstitution des peuplements. Cependant, même si cette technique de taillis pourrait constituer la meilleure stratégie pour la régénération de *P. erinaceus*, elle ne peut se limiter que dans les peuplements naturels de l'espèce où les semenciers existent déjà. De ce fait, le taillis ne saurait être une solution pertinente de reconstitution des peuplements de l'espèce dans les zones où celle-ci est

absente. Des entretiens menés avec les exploitants, il ressort que la taille à la hache de la partie de la souche tronçonnée stimule le rejet des souches (com.pers.)..

C'est en cela que les pistes pour promouvoir la régénération de l'espèce par semis semblent être les plus pertinentes pour le développement des programmes de reboisement à grande échelle à base de cette essence.

2.5. Ecologie de *Pterocarpus erinaceus*

Pterocarpuserinaceus est une espèce endémique des zones sahélo-soudanienne et soudano-guinéenne **(Habou et *al.*, 2015)**. L'espèce est inféodée aux forêts sèches des régions semi-arides et subhumides d'Afrique de l'Ouest où les précipitations annuelles moyennes sont comprises entre 600 mm et 1200 mm, avec une saison sèche longue et des températures annuelles moyennes variant de 15-35ºC (**PROTA /Backhuys P. /CTA W., 2008**). Cette espèce tolère des températures élevées atteignant 40ºC. Elle se développe en basses altitudes (0-600 m) et **se retrouve sur tous les types de sols, mais préfère les sols acides à neutres, légers à moyens, drainant librement (Prota, 2015).** Sa niche naturelle se retrouve essentiellement en Afrique de l'ouest où cette espèce occupe près de 17,48 % de la superficie totale de cette zone géographique (**Adjonou *et al.*, 2020**).

2.6. Distribution spatiale de *Pterocarpuserinaceus* en Afrique

L'aire de répartition couvre l'Afrique occidentale et une partie de l'Afrique centrale, allant du Sénégal à l'Ouest à la République Centrafricaine à l'Est (**Figure 4**).

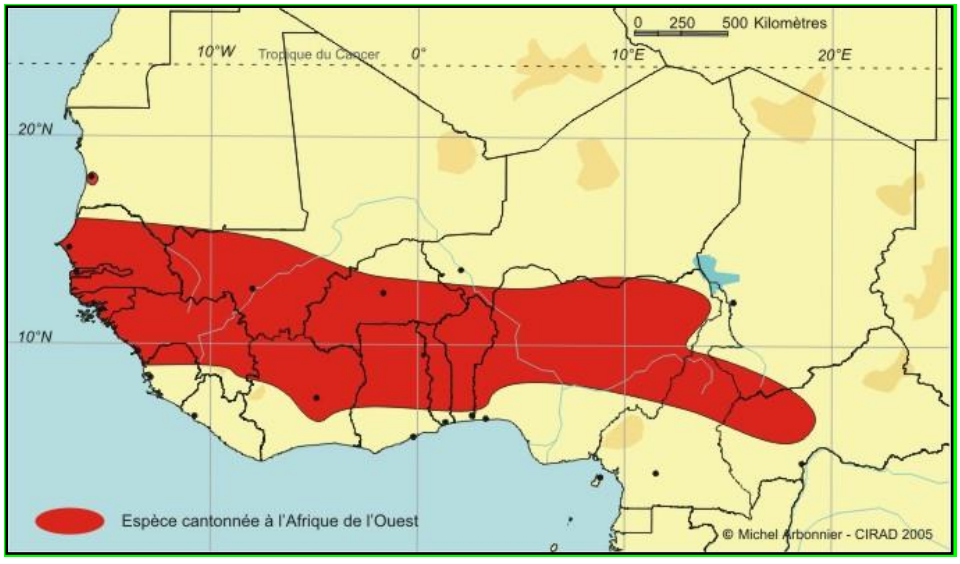
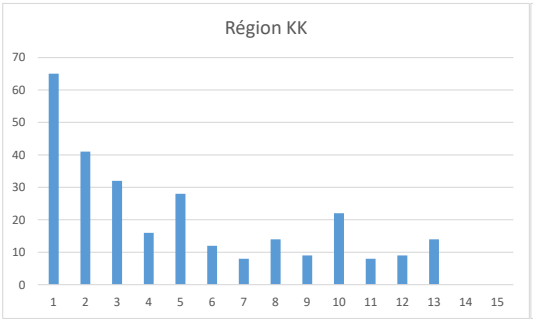


Figure 2. Aire de répartition naturelle de *Pterocarpuserinaceus*.

2.7. Distribution de *Pterocarpuserinaceus*au Mali

L'inventaire forestier national conduit en 2014 a permis de localiser *Pterocarpus erinaceus* dans quatre Régions : Koulikoro (KK), Kayes (KY) , Ségou (SG) et Sikasso (SK). Les figures 4a, b, c et d illustrent les structures diamétriques de l'espèce dans les quatre régions. *P. erinaceus* se comporte globalement bien dans les quatre Régions, avec des structures de population illustrant une assez bonne régénération. Kayes apparaît comme la région qui regorge des grands volumes de *P. erinaceus*.



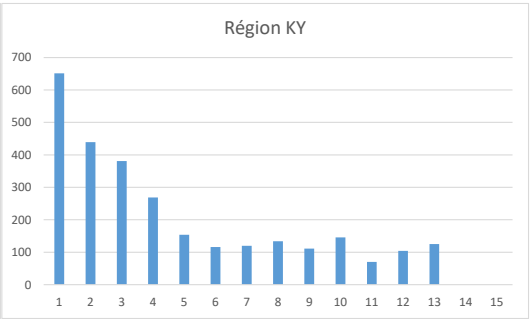
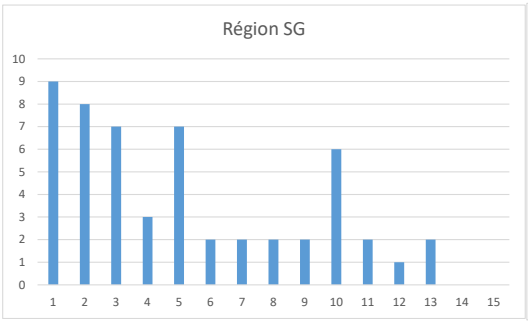


Figure 4a : Structure diamétrique à Koulikoro

Figure 4b : Structure diamétrique à Kayes



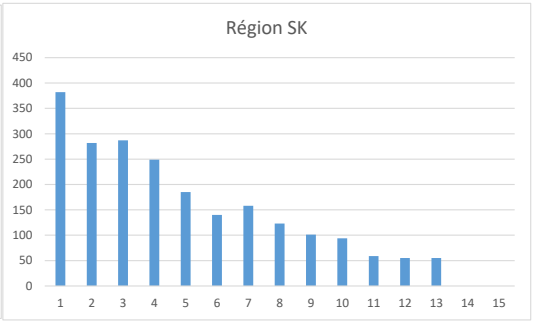


Figure 4c : Structure diamétrique à Ségou

Figure 4. D : Structure diamétrique à Sikasso

CHAPITRE III. INFORMATIONS SUR LA POPULATION DE *Pterocarpus erinaceus* DANS LES MASSIFS FORESTIERS

3.1. Structure des peuplements

La synthèse des structures diamétriques de 148 massifs forestiers avec plans d'aménagement approuvés par l'administration en charge des forêts est illustrée dans la figure 5. Comme pour l'inventaire national, la régénération de l'espèce est assurée. La densité moyenne des tiges est de 23,6 tiges/ha.

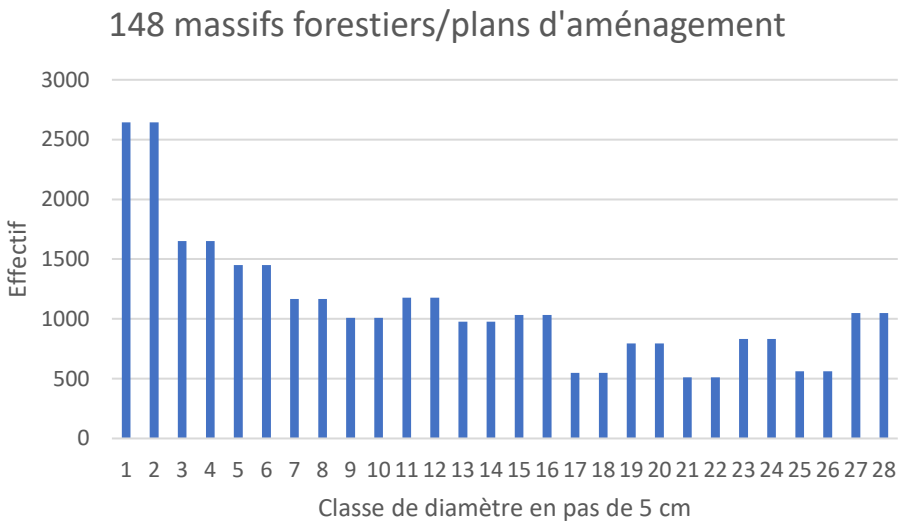


Figure 5. Structure diamétrique de *P. erinaceus* dans 148 massifs forestiers

3.2. Détermination des quotas d'exploitation de Pterocarpus erinaceus pour le Mali

Introduction

La définition des quotas d'exploitation répond au souci de gestion durable des ressources naturelles. Au Mali, les quotas d'exploitation dans les massifs forestiers (forêts protégées) sont fixés à l'échelle des Cercles par une Commission ad-hoc composée des personnels de l'Administration forestière, la Société civile, les concessionnaires forestiers, les communautés locales et les coopératives. Pour les espèces menacées et notamment celles qui sont dans l'annexe II de la CITES, ces quotas sont fixés par l'Autorité Scientifique CITES du Mali.

Les quotas proposés dans le cadre de ce travail ont été définis sur la base des données des inventaires d'aménagement conduits entre 2020 et 2022 par les Concessionnaires forestiers assistés par les bureaux d'étude. Les tables de peuplement de ces plans d'aménagement ont été exploités pour ressortir par forêt la structure diamétrique et le diamètre minimum d'aménagement (DAM) adéquat, c'est-à-dire le diamètre qui permet à la ressource de se régénérée normalement après une certaine rotation (temps de passage entre deux coupes successives). Pour obtenir ce Diamètre (DMA), nous avons essayé de faire varier le taux de prélèvement (Np).

Le Diamètre minimum de fructification régulier (DFR) de *P. erinaceus*est situé autour de 25 cm tandis l'accroissement annuel moyen en diamètre serait de 0,4 cm/an.Au Mali, le diamètre minimum d'exploitabilité de *P. erinaceus* est de 25 cm pour une rotation qui varie entre 6 et 10 ans. Ces deux paramètres mis ensembles ne permettent pas une régénération assurée de l'espèce après exploitation. La détermination du quota a été faite en considérant une rotation de 12,5 ans et un diamètre minimum d'aménagement (DMA) situé au dessus de 50 cm. Les tiges exploitables sont celles qui seront comprises entre le DMA déterminé + 3 classes immédiatement au-dessus de ce diamètre. Le reste des tiges de diamètre au dessus du DMA+3 sont conservées pour constituer encore des semenciers ou porte graines. Sur cette base, seules les forêts qui auront leur taux de reconstitution (%Re) supérieure à 50% à la seconde rotation (c'est-à-dire après 12,5 ans) seront retenues pour exploitation de cette espèce.Toutes ces restrictions font partie des mesures de précaution en ce sens que les tiges soumises à l'exploitation sont non seulement celles qui auront déjà assurer la régénération (production des graines), mais aussi et surtout ces tiges à abattre constituent une fine partie de toutes les tiges exploitables c'est-à-dire de diamètre supérieur au DMA.

Le passage des tiges aux volumes a été fait en utilisant le tarif global du SIFOR et qui précise que : 1 pied de bois d'œuvre = 0,72 $m^{3.}$. Le passage du volume ou quota de récolte au quota de bois débité (ici les madriers) est fait en considérant un rendement matière moyen de 80%, selon les dires des Concessionnaires visités sur le terrain.

Le tableau 1 en annexe présente pour chaque massif identifié, la table de peuplement (distribution des tiges par classe de diamètre). La densité moyenne des tiges de plus de 50 cm de diamètre est de 25 tiges/ha.

La densité, le quota de récolte et le quota des bois débités (madriers) sont présentés dans le tableau 2. Dans l'ensemble, 103 massifs peuvent se reconstituer après la rotation de 12,5 ans

selon les critères fixés. Les 103 massifs totalisent un quota annuel de récolte de **65 302,4 m^3** et un quota en produit madrier de **55384,8 m^3**.

4. RECOMMENDATIONS

1. Respecter le quota annuel Elaborer pour chaque massif forestier de l'aire de distribution de *P. erinaceus*, un plan simple de gestion ;
2. Adopter une rotation d'au moins 12,5 ans ;
3. Respecter le Diamètre minimum d'aménagement défini pour chaque massif sur base du taux de reconstitution et du pourcentage de prélèvement ;
4. Conduire les études d'arbres pour mieux affiner les paramètres d'aménagement
5. Conduire avant toute exploitation, un inventaire d'exploitation géoréférencé dans l'Assiette annuelle de coupe ;
6. Faire un suivi de la mise en œuvre efficace des plans de gestion à élaborer.

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In replying, please quote
Ref.: FD/CITES/1003/23/01

GOVERNMENT OF SIERRA LEONE

Forestry Department,
Ministry of the Environment and Climate Change
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10th March 2023

CITES Secretariat
Palais des Nations
Avenue de la Paix 8-14
CH-1211 Geneva 10
SWITZERLAND

For the attention of the Chair, CITES Standing Committee,

Dear CITES Secretariat,

SUBMISSION OF THE DRAFT NON-DETRIMENT FINDING (NDF) FOR WEST AFRICAN ROSEWOOD *PTEROCARPUS ERINACEUS* IN SIERRA LEONE AND A REQUEST FOR SPECIAL AUTHORIZATION TO EXPORT STOCKPILE OF *PTEROCARPUS ERINACEUS*

Sierra Leone is pleased to inform you that it has made substantial progress in documenting the legality and sustainability of *Pterocarpus erinaceus* harvested pre-Notification to the Parties Nº 2022/021.

As reiterated in several correspondence to the Secretariat about the genuine commitment of Sierra Leone in the development of the Non-Detriment Finding (NDF) and a Legal Acquisition Finding (LAF) for *Pterocarpus erinaceus,* please find attached the draft NDF Report produced by the CITES Scientific Authority, Sierra Leone and guided by the CITES Information Document Inf. 11.3 titled "CITES Scientific Authorities – Checklist to assist in making Non-Detriment Findings for Appendix II exports". The draft NDF Report will serve as a basis for the international experts when conducting the NDF and LAF Review, Report and Traceability for Sierra Leone with guidance from the Secretariat.

The identified international experts have been working with the Secretariat for support and advise on the ongoing compliance recommendations for *Pterocarpus erinaceus.* The draft proposal on the findings has been reviewed by the Secretariat and presented to the Government of Sierra Leone. The contract for the commencement of work will soon be signed between the Government and the Contracting Firm.

Let me at this point draw your attention again to the earnest request from Sierra Leone to export the *Pterocarpus erinaceus* stockpile of 160,000m^3 that were legally harvested pre-Notification to the Parties N^o 2022/021. As a country, we will continue to appeal for your kind consideration because of the continuous deterioration of the stockpile, the costs related to its maintenance and its security, and the damaged caused in terms of the huge investments made by the Timber Concession Companies, and the payments made for timber exportation to the National Revenue Authority before 22nd March 2022.

At this juncture, Sierra Leone invoke the procedure set out in Rule 20 of the Rules of Procedure of the Standing Committee and we humbly crave the indulgence of the Standing Committee to take a decision with respect to the stockpile mentioned, on an extraordinary basis between sessions of the Committee.

Export of stockpile will be in accordance with the provisions of the Convention and the recommendations of the Standing and Plants Committee. Rest assured that Sierra Leone will **ONLY** export legally harvested stockpile of *Pterocarpus erinaceus* and export will not exceed the initial requested amount of 160,000m^3. Also, there is a ban on harvesting of *Pterocarpus erinaceus* for export until the final Non-Detriment Finding (NDF) and Legal Acquisition Finding (LAF) for *Pterocarpus erinaceus* are accepted as credible by the Secretariat and the Chairs of the Standing Committee and of the Plants Committee and an export quota is established. This implies that new consignment will not be added to the existing labeled stockpile of *Pterocarpus erinaceus.*

In concluding, I will continue to reassure you that the Government of Sierra Leone is fully committed to the compliance procedure for *Pterocarpus erinaceus* based on document SC74 Sum.13-11/13/2022 and will enforce measures already in place and devise further methods

to engage in properly regulated and legitimate timber trade. We will further sanitise the trade based on the outcomes of the mandated findings.

While we look forward to hearing from you, please accept our assurances of the highest consideration.

Yours sincerely,

Kate M.B. Karemo-Garnett
Director of Forestry
CITES MANAGEMENT AUTHORITY, SIERRA LEONE

Cc:
The Chief Minister - Office of the President

The Minister of the Environment and Climate Change

The Ambassador Extraordinary and Plenipotentiary to Switzerland and Representative of Sierra Leone in Geneva

The Deputy Minister of the Environment and Climate Change

The CEO, Leadway Trading Company Sierra Leone Limited

The CITES Scientific Authority – Sierra Leone

NON-DETRIMENT FINDING

FOR

WEST AFRICAN ROSEWOOD

PTEROCARPUS ERINACEUS

IN SIERRA LEONE

CITES SCIENTIFIC AUTHORITY
SIERRA LEONE

FEBRUARY 2023

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ACRONYMS / ABBREVIATIONS

CITES	The Convention on International Trade in Endangered Species of Wild Fauna and Flora
DBH	Diameter at breast height.
DFO	District Forest Officer
EPA-SL	Environment Protection Agency Sierra Leone
GDP	Gross Domestic Product
GDI	Gender Development Index
ha.	Hectare
IUCN	International Union of Conservation of Nature
LAF	Legal Acquisition Finding
MA	Management Authority
MPAs	Marine Protected Areas
MAFFS	Ministry of Agriculture, Forestry and Food Security
MDAs	Ministries, Departments and Agencies
NDF	Non-Detriment Finding
NP	National Park
PRS	Poverty Reduction Strategy
RST	Review of Significant Trade
SA	Scientific Authority
WAPNP	Western Area Peninsula National Park

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EXECUTIVE SUMMARY

Sierra Leone (central coordinates 6°55' – 10°14'N and 10°14' – 13°17'W) with a land area of 72,300 km^2 is located on the west coast of Africa, which is also the east-Atlantic coast in Africa. The country's geographic location is a quintessential factor that determines the diversity of its ecosystems, vegetation, and biodiversity. Sierra Leone's vegetation comprises two major biogeographic ecosystems: the Sudan-Guinea savanna biome which occupies most areas of the north to the north-west; and the Guinea-Congo Forest biome stretching across the south to north-eastern flank of the country and constitutes the westernmost extent of the Upper Guinea forest endemic area. Vast areas of savanna woodland (mainly *Pterocarpus erinaceus*) occur in the protected areas of Outamba-Kilimi National Park (OKNP) and Lake Sonfon and their respective environs and other areas extending from the northeast to northwest of the country. According to data from Allan (1990) and Mnzana (1992), the national Forest Estate had an area of 610,122ha (8.4% of the total land area of Sierra Leone) comprising Protected Areas (74,800 ha), Non-Hunting Forest Reserves (360,622ha), and Game Reserves and Game Sanctuaries (60,100ha).

Pterocarpus erinaceus species is logged and traded in Sierra Leone and other West Africa countries mainly for commercial export purposes. The species belongs to the Fabaceae family and native to the Guinean forest–savannah mosaic ecoregion and has been reported from Senegal to Cameroon (Adjonou et al., 2019; Arbonnier, 2004). Recent scientific investigations on *Pterocarpus erinaceus* international trade have highlighted a considerable increase in export volume of its wood from West Africa countries for Asia, particularly China (Dumenu, 2019; Lawson, 2015). During the period after the ten years rebel war in Sierra Leone, the country witnessed dramatic increase in trade of *Pterocarpus erinaceus* in response to rising demand in Asia for rosewood furniture and increasing scarcity of other officially recognized 'rosewood' species.

Based on the progress report of the Review of Significant Trade (RST) submitted by the Plants Committee during the 74th meeting of the CITES Standing Committee in Lyon, France in March 2022, the Standing Committee requested the Secretariat to open an expedited compliance procedure for *Pterocarpus erinaceus* for all range States (Benin, Burkina Faso, Cameroon, Central

African Republic, Chad, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo) based on the exceptional circumstances generated by the documented pervasive illegal trade.

In response to the Notification to the Parties Nº 2022/021, Sierra Leone requested the Standing Committee, Plants Committee and the CITES Secretariat to accept a **Zero Export Quota** for commercial trade in specimens of *Pterocarpus erinaceus* in accordance with Resolution Conf 14.7 (Rev. CoP15) in a letter titled "Submission of Zero Export Quota for Pterocarpus erinaceus" dated 6 April 2022. The Zero Export Quota was chosen as the preferred option now rather than the submission of a Non-Detriment Finding (NDF) and a Legal Acquisition Finding (LAF) for *Pterocarpus erinaceus* in Sierra Leone because it was very difficult to conduct such a scientifically based Non-Detriment Finding that will be accepted as credible by the Standing Committee in advance of the 27th of April 2022 deadline indicated in the Notification. The CITES Secretariat accepted the request and publication was made on the national export quota section of the CITES website.

One of key objective of this study is: To conduct a Non-Detriment Finding (NDF) for *Pterocarpus erinaceus* within Sierra Leone and produce a standard acceptable report for submission to CITES Secretariat including (a) Legal Acquisition Finding (LAF); (b) Traceability mechanism.

This report was prepared by the CITES Scientific Authority, Sierra Leone and guided by the CITES Information Document Inf. 11.3 titled "CITES Scientific Authorities – Checklist to assist in making Non-Detriment Findings for Appendix II exports". The study was conducted in all Regions, Districts and Chiefdoms holding *Pterocarpus erinaceus* in Sierra Leone. Four Regions were visited, comprising eight (8) Districts and fifty-four Chiefdoms. The survey coverage per District/Chiefdom is based on the overall extent of *Pterocarpus erinaceus* woodland in the Chiefdom, and so the larger the cover the greater will be the coverage and the number of plots chosen for the survey. Drone data and GIS mapping tool was used to produce a vegetation status map of the areas where the species occur to give a spatial impression of the extent of the species distribution and the degree of utilization. In each sampling area within a Chiefdom, several sampling units were selected, depending on the spatial coverage of the woodland in that area. The sampling unit was a belt transect of 20m x 50m in which all relevant sampling were implemented to collect the required data, such as count and measurement of trees (DBH ≥10cm), number of

saplings (DBH <10cm), number of seedlings, plots level threats and conservation issues in the chiefdom.

The result of the survey shows that *Pterocarpus erinaceus* has been correctly identified in Sierra Leone and is called by many different names, respectively, depending on the language and dialect of the local communities and indigenous people. The rosewood occurs in woodlands widely distributed in the Districts and Chiefdoms surveyed, but has undergone extensive logging, the intensity of logging varies between locations, depending on accessibility and level of control. Other threats include cutting for charcoal production, slash and burn agriculture, grazing which tramples on and kills seedlings and coppicing stumps, debarking of the trunk of the tree and fungus infestation of the leaves. The wood is in high demand internationally because of its various uses. The wood is highly valued for furniture and cabinet work, but is also used for heavy construction including waterworks, parquet flooring, stairs, implements, turning, sculpturing and sliced veneer. It is also suitable for joinery, interior trim, mortars, pestles, house posts, mine props, ship and boat building, vehicle bodies, sporting goods, toys, novelties, musical instruments (e.g., balafons) and precision equipment. The roots are made into bows. The wood is suitable for fuel and charcoal production.

Based on field data from this study, much of the remaining live tree stock belong to DBH categories of 10-20cm and 21-30cm and about 30% are above 30 cm DBH. The result of the survey shows that a large proportion of the remaining *Pterocarpus erinaceus* trees comprise younger trees. This indicates that the commercially viable and exportable stock in most of Districts is relatively low, although good stock can be found in certain Chiefdoms across all Districts where the woodland occurs. Based on the assessment standards provided by CITES on the NDF process, only twenty-two (41.5%) of the fifty-three Chiefdoms studied have positive NDF; thirty-one Chiefdoms failed the overall NDF criteria. Many of the Chiefdoms with positive NDF are found in the Koinadugu and Falaba Districts of the Northern Province of the country. The key actions proffered to address issues of illegal harvest and unsustainable exploitation is to develop an effective management system for *Pterocarpus erinaceus* including a traceability and chain of custody mechanism that will monitor the entire process from licensing to harvest and exportation.

CHAPTER 1 – SETTING THE SCENE FOR NON-DETRIMENT FINDING FOR *PTEROCARPUS ERINACEUS* IN SIERRA LEONE

1.1 COUNTRY PROFILE

The Republic of Sierra Leone is located on the southwest coast of West Africa, mainly lying between latitudes 7°and 10°N (a small area is south of 7°), and longitudes 10° and 14°W. The country is bordered by Guinea to the north and east, Liberia to the southeast, and the Atlantic Ocean to the west and southwest. Sierra Leone has a total area of 71,740 km^2 (27,699 sq mi), divided into a land area of 71,620 km^2 (27,653 sq mi) and water of 120 km^2 (46 sq mi) according to the United Nations Statistics Division. The country's geography is characterised by five topographic features, namely, coastal lowlands, interior plains, interior plateau, and scattered hills and mountains. Politically, the country has five regions, of which four are provinces (Northern, North-Western, Eastern and Southern) and the fifth, named the Western Area, encompasses a peninsula where the capital city is situated adjacent to largest natural harbour in Africa. In eastern Sierra Leone the plateau is interspersed with high mountains, including Mount Bintumani, which reaches 1,948 m (6,391 ft), the highest point in the country and in West Africa. This region contains catchment sources and drainage basins of some of the major rivers in the country, including the Seli, Sewa and Moa.

The country's geographic location is a quintessential factor that determines the diversity of its ecosystems, vegetation, and biodiversity. Traversing the center of the country is a region of lowland plains, containing forests, bush, and farmland, occupying about 43% of Sierra Leone's land area. Towards the northern sections is an area categorized by the World Wildlife Fund as part of the Guinean forest-savanna mosaic ecoregion, which forms a transition zone between the northern savanna vegetation and the closed forest southern areas. In the south and southeast, lowland rainforest and farmlands predominate the landscape and accounts for a greater proportion of the Forest Reserves in the country. The west of Sierra Leone is bounded by the east-Atlantic coast, running for some 400 km (249 miles) of coastline, giving it bountiful marine resources, extensive sandy beaches, and attractive tourist potentials. The key ecological feature of the low-lying coastal areas is the Guinean mangroves swamp.

The climate is tropical, with two seasons determining the agricultural cycle: the rainy season from May to November, and a dry season from December to May, which includes harmattan, when cool, dry winds blow in from the Sahara Desert and the night-time temperature can be as low as 16 °C (60.8 °F). The average temperature is 26 °C (78.8 °F) and varies from around 20 to 36 °C (70.8 to 96.8 °F) during the year. In recent times the duration and intensity of rainfall is anecdotally thought to be erratic, adversely affecting agricultural activities, whilst the range of diurnal temperatures is shifting towards higher figures, encouraging greater infestation of tropical disease vectors like mosquitos and houseflies.

Statistics Sierra Leone recorded a total population of 7,092,113 for the 2015 Population and Housing Census (PHC). This comprises a household population of 7,076,119, and an institutional population of 15,994. By type of residence, the 2015 PHC reveals that 4,187,016 people live in the rural areas (59.0%), and 2,905,097 people live in the urban areas (41.0%). According to UNDP HDI Report (2022), Sierra Leone's HDI value for 2021 is 0.477, which puts the country in the low human development category and keeps it 181 out of 195 countries and territories. The following data applies to Sierra Leone's current development status: Life expectancy at birth stands at 60.1 years in 2022; Expected years of schooling and mean year of schooling are given as 9.5 and 3.3, respectively; Gross National Income (GNI) per capita increased to $1,622 since the decline caused Ebola Virus Disease (EVD) outbreak in 2014; Gender inequality remains high though in a downward trend, with the female Gender Development Index (GDI) value given as 0.452 in contrast with 0.506 for males, giving a comparative GDI value of 0.893. Overall, Sierra Leone HDI in 2022 shows a reasonable improvement compared to the last two decades. However, as a measure of multiple deprivations in a household in education, health and living standards, 59.2% of Sierra Leoneans are considered multi-dimensionally poor.

Agriculture constitutes the key economic activity, accounting for almost 50% of the country's GDP, and employing about 60% of the national work force (ICADEP, 2014). The form of agriculture practiced by most farmers in Sierra Leone is very rudimentary and is characterized by the archaic slash-and-burn fallow cultivation (Birchall et al., 1979; Gordon et al., 1979; Gleave, 1996). Over the years, as the land availability becomes limited by growing population and traditional governance system, anecdotal evidence show that the farming system has changed from a traditional shifting cultivation (wherein the farming village moving from one location to another

to farm) to a more sedentary fallow mechanism (wherein the village remain in one location and the farming plots rotated). Of the national land area, 5,360,000ha (approximately 74%) are arable, of which 80% constitute upland ecosystems (NRDS, 2009). The agriculture sector is the largest employer of about 2.5 million people and accounts for about 50% of GDP, yet less than five percent of the farming families have access to fertilizers, insecticides, herbicides, and basic machinery which are resources that could help enhance crop production (NRDS, 2009).

1.2 VEGETATION DISTRIBUTION

Sierra Leone's vegetation comprises two major biogeographic ecosystems: the Sudan-Guinea Savanna biome which occupies most areas of the north to the north-west; and the Guinea-Congo Forest biome stretching across the south to north-eastern flank of the country and constitutes the westernmost extent of the Upper Guinea Forest endemic area. Mixed elements of these two major biomes occur in places, mainly in the transition zones between the northern and southern sections. The current vegetation map of Sierra Leone (Figure 1.1) shows a vast area of degraded land (pale green), mainly comprising bush fallows (farm bush), covering approximately 50% of the land area.

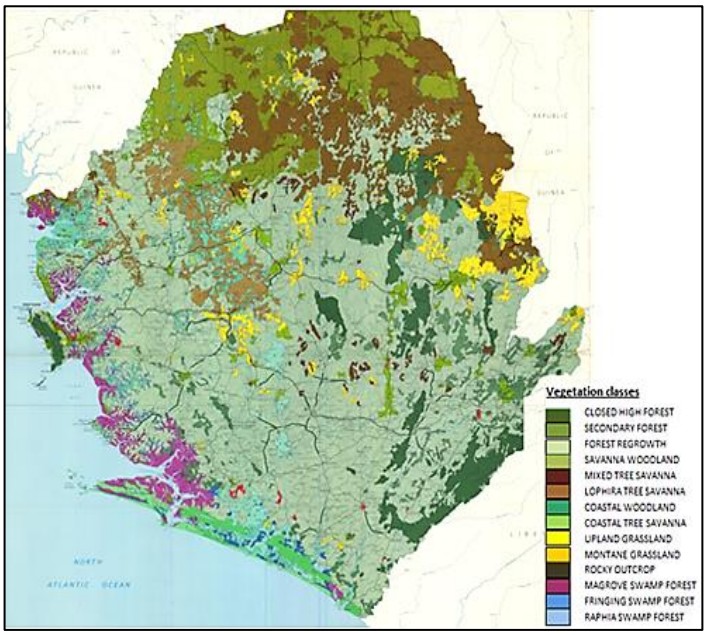

Figure 1.1 - Vegetation distribution map of Sierra Leone (Source: Panagos et al, 2011). Note that the closed moist forests are limited to the north-east to the south-east of the country.

Closed forest vegetation, which is apparently declining, accounts for only about 3-5% of the land area (Savill and Fox: 1969; Gordon et al 1980; Unwin 1922), which is a vast difference from the estimated 60% cover over a century ago. However, Elliot and Raisin (1893) observed that most of the country was covered in secondary forest by late 1800s. The Gola Rainforest National Park accounts for the largest tract of closed forest cover: 71,070 ha representing 25% of the estimated 285,000 ha of forest estate in the country. Significant closed forests can also be found in the major Forest Reserves. In the north to northwest the vegetation is mainly savanna, with mixed elements of woodland and grassland ecosystems. Table 1.1 shows the diversity of plant communities in the major ecosystems in Sierra Leone.

Table 1.1 - Diversity of plant communities found in the major ecosystems in Sierra Leone and their land coverage (Source: Karim, 1996)

Plant Community	Area (ha)	% of country
Tropical Closed Forest		
Moist closed evergreen rain forest	358,700	5.0
Moist semi-deciduous forest	258,264	3.6
Moist montane forest	NA-	NA
Secondary forest & forest regrowth	**3,766,350**	**52.2**
Edaphic / Swamp Forest		
Fresh inland valley swamp forest	107,610	1.5
Riverine, riparian and gallery forests	35,870	0.5
Mangrove swamp forest	172,176	2.4
Raphia swamp forest	28,690	0.4
Savanna		
Savanna-Forest mosaic -	616,964	8.6
Woodland Savanna (Pterocarpus)	724,574	10.1
Southern Guinea or mixed savanna	265,438	3.7
Lophira tree savanna	107,610	1.5
Coastal Park savanna	251.090	3.5
Tropical Grasslands		
Riverine grassland	179,350	2.5
Bolilands (seasonally flooded grasslands)	71,740	0.1
Montane grassland	NA-	NA
Plantations		
Rubber	-	-
Oil palm	71,740	0.1
Cacao and Coffee	165,002	2,3
Forest tree plantations	NA	NA

The largest area of savanna ecosystem under protection is the Outamba-Kilimi National Park covering a total of 110,900 ha, in two separate portions: Outamba 74,100 ha and Kilimi 36,800 ha. There are some elements of savanna found at Lake Sonfon- a proposed Game Sanctuary, a vast area of woodland (mainly *Pterocarpus erinaceus*) on the Sula Mountain range and environs and montane grasslands at Loma Mountains National Park and Tingi Hills Non-Hunting Forest Reserve. In addition, some of these savanna areas are interspersed by patches of closed forest, giving rise to forest-savanna mosaic vegetation.

The wetlands in Sierra Leone cover a land area of about 4,838 km2 (Bah, 1994) and can be categorized into two main types – the inland wetlands (floodplains, lakes, and rivers) with vegetation typical of freshwater swamp forests, riparian zones and bolilands; and the coastal/marine wetlands, mainly associated with mangroves, sand flats and mud flats. There are ten major rivers in the county running almost parallel in the northwest direction, many of which empty into the Atlantic Ocean through estuarine systems. The lakes form the catchment area for numerous streams and tributaries associated with the river systems. Lake Sonfon, Lake Mape and Lake Mabesi are the larger lakes, whilst Lake Idrissa, Lake Dakrafi and Lake Ronietta are among the well-known smaller lakes. The rivers and lakes are a major source of ecosystems services to the local communities including water supply, fish and a host of other food and life-supporting resources.

The shores of Sierra Leone run for about 560 km northeast to south, and a continental shelf of area 25,000 km^2. There are four major estuarine systems that form the drainage basins of the network of rivers and accounts for the largest proportion of mangrove swamps in the country. The total mangrove estate covers area of 172,000 hectares of mangroves covering about 825 km of coastline, bays and creeks, extending 30 to 50 km inland. The mangrove plant communities comprise of five species - *Rhizophora racemosa, Rhizophora harrisonni, Rhizophora mangle, Avecenia nitida,* and *Laguncularia racemosa,* which are found differentially in various locations along the river beds and coastlines. Intermingled among the mangroves are other plant species such as *Paspalum vaginatum, Sesuvium species* and *Philoxerus vermicularis*. Apart from mangroves the coastal resources include sandy beaches, mud flats, cliffs, wildlife, cultural and historical sites and attractive landscape.

1.3 FOREST GOVERNANCE CONTEXTUAL ANALYSIS

Forest governance issues are complex and involve multiple actors with diverse interests. Therefore there is an urgent need for forest governance context analysis in Sierra Leone to assess the breadth of the governance, identify any knowledge gaps, governance issues affecting the Forestry sector, identify the enablers and constraints for the implementation of reforms in the sector where necessary.

The challenges being experienced in the Forestry Sector are a consequence of the broader development challenges facing the country. Rapid population growth with limited economic opportunities, widespread poverty and urbanization have generated a high demand for agricultural land, housing, fuel wood and timber. Although the Sierra Leone's Medium -Term National Development Plan 2019-2023 underscores the important role of the Forestry Sector to the attainment of the country's development goals, the policy emphasis on economic growth and foreign investment that will contribute to the conversion of forests into industrial land and thereby increasing threats to biodiversity as well as the livelihoods of forest dependent communities.

Even though many actors and factors are contributing to the problem, the inability to curb the degradation of forests can be attributed to gaps in stewardship and the way forest resources are managed. The analysis should also bring out whether forest governance in Sierra Leone is characterized by a lack of transparency and accountability, insufficient participation of key stakeholders in decision-making processes and poor coordination and cooperation of institutions working with the Forestry Department.

Additional information is also required on the following: -

- Is the Forestry Sector depending on donor support, the central government as well as revenues generated from fees for funding to support the sustainable management of forest resources?
- What are the technical capacities with respect to data/ knowledge on national forest inventory and information management systems within the sector?
- Are there overlapping roles and coordination between the various Ministries, Departments and Agencies collaborating with the Forestry Department to manage forest resources?

- Is there clarity and consistency within and between laws in related sectors (Forestry, Agriculture, Lands, Mining and Energy)?
- Are there vested political and economic interests in the forestry activities?
- What provisions are made to strengthen accountability mechanisms and protect the rights of forest dependent communities for collaborative forest governance arrangements.
- Are there leakages in the system for corruption in the issuance of logging permits, valuation of timber, collection of revenue from timber sales and conversion/degazetting of Forest Reserves, Community Forests and National Parks with the provision of illegal land titles and is it likely to lead to negative long term economic impacts caused by environmental degradation and climate change?

1.4 *PTEROCARPUS ERINACEUS* CONTEXTUAL ANALYSIS

Pterocarpus erinaceus species belonging to the Fabaceae family is extensively harvested and traded in the sixteen known range States namely: Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo. In Sierra Leone, it is found only in the North-West and North-East regions and part of the Kono District in the Eastern region. However, few are found in some parts in the Western Area, Moyamba and Bo Districts in areas that borders with the Districts of dominance.

During the period after the ten years rebel war in Sierra Leone, the country witnessed dramatic increase in trade of *Pterocarpus erinaceus* in response to rising demand in Asia for rosewood furniture and increasing scarcity of other officially recognized 'rosewood' species. Prior to the war, this species was considered uneconomical, not useful, and disregarded in many communities and the entire country. During those pre-war years, it was used as medicine for certain ailments and sicknesses such as stomachache, paralysis, cleaning of the breast milk of the lactating mothers after weaning the baby from breastfeeding etc. It was also used in those years in building local canoes and bridges, among others.

With increase international trade controls for the *Dalbergia* species in keeping with decisions made by the 17th Conference of the Parties (CoP17) to the Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES), the trade shifted to alternate Rosewood as replacements, particularly in the *Pterocarpus* genus (Winfield et al., 2016). Stands of this Leguminous species are especially targeted for timber and fuel wood production (Figure 1.1), but this species also has several medicinal uses (Fontodji et al., 2011; Kokou et al., 2009; Segla et al., 2015). As a woodworking material, the quality is very high and expensive at international level. Its traditional medicine uses has increased in sub Saharan Africa (Duvall, 2008; Karou et al., 2003; Ouedraogo et al., 2012). Treanor (2015) reported a higher figure of 151,037 m3 of rosewood logs emanating from Ghana to China in 2014.

Recent scientific investigations on *Pterocarpus erinaceus* international trade have highlighted a considerable increase in export volume of its wood from West Africa countries for Asia, particularly China (Dumenu, 2019; Lawson, 2015). Available information suggests that Pterocarpus erinaceus was in 2015 the most traded species of "Hongmu", in volume, at the international level. In West Africa, rosewood over exploitation and export faced dramatic increase to meet Chinese classical furniture between 2010 and 2016 after their classification as Hongmu (Redwood) compared to export before 2010. Unless rapidly checked unsustainable exploitation of the species for international trade is likely to have serious negative impacts on the species itself, the ecology of the West African dry forests and the human population of the West African savanna who depend on it. To prevent the decline of this species and to regulate its exploitation and export, ten West African countries led by Senegal, the European Union and Chad submitted a proposal for the species to be moved from Appendix III to II on the CITES Appendix and it was adopted. The implication of this great achievement among other issues is that before any permit for trade can be issued, a Non-Detriment Finding (NDF) must be carried out. This is a science-based study that assesses whether any trade will have a negative (or detrimental) effect on the survival of that species. More than that, it looks at whether a trade would allow populations of the specific species to be maintained, throughout its range and at a level 'consistent with its role in the ecosystems in which it occurs. To define export quotas and comply with existing CITES resolutions, it is expedient to conduct Non-Detriment Finding (NDF) and Legal Acquisition Finding (LAF) for Pterocarpus erinaceus in Sierra Leone.

Some of the concerns identified that should be addressed before the commencement of trade of this species includes but not limited to the following:

- Quantitative information on the total population of the species or other indices of population abundance, the total area of relevant habitat or the average density of stems per hectare
- The largest specimens are supposed to be targeted for timber production but with increase in demand of this species, will harvesting lead to a skewing of the population structure towards immature specimens?
- Identification of the different types of Pterocarpus species found in Sierra Leone
- Do the existing legal instruments have special measures for the protection or management of this species?

1.5 AIM AND OBJECTIVES FOR CONDUCTING NON-DETRIMENT FINDING FOR *PTEROCARPUS ERINACEUS* IN SIERRA LEONE

The aim was to conduct a study to determine that the harvesting and exportation of *Pterocarpus erinaceus* is not detrimental to the survival of the species in Sierra Leone.
The specific objectives include but not limited to the following alone:

1. To verify the identification, spatial extent, distribution, and conservation status of *Pterocarpus erinaceus* in Sierra Leone.
2. To conduct a Non-Detriment Finding (NDF) for *Pterocarpus erinaceus* in Sierra Leone and produce a standard acceptable report for submission to CITES Secretariat including the following:
    a) Legal acquisition finding (LAF)
    b) Traceability mechanism
3. To build capacity in Sierra Leone for future NDF and LAF process

1.6 RATIONALE FOR A NON-DETRIMENT FINDING FOR *PTEROCARPUS ERINACEUS* IN SIERRA LEONE

Sierra Leone is a Party to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten the survival of the species. The species covered by CITES are listed in three Appendices, according to the degree of protection they need.

West African Rosewood *Pterocarpus erinaceus* is a CITES-listed species in Appendix II and a native to Sierra Leone. Species under Appendix II are not necessarily threatened with extinction, but trade must be controlled to avoid utilization incompatible with their survival. The last few years have seen a dramatic increase in international trade of *Pterocarpus erinaceus* timber, in response to rising demand in Asia for rosewood furniture.

Based on the progress report of the Review of Significant Trade (RST) submitted by the Plants Committee during the 74th meeting of the CITES Standing Committee in Lyon, France in March 2022, the Standing Committee requested the Secretariat to open an expedited compliance procedure for *Pterocarpus erinaceus* for all range States (Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo) based on the exceptional circumstances generated by the documented pervasive illegal trade.

Sierra Leone received a communication from the CITES Secretariat via Notification to the Parties N^{o} 2022/021 titled "Expedited application of Article XIII for West African rosewood *Pterocarpus erinaceus* for all range States" dated 28 March 2022 inviting, *inter alia*, range States to submit to the Secretariat within 30 days of receipt of same, a written justification that the expedited compliance procedure pursuant to Article XIII is not applicable to them. This justification, is occasioned due to the exceptional circumstances generated by the illegal trade in *Pterocarpus erinaceus*, should be done by either providing their non-detriment finding (NDF) and legal acquisition finding (LAF), or by requesting a voluntary zero export quota.

In response to the Notification to the Parties Nº 2022/021, Sierra Leone requested the Standing Committee, Plants Committee and the CITES Secretariat to accept a **Zero Export Quota** for commercial trade in specimens of *Pterocarpus erinaceus* in accordance with Resolution Conf 14.7 (Rev. CoP15) in a letter titled "Submission of Zero Export Quota for Pterocarpus erinaceus" dated 6 April 2022. The Zero Export Quota was chosen as the preferred option now rather than the submission of a Non-Detriment Finding (NDF) and a Legal Acquisition Finding (LAF) for *Pterocarpus erinaceus* in Sierra Leone because it was very difficult to conduct such a scientifically based Non-Detriment Finding that will be accepted as credible by the Standing Committee in advance of the 27th of April 2022 deadline indicated in the Notification. The CITES Secretariat accepted the request and publication was made on the national export quota section of the CITES website.

On 24 June 2022, the Plants Committee agreed that, in the context of paragraph 1 g) of Resolution Conf. 12.8 (Rev. CoP18), '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 are found in the Annex to the Notification to the Parties Nº 2022/050 titled "Intersessional decision-making of the Plants Committee - Review of Significant Trade for *Pterocarpus erinaceus*" dated 29 June 2022. Outlined below are the recommendations for Sierra Leone.

<u>Short term recommendations Within 30 days:</u>

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.

As indicated earlier, recommendation (a) has been accepted by the CITES Secretariat and publication made on the national export quota section of the CITES website. According to recommendations (c) and (d), to define export quotas and comply with existing CITES resolutions, it is expedient to conduct Non-Detriment Findings for *Pterocarpus erinaceus* in Sierra Leone.

Due to the exigency in providing the Non-Detriment Finding (NDF) and Legal Acquisition Finding (LAF) for Pterocarpus erinaceus in Sierra Leone, the CITES Scientific Authority, Sierra Leone and Team started the data collection in the field immediately. He is guided by the CITES Information Document Inf. 11.3 titled "CITES Scientific Authorities – Checklist to assist in making Non-Detriment Findings for Appendix II exports". In Resolution Conf. 14.7 (Rev. CoP15) on Management of nationally established quotas, CITES Parties *"recognized the linkage between export quotas and NDFs and adopted guidelines to manage these quotas. In particular, they agreed that an export quota system is a management tool, used to ensure that exports of specimens of a certain species are maintained at a level that has no detrimental effect on the population of the species. The setting of an export quota advised by a Scientific Authority effectively meets the requirement of CITES to make an NDF for species included in Appendix I or II and, for species in Appendix II, to ensure that the species is maintained throughout its range at a level consistent with its role in the ecosystems in which it occurs. When export quotas are established for the first time or revised, this should be as a result of an NDF by a Scientific Authority and this NDF should be reviewed annually."*

Figure 1.2 – Photo of semi-processed *Pterocarpus erinaceus* loaded for transport to depots in Freetown.

CHAPTER II - POLICY AND LEGISLATIVE PROVISIONS

2.1 SIERRA LEONE'S FORESTS

The history of Sierra Leone's effort in the conservation and management of natural habitats dates to the 19th century and the Forestry Department was constituted in 1911 to protect and conserve the dwindling forests in the country.

According to The Forestry Act of 1988, two main categories of forests are identified in Sierra Leone: **Classified Forests**, embracing National Production and Protection Forests (Forest Reserves) and **Community Forests** (Protected). Forests outside Forest Reserves and Protected Forests which are neither a Game Sanctuary nor other area declared by Government are considered Unclassified Forests and include Private Forests.

The **National Forest Estate** is made up of Gazetted Forest Reserves, Proposed Reserves and Communal Forests on Chiefdom lands. All forest lands except Forest Reserves are subject to local traditional land use rights. Most of the Production Forests lie in the East of the country, about half of the Estate is the north is savannah and over half the forests of the Western Area are Protection Reserves.

Forest tenure is closely linked to the land tenure system of the country. Generally, land tenure in the Western Area, i.e., in the capital city of Freetown and its environs formerly known as the "colony" is free hold. In the provinces however, ownership of land is vested in the community or family. Hence forests on land in the Western Area belong to the owner of the land while forests on land in the provinces belong to the community or to families.
Forest Reserves are forest areas constituted legally by Government as National Forests for purposes of protection, production or for environmental stability. They are wholly and solely under jurisdiction of the Forestry Department.

Community Forests, also called Protected Forests, are located on Chiefdom lands, and are managed by the Forestry Department in collaboration with the Chiefdom Council. It is possible

for Community Forests to be managed by credible and trained Forest Associations or Forest Cooperatives on the basis of an agreement with the Chiefdom Council and the Forestry Department. Revenue accruing from the utilization of Community Forests is paid to the chiefdom in which the forests are located. Private forests are owned and managed by families under the supervision of the Forestry Department.

According to data from Allan (1990) and Mnzana (1992), the national Forest Estate had an area of 610,122ha (8.4% of the total land area of Sierra Leone) comprising Protected Areas (74,800 ha), Non-Hunting Forest Reserves (360,622ha), and Game Reserves and Game Sanctuaries (60,100ha). Following the recommendations in the National Biodiversity Strategic Action Plan in 2003, the Forestry Department released four Non-Hunting Forest Reserves which have been proclaimed as National Parks, an island upgraded to a Game Sanctuary and also proposed a significant number of others including wetlands to form the network of protected areas across the country. A representative sample of the Forest Estates in Sierra Leone, their respective sizes and region where they occur is presented in Table 2.1

Table 2.1 - A Representative sample of the Forest Estates in Sierra Leone, their respective sizes and region where they occur.

Protected Terrestrial Forest	Size (ha)	Province
Gola Rainforest National Park	71,070	East
Tonkoli Forest Reserve	47,656	North
Loma Mountains National Park	33,200	North
Kambui Hills Forest Reserve	21,213	East
Dodo Hills Forest Reserve	21,185	East
Western Area Peninsula National Park	17,800	West
Tama Forest Reserve	17,094	North
Nimini Hills Forest Reserve	15,557	East
Tingi Non-Hunting Forest Reserve	11,885	East
Kangari Non-Hunting Forest Reserve	8,573	South
Kuru Hills Forest Reserve	7,001	North
Kasewe Forest Reserve	2,333	North
Moyamba Hills Forest Reserve	4,000	South
Outamba Kilimi National Park	110,900	North
Total size	**389,467**	

2.2 OTHER LEGISLATIVE PROVISIONS

2.2.1 Legal and Policy Framework

In our effort to tackle the numerous challenges engulfing our Forestry Sector, it has become very clear that the outdated Forestry Act of 1988 is a major limitation. Currently **The Forestry Act of 1988** is the primary legislation guiding the efficient management and regulation of forestry, Classified and Unclassified Forests in Sierra Leone and the establishment of a Reforestation Fund but lacks the required measures to address the emerging issues such as climate change, community-based forest management, adequate revenue generation, commeasurable fines to offenses, promoting the use of Non-Timber Forest Products, Forest Investment Plan, domesticating CITES etc.

It is now clear that we urgently need a holistic review of the Forestry Act of 1988 to make it more responsive to current day challenges and emerging issues for sustainable forest management specifically and to sustainable environmental management in general.

When this Act is reviewed: -

i) It will ensure the sustainable management of our forest resources in Sierra Leone taking into consideration the economic benefit, environmental protection and enhance local community participation.

ii) It will address the alarming rate of deforestation, land degradation and other environmental challenges.

iii) It will address present day challenges, emerging issues, enhance enforcement and compliance and upgrade to international best practices and standards.

iv) It will increase the forest cover and as a result boost our carbon stock for trading.

The following subsections from other legislations provide an analysis of the provisions related to this study: -

The Forestry Policy 2010

The Constitution of the Republic of Sierra Leone provides that the State shall "harness all the natural resources of the nation to promote national prosperity and an efficient, dynamic and self-reliant economy" (Section 7(1)a). This policy provides one tool by which this constitutional requirement is met.

Specific policy statements and strategies within this policy find support in other relevant provisions of the Constitution. This includes Section 18, which permits restrictions on activities within forests "which is reasonably required in the interests of … conservation of the natural resources" and Section 10.D which requires "respect for international laws, treaties and obligations, as well as the seeking of settlement of international disputes by negotiation, conciliation, arbitration or adjudication." This Forestry Policy also supports strategies outlined in the Framework for Effective Management of Natural Resources, found in Section 11 of the Sierra Leone Poverty Reduction Strategy II, "Agenda for Change" (PRS II) and Mid-term Development Plan of 2018. Specific to forestry, the framework urges the formulation of new Forest Policy and Legislation based on resource inventory information and the principles of Sustainable Forest Management (Section 11.4). The PRSP II recognizes that sustainable forest management can be consistent with poverty reduction strategies such as eco-tourism, community management, and commercialization of forest lands. Further the PRSP II identifies certified timber markets as a means of promoting "principles of the rule of law, governance and sustainable trading".

The following policy statements below is a summary of few in the Forestry Policy of 2010, each having a set of strategies to implement and ultimately accomplish that policy statement. Successful implementation of most strategies will require participatory engagement of a range of stakeholders: -

- Policy Statement on Land Use Planning - Engage in land use planning processes for forestlands with relevant stakeholders.
- Policy Statement on Forest Reserve Management - Support the development of collaborative partnerships with rural communities and other relevant stakeholders for the

sustainable management of Forest Reserves to ensure a sustainable stream of economic, social and environmental benefits.

- Policy Statement on Community Forest Management - Support the establishment, expansion, and management of community forests for economic benefits and forest ecosystem health.
- Policy Statement on Timber-based Enterprises - Contribute to the sustainable development of timber-based enterprises through effective resource management, monitoring and regulation.
- Policy Statement on Non-Timber Forest Product-based Enterprises - Contribute to the sustainable development of non-timber forest product (NTFP)-based enterprises through effective resource management, monitoring and regulation, and coordination with relevant agencies.
- Policy Statement on Research - Adopt, adapt and utilise best practices and science-based research to support and improve sustainable forest management.
- Policy Statement on Capacity Building for Forestry Division staff and stakeholders - Increase the capacity of the Forestry Division and relevant stakeholders to meaningfully engage and contribute to the management of forest resources.

The Environment Protection Agency Act of 2008 and Amendment of 2022.

The functions of the Environment Protection Agency Sierra Leone (EPA-SL) in relation to this study are stipulated in relevant sections of Part III Section 12 of the Act as follows:

12(a) *advice the Minister on the formulation of policies on all aspects of the environment and in particular make recommendations for the protection of the environment,*

12(h) *prescribe standards and guidelines relating to ambient air, water and soil quality, the pollution of air, water, land, and other forms of environmental pollution, including the discharge of wastes and the control of toxic substances,*

12(J) *act in liaison and cooperation with government agencies, local councils and other bodies and institutions to control pollution and generally protect the environment,*

12(l) *promote studies, research, surveys and analyses for the improvement and protection of the environment and the maintenance of a sound ecological system,*

12(m) *initiate and pursue formal and non-formal education programmes for the creation of public awareness of the environment and its importance to the economic and social life of Sierra Leone,*

12(n) *promote effective planning in the management of the environment.*

To ensure its effectiveness in the discharge of its function, the Agency operated under the Office of the President between 2008 and 2018. Presently, a Ministry of the Environment and Climate Change has been formed and the operations of the EPA-SL is now under the direction of the Minister.

The Local Government Act of 2004 and Amendments of 2016, 2022

The operations of all local council are guided by the 2004 Local Government Act and its amendment of 2016. In Part V, Section 20 of the Act, it states as follows:

A local council shall be the highest political authority in the locality and shall have legislative and executive powers to be exercised in accordance with this Act or any other enactment, and shall be responsible generally for promoting the development of the locality and the welfare of the people in the locality, with the resources at its disposal and with such resources and capacity as it can mobilise from the central government and its agencies, national and international organisations and the private sector.

Specifically, the Act provides for local councils in carrying out their functions, in the following paragraphs: 2(a) mobilise the human and material resources necessary for the overall development and welfare of the people of that locality; 2(b) be responsible for the development, improvement and management of human resources and the environment in the locality. With regards to the use of land, the Act in Section 20 paragraphs 28 stipulate that local council shall cooperate with the chiefdom council to 28(c) making and enforcing byelaws; and 28(d) holding land in trust for the people of the chiefdoms.

CHAPTER III - METHODOLOGICAL APPROACH FOR THE NON-DETRIMENT FINDING (NDF)

3.1 SURVEY AREAS AND MAPPING

The surveys were carried out in eight Districts encompassing fifty-three chiefdoms in Sierra Leone, where *Pterocarpus erinaceus* dominated woodlands occur. These Districts and their political regions covered in the study are given in Table 3.1.

Table 3.1 – Locations where NDF study for *Pterocarpus erinaceus* were conducted.

PROVINCE	DISTRICT & No. OF CHIEFDOM	LIST OF CHIEFDOMS
EASTERN PROVINCE	Kono District (7)	Sandoh, Fiama, Gbanekondor, Lei, Mafindor, Soa & Toli
NORTHEN PROVINCE	Bombali District (3)	Biriwa, Gbendembu, Kamaranka
	Tonkolili District (3)	Dansogoia, Kholifa-Mabang, Sambaia
	Koinadugu District (6)	Alkalia, Diang, Kamekeh, Nieni, Tamisso & Wara Wara Yagala
	Falaba District (13)	Kamadugu, Kurosaradu, Morigindu, Mongo-Bendugu, Nyedu, Kabillia, Delmadugu, Barawa, Sulima, Neya, Folosaba-Kamba, Dembelia-Sinkunia & Dembelia-Musaia
NORTH-WESTERN PROVINCE	Kambia District (8)	Bramaia, Dixon, Khonimakeh, Mambolo, Masungbiaia, Muno-Talah, Samu & Tonko-Limba
	Karene District (11)	Buya, Gbanti, Lebei-Saygahun, Mafonda-Makerembay, Romende, Sanda-Loko, Sanda-Magbolontor, Sanda-Tenderan, Sella-Limba, Tambakha-Simibungie & Tambakha-Yobangie
	Port Loko District (2)	Bureh & Kasseh

The vegetation characterizing the ecosystem in these provinces is woodland and grassland savanna and a mixture of both in some places. *Pterocarpus erinaceus* is among the most dominant tree stands in the woodland and so it is presumed to be harvested in all these areas.

A GIS mapping tool was used to produce a vegetation status map of the areas where the species occur to give a spatial impression of the extent of the species distribution and the degree of utilization. The GIS mapping exercise 4also provided analysis of the viable and non-viable quantities of the species from a spatial point of view, based on non-differential vegetation index tool. This information provided indications of where the ground truthing team should focus on in terms of assessing relative viability and sustainability for utilization of the species.

3.2 THE NDF METHODOLOGY/ PROCEDURES

The procedures for conducting an NDF was initially developed by IUCN (Rosier and Haywood, 2002). This was further discussed at the Cancun NDF workshop in 2008 for application to diverse taxonomic groups that resulted in the development of NDF Guidance (Rose, 2014) and NDF Guidance for perennial plants (Wolf *et al*., 2016). This report was prepared following the NDF Guidance developed by Leaman and Oldfield (2014) and the improved version by Wolf *et al*., 2016 and 2018 for perennial plants and specifically for timber tree species respectively. The NDF process comprises of nine steps (Figure 3.1) which are: -

1. Review specimen identification,
2. Review compliance with requirements for artificial propagation,
3. Review relevant exclusions and previously made NDFs,
4. Evaluate conservation concerns,
5. Evaluate potential biological risk,
6. Evaluate impacts of harvest,
7. Evaluate impacts of trade,
8. Evaluate effectiveness of existing management measures and

9. Make a non-detriment finding or provide related advice.

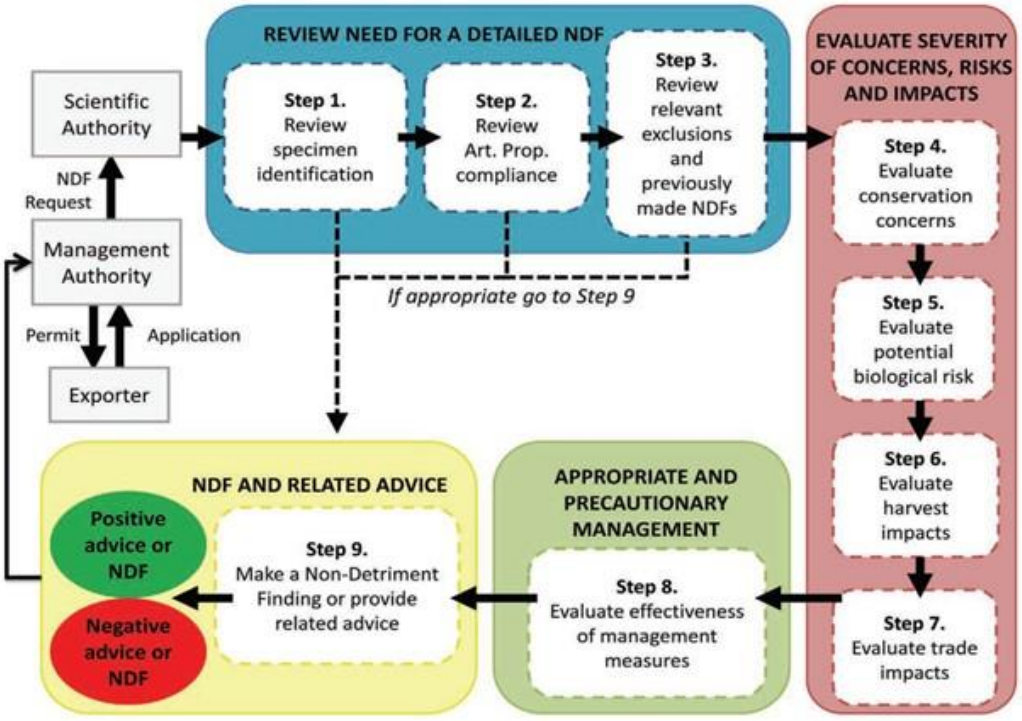

Figure 3.1 - Making NDF for Timber Tree Species - A nine-step process (Wolf *et al.*, 2018).

3.3 GIS AND DRONE COVERAGE

Drones have shown to be among the most effective tools for research and monitoring of species and ecosystems, and its use has been growing globally. In this study, drone coverage was used to provide real-time aerial data on *Pterocarpus erinaceus* vegetation status and was very helpful to provide information on areas that seem difficult to reach during the survey. The data generated provided indications of the intensity of logging as a back-up to practical field measurements and GIS.

Each survey unit, defined by a District or Chiefdom (depending on the size of the *Pterocarpus erinaceus* cover) received at least one-hour drone coverage which culminated into a total of ten hours drone footage across all survey sites, and made available for analysis. The drone data generated was useful in producing relevant information for use by stakeholders in the timber exploitation and management network in the country.

3.4 GROUND TRUTHING AND PRACTICAL VEGETATION MEASUREMENTS

Choice of Sampling Unit and Size

In each sampling area within a Chiefdom, several sampling units were selected, depending on the spatial coverage of the woodland in that area. The sampling unit was a belt transect of 20m x 50m in which all relevant sampling were implemented to collect the required data. Belt transects were separated by an interval of 50 meters. The GPS data for the center and four corners of each belt transect were recorded. The number of belt transects selected for sampling was dependent on the proportion of woodland cover present in the Chiefdom. At least 10 plots were sampled in each Chiefdom. The sampling protocols ensured that statistically sound proportion of sites are sampled that would provide appropriate measurements of the tree indices across the Chiefdom. Information on the relative size of the *Pterocarpus* woodland estate was provided by the GIS expert.

Measurement of Tree Density of all Exploitable Species

All plant stands (*Pterocarpus erinaceus* or other exploitable species) with diameter at breast height (DBH) greater or equal to 10cm are considered measurable tree sizes. DBH measuring tapes were used to measure the DBH for all target tree species within the required size range. The number of actual tree stands was generated for all survey units from which the tree density of the sampling unit or survey area was calculated using simple density indices.

Measurement of Tree Height

The height of each tree stand was measured using a range finder, to give an indication of the maturity of trees, in combination with data from measurement of DBH. The data was analyzed to give a comparative view of the maturity of stands of *Pterocarpus erinaceus* across areas and sites surveyed and to estimate the number of processed logs obtained (assuming that the processed length is 7 – 10 feet); the biomass extracted from this data.

Measurement of Logging Intensity

In each of the subunits (plots), the number of tree stumps were counted to generate data on the proportion of trees that have been cut since the logging activities started. Where possible the

diameter and height of each tree stump were also obtained. The number of tree stumps will be expressed as a proportion of the total number of trees that existed in that location (i.e., the number of live tree stands plus number of tree stumps). This data can then be comparatively analyzed across all areas and sites, to provide indications of the relative intensity of logging.

Measurement of Coppicing and Regenerative Potential

For each of the 20 x 50 meters belt transect that were sampled, the number of tree stumps that were actively coppicing were counted. The data was analyzed to provide an indication of the potential future stock of the tree species and probably the deleterious potential if coppicing is found to be limited. In addition, the number of seedlings and saplings and their approximate heights, in each of the plots, were also enumerated.

3.5 ADDITIONAL RELEVANT DATA

Other relevant data were collected within each sampling unit, including but not limited to the following:

(i) Noticeable threats within and the immediate surroundings of the site surveyed - for instance evidence of wildfire, farming, charcoal production etc. that may have affected or is affecting the site.

(ii) Wastage within sites and depots; the number of trees cut and unprocessed and the quantity of waste from processed timber.

(iii) What are the wastages used for by the local communities.

(iv) The type and extent of restoration efforts e.g., replanting, natural regeneration etc.

(v) Community projects or social measures as a direct result of timber exploitation.

(vi) A questionnaire survey that generates other important socio-economic data consistent with the NDF checklist published by CITES.

(vii) Existing legal and regulatory mechanisms.

3.6 ANALYSIS AND RESULTS PRESENTATION

The data was analysed to show variation in *Pterocarpus erinaceus* status among Chiefdoms, Districts and Regions where they occur in the country. The key variables considered relevant to the assessment of the biological risk of the species are: - the tree density, seedlings and saplings density and stump coppicing density.

The results are presented in tables and graphs depending on the nature of the data and the key understanding and explanations to be derived. The results and findings sections are presented in separate chapters for each District and the situations elaborated. For each District, some level of distinctions is shown for each chiefdoms, to provide a clearer view within Districts on the variations in *Pterocarpus erinaceus* distributions.

However, the CITES checklist was used as a guide to review the biological, conservation and management characteristics of the species at the District level.

CHAPTER IV - BIOLOGICAL CHARACTERISTICS AND CONSERVATION STATUS OF *PTEROCARPUS ERINACEUS* IN SIERRA LEONE

4.1 INTRODUCTION

West African Rosewood *Pterocarpus erinaceus* is a CITES-listed species in Appendix II and a native to Sierra Leone. Species under Appendix II are not necessarily threatened with extinction, but trade must be controlled to avoid utilization incompatible with their survival. The last few years have seen a dramatic increase in international trade of *Pterocarpus erinaceus* timber, in response to rising demand in Asia for rosewood furniture.

The Conference of the Parties to the CITES in Resolution Conf. 12.8 (Rev. CoP18) directed the Plants Committee in cooperation with the Secretariat and experts and in consultation with range states to regularly undertake Review of Significant Trade (RST); RST procedure is applied when trade in a species is suspected to be unsustainable and a threat to wild populations. This RST procedure allows the review of biological, trade and other relevant information on Appendix II species subject to significant levels of trade, to identify problems and solutions concerning the implementation of Article IV, paragraphs 2 (a), 3 and 6 (a).

There is an absence of data on which to base analysis of sustainability of this trade as the national stocks of *Pterocarpus erinaceus* in Sierra Leone are unknown. Consequently, it is virtually impossible to establish sustainable quotas for harvest and trade in this species from Sierra Leone. To define these quotas and comply with existing CITES resolutions, it is expedient to conduct Non-Detriment Finding for *Pterocarpus erinaceus* in Sierra Leone. The exercise will provide scientific information to justify that international trade in *Pterocarpus erinaceus* from the country is not detrimental to the survival of the species and that the trade is compliant with Article IV of CITES.

Specifically, the following should be considered in conducting NDF on the sustainability of international trade in *Pterocarpus erinaceus* (West African rosewood):

- a Non-Detriment Finding for an Appendix-I or -II species is the result of a science-based assessment that verifies whether a proposed export is detrimental to the survival of that species or not,
- the Scientific Authority should consider whether the species would be maintained throughout its range at a level consistent with its role in the ecosystems in which it occurs,
- the Scientific Authority should also consider the volume of legal and illegal trade (known, inferred, projected, estimated) relative to the vulnerability of the species (intrinsic and extrinsic factors that increase the risk of extinction of the species),
- the data requirements for a determination that trade is not detrimental to the survival of the species should be proportionate to the vulnerability of the species concerned,
- the implementation of adaptive management, including monitoring is also important,
- the Non-Detriment Finding is based on resource assessment methodologies which may include, but are not limited to:
    - species biology and life-history characteristics,
    - species range (historical and current),
    - population structure, status, and trends (in the harvested area, nationally and internationally),
    - threats,
    - historical and current species-specific levels and patterns of harvest and mortality (e.g., age, sex) from all sources combined,
    - management measures currently in place and proposed, including adaptive management strategies and consideration of levels of compliance,
    - population monitoring; and
    - conservation status.

4.2 SPECIES IDENTITY AND BIOLOGICAL CHARACTERISTICS

4.2.1 Scientific Name and Common Name

Scientific name***:*** *Pterocarpus erinaceus* Poir.

Fabaceae (legumes) family and Papilionaceae subfamily.

Common names: African rosewood, Senegal rosewood, African barwood, African teak, African kino tree, madobia (En).

4.2.2 Review Specimen Identification

Has the plant/specimen been correctly identified, and is the scientific name used compliant with the appropriate CITES standard?

Pterocarpus erinaceus Poir, is often referred to as the African Rosewood tree. It is a medium sized, deciduous legumes tree of African savannas and dry forests, often with height ranging between 12-15m and poorly formed bole that is markedly fluted and gnarled, and with plank-like buttress. Its outer bark is finely scaly fissured, brown-blackish whereas its inner bark is thin that produces red exudate (sap) when cut. Its leaves, approximately 30 cm long, are alternate imparipinnate compound with small, linear, or narrowly triangular shaped stipules and leaflets up to 11. Flowers are axillary, bisexual, irregular, golden yellow in colour with 5cm long calyx and 5 free petals that are glabrous or sparsely hairy outside. Fruit is compressed indehiscent, broad, and winged pod. The seed is kidney shaped.

The accepted English trade names of *Pterocarpus erinaceus* Poir include African Barwood, African Kino tree, African Rosewood, Senegalese Rosewood. Other known vernacular names include Bois de vène, Kino de gambie, Santal rouge d'afrique, Teak africain (in French) and Gbenie in major Sierra Leonean local languages.

Confirmation of *Pterocarpus erinaceus* taxonomic status can be determined online at the following websites: Checklist of CITES species), species+ (https://www.speciesplus.net), The Plant List (http://www.theplantlist.org).

The specimens of *Pterocarpus erinaceus* Poir examined in this study are shown in Appendix 1 (Bark, Leaves, flowers).

It is therefore corroborated that the scientific name, *Pterocarpus erinaceus* Poir, used is compliant with the appropriate CITES standard.

4.2.3 Important Biological Information

Properties

The heartwood is yellowish brown to reddish brown, often with purplish brown streaks, and distinctly demarcated from the 2–5(–8) cm thick, yellowish, or pale cream-coloured sapwood. The grain is straight to interlocked, texture fine to moderately coarse. Fresh wood has an unpleasant smell.

The wood is moderately heavy to heavy, with a density of (560–) 800–890 (–940) kg/m³ at 12% moisture content. It dries slowly, but with little risk of deformation. The rates of shrinkage are moderate, from green to oven dry 3.0–3.5% radial and 5.2–7.4% tangential. Once dry, the wood is stable in service.

At 12% moisture content, the modulus of rupture is (76–)137–198 N/mm², modulus of elasticity 11,500–15,700 N/mm², compression parallel to grain 62–80 N/mm², compression perpendicular to grain 2.5 N/mm², shear 7–10 N/mm², cleavage 20 N/mm and Chalais-Meudon side hardness 11.2.

The wood is rather difficult to saw and work, requiring considerable power; saw blades with stellite-tipped teeth are recommended. It finishes well, but picking up may occur in planing due to interlocked grain. The wood holds nails and screws well, but pre-boring is needed because it is brittle. The gluing properties are often poor because of the presence of exudates in the wood, but the wood readily accepts stains and polishes well. The wood turns well, and the bending properties are moderate. It is durable, being resistant to fungi, dry wood borers, and termites; it is also resistant to freshwater organisms. The wood is not permeable to preservatives. The energy value of the wood is about 21,000 kJ/kg.

Morphology

Deciduous small tree up to 15(–25) m tall; bole straight, cylindrical and branchless for up to 10 m under good conditions but often twisted, fluted and low-branched under poorer conditions, up to 75(–100) cm in diameter, slightly buttressed; bark surface greyish brown to blackish, fissured and scaly, inner bark yellowish brown, with reddish streaks, exuding a reddish translucent gum on slashing; crown rounded, open; twigs densely short-hairy when young.

Leaves alternate, imparipinnate compound with (5–)7–11(–15) leaflets; stipules linear, up to 9 mm long, hairy, falling off early; petiole 3–7 cm long, rachis (7–)10–17(–22) cm long, hairy; petioles 3–8 mm long; leaflets usually alternate, ovate to elliptical, (4–)6–11 cm × (2–) 3–6 cm, base rounded to obtuse, apex obtuse to slightly acuminate with usually shallowly notched tip, thick-papery, brownish hairy when young but later glabrescent, with 12–20 pairs of lateral veins.

Inflorescence an axillary or terminal panicle 7–20 cm long, densely brown hairy; bracts up to 6 mm long, falling off early.

Flowers bisexual, papilionaceous; pedicel 4–8 mm long, hairy; calyx campanulate, c. 7 mm long, densely hairy, with 5 triangular teeth 1–2.5 mm long, upper 2 more or less connate; corolla with clawed petals, golden yellow, standard almost circular, up to 15 mm × 13 mm, wings up to 13 mm long, keel up to 10 mm long; stamens 10, fused into a sheath up to 8.5 mm long, the upper stamen sometimes free; ovary superior, stiped, hairy, style up to 5 mm long, almost glabrous.

Fruit a circular, flattened, indehiscent pod 4–7 cm in diameter, on a stipe up to 1 cm long and with a papery, finely veined wing with wavy or plaited margin, with prickles on the seed-bearing portion, straw-coloured, 1(–2)-seeded.

Seed kidney-shaped, flat to slightly thickened, c. 10 mm × 5 mm, smooth, red to dark brown.

Seedling with epigeal germination; cotyledons leafy.

4.2.4 Regeneration and Growth Rate

Seedlings develop a long taproot, and they grow slowly. In Mali, seedlings were only up to 15 cm tall after one year and up to 42 cm after two years. However, under better conditions a height of up to 25 cm, 21 weeks after germination has been reported and up to 100 cm after 2 years. In northern Côte d'Ivoire planted seedlings had an average height of 9 cm after 3 months, 50 cm after 18 months, 2.8 m after 2.5 years, 4.4 m after 4.5 years and 5.5 m after 5.5 years. The fastest growing tree was 10 m tall after 5.5 years. Coppiced trees may grow more than 1 m/year. *Pterocarpus erinaceus* is deciduous, becoming leafless towards the end of the dry season. The trees flower when leafless, usually in December–February (–April), before developing new leaves, but sometimes inflorescences develop together with young leaves. The flowers are much visited by bees, which are probably responsible for pollination. The tree may produce so many fruits that when the fruits are green it looks as if the tree is covered with leaves. Young leaves normally develop after the fruits have ripened and have become brown. Natural regeneration is often abundant, and the species may be quite invasive if protected from grazing for some years. The roots have nodules containing nitrogen-fixing bacteria. However, *Pterocarpus erinaceus* has low nitrogen-fixation potential in comparison with several other leguminous trees.

4.2.5 Bioactivity

The bark exudate quickly hardens upon exposure. It contains 30–80% kinotannic acid, which is a strong astringent. Bark extracts showed in-vitro antibacterial and antifungal activities against several human pathogens. In tests they blocked the ovulation and oestrus cycle of female rats through antigonadotrophic activity. Moderate in-vitro antimalarial activity was also demonstrated against strains of *Plasmodium falciparum*. The effectivity of the bark as a wound-healing agent was confirmed in tests, and the activity may be explained by the presence of phenolic compounds that influence the complement system (part of the immune system). The bark showed significant antioxidant activity. Water and methanol extracts showed in-vitro inhibitory activities against *Mycobacterium smegmatis* and *Mycobacterium tuberculosis*, the latter being a causative agent of tuberculosis. The crude protein content (dry matter basis) decreases from 13.4–16.9% in young leaves to 10.3% in dry leaves, and digestible nitrogen from 10.7% to 5.8%. The feed value is 0.79,

0.74 and 0.51 forage unit/kg dry matter for young, green and dry leaves, respectively. In tests with rabbits, the leaves showed good digestibility and no adverse effects on health.

4.2.6 Utilization

The wood is highly valued for furniture and cabinet work, but is also used for heavy construction including waterworks, parquet flooring, stairs, implements, turning, sculpturing and sliced veneer. It is also suitable for joinery, interior trim, mortars, pestles, house posts, mine props, ship and boat building, vehicle bodies, sporting goods, toys, novelties, musical instruments (e.g., balafons) and precision equipment. The roots are made into bows. The wood is suitable for fuel and charcoal production.

The heartwood is a source of a red dye, which is used for dying cloth, the body or hair. The bark is occasionally used for tanning. The reddish bark exudate ('kino') is beaten onto cloth with a mallet to give it a glaze. Kino is commonly used in traditional medicine, internally to treat diarrhoea including dysentery, fever, gonorrhoea, and intestinal worm infections, and externally to treat eye complaints, ulcers, and sores. Until the middle of the 20th Century, kino was also used in North America and Europe against chronic diarrhoea. Decoctions or infusions of bark or roots serve for treating bronchial infections, toothache, dysentery, menstruation complaints, anaemia, gonorrhoea, post-partum haemorrhage, ringworm infections, leprosy, wounds, tumours, and ulcers, and as an anti-emetic, purgative and tonic. Root preparations are administered as an enema to treat venereal diseases. Leaf decoctions are applied to treat fever, syphilis and are used as an aphrodisiac and insect repellent. Leafy branches are browsed by livestock and are especially important towards the end of the dry season when not much else is available. Livestock keepers rely heavily on *Pterocarpus erinaceus* trees in the woodlands of the Sudanian zone.

4.2.7 Habitat Types

Pterocarpus erinaceus occurs in semi-arid to sub-humid tree savanna up to 400–1200 m altitude, in regions with 600–1600 mm annual rainfall, a long dry season (up to 9 months) and a mean annual temperature of 15–32°C. It can be found on all soil types, but prefers light to medium, free-draining, acid to neutral soils. It can survive annual bush fires.

4.2.8 Role of the Species in its Ecosystem

Pterocarpus erinaceus has at least two key roles in forest ecosystem. Firstly, like other species of the Fabaceae, it has ability of fixing atmosphere nitrogen in soil, which will then be used by other nearby plants for their growth. Therefore, the tree is highly potential for rehabilitation of degraded forest ecosystem where it is present. Secondly, *Pterocarpus erinaceus* is one of the species which contribute to the dominant canopy of the forest, thereby increasing the forest cover that protects soil from direct hit of rain and sun, protects wild animals from natural disasters such as typhoon, whirlwind, hail, and heavy rain, and creates beautiful landscape.

4.3 NATIONAL STATUS

4.3.1 Spatial Extent

Pterocarpus erinaceus woodlands occur mostly in the Northern Region of the country, traversing areas stretching from the Northwestern Region to the Eastern Region of the country, and covering areas that constitute almost two-fifth of the land area of the country (Figure 4.1)

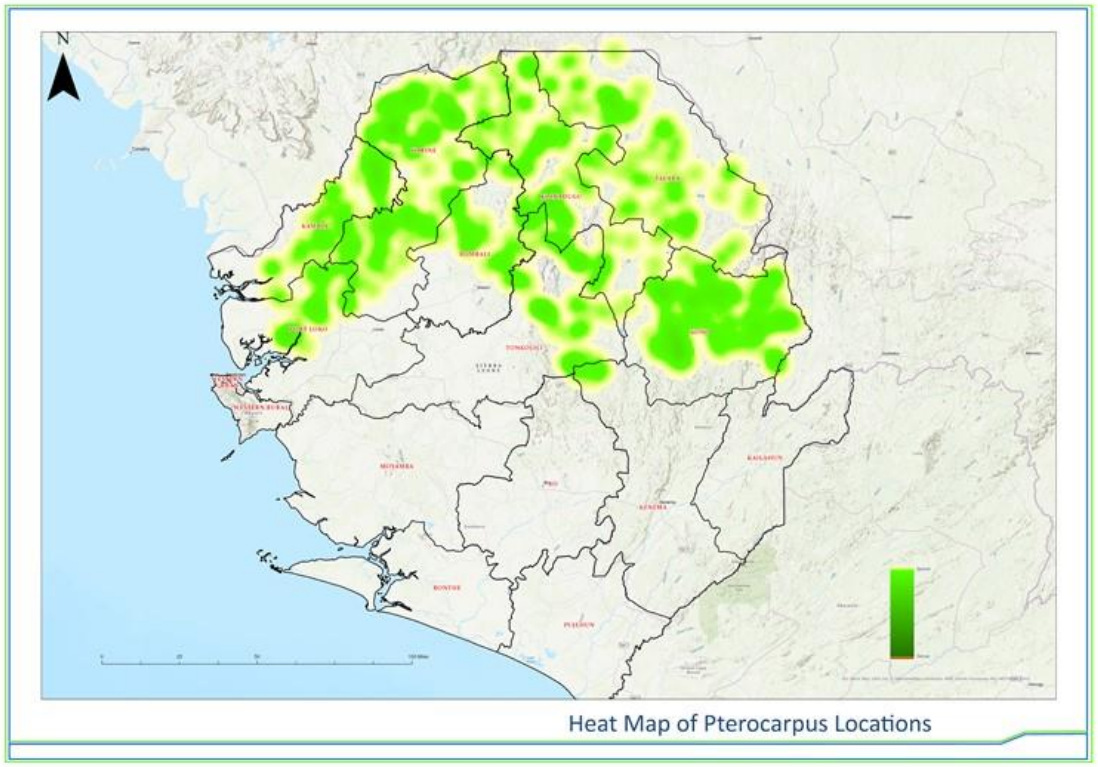

Figure 4.1 - Map of Sierra Leone indicating the spatial extent of *Pterocarpus erinaceus* woodland and the survey coverage.

4.3.2 Population Trends

No data is available on population trends of the species, but suggestions of increasing scarcity even prior to the recent boom in harvesting for international trade can be inferred from the available literature and the actions taken by the range states. Due to its various local utilizations and despite the plasticity of the species, the impact of the exploitation and first signs of overexploitation of the populations of Pterocarpus erinaceus have been described in several countries in the region, including Benin (Glèlè, 2008), Burkina Faso (Devineau, 1999; Sawadogo, 2006; Ouedraogo, 2008), Ghana (Dumenu and Bandoh, 2014) and Togo (Kokou et al., 2009 ; Adjonou, 2010). However, despite the importance devoted to this multi-purpose species, many countries of the range do not have adequate information on the current state of natural populations, especially to develop appropriate management strategies of the resource. In the late 1990s, more than 10 range countries reported the species as among highest priorities for management and conservation (Eyog et al., 1999). Niger already classified the species as endangered before 2006 (Garzuglia, 2006), while in Senegal it has been given special protection since 1993 (Gueye, 2015). In Mali, cutting for livestock fodder had already resulted in extirpation within 50 kilometers of the capital city of Bamako by 1998 (Bonkoungou, 1998). That many other countries have been compelled to prohibit all harvesting of the species in recent years and it is suggested that it should be of concern on the part of relevant Forestry Authorities regarding rapidly declining populations. In 2014, China alone imported approximately 750,000 cubic meters of West African rosewood (Lawson, 2015); given a typical yield of 0.8 cubic meters for a relatively large tree (Duvall 2008), such a volume would have required the harvesting of more than 1 million trees.

National/Subnational Population Size and Distribution

There was no information on the population size and distribution of *Pterocarpus erinaceus* in the country. However, information received from the field indicates that the species can be found in the country from the Northern Region in Bombali, Tonkolili, Falaba and Koinadugu Districts, to the Northwestern Region, in Port Loko, Karene and Kambia Districts to the Eastern Region of Kono District (though the exact area of occurrence and where the species is concentrated in density terms were not reported).

Size Structure of National/Subnational Populations

To gather reliable and relevant information for the Non–Detriment Finding of *Pterocarpus erinaceus* in Sierra Leone, a field survey was undertaken on the population structure and density of the species in all Districts and Chiefdoms where the woodland is found. Quantitative assessment of the live trees, saplings, seedlings and stumps were enumerated within reasonable number of 0.1 ha (20m x 50m) sampling units. In this report, the results are presented in separate Chapters for each Region and District.

4.3.3 Evaluation of Conservation Concern

Considering conservation status assessments, what is the indicated severity of conservation concern?

Internationally, the severity of conservation concern for *Pterocarpus erinaceus* is considered high (Adjonou *et al*., 2020). Locally however, the severity of conservation concern is yet to be evaluated through this study.

Pterocarpus erinaceus Poir, the Rosewood tree, is endemic to the semi-arid Sudan-Guinea Savanna Forests of West Africa. For instance, in 2009, estimate suggests that imports of logs of the African Rosewood tree into China alone rose by more than 2000-fold. However, in 2015, a more dramatic increase in international trade in the species was recorded to have risen from 70 cubic meter to about 149,000 cubic meter. It is interesting to know that these importations occurred concurrently with widespread illegal and indiscriminate harvesting of the species in its range states with severe effects not only on the species but its habitat, the ecosystem and consequently, the people who depend on it.

To save the species from going into extinction, most range states passed and enforced harvest and/or trade bans but international trade in the species continues illegally. To further address the problem, Senegal, one of the range countries, recommended listing all population of the species in Appendix III of CITES listing in 2016. However, previous experiences showed that Appendix III listing does not provide sufficient regulation to prevent the commercial exploitation of the species.

In order to upgrade the species profile and ensure increased resources and attention to control trade in the species, CITES Plant Committee at its 22nd meeting in Tbilis (Georgia), 19th to 23rd October, 2015 proposed to transfer *Pterocarpus erinaceus* from Appendix III to Appendix II of CITES listing which indicates that the species is not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilization incompatible with their survival.

4.3.4 Review of Species Protection Measures and Harvest Management

Pterocarpus erinaceus is listed in CITES Appendix II and requires a Non-Detriment Finding, and national quota before trade of the species is allowed. This was a great move to help protect the species in its natural state. In Sierra Leone, No Science No trade has been adopted for the protection of this species.

However, management history shows that Local Authorities and communities in collaboration with the Forestry Department across the country are able to protect and regulate harvest in their Community Forests and keep the species flourishing in a sustainable manner within their respective localities.

A managed harvest is one in which there is some degree of oversight and feedback, whether it be under a formal or an informal process. At community level, there is already in place both formal and informal harvest management scheme. An ongoing but informally managed harvest may not have a nationally approved structure, but may however have a good chance of sustainability, particularly if associated with strong local resource ownership.

Instituting rotational management and harvest regime for a species has a considerable bearing on the probability that a harvest will be sustainable. The adoption of management plans requires an optimum situation where a national quota is based on local quotas that guard against local over exploitation, and the quota is based on knowledge of species' biology, life history, demographics, and reproductive capacity.

The Scientific Authority advised the Management Authority to institute a harvesting scheme with a long history of effective management. A well-regulated adaptive management is more likely to be sustainable than an unmanaged harvest. He also advised the development and adoption of both

local and national management plan to build and gain political will to establish the process of sustainable use.

Reviewing existing local policies (bylaws) and national policies to guide the entire process will be instrumental in ensuring sustainability.

4.4 LEGAL INTERNATIONAL TRADE

Until recently, wood of *Pterocarpus erinaceus* was virtually unknown in commerce outside of its native range (Winrock, 1999). However, in recent years there has been a dramatic increase in trade of the species to Asia for rosewood furniture manufacturing. The species is formally recognized as one of the thirty-three "Hongmu" (literally "red wood" in Chinese) species included in China's National Hongmu Standard (2010), and from 2010 onwards, the high prices and limited supplies of more traditional Southeast Asian rosewood species led to dramatic growth in imports of rosewood from West Africa (Forest Trends, 2013). In 2015, Africa was the first source of "Hongmu" species in logs for China and in volume, accounting for 64% of all "Hongmu" imports. West Africa alone accounted, the same year, for 84% of Chinese import of "Hongmu" from Africa, in volume, becoming the principal source sub-region in the world. While South-Eastern countries have some of the rarer and therefore more valuable "Hongmu" species, Africa is now playing a preeminent role in the international trade.

4.5 USE AND MARKET

Considering the plentitude of *Pterocarpus erinaceus* woodlands in the Districts of the Northern latitudes in Sierra Leone, the species was the most logged timber in the country. There are several uses and benefits from *Pterocarpus* timber, which have been outlined for each of the Districts, including fencing, construction work, firewood, charcoal, medicine, and fodder. According to local sources, the durability, thickness, and robustness of the wood is the main reason for its choice of use, among other timber species.

In most of the remote areas, it was observed that *Pterocarpus erinaceus* wood are used for the construction of roads and local bridges. The logs are laid across trenches and drainages to connect roads and accesses to communities and houses, for the easy movement of people, vehicles, cattle, and goods. The wood of *Pterocarpus erinaceus* is also used in the construction of houses in most Chiefdoms and Villages across the Districts.

Farmers also use *Pterocarpus erinaceus* to fence their crops and livestock. The trees are extensively cut down into many pieces of equal height (4-5 ft), which are braced together around the farmland and stable. The fence serves the purpose for protecting crops against pest and theft and to restrict the movement of cattle and other livestock to prevent loss and control their destructive potentials. Charcoal production is the growing alternative profitable use of the wood in Kono, Bombali, Tonkolili, Kambia and Karene Districts and there is evidence that this activity has started in some other Districts.

The market for *Pterocarpus erinaceus* timber provides a source of income for everyone along the supply chain. Therefore, there is need for a coordinated approach from the Concession holders, entire supply chain actors, Factory owners and the Government Regulatory Agencies and the Local Authorities. Proof of legality should always be made transparent from source, transport, stockpiling and finally to the retail market or for exportation.

4.6 CONTROL AND MONITORING OF HARVESTING AND EXPORTATION

Logging of *Pterocarpus erinaceus*, has been the main source of income for many people both young and old in the various Districts and Chiefdoms for export, and in many instances, used for charcoal production, which is a growing trend, where the woodland occurs in the country.

The Local Government Act, 2004 provides for the decentralisation and devolution of functions, powers and services to local councils and for other matters connected therewith.

The following functions were devolved from the Forestry Department to the local councils: -

- Sensitisation campaigns on forest conservation
- Fire prevention and control
- Village forest nurseries

- Community forest woodlots
- National production forests
- National production forests catchments
- Central nurseries

The Forest Management Unit in each of these Districts comprises of the District Forest Officer (DFO) who is the Head of Forestry in the District and assisted by Forest Rangers and Forest Guards (front line extension staff) who are deployed in the Chiefdoms within their respective Districts. The District Forest Officer is considered the subject matter specialist for forestry, responsible for the implementation of forestry programmes in the District and reports to the Director of Forestry at the national level.

Under the supervision of the Forestry Department and because *Pterocarpus erinaceus* is mostly found in Community Forests, Timber Sales Agreements were developed and signed by the Paramount Chiefs and Local Authorities giving permission to four respective Companies for forest utilization. Referring to the table below (Table 4.1), The Timber Sales Agreements covered areas in the East, North and North-West Regions, where *Pterocarpus erinaceus* is mostly found in the country.

Monitoring and supervision of these areas is done by the team of the Forest Management Unit in each of the Districts, with periodic visits from the Assistant Director of Commercial Unit in the Forestry Department in the Ministry of the Environment and Climate Change. This is to verify compliance with the Policies, Laws, and Regulations on Forestry, which will allow the Department to propose changes, adjustments and appropriate solutions that apply.

As indicated earlier, the trade is regulated and supervised by the Government, through the Forestry Department in the Ministry of the Environment and Climate Change. To further insulate the trade from illegality, the Government of Sierra Leone appointed a Sole Timber Agent in June 2018, charged with the responsibility to facilitate all timber exportation from the country in collaboration with the CITES Management Authority. The Timber Agent has handled the trade responsibly and paid all revenues emanating from tax levy on export of timber in full to the National Revenue Authority.

Table 4.1. List of Companies with Timber Sales Agreement for Harvesting *Pterocarpus erinaceus* (West Africa Rosewood) in Sierra Leone

No	Name Of Company	Name Of Forest	Area of Operation		Timeframe For Timber Sales Agreement	Initial Timber License (Tl. No.)	Initial Power-saw Registration Nos
			District / Region	Chiefdom			
1.	Liberation Logistics ***I***nvestment	Toli Community Forest (***Unclassified Forest***)	Kono / East	Toli	2018-2023	1401 1402 1403	003501 003502 003503
2.	MANS Sierra Leone LTD	Bendugu ***C***ommunity ***F***orest (***Unclassified Forest***)	Koinadugu / North	Sengbeh	2018-2023	1404 1405 1406 1407	003504 003505 003506 003507
3.	Global Logistics Services	Dembelia Musaia **C**ommunity **F**orest**s** (***Gazetted and Unclassified Forests***)	Falaba / North	Dembelia Musaia	2019-2023	1411 1412 1413	003511 003512 003513
4.	ERA Investment	Samaya ***C***ommunity ***F***orest (***Unclassified Forest***)	Karene / North-West	Tambaka Simibuyie	2018-2023	1408 1409 1410	003508 003509 003510

4.7 ESTIMATION OF AN EXPORT QUOTA

The CITES Secretariat accepted the request from Sierra Leone for a **Zero Export Quota** for commercial trade in specimens of *Pterocarpus erinaceus* in accordance with Resolution Conf 14.7 (Rev. CoP15) in a letter titled "Submission of Zero Export Quota for Pterocarpus erinaceus" dated 6 April 2022 and publication was made on the national export quota section of the CITES website. The Zero Export Quota was chosen as the preferred option rather than the submission of a Non-Detriment Finding (NDF) and a Legal Acquisition Finding (LAF) for *Pterocarpus erinaceus* in Sierra Leone because it was very difficult to conduct such a scientifically based Non-Detriment Finding that will be accepted as credible by the Standing Committee in advance of the 27th of April 2022 deadline indicated in the Notification to the Parties Nº 2022/021.

This Non-Detriment Finding will include 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. Additionally, it will 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.

4.8 MAIN THREATS

There are various uses of *Pterocarpus erinaceus* in Sierra Leone such as, medicinal, fuelwood, charcoal, timber, fencing, construction work, artisanal and fodder uses. All organs of the species are used and valued for various purposes, making *Pterocarpus erinaceus* an important multi-use species for the rural communities. The exploitation of *Pterocarpus erinaceus* for animal food and the treatment of several diseases or symptoms results in frequent pruning and debarking of the trees in forests, farms and wherever it is in the country. However, the various anthropogenic pressures exerted pose little or no threat to the survival of the species.

The fungus that infects *Pterocarpus erinaceus* has been observed, and it is producing dark spots on leaves; it spreads by air dispersal of ascospores. Seedlings are often severely attacked by rodents and crickets, while in some locations, grazing is causing the trampling of seedlings. Therefore, the survival rate of seedlings is limited by the grazing activities of these animals. Localized and isolated observations in a few locations indicate that the bark is peeled off at around the trunk causing reduction or prevention of transpiration and could lead to the death of the plant with time.

In many of the Districts and Chiefdoms, *Pterocarpus erinaceus* woodland is cleared by farmers for agriculture. This activity is destroying a vast area of the habitat, decimating the population of the species that depend on this woodland and not allowing the wood to coppice and seedlings to grow. One key reason why some farmers cut down the entire stands of the wood for charcoal production is because they perceive that the presence of the species would result to poor harvest.

The cutting down of Pterocarpus woodland for charcoal production is a growing trend, which initially emanated from the use of the waste wood for such purposes, but now considered by some

sections of the local communities to be an alternative profitable venture. Fire is also a key challenge to Pterocarpus woodland ecology as there were evidence of either natural or deliberate use of fire by local people for the purpose of managing the vegetation for cattle grazing. However, the number of seedlings and the number of coppicing stumps observed in most of the exploited areas show that the regeneration potential is high for *Pterocarpus erinaceus*, which gives hope for the future and a clear indication that the species is not under any immediate threat of extirpation.

Figure 4.2 – Photos of *Pterocarpus erinaceus* woodland, taken in areas visited during the survey.

Figure 4.3 – Photos showing various activities local communities engage in, that threaten *Pterocarpus erinaceus* woodland.

Figure 4.4 – Photos of open deports for *Pterocarpus erinaceus* in local communities before transporting to their main depots in Freetown.

CHAPTER V – RESULTS AND FINDINGS: THE EASTERN REGION

5.0 REGIONAL COVERAGE

Pterocarpus erinaceus distribution in the Eastern Region is restricted to only Kono District. One hundred and seventeen plots were surveyed in eighteen Sections of the seven Chiefdoms.

5.1 KONO DISTRICT

5.1.1 Review Specimen Identification

Has the plant/specimen been correctly identified, and is the scientific name used compliant with the appropriate CITES standard?

The species has been correctly identified in accordance with the information provided in Chapter 4, therefore it is scientifically identified as *Pterocarpus erinaceus*.
Locally the species is called ***Gbenie*** by the Kono ethnic group.

5.1.2 Review of Compliance with Requirements for Artificial Propagation

Is the permit application for artificial propagated specimens?

Pterocarpus erinaceus occurred naturally in the Kono District. Although there is no evidence of artificial propagation of the species for now, but plans are on the way for that.

5.1.3 Review of Relevant Exclusions and Previously Made Non-Detriment Finding

Are the specimens covered by CITES Appendix II?

YES, and ***Pterocarpus erinaceus*** is listed in CITES Appendix II.

Is the harvest or the export of wild-harvested specimens of *Pterocarpus erinaceus* permitted?

Presently there is suspension on the export of any specimens of *Pterocarpus erinaceus* until an NDF is developed to advise that such export will not be detrimental to the survival of the species.

Has a science based NDF been made for *Pterocarpus erinaceus* that is still valid and sufficient to evaluate the current application?

This is the very first time an NDF study is conducted in Sierra Leone for ***Pterocarpus*** *erinaceus*.

5.1.4 Evaluate Conservation Concern

Considering conservation status assessments, what is the indicated severity of conservation concern?

While the severity of conservation concern for ***Pterocarpus*** *erinaceus* is internationally considered high, it is however unscientifically and locally considered moderately high to high, depending on the chiefdom. However, the following threats were observed during the stock assessment activities:

- Burning was observed in many of the plots sampled and this was associated with the high number of dead stumps counted. Burning may be a natural vegetation management event, but how it affects coppicing and seedling growth needs more study.
- Grazing was observed, though not intensive, but could increase over time and has the potential of killing seedlings through trampling.
- Some of the waste wood and left over from piles of timber are now being used for charcoal production which is becoming a viable alternative livelihood option for young people in the District and considered one of the best wood for charcoal. This may compound the current pressure on the species.

5.1.5 Evaluation of Potential Biological Risk

What is the severity of biological risk?

Risk severity is MODERATE.

Geographic distribution of *Pterocarpus erinaceus* in the Kono District

The distribution of ***Pterocarpus erinaceus*** in the Kono District covers seven out of the fourteen Chiefdoms in the District.

National/Subnational Population Size and Distribution

Table 5.1.1 and Figure 5.1.1 show the total plots surveyed and total live tree species enumerated per Chiefdom in the Kono District. To estimate the population at the District level, a total of one hundred and seventeen plots were randomly chosen and surveyed with a total of seven hundred and ninety live trees measured. The variation in plots number was based on the relative spatial distribution of ***Pterocarpus erinaceus*** woodland among the Chiefdoms where it occurs. The data shows that plots in Lei Chiefdom has the highest density of trees, followed by Fiama Chiefdom.

Table 5.1.1 – No. of plots surveyed, number and density of live trees enumerated in the Kono District.

Chiefdoms	No. of Plots	No. of live trees counted	Live trees per plot	Tree density per ha
Sandor	12	34	23	28
Fiama	18	189	11	105
Gbanekondor	28	62	2.2	22
Lei	19	332	18	175
Mafindor	12	49	4	41
Soa	21	91	4	43
Toli	7	33	5	47
TOTAL/AVERAGE	117	790	9	66

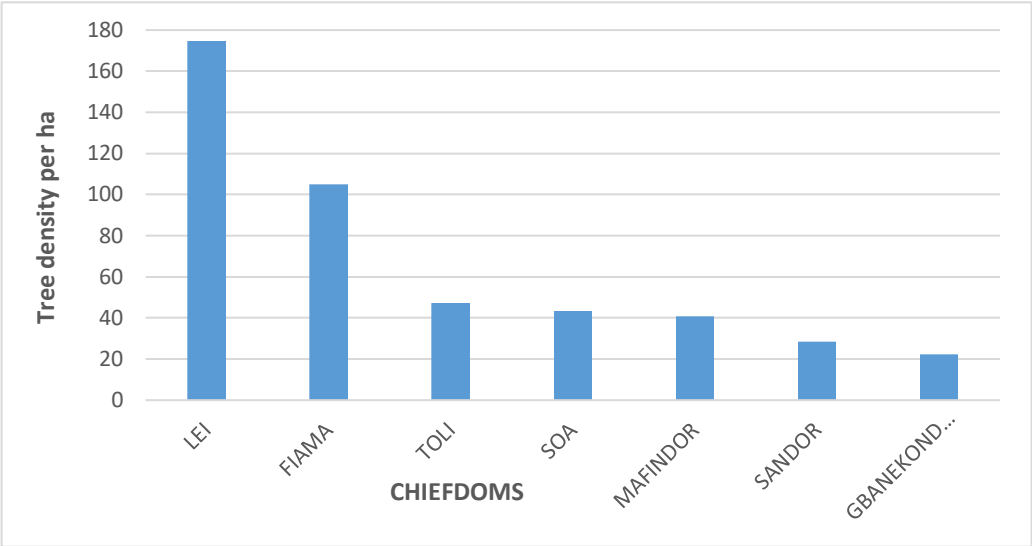

Figure 5.1.1 – Comparative distribution of tree densities (per ha) among Chiefdoms in the Kono District.

Size Structure of Sub-national Populations (Kono District)

Current Live Tree Stock

A total of one hundred and seventeen plots were visited and assessed. The average live tree per plot was 6.8 (range – 2.8 – 17.5), giving an average tree density per ha of 67.5 (range 28.3 – 174.7). The distribution of live tree stock shows that the level of exploitation varies from Chiefdom to Chiefdom, which to a large extent is dependent on the local traditional control, level of awareness of the value of *Pterocarpus*, and accessibility. In some accessible Chiefdoms the exploitation levels are considerably high and so the number of trees present per plot is low. This is particularly true for Gbanekondor and Mafindor Chiefdoms, which are closer to the main District Headquarter Town. In relative remote chiefdoms, the tree density per plot is reasonably high and there are locations where *Pterocarpus* exploitation is virtually non-existent, as observed in Lei and Soa Chiefdoms. In relative terms, the number of Chiefdoms showing higher levels of exploitation and thus, low tree density, are lower than Chiefdoms where exploitation is considered low.

The average number of trees per ha for less exploited Chiefdoms is 140 (N = 37) trees per ha; those from Chiefdoms with moderate exploitation levels was 32.8 (N = 40); and those from intensely

exploited Chiefdoms was 12.6 (N = 40). Findings based on a study by Segia et al. (2016) showed that the average tree density of *Pterocarpus erinaceous* was 1.17 ± 0.75 trees/ha in the Sahelian zone, 49.20 ± 63.2 trees/ha in the Sudanian zone and 110.9 ± 1.15 trees/ha in the Guinean zone. The data generated from the survey in Kono District clearly indicate that the average of 67.5 trees per ha of the remaining stock of *Pterocarpus* is below the natural average, but much higher in areas that have experienced lower exploitation levels.

In terms of diameter at breast height which is the standard measurement that determines exploitability of logs, five categories were identified among the trees measured (Figure 5.1.2). Much of the trees were found to be within DBH 10-20cm (45.7%) and 21-30 cm (34.9%). The commercially viable sizes pf DNH >30cm only constitute less than 20% of the trees enumerated. Lei Soa and Toli Chiefdoms have the highest densities of trees in this category, followed by Mafindor and Fiama Chiefdoms.

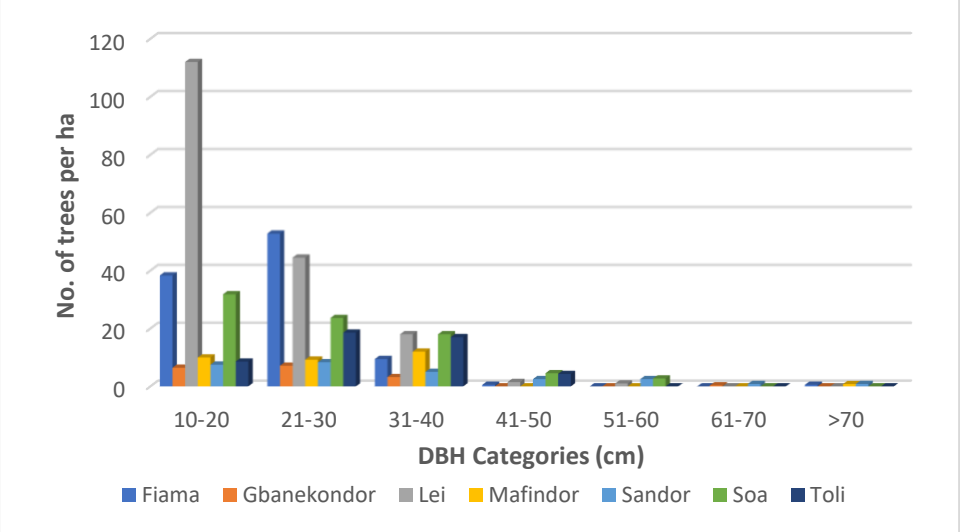

Figure 5.1.2 – Comparative distribution of tree size categories (DBH) per ha, among chiefdoms in the Kono District.

Potential Live Tree Stock based on Field Data.

The distribution of potential stock is displayed in Figure 5.1.3, showing wide ranging levels of future stock based on data generated in different plots and in different Chiefdoms. The graph incorporates the distribution of potential tree densities across all Chiefdoms, to provide a basis for comparisons between current stock and potential stock. The graph indicate that seedling density

was highest across all Chiefdoms in relation to potential stock, followed by coppicing stumps. Toli and Lei Chiefdoms had the highest density of seedlings, but in general, four of the seven Chiefdoms had densities of over 80 seedlings per ha. In terms of coppicing stumps, this category of regenerative potential was the second most important, with Toli and Mafindor Chiefdoms showing the highest densities of over 40 coppicing stumps per ha. Overall, the regenerative potential shows different variation in the data across the seven Chiefdoms, though seedlings were more abundant in all plots sampled in all Chiefdoms (Figure 5.1.4). This may be associated with the tree to seedling/sapling ratio (which is dependent on the ecology of the woodland) and the factors affecting copping potentials within the plot or the area where the plot exists. Toli Chiefdom shows the greatest regenerative potential across all Chiefdoms, whilst Fiama was the least among the Chiefdoms,

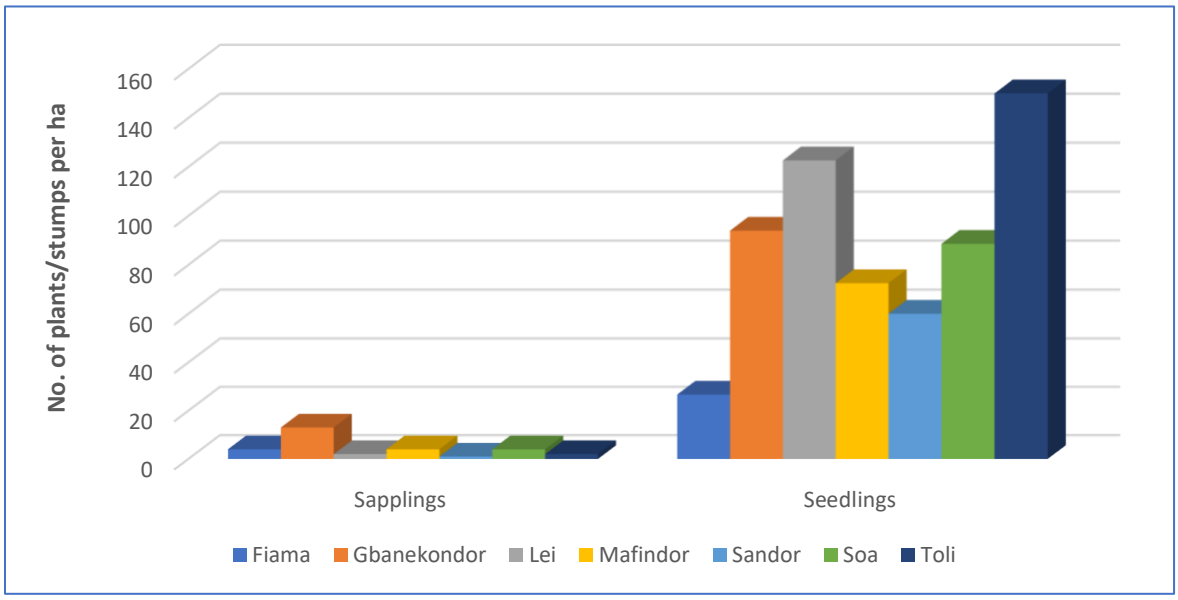

Figure 5.1.3 – Distribution of the regenerative potential *Pterocarpus erinaceus* among Chiefdoms in the Kono District.

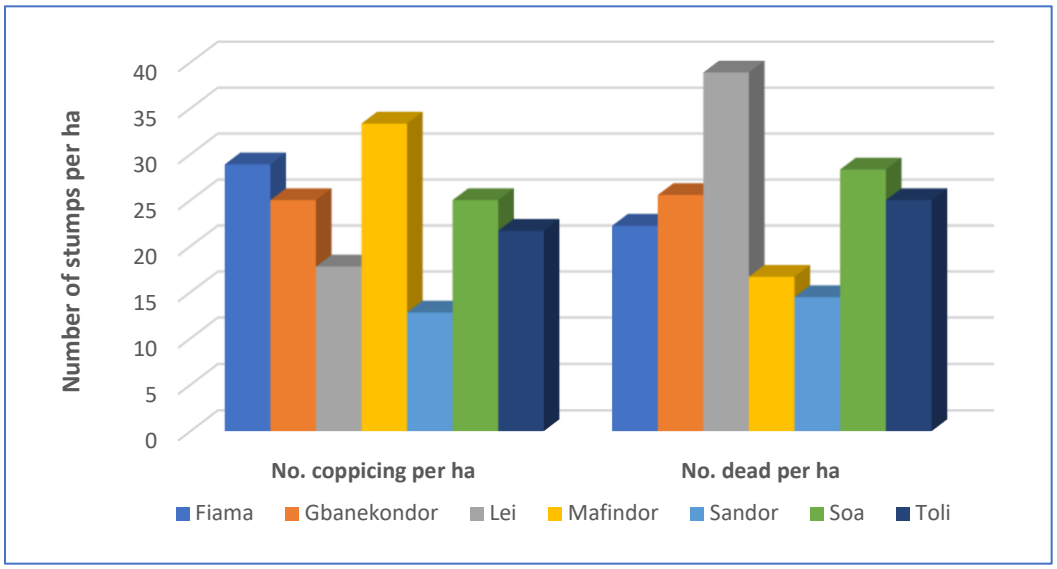

Figure 5.1.4 – Status and distribution of stumps of *Pterocarpus erinaceus* among Chiefdoms.

In terms of stumps, which are indicators of the level of exploitation of *Pterocarpus* timber, the density was much higher than that of the live trees of exploitable sizes for timber export (>30 cm DBH). However, it was observed at some of the local deports that exploitation included sizes that were below commercially acceptable range, which indicates that the wood is used for other purpose in country other than export. When both active and dead stumps are combined, the estimated number of trees that have been exploited over the years was comparable to the current viable stock and potential stocks (seedlings and saplings) combined. This is a clear indication of high degree of exploitation experienced in this District, the implications being that long-term recovery is needed to reestablish viable stands for future sustainable exploitation.

5.1.6 Evaluation of Impacts of Harvest

Control and monitoring of harvesting and exportation.

Logging of *Pterocarpus erinaceous*, has been the main source of income for many young people in the various Chiefdoms in Kono District, where the species is found in abundance. During the last six to seven years, the species has been harvested for export, and in some cases for charcoal production. No harvesting of *Pterocarpus erinaceus* is going on now in the District.

What is the impact of harvest on target population?

The impact of the harvest on target population is MODERATELY HIGH

In the Kono District, the species was the most logged of all timber species, not just for export but for other reasons. The wood of *Pterocarpus erinaceus* in Kono District provides numerous uses such as outlined below, many of which are sources of livelihoods to local communities.

- Wood fuel – the wood is cut and used as firewood, whilst there is a growing trend towards charcoal production as an alternative profitable venture to timber export.
- Fencing – Farmers use *Pterocarpus erinaceus* to fence their crops and livestock, especially cattle (locally called worreh). The fence serves the purpose for protecting crops against pests and livestock against theft and straying.
- Construction work – the timber is tough and durable and used for many local constructions.
- Roads and bridges - The woods are laid across drainages and trenches to connect roads, for the easy movement of vehicles, cattle, and goods.
- Medicinal use – the bark and leaves are used by some communities for medicinal purposes.

Estimation of an export quota

Export quota to be determined for the District.

5.1.7 Impact of Harvest on National Population

Impact of harvest is considered **MODERATE** but must be determined.

The Kono District has a significant cover of ***Pterocarpus*** *erinaceus* woodland. Based on the data generated only two of the seven Chiefdoms now have reasonable density of the rosewood and much of it have been harvested in greater portions of the areas where it is found in the District. Considering the spatial coverage in the District and the extent of exploitation, the impact of harvest on national population is considered moderate but must be determined.

5.1.8 Evaluate Impacts of Trade

What is the impact of legal and illegal trade on harvest area population and on species of concerned nationally?

There are no quantitative studies on the impact of legal and illegal trade on the natural populations of ***Pterocarpus erinaceus*** in the Kono District. Many depots were observed with both marketable and non-marketable logs. No illegal harvest was observed in the District.

Trade level in relation to harvest area.

No specific information on the Kono District on trade level in relation to harvest exists and so it would be difficult to determine at this stage.

Magnitude and trend of national trade

See Chapter 8, Subsection 8.1

5.1.9 Evaluate Appropriate Rigour of Existing Management Measures

What management/protection measures are in place for the target species

Pterocarpus erinaceus is listed in CITES Appendix II and requires a Non-Detriment Finding, national quota before trade of the species is allowed. This was a great move to help protect the species in its natural state. In Sierra Leone, No Science No trade has been adopted for the protection of this species.

To ensure that harvesting of the species for trade is going on, monitoring and supervision of the species is done by the team of the Forest Management Unit in the District, with periodic visits from the Assistant Director of Commercial Unit in the Forestry Department in the Ministry of the Environment and Climate Change. This is to verify compliance with the Policies, Laws, and Regulations on Forestry, which will allow the Department to propose changes, adjustments and appropriate solutions that apply.

In addition, local traditional bylaws exist in all seven Chiefdoms for management and protection purposes.

What are the key legislations governing the harvesting of forest products at the national and regional levels in Sierra Leone?

The following existing legal instruments govern the harvesting of forest products throughout Sierra Leone: - The Forestry Act of 1988 (Amended 2022), The Forestry Regulations of 1990, Forestry Development, Exploitation and Trade Reforms of 2010, and The Forestry Policy of 2010.
In compliance with the national legal instruments highlighted above, harvesting of the *Pterocarpus erinaceus* for exportation is generally done in accordance with Section 20 (Utilization of Community Forests) of The Forestry Act, 1988 and Section 8 (Submission of Logging Plans for Unclassified Forests) of The Forestry Regulations, 1990.

5.1.10 Review of Harvest Management

Based on the summary of harvest regime for *Pterocarpus erinaceus* in the Kono District illustrated in Table 5.1.2, the following recommendations were made by the Scientific Authority to the Management Authority: -

- to institute a harvesting scheme with a long history of effective management. A well-regulated adaptive management is more likely to be sustainable than an unmanaged harvest.
- the development and adoption of both local and national management plan to build and gain political will to establish the process of sustainable use.

Artificial Propagation

No evidence of artificial propagation exists in the district.

Non-lethal harvesting of fruits/flowers/seeds/leaves

Evidence exists that the leaves are being harvested.

Non-lethal harvesting of bark/roots/wood

Peeling off the bark was observed and used as medicinal herbs. No evidence of the roots being harvested. Some evidence of non-lethal harvesting of the wood do exist.

Removal of Whole Plant.

The main products in this case were whole stems with regulated degree of control while others were unmanaged with reference to the height level where they were harvested. The regulated products were harvested sometimes immature, but most times matured, while the unmanaged products were harvested either immature or matured every time. The relative level of uptake is unknown for both degrees of control, while the reason for take-off were for both subsistence and commercial purposes.

Removal of Whole Bulb

Not Applicable to *Pterocarpus erinaceus*

Killing of individual by removal of seeds, leaves, bark, roots, wood.

This is the most common exploitation method, mainly targeting the wood. The whole tree is cut down and only the portion of the wood that supposedly meets exportable quality is extracted and taken away. The rest of the tree such as the remaining part of the trunk and the branches are either left to waste or where possible, used to produce charcoal.

Except in few isolated cases where the back is entirely removed, which eventually leads to the death of the plant, the removal of the other parts of the plant is rare and in the few cases, do not result to the death of the plant.

Table 5.1.2 Summary of Harvest Regime for *Pterocarpus erinaceus* in the Kono District.

Species: *PTEROCARPUS ERINACEUS*	**Country (if applicable State or Province): SIERRA LEONE, EASTERN PROVINCE, KONO DISTRICT**
Date (of making Non-Detriment Finding): JUNE 2022	**Period to be covered by the finding: JUNE 2022 – MAY 2027**
Name: DR ABDUL BABATUNDE KARIM	**Position in Scientific Authority: HEAD**
Is the species endemic, found in a few countries only, or widespread? WIDESPREAD IN WEST AFRICA	
Conservation status of the species (if known): IUCN Global status:___ENDANGERED_____National status:__CITES APPENDIX II SPECIES___Other……	

Type of harvest	Main Product	Degree of Control	Demographic segment of population harvested			Relative level of off-take (include number or quantity if known)				Reason for off-take and percentage (if known)			Commercial destination and percentage (if known)		
			Immature	Mature	Sex	Low	Medium	High	unknown	Subsistence	Commercial	Others	Local	National	International
1.1 Artificial propagation	*P. erinaceus*	Regulated													
		Unregulated													
1,2 Non-lethal harvesting of fruits/flowers/seeds/ leaves	*P. erinaceus*	Regulated													
		Unregulated		✓	na	✓				20%	5%			✓	✓
1.3 Non-lethal harvesting of bark/roots/ wood	*P. erinaceus*	Regulated	✓	✓											
		Unregulated		✓	na	✓			✓	10%	15%		✓	✓	
1.4 Removal of whole plant	*P. erinaceus*	Regulated		✓	na			✓			75%				✓
		Unregulated		✓	na		✓			5%	15%	10%	✓	✓	✓
1.5 Removal of whole bulb	*P. erinaceus*	Regulated													
		Unregulated													
1.6 Killing of individual by removal of seeds, leaves, bark, roots, wood	*P. erinaceus*	Regulated													
		Unregulated	✓	✓	na				✓	10%	0%		✓	✓	

CHAPTER VI – RESULTS AND FINDINGS: NORTHERN REGION

6.0 REGIONAL COVERAGE

Pterocarpus erinaceus woodland is found in four Districts namely – Bombali, Tonkolili, Koinadugu and Falaba Districts in the Northern Region.

6.1 BOMBALI DISTRICT

6.1.1 Review Specimen Identification

Has the plant/specimen been correctly identified, and is the scientific name used compliant with the appropriate CITES standard?

The species has been correctly identified in accordance with the information provided in Chapter 4, therefore it is scientifically identified as *Pterocarpus erinaceus*.

Locally the species is called by various names depending on the ethnic group in the area, as follows, but they all have similar semantics:

Temne – ***Gbenie***

Limba – ***Gbene***

Koranko - ***Gbene***

6.1.2 Review of Compliance with Requirements for Artificial Propagation

Is the permit application for artificial propagated specimens?

Pterocarpus erinaceus occurred naturally in the Bombali District. Although there is no evidence of artificial propagation of the species for now, but plans are on the way to start.

6.1.3 Review of Relevant Exclusions and Previously Made Non-Detriment Finding

Are the specimens covered by CITES Appendix II?

YES, and *Pterocarpus erinaceus* is listed in CITES Appendix II.

Is the harvest or the export of wild-harvested specimens of *Pterocarpus erinaceus* permitted?

Presently there is suspension on the export of any specimens of *Pterocarpus erinaceus* until an NDF is developed to advise that such export will not be detrimental to the survival of the species.

Has a science based NDF been made for *Pterocarpus erinaceus* that is still valid and sufficient to evaluate the current application?

This is the very first time an NDF study is conducted in Sierra Leone for ***Pterocarpus*** *erinaceus*.

6.1.4 Evaluate Conservation Concern

Considering conservation status assessments, what is the indicated severity of conservation concern?

In this study, threat assessment was conducted as part of the NDF in the Northern Region. The specific threats noticed during the field visit to isolated forest areas with *Pterocarpus erinaceus* within three Chiefdoms in Bombali District, three Chiefdoms in the Tonkolili District, six Chiefdoms in the Koinadugu District and 13 Chiefdoms in the Falaba District are indicated below.

- Stumps of *Pterocarpus erinaceus* were imminent in 5 of the 10 plots surveyed in Biriwa; 11 of 13 plots surveyed in Gbendembu; 9 of 10 plots surveyed in Kamaranka with diameter of cut stumps ranging from <10 cm in all three Chiefdoms to between 41-50 cm, 61-70 cm and 51-60 cm in Biriwa, Gbendembu and Kamaranka respectively (Table 6.1.1), indicating harvesting of the species for firewood, charcoal burning and timber in Bombali District.
- Blackish-brown outer walls of live trees as well as stumps were also observed suggesting the occurrence of frequent fires in the District. These fires may be part of the natural fire climax ecology of these woodlands, but the fact that agriculture is practiced in these areas suggests that farm preparation activities may be another cause for the fire.
- Farm bush were also prominent in all three Chiefdoms suggesting farming as a major threat in the District.

6.1.5 Evaluation of Potential Biological Risk

What is the severity of biological risk?

Risk severity is MODERATELY HIGH

Geographic distribution of *Pterocarpus erinaceus* in the Bombali District

Bombali District is one of the four Districts in the Northern Region where *Pterocarpus erinaceus* woodland is widely distributed. The species is found in three of the 12 Chiefdoms in the District - Biriwa, Gbendembu and Kamaranka, where wild populations are reported to occur.

National/Subnational Population Size and Distribution

Quantitative assessment of *Pterocarpus erinaceus* was done by demarcating 0.1ha sample plots randomly in the three Chiefdoms visited: - Biriwa, Gbendembu and Kamaranka. Forty three plots were sampled for trees ≥ 10cm DBH, and saplings, seedlings and coppices as means of determining the regeneration potential of the species.

Table 6.1.1 – No. of plots surveyed, number and density of live trees enumerated in the Bombali District.

Chiefdoms	No. of Plots	No. of live trees counted	Live trees per plot	Tree density per ha
Biriwa	10	52	5	52
Gbendembu	23	194	8	84
Kamaranka	10	154	15	154
TOTAL/AVERAGE	43	400	9	97

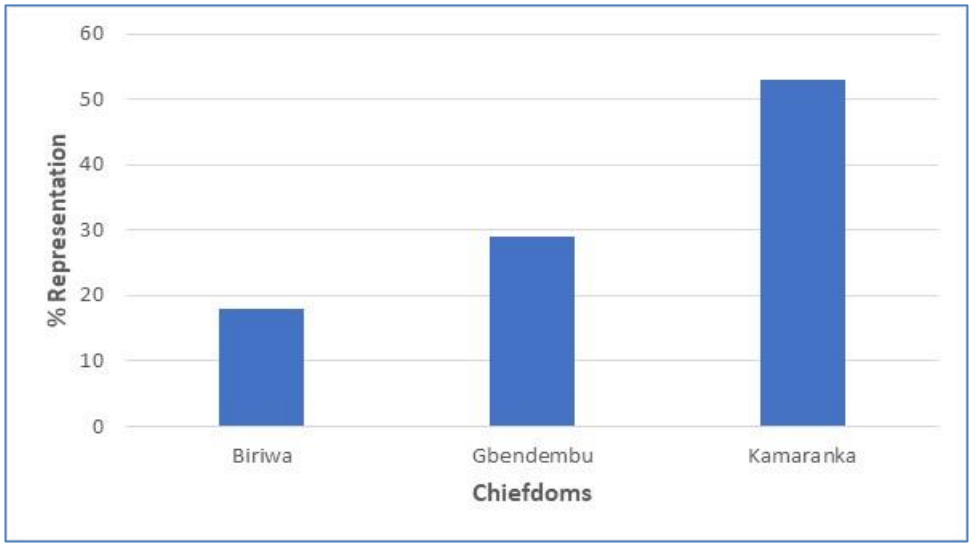

Figure 6.1.1 - Proportional distribution of *Pterocarpus erinaceus* trees in the Bombali District based on sample data.

Size structure of sub-national populations (Bombali District)

Current Live Tree Stock based on Field Data.

The results for on current tree stock for Bombali District are presented in Figure 6.1.2 It was observed that a large proportion of the *Pterocarpus erinaceus* enumerated had DBH of the categories 10-20 cm (56.0%) and 21-30 cm (36.1%). Only a small proportion (7.9%) of the trees had DBH above 31-40 cm and 41-50 cm, but no tree with DBH ≥ 50 cm were encountered in the District. This indicates that most of the current live tree stock are below the exploitable diameter of 30cm DBH, and only about 7% were 30 cm DBH and above, This suggests that older, larger and more matured *Pterocarpus erinaceus* have been harvested through logging and that the current population of is made up of young trees obtained from either seedlings or coppicing stumps.

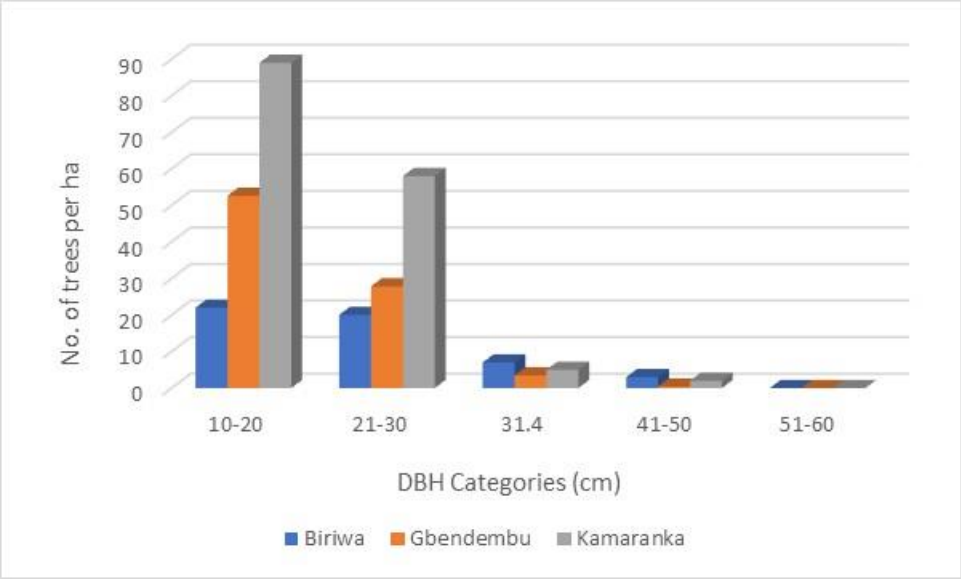

Figure 6.1.2 - Diameter distribution of live tress of *Pterocarpus erinaceus* in three Chiefdoms in Bombali District.

Potential Live Tree Stock based on Field Data.

Quantification of the regeneration potential of *Pterocarpus erinaceus* in Bombali District revealed that it is high as indicated by the relatively high number of seedlings and coppices/ha, although saplings number/ha was lower (Figure 6.1.3) suggesting likelihood of threat events probably bush fires that prevent seedlings and young coppices from developing to sapling stage (Figure 6.1.4). Also, the diameter of stumps of harvested *Pterocarpus erinaceus* ranged from <10 cm to approximately 70 cm, meaning trees of a wide range of DBH have been target for harvest. However, given that large number of trees are in the range of 10-20 cm DBH, this suggests the likelihood that threat events alone might not be responsible for decline in the number of saplings but the growth rate from seedlings to young trees might be fast and plays a key role. However, more comprehensive research in required to validate such assumption.

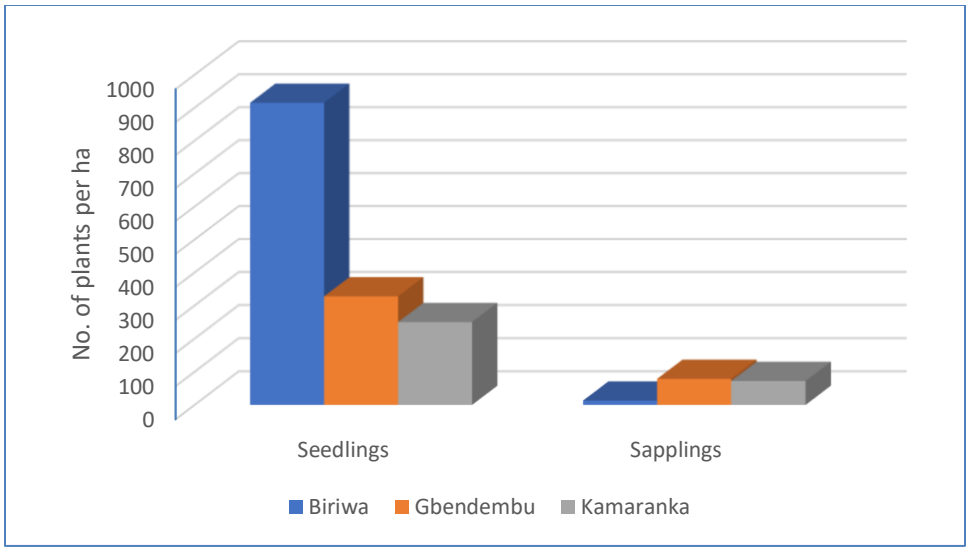

Figure 6.1.3 - Regeneration potential of *Pterocarpus erinaceus* seedlings and saplings in the Bombali District.

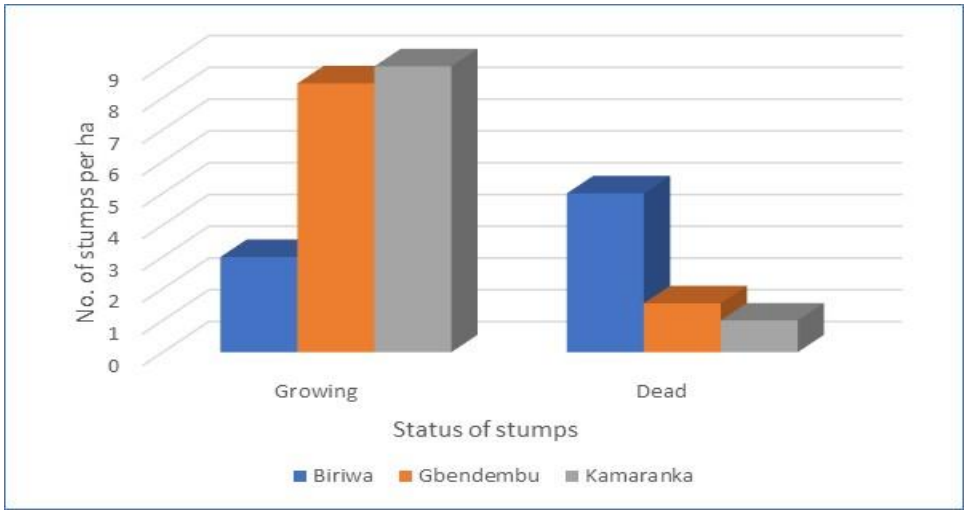

Figure 6.1.4. Regeneration potential of stumps of *Pterocarpus erinaceus* in the Bombali District.

6.1.6 Evaluation of Impacts of Harvest

What is the impact of harvest on target population?

Severity of harvest is **HIGH.**

Although no study on the impact of harvest on Rosewood tree has been previously conducted in the Bombali District, the findings of the current study revealed that in all three Chiefdoms, trees with smaller DBH formed a greater proportion of the existing population i.e., trees that are reproductively fit (mature individuals) are in the minority. Surprisingly, a high percentage of stumps with larger diameter was prominent. Further, a good proportion of the stumps was observed to coppice (classified as live stumps) whilst a lesser proportion of the stumps was dead with zero coppicing potential, classified as dead stums (Figure 6.1.4).

6.1.7 Impact of Harvest on National Population

Impact of harvest is considered **HIGH** but must be determined.

No study on the species population has been conducted in the past therefore population trends cannot be estimated from this study. However, quantification of the impact of harvest on *Pterocarpus erinaceus* populations in the other Districts within the species range can assist in judging whether the national population is being depleted or not and the protection measures that should be reviewed and enforced.

6.1.8 Evaluate Impacts of Trade

What is the impact of legal and illegal trade on harvest area population and on species of concerned nationally?

There are no quantitative studies on the impact of legal and illegal trade on the natural populations of ***Pterocarpus erinaceus*** in the Bombali District. However, it is envisaged that the present study will give an insight into how legal and illegal logging can result in natural population decline. There is no evidence of harvesting now in the District.

Trade level in relation to harvest area.

Presently, the diameter classes of stumps from 41-50cm and above are in smaller number when compared to diameter classes 40cm and below, which indicates the harvesting is not done for trade in Bombali District.

6.1.9 Evaluate Appropriate Rigour of Existing Management Measures

What management/protection measures are in place for the target species

Review of Legislations

At the national level, see information in Chapter 8, Section 8.2 which explains the key legislations governing the harvesting of forest products at the national and regional levels in Sierra Leone.

These legislations are being reviewed to reflect current day realities.

Review of Protection Measures

There are no specific protection measures in place for *Pterocarpus erinaceus* woodland in the District from natural events such as fire and storms. Some level of protection exists against anthropogenic destruction, particularly with respect to logging and fire through the deployment of rangers by the government and chiefdom bylaws in all Chiefdoms surveyed.

What are the key legislations governing the harvesting of forest products at the national and regional levels in Sierra Leone?

The following existing legal instruments govern the harvesting of forest products throughout Sierra Leone: - The Forestry Act of 1988 (Amended 2022), The Forestry Regulations of 1990, Forestry Development, Exploitation and Trade Reforms of 2010, and The Forestry Policy of 2010.
In compliance with the national legal instruments highlighted above, harvesting of the *Pterocarpus erinaceus* for exportation is generally done in accordance with Section 20 (Utilization of Community Forests) of The Forestry Act, 1988 and Section 8 (Submission of Logging Plans for Unclassified Forests) of The Forestry Regulations, 1990.

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

Monitoring and supervision of the species is done by the team of the Forest Management Unit in the District, with periodic visits from the Assistant Director of Commercial Unit in the Forestry Department in the Ministry of the Environment and Climate Change. This is to verify compliance

with the Policies, Laws, and Regulations on Forestry, which will allow the Department to propose changes, adjustments and appropriate solutions that apply.

In addition, local traditional bylaws exist in all seven Chiefdoms for management and protection purposes.

6.1.10 Review of Harvest Management

Based on the summary of harvest regime for *Pterocarpus erinaceus* in the Bombali District illustrated in Table 6.1.2, the following recommendations were made by the Scientific Authority to the Management Authority: -

- to institute a harvesting scheme with a long history of effective management. A well-regulated adaptive management is more likely to be sustainable than an unmanaged harvest.
- the development and adoption of both local and national management plan to build and gain political will to establish the process of sustainable use.

In addition, local traditional bylaws exist in all three Chiefdoms for management and protection purposes.

Artificial Propagation

No evidence of artificial propagation exists in the District.

Non-lethal harvesting of fruits/flowers/seeds/leaves

No evidence exists that they are being harvested.

Non-lethal harvesting of bark/roots/wood

Some evidence of non-lethal harvesting of the wood do exist.

Removal of Whole Plant.

The main products in this case were whole stems with regulated degree of control while others were unmanaged with reference to the height level where they were harvested. The regulated products were harvested sometimes immature, but most times matured, while the unmanaged products were harvested either immature or matured every time. The relative level of uptake is unknown for both degrees of control, while the reason for take-off were for both subsistence and commercial purposes.

Removal of Whole Bulb

Not Applicable to *Pterocarpus erinaceus*

Killing of individual by removal of seeds, leaves, bark, roots, wood.

The main products in this case were whole stems with regulated degree of control while others were unmanaged with reference to the height level where they were harvested. The regulated products were harvested sometimes immature, but most times matured, while the unmanaged products were harvested either immature or matured every time. The relative level of uptake is unknown for both degrees of control, while the reason for take-off were for both subsistence and commercial purposes.

Table 6.1.2 Summary of Harvest Regime for *Pterocarpus erinaceus* in the Bombali District.

Species: *PTEROCARPUS ERINACEUS*	**Country (if applicable State or Province): SIERRA LEONE, NORTHERN PROVINCE, BOMBALI DISTRICT**
Date (of making Non-Detriment Finding): JUNE 2022	**Period to be covered by the finding: JUNE 2022 – MAY 2027**
Name: DR ABDUL BABATUNDE KARIM	**Position in Scientific Authority: HEAD**
Is the species endemic, found in a few countries only, or widespread? WIDESPREAD IN WEST AFRICA	
Conservation status of the species (if known): IUCN Global status:___ENDANGERED National status _CITES APPENDIX II SPECIES___Other_____.	

Type of harvest	Main Product	Degree of Control	Demographic segment of population harvested			Relative level of off-take (include number or quantity if known)				Reason for off-take and percentage (if known)			Commercial destination and percentage (if known)		
			Immature	Mature	Sex	Low	Medium	High	unknown	Subsistence	Commercial	Others	Local	National	International
1.1 Artificial propagation	*P. erinaceus*	Regulated													
		Unregulated													
1,2 Non-lethal harvesting of fruits/flowers/seeds/ leaves	*P. erinaceus*	Regulated													
		Unregulated		✓	na	✓				20%	5%			✓	✓
1.3 Non-lethal harvesting of bark/roots/ wood	*P. erinaceus*	Regulated	✓	✓											
		Unregulated		✓	na	✓			✓	15%	5%		✓	✓	
1.4 Removal of whole plant	*P. erinaceus*	Regulated		✓	na		✓				80%				✓
		Unregulated		✓	na			✓		10%	20%	10%	✓	✓	✓
1.5 Removal of whole bulb	*P. erinaceus*	Regulated													
		Unregulated													
1.6 Killing of individual by removal of seeds, leaves, bark, roots, wood	*P. erinaceus*	Regulated													
		Unregulated	✓	✓	na				✓	10%	10%		✓	✓	

6.2 TONKOLILI DISTRICT

6.2.1 Review Specimen Identification

Has the plant/specimen been correctly identified, and is the scientific name used compliant with the appropriate CITES standard?

The species has been correctly identified in accordance with the information provided in Chapter 4, therefore it is scientifically identified as *Pterocarpus erinaceus*.

Locally the species is called different names, depending on the different ethnic groups in the District as follows:

Temne - ***Gbenie***

Limba - ***Gbene***

6.2.2 Review of Compliance with Requirements for Artificial Propagation

Is the permit application for artificial propagated specimens?

Pterocarpus erinaceus occurred naturally in the Tonkolili District. Although there is no evidence of artificial propagation of the species for now, but plans are on the way to start.

6.2.3 Review of Relevant Exclusions and Previously Made Non-Detriment Finding

Are the specimens covered by CITES Appendix II?

YES, and *Pterocarpus erinaceus* is listed in CITES Appendix II.

Is the harvest or the export of wild-harvested specimens of P. erinaceus permitted?

Presently there is suspension on the export of any specimens of *Pterocarpus erinaceus* until an NDF is developed to advise that such export will not be detrimental to the survival of the species.

Has a science based NDF been made for *P. erinaceus* that is still valid and sufficient to evaluate the current application?

This is the very first time an NDF study is conducted in Sierra Leone for *Pterocarpus erinaceus*.

6.2.4 Evaluate of Conservation Concern

Considering conservation status assessments, what is the indicated severity of conservation concern?

This work focused on threat assessment carried out in three Chiefdoms of Tonkolili District, as part of the NDF. The specific threats recorded during some visits to the isolated forest areas containing *Pterocarpus erinaceus* are indicated as follows: -

- In Kholifa-Mabang Chiefdom, high rate of pastoral activities was observed as many of the inhabitants of the settlements in that area are herders who possessed cattle, sheep and goats in large numbers. Due to the pastoral activities, heavy grazing was a major threat to the survival of the species investigated. As a matter of fact, it was discovered that this Chiefdom contains more dead stumps than the other two Chiefdoms, as evidenced by the lack of coppices on most of the stumps (Figure 6.2.4). The Chiefdom is characterized by more seedlings, lesser saplings and lesser live trees, when compared to other sampled Chiefdoms within the same District (Figure 6.2.3). This is a result of the grazing activities which prevents the seedlings from getting to maturity.
- Harvesting of *Pterocarpus erinaceus* for firewood, charcoal burning, and timber are suspected in all Chiefdoms of Tonkolili District. As a matter of fact, high rates of tree felling are evidenced by the number of stumps within the sampled plots (Figure 6.2.4). In addition, sites of charcoal burning were observed at various locations within the Chiefdoms.
- Apart from the above-mentioned threats to the abundance of *Pterocarpus erinaceus* in Tonkolili District, farming and building construction activities also attributed to reasons for removal of vegetation in general. Majority of the stumps recorded during this study are far below maturity sizes for exploitation. There are more stumps with less than 30 cm diameter at point of cutting.

6.2.5 Evaluation of Potential Biological Risk

What is the severity of biological risk?

The biological risk severity could be rated as MEDIUM.

This is so because at the time of the survey, the threats (despite their occurrence for many years before the study) did not totally remove the occurrence of *P. erinaceus* from the study area.

Geographic distribution of *Pterocarpus erinaceus* in the Tonkolili District

Tonkolili District is one of the four Districts in the Northern Region where *Pterocarpus erinaceus* woodland is widely distributed. The species is found to occur in three of the twelve Chiefdoms in the District: Kholifa-Mabang, Sambaya and Dansogoia, where wild populations of *Pterocarpus erinaceus* are found.

National/subnational population size and distribution

In the Tonkolili District, the species is recorded to be more concentrated at three Chiefdoms, namely, Kholifa-Mabang, Sambaya and Dansogoia; there are scattered scanty distributions in other Chiefdoms. This study only covers the population of the species in the three Chiefdoms mentioned. The Dansogoia Chiefdom has the highest density of *Pterocarpus erinaceus* enumerated in the District (Table 6.2.1 and Figure 6.2.1).

Table 6.2.1 – No. of plots surveyed, number and density of live trees enumerated in the Tonkolili District.

Chiefdoms	No. of Plots	No. of live trees counted	Live trees per plot	Tree density per ha
Dansogoia	10	142	14	142
Kholifa-Mabang	10	108	11	108
Sambaia	15	186	12	124
TOTAL/AVERAGE	35	436	13	125

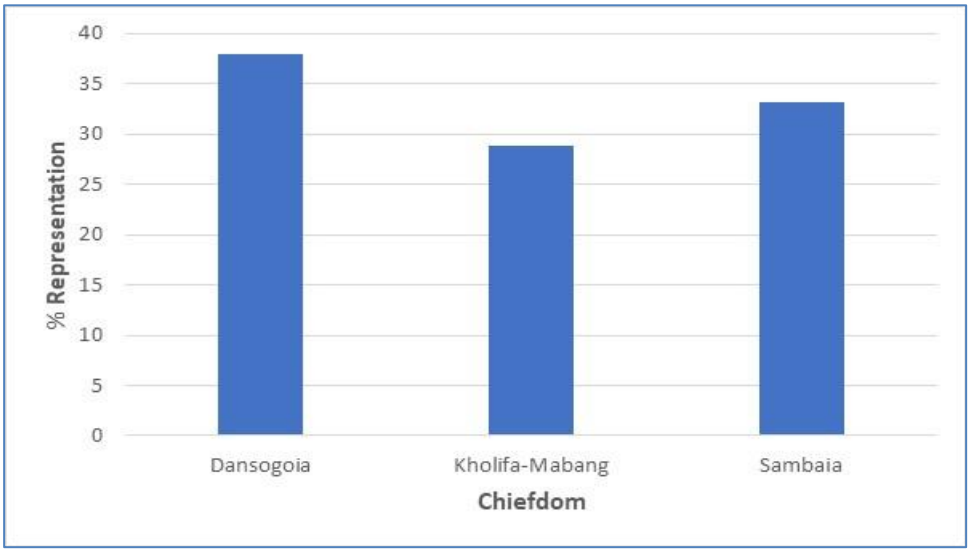

Figure 6.2.1 - Comparative distribution of tree densities among Chiefdoms in the Tonkolili District.

Size structure of national/sub-national populations

Current Live Tree Stock

In total, thirty-five plots were sampled for trees ≥ 10cm DBH to determine abundance and distribution of trees in the Tonkolili District. It was observed from the data presented in Figure 6.2.2 indicates that a larger proportion of the sampled rosewood trees were of 10-20cm (38.2%) and 21-30cm (21.0%) DBH, meaning that much of the live tree stock are below commercially exploitable sizes. Larger size stock of DBH > 30cm (31-40 and 41-50 cm DBH) account for only about one-fourth of the total tree stands in the District. Only one tree was found with DBH ≥ 51-60 cm, while trees with DBH above 60 cm were not encountered in this study (Figure 6.2.2). On the other hand, the diameter of stumps of harvested species ranges from 4 cm to approximately 130 cm. As indicated on Figure 6.2.2, the chiefdoms Diansogaia and Sambaya have reasonable number of exploitable sizes *P. erinaceus.*

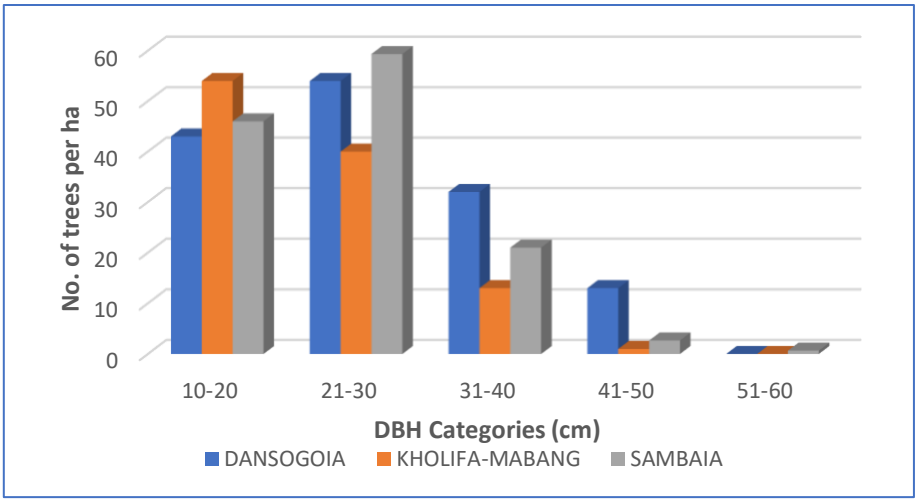

Figure 6.2.2 Distribution of trees of various DBH categories in three Chiefdoms of Tonkolili District.

This suggests that older, larger, more matured as well as very immature species have been harvested. It also indicates that despite the presence of matured merchantable trees, majority of the current population of *Pterocarpus erinaceus* in the District is composed of younger trees (DBH 30 and below) obtained from either seedlings or coppices of stumps.

Potential Tree Stock

Assessment of the various forms of regeneration potentials of the species in Tonkolili District revealed that even though a relatively low number of saplings number/ha was recorded, a combined data with seedlings gives a regeneration potential of between 150 to 300 plants per ha among the Chiefdoms (Figure 6.3.3). Comparatively, the data shows a high regeneration potential of the species in the Tonkolili District evidenced by the relatively reasonable number of seedlings and the density of coppices/ha in some of the plots, especially at Sambaya Chiefdom. One key challenge in this District is the threat posed by pastoral activities such as grazing by pasture animals, and/or bush fires and other agricultural activities which is suspected to hamper the growth of seedlings and young coppices beyond certain stages, and this may affect regeneration in the medium to long term.

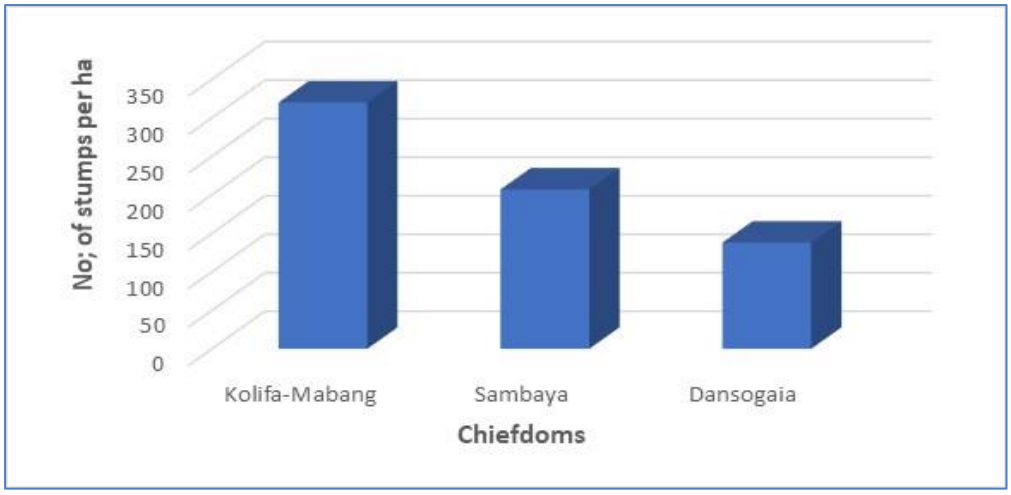

Figure 6.2.3. Distribution of seedlings and saplings per ha in three Chiefdoms of Tonkolili District.

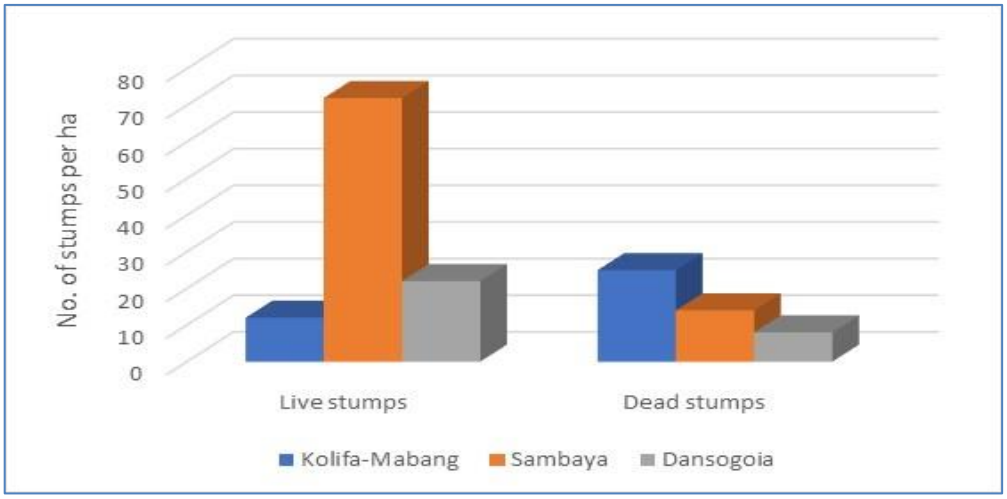

Figure 6.2.4. Distribution of live and dead stumps/ha in three Chiefdoms of Tonkolili District.

6.2.6 Evaluate Impacts of Harvest

What is the impact of harvest on target population?

Severity of harvest can be regarded as MODERATE.

Based on the data, trees with DBH of less than 30cm formed a greater part of the existing population in all three Chiefdoms. This means that there are fewer trees which are considered

mature and of commercially viable sizes. As mentioned earlier, coppicing was found to be very low, compared to seedlings in Kholifa-Mabang where pastoral activities are more pronounced.

According to Figure 6.2.4, it is observed that in comparison, there were more live trees on the average than stumps across the Chiefdoms surveyed, although Kholifa-Mabang and Dansogoia Chiefdoms, accounted for greater proportions. This can be attributed to the steep and rugged terrain of Kholifa-Mabang, coupled with greater engagement of the inhabitants in pastoral farming, as their major occupation than on logging. In the case of Dansogoia, majority of the live trees are very difficult to access because of lack of motorable roads to the forest areas. Apart from this, an embargo has been placed on harvesting of *Pterocarpus erinaceus* in Dansogoia Chiefdom by the Paramount Chief. As for Sambaya Chiefdom, highest level of logging was recorded because of accessibility through the fairly smooth roads, and the young to middle-aged men of the Chiefdom seem to depend more on cutting down of the trees as source of livelihood for different purposes other than for export. Of the three Chiefdoms, Sambaya seem to contain more live stumps which signifies the potential of regeneration, probably because the altitude (more than 350m above sea level) contributed more to higher rates of survival of stumps which coppiced more than those located at the other two Chiefdoms.

6.2.7 Impact of Harvest on National Population

Impact of harvest is considered moderate but must be determined.

No study on the species population has been conducted in the past therefore population trends cannot be estimated from this study. However, quantification of the impact of harvest on *Pterocarpus erinaceus* populations in the other Districts within the species range can assist in judging whether the national population is being depleted or not and the protection measures that should be reviewed and enforced.

6.2.8 Evaluate Impacts of Trade

What is the impact of legal and illegal trade on harvest area population and on species of concern, nationally?

There are no quantitative studies on the impact of legal and illegal trade on the natural populations of ***Pterocarpus erinaceus*** in the Tonkolili District. However, it is envisaged that the present study will give an insight into how legal and illegal logging can result in natural population decline. There is no evidence of harvesting now in the District.

Trade level in relation to harvest area.

Most of the harvest is for other purposes other than export/trade.

6.2.9 Evaluate Appropriate Rigour of Existing Management Measures

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

Review of Legislations

At the national level, see information in Chapter 8, Section 8.2 which explains the key legislations governing the harvesting of forest products at the national and regional levels in Sierra Leone.

These legislations are being reviewed to reflect current day realities.

Review of Protection Measures

There are no specific protection measures in place for *Pterocarpus erinaceus* woodland in the District from natural events such as fire and storms. Some level of protection exists against anthropogenic destruction, particularly with respect to logging and fire through the deployment of Rangers by the Government and Chiefdom bylaws in all Chiefdoms surveyed.

Do existing management measures adequately mitigate harvest impacts and trade impacts for populations/subpopulations?

There is always room for improvement but presently monitoring and supervision of the species is done by the team of the Forest Management Unit in the District, with periodic visits from the Assistant Director of Commercial Unit in the Forestry Department in the Ministry of the Environment and Climate Change. This is to verify compliance with the Policies, Laws, and Regulations on Forestry, which will allow the Department to propose changes, adjustments and appropriate solutions that apply.

In addition, local traditional bylaws exist in all three Chiefdoms for management and protection purposes.

Also, there is an urgent need to recruit more field staff for forest patrols the actual number now in relation to the size of the District is grossly inadequate.

6.2.10 Review of Harvest Management

Based on the summary of harvest regime for *Pterocarpus erinaceus* in the Tonkolili District illustrated in Table 6.2.2, the following recommendations were made by the Scientific Authority to the Management Authority: -

- to institute a harvesting scheme with a long history of effective management. A well-regulated adaptive management is more likely to be sustainable than an unmanaged harvest.
- the development and adoption of both local and national management plan to build and gain political will to establish the process of sustainable use.

In addition, local traditional bylaws exist in all three Chiefdoms for management and protection purposes.

Artificial Propagation

No evidence of artificial propagation exists in the District.

Non-lethal harvesting of fruits/flowers/seeds/leaves

Evidence exists that they are being harvested.

Non-lethal harvesting of bark/roots/wood

Evidence of non-lethal harvesting of the wood do exist.

Removal of whole plant.

The main products in this case were whole stems with regulated degree of control while others were unmanaged with reference to the height level where they were harvested. The regulated products were harvested sometimes immature, but most times matured, while the unmanaged products were harvested either immature or matured every time. The relative level of uptake is unknown for both degrees of control, while the reason for take-off were for both subsistence and commercial purposes.

Removal of Whole Bulb

Not Applicable to *Pterocarpus erinaceus*

Killing of individual by removal of seeds, leaves, bark, roots, wood.

The main products in this case were whole stems with regulated degree of control while others were unmanaged with reference to the height level where they were harvested. The regulated products were harvested sometimes immature, but most times matured, while the unmanaged products were harvested either immature or matured every time. The relative level of uptake is unknown for both degrees of control, while the reason for take-off were for both subsistence and commercial purposes.

Table 6.2.2 - Summary of Harvest Regime for *Pterocarpus erinaceus* in the Tonkolili District.

Species: *PTEROCARPUS ERINACEUS*	**Country (if applicable State or Province): SIERRA LEONE, NORTHERN PROVINCE, TONKOLILI DISTRICT**
Date (of making Non-Detriment Finding): JUNE 2022	**Period to be covered by the finding: JUNE 2022 – MAY 2027**
Name: DR ABDUL BABATUNDE KARIM	**Position in Scientific Authority: HEAD**
Is the species endemic, found in a few countries only, or widespread? WIDESPREAD IN WEST AFRICA	
Conservation status of the species (if known): IUCN Global status:___ENDANGERED_____National status:___CITES APPENDIX II SPECIES___Other_____	

Type of harvest	Main Product	Degree of Control	Demographic segment of population harvested			Relative level of off-take (include number or quantity if known)				Reason for off-take and percentage (if known)			Commercial destination and percentage (if known)		
			Immature	Mature	Sex	Low	Medium	High	unknown	Subsistence	Commercial	Others	Local	National	International
1.1 Artificial propagation	*P. erinaceus*	Regulated													
		Unregulated													
1,2 Non-lethal harvesting of fruits/flowers/seeds/ leaves	*P. erinaceus*	Regulated													
		Unregulated		✓	na	✓				20%	5%			✓	✓
1.3 Non-lethal harvesting of bark/roots/ wood	*P. erinaceus*	Regulated	✓	✓											
		Unregulated		✓	na	✓			✓	15%	5%		✓	✓	
1.4 Removal of whole plant	*P. erinaceus*	Regulated		✓	na		✓				70%				✓
		Unregulated		✓	na			✓		5%	30%	10%	✓	✓	✓
1.5 Removal of whole bulb	*P. erinaceus*	Regulated													
		Unregulated													
1.6 Killing of individual by removal of seeds, leaves, bark, roots, wood	*P. erinaceus*	Regulated													
		Unregulated	✓	✓	na				✓	10%	10%		✓	✓	

6.3 KOINADUGU DISTRICT

6.3.1 Review Specimen Identification

Has the plant/specimen been correctly identified, and is the scientific name used compliant with the appropriate CITES standard?

The species has been correctly identified in accordance with the information provided in Chapter 4, therefore it is scientifically identified as *Pterocarpus erinaceus*.

Locally the species is called by various names depending on the ethnic group in the area, as follows, but they all have similar semantics:

Limba – ***Gbene***

Koranko – ***Gbene***

Madingo – ***Bani-fere***

6.3.2 Review of Compliance with Requirements for Artificial Propagation

Is the permit application for artificial propagated specimens?

Pterocarpus erinaceus occurred naturally in the Koinadugu District. Although there is no evidence of artificial propagation of the species for now, but plans are on the way to start.

.

6.3.3 Review of Relevant Exclusions and Previously Made Non-Detriment Finding

Are the specimens covered by CITES Appendix II?

YES, and *Pterocarpus erinaceus* is listed in CITES Appendix II.

Is the harvest or the export of wild-harvested specimens of P. erinaceus permitted?

Presently there is suspension on the export of any specimens of *Pterocarpus erinaceus* until an NDF is developed to advise that such export will not be detrimental to the survival of the species.

Has a science based NDF been made for *P. erinaceus* that is still valid and sufficient to evaluate the current application?

This is the very first time an NDF study is conducted in Sierra Leone for *Pterocarpus erinaceus*.

6.3.4 Evaluation of Conservation Concern

Considering conservation status assessments, what is the indicated severity of conservation concern?

The severity of conservation concern in the Koinadugu District is comparatively lower than the general national severity. This District accounts for some of the largest tracts of *Pterocarpus erinaceus* woodland in the country and there is a strong traditional control over the level of exploitation to the extent that exploitation of the wood is virtually prohibited.

6.3.5 Evaluation of Potential Biological Risk

What is the severity of biological risk?

Risk severity is MODERATELY LOW

Geographic distribution of *P. erinaceus* in the Bombali District

Koinadugu District is one of the four Districts in the Northern Region, where *Pterocarpus erinaceus* woodland is widely distributed. It is found to occur in all ten Chiefdoms in the District, but much of the woodland occurs in six of these Chiefdoms and so the survey was concentrated at these locations: Alkalia, Diang, Kamukeh, Nieni, Tamisso and Wara Wara Yagala.

National/subnational population size and distribution

Pterocarpus erinaceus was found in all the six Chiefdoms in Koinadugu District. Tamiso Chiefdom had the highest count of individual trees (386), followed by Nieni Chiefdom (231); the least number of trees were counted in Wara Wara Yagala (24). All ten Chiefdoms in the District have *Pterocarpus erinaceus*, but the six Chiefdoms listed on Table 6.3.1 are highly populated with the species.

Table 6.3.1 – No. of plots surveyed, number and density of live trees enumerated in the Koinadugu District.

Chiefdoms	No. of Plots	No. of live trees counted	Live trees per plot	Tree density per ha
Alkalia	6	83	14	138
Diang	15	113	8	75
Kamukeh	15	163	11	109
Nieni	24	231	10	154
Tamisso	15	386	26	257
Wara Wara Yagala	3	24	7	70
TOTAL/AVERAGE	78	997	13	128

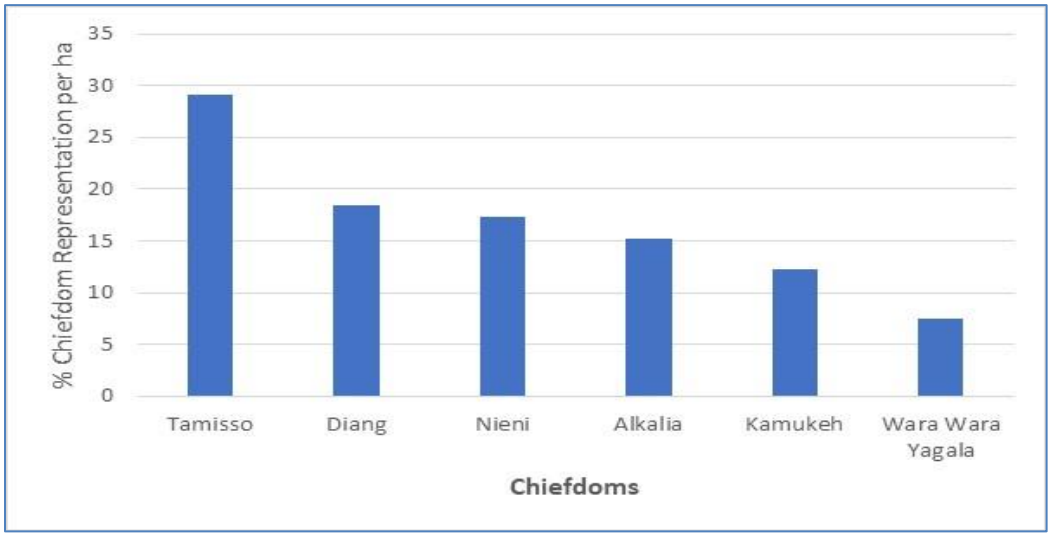

Figure 6.3.1: Percentage distribution of *Pterocarpus erinaceus* per ha of sampled Chiefdoms in the Koinadugu District.

Size structure of sub-national populations

Current Live Tree Stock

Quantitative assessment of *Pterocarpus erinaceus* was done by demarcating 0.1ha sample plots randomly in the six chiefdoms visited. Seventy-eight plots were sampled for trees ≥ 10cm DBH, and saplings (DBH <10 cm), seedlings and stumps were enumerated, as means of determining the current stock and regenerative potential of the species. The highest proportion of trees counted were of DBH 21-30 cm (35.3%). More significantly, exploitable tree stocks with DBH 31-40 cm

(19.5%), 41-50 cm (15.2%) and 61-70 cm (6.5%) were recorded in reasonable numbers (Figure 6.3.2), particularly showing that five (Alkalia, Diang, Kamukeh, Nieni and Tamisso) of the six chiefdoms in the district have exploitable stock. Surprisingly, trees with the lowest DBH category of 10-20 cm only represented 13.9% of the live tree stock in the Chiefdoms surveyed. These observations indicate that the woodlands in the Koinadugu District still holds commercially viable stock of *Pterocarpus erinaceus*.

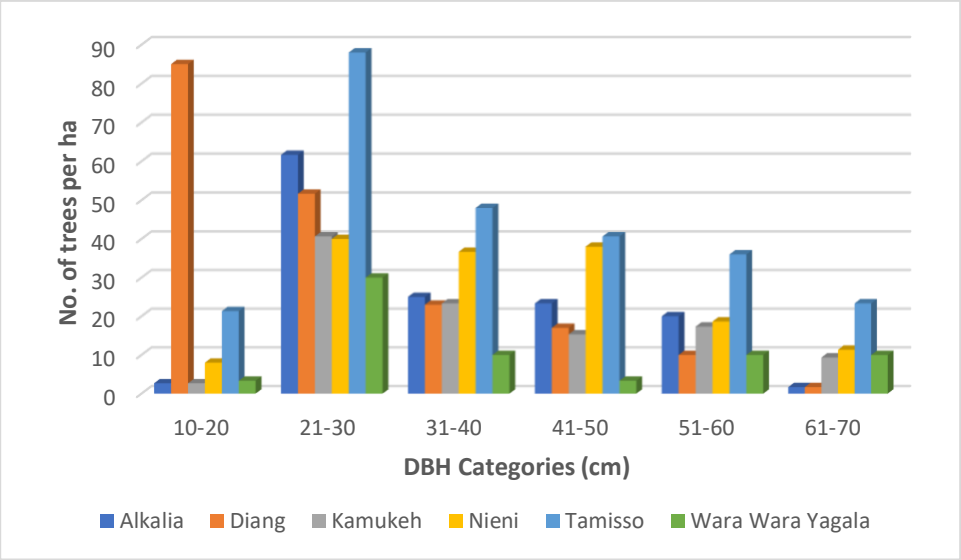

Figure 6.3.2 Distribution of trees of various DBH categories in six Chiefdoms of Koinadugu District.

Potential Tree Stock

In Koinadugu District, seedlings and saplings were combined during the survey. Seedlings and saplings were found in all Chiefdoms and plots sampled (Figure 6.3.3). In general, the density of seedlings and saplings were slightly lower than the average expected density. Only plots at Wara Wara Yagala and Alkalia Chiefdoms had densities of seedlings/saplings greater than 30 plants per ha of *Pterocarpus erinaceus* woodland surveyed in the District. Coppicing stump density per hectare (Figure 6.3.4) is highest in Tamisso with over 66 stumps per ha; the next Chiefdom is Alkalia with 35 coppicing stumps per ha. These two Chiefdoms show great potential for regeneration even though Tamisso Chiefdom had the least density of seedlings among the others.

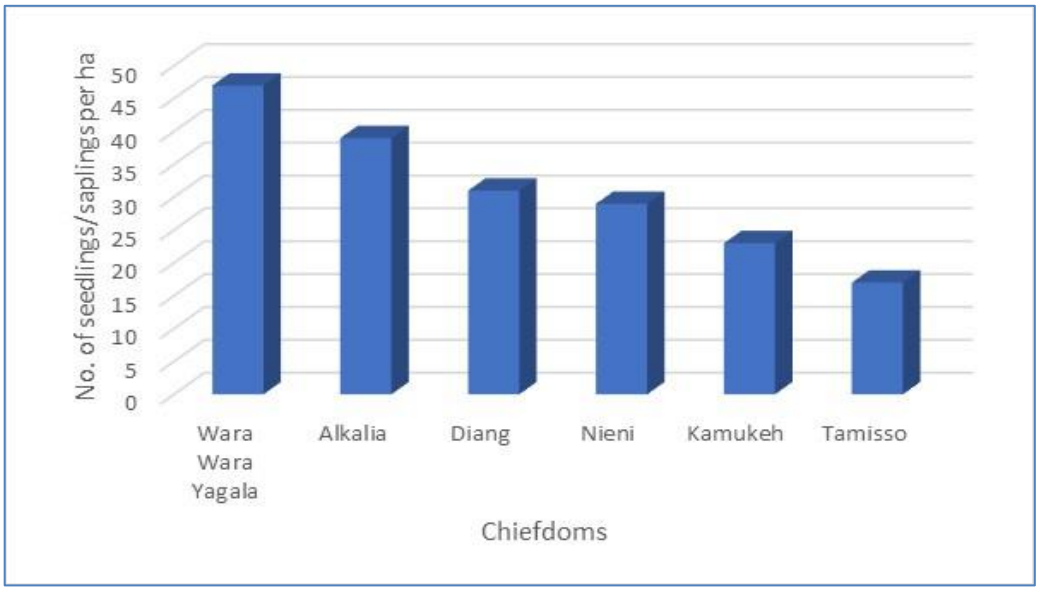

Figure 6.3.3 - Seedling and sapling density per ha in Koinadugu District.

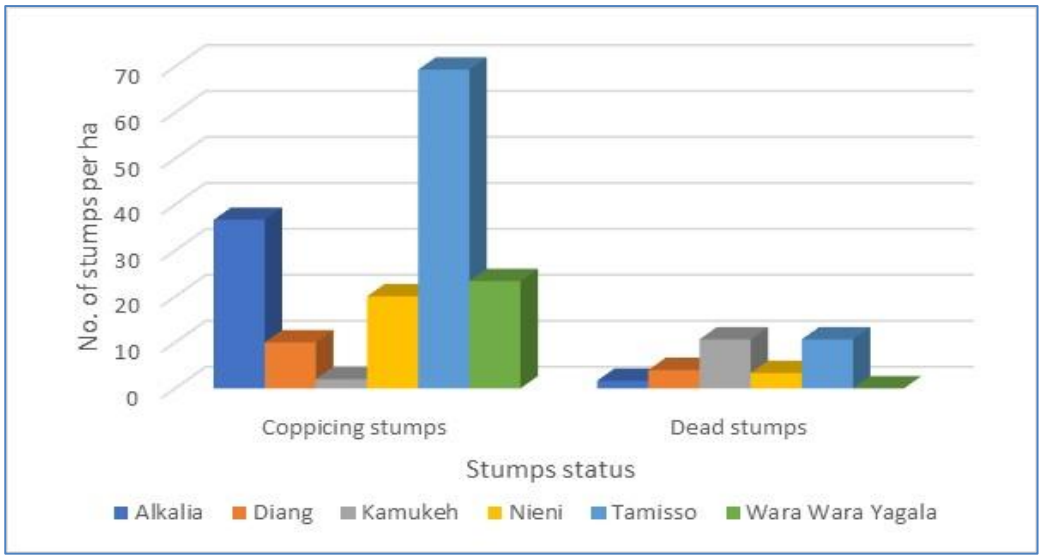

Figure 6.3.4: Stump density per ha in Koinadugu District.

6.3.6 Evaluation of Impacts of Harvest

What is the impact of harvest on target population?

Severity of harvest is **LOW.**

In Koinadugu District, only two of the six Chiefdoms have experience high-level of *Pterocarpus* exploitation. In most of the Chiefdoms, the vast majority of the tree stands are ≥30cm compared to other DBH categories (Figure 6.3.2). The distribution of the DBH categories in the *Pterocarpus* woodland in this District may suggest relatively low exploitation as there are mature stands present in almost all the Chiefdoms.

6.3.7 Impact of Harvest on National Population

Severity of wild harvest: MODERATELY LOW

6.3.8 Evaluate Impacts of Trade

What is the impact of legal and illegal trade on harvest area population and on species of concerned nationally?

There are no quantitative studies on the impact of legal and illegal trade on the natural populations of ***Pterocarpus*** *erinaceus* in the Koinadugu District. However, it is envisaged that the present study will give an insight into how legal and illegal logging can result in natural population decline. There is no evidence of harvesting now in the District.

Trade level in relation to harvest area.

In Koinadugu District, the low level of harvest means that the trade in *Pterocarpus erinaceus* from most of the Chiefdoms in relatively low.

6.3.9 Evaluate Appropriate Rigour of Existing Management Measures

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

Review of Legislation

At the national level, see information in Chapter 8, Section 8.2 which explains the key legislations governing the harvesting of forest products at the national and regional levels in Sierra Leone.

These legislations are being reviewed to reflect current day realities.

Review of Protection Measures

There are no specific protection measures in place for *Pterocarpus erinaceus* woodland in the District from natural events such as fire and storms. Some level of protection exists against

anthropogenic destruction, particularly with respect to logging and fire through the deployment of Rangers by the Government and Chiefdom bylaws in all Chiefdoms surveyed.

What are the key legislations governing the harvesting of forest products at the national and regional levels in Sierra Leone?

The following existing legal instruments govern the harvesting of forest products throughout Sierra Leone: - The Forestry Act of 1988 (Amended 2022), The Forestry Regulations of 1990, Forestry Development, Exploitation and Trade Reforms of 2010, and The Forestry Policy of 2010.

In compliance with the national legal instruments highlighted above, harvesting of the *Pterocarpus erinaceus* for exportation is generally done in accordance with Section 20 (Utilization of Community Forests) of The Forestry Act, 1988 and Section 8 (Submission of Logging Plans for Unclassified Forests) of The Forestry Regulations, 1990.

6.3.10 Review of Harvest Management

Based on the summary of harvest regime for *Pterocarpus erinaceus* in the Koinadugu District illustrated in Table 6.3.2, the following recommendations were made by the Scientific Authority to the Management Authority: -

- to institute a harvesting scheme with a long history of effective management. A well-regulated adaptive management is more likely to be sustainable than an unmanaged harvest.
- the development and adoption of both local and national management plan to build and gain political will to establish the process of sustainable use.

In addition, local traditional bylaws exist in all three Chiefdoms for management and protection purposes.

Artificial Propagation

There is no artificial propagation of the specimen in the Koinadugu District. There are unconfirmed claims of artificial propagation in the District, but these were not observed during the field studies.

Non-lethal harvesting of fruits/flowers/seeds/leaves

Evidence exists that they are being harvested.

Non-lethal harvesting of bark/roots/wood

YES, in some instances, it was observed that the leaves and bark of the trees were harvested for medicinal purposes. Dead branches of the wood were removed for use as fuel wood.

Removal of whole plant.

It was observed that the removal of the whole plant was the most common exploitation activity for *Pterocarpus erinaceus* in the Koinadugu District. Also, the whole tree is cut down for charcoal production, whilst whole plots of trees (say 1 to 3 ha) would be slashed and burned for agriculture.

Removal of whole bulb.

Not Applicable to *P. erinaceus*

Killing of individual by removal of seeds, leaves, bark, roots, wood.

A significant number of stumps observed, were as a result of various forms of exploitation, mainly the removal of the whole tree for timber. In most instances the harvest specimens were mature, but with few immature ones. The relative level of uptake is unknown but the reasons for take-off are both for subsistence and commercial purposes. In some instances, it was observed that the farmers cut around the bark to allow the trees to shed their leaves to add fertility to the soils and improve their yields.

Table 6.3.2 - Summary of Harvest Regime for *Pterocarpus erinaceus* in the Koinadugu District

Species: *PTEROCARPUS ERINACEUS*	**Country (if applicable State or Province): SIERRA LEONE, NORTHERN PROVINCE, KOINADUGU DISTRICT**
Date (of making Non-Detriment Finding): JUNE 2022	**Period to be covered by the finding: JUNE 2022 – MAY 2027**
Name: DR ABDUL BABATUNDE KARIM	**Position in Scientific Authority: HEAD**
Is the species endemic, found in a few countries only, or widespread? WIDESPREAD IN WEST AFRICA	
Conservation status of the species (if known): IUCN Global status:___ENDANGERED_____National status:__CITES APPENDIX II SPECIES_____Other_____	

Type of harvest	Main Product	Degree of Control	Demographic segment of population harvested			Relative level of off-take (include number or quantity if known)				Reason for off-take and percentage (if known)			Commercial destination and percentage (if known)		
			Immature	Mature	Sex	Low	Medium	High	unknown	Subsistence	Commercial	Others	Local	National	International
1.1 Artificial propagation	*P. erinaceus*	Regulated													
		Unregulated													
1,2 Non-lethal harvesting of fruits/flowers/seeds/ leaves	*P. erinaceus*	Regulated													
		Unregulated		✓	na	✓				20%	5%			✓	✓
1.3 Non-lethal harvesting of bark/roots/ wood	*P. erinaceus*	Regulated	✓	✓											
		Unregulated		✓	na	✓			✓	15%	5%		✓	✓	
1.4 Removal of whole plant	*P. erinaceus*	Regulated		✓	na		✓				75%				✓
		Unregulated		✓	na			✓		15%	25%	5%	✓	✓	✓
1.5 Removal of whole bulb	*P. erinaceus*	Regulated													
		Unregulated													
1.6 Killing of individual by removal of seeds, leaves, bark, roots, wood	*P. erinaceus*	Regulated													
		Unregulated	✓	✓	na				✓	10%	5%		✓	✓	

6.4 FALABA DISTRICT

6.4.1 Review Specimen Identification

Has the plant/specimen been correctly identified, and is the scientific name used compliant with the appropriate CITES standard?

The species has been correctly identified in accordance with the information provided in Chapter 4, therefore it is scientifically identified as *Pterocarpus erinaceus*.

Locally the species is called by various names depending on the ethnic group in the area, as follows, but they all have similar semantics:

Koranko – ***Gbene***

Madingo – ***Bani-fere***

6.4.2 Review of Compliance with Requirements for Artificial Propagation

Is the permit application for artificial propagated specimens?

Pterocarpus erinaceus occurred naturally in the Falaba District. Although there is no evidence of artificial propagation of the species for now, but plans are on the way to start.

6.4.3 Review of Relevant Exclusions and Previously Made Non-Detriment Finding

Are the specimens covered by CITES Appendix II?

YES, and *Pterocarpus erinaceus* is listed in CITES Appendix II.

Is the harvest or the export of wild-harvested specimens of P. erinaceus permitted?

Presently there is suspension on the export of any specimens of *Pterocarpus erinaceus* until an NDF is developed to advise that such export will not be detrimental to the survival of the species.

Has a science based NDF been made for *P. erinaceus* that is still valid and sufficient to evaluate the current application?

This is the very first time an NDF study is conducted in Sierra Leone for *Pterocarpus erinaceus*.

6.4.4 Evaluation of Conservation Concern

Considering conservation status assessments, what is the indicated severity of conservation concern?

The severity of conservation concern in the Falaba District is comparatively lower than the general national severity. This District accounts for some of the largest tracts of *Pterocarpus erinaceus* woodland in the country and there is a strong traditional control over the level of exploitation to the extent that exploitation of the wood is virtually prohibited.

6.4.5 Evaluation of Potential Biological Risk

What is the severity of biological risk?

Risk severity is MODERATELY LOW

This District is located in a remote far away from Freetown and accessibility is much more difficult than any other District where *Pterocarpus erinaceus* is found.

Geographic distribution of *Pterocarpus erinaceus* in Falaba District

Pterocarpus erinaceus was found to be widespread in the Falaba District and found in all thirteen Chiefdoms of the District. Barawa Chiefdom had the highest tree density of over 120 trees per ha, whilst the lowest was Dembelia-Musaia Chiefdom with over 60 trees per ha.

National/subnational population size and distribution

Pterocarpus erinaceous woodland was found in all thirteen Chiefdoms in Falaba District and all Chiefdoms were covered during the survey. Data from live trees, seedlings, saplings, and stumps were collected from a total of one hundred and eighty-seven plots of dimension 0.1 ha (20 cm x 50 cm). The highest tree counts were from Kamadugu, Kurosaradu and Morifindu Chiefdoms, each with over 160 units.

Tree density is high in all the Chiefdoms in Falaba District with over 100 trees per hectare in one third of the Chiefdoms and the minimum being 70 trees/ha (Table 6.4.1 and Figure 6.4.1). The

highest density was found in the Barawa Chiefdom followed very closely by Kamadugu, Kurusaradu and Morifindu Chiefdoms, all of which have a tree density per ha of over 100. Being one of the remote Districts in the country, the high density of trees is not unexpected, as most of the areas covered are naturally protected by inaccessible road network and rugged terrains.

Table 6.4.1 – No. of plots surveyed, number and density of live trees enumerated in the Falaba District.

Chiefdoms	No. of Plots	No. of live trees counted	Live trees per plot	Tree density per ha
Kamadugu	15	169	11.2	112.4
Kurosaradu	15	164	10.9	109.3
Morifindu	15	164	10.9	109.0
Mongo Bendugu	15	149	9.9	99.1
Nyedu	15	143	9.6	95.6
Kabillia	15	131	8.8	87.6
Delmadugu	15	126	8.4	84.0
Barawa	10	122	12.2	122.0
Sulima	15	117	7.8	77.8
Neya	14	111	7.9	79.1
Folosaba-Kamba	13	105	8.1	81.0
Dembelia-Sinkunia	15	105	7.0	69.8
Dembelia-Musaia	15	103	6.9	68.9
TOTAL/AVERAGE	187	1708	8.31	92.0

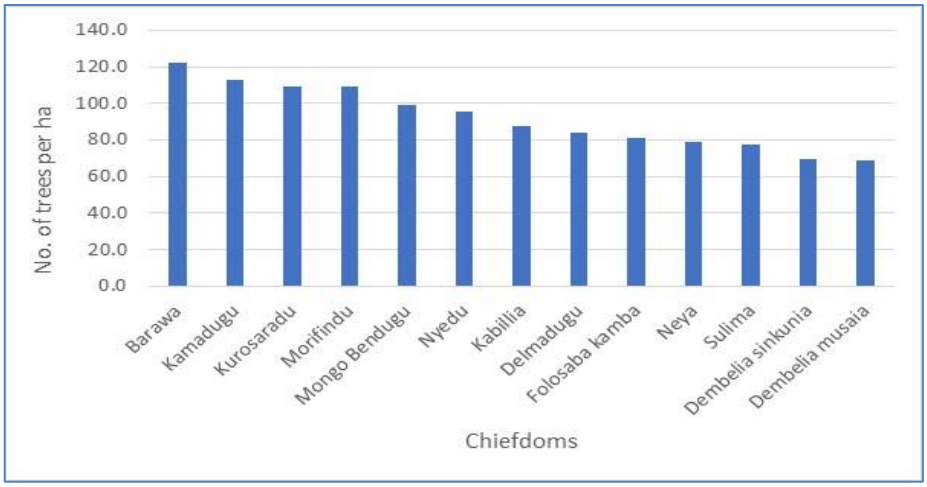

Figure 6.4.1 - Tree density per ha in chiefdoms of the Falaba District.

Size structure of sub-national populations

Current Live Tree Stock

A comparative assessment of the *Pterocarpus erinaceus* stock based on diameter at breast height (DBH) measurements indicate high proportion of trees with DBH 10-20 cm (41.2%) and 21-30 (43.6%), a reasonable proportion of trees of DBH 31-40 cm (12.7%), but very low density of trees less than are greater 40cm DBH (Figure 6.4.2). However, exploitable stock (DBH>30 cm) is found in the chiefdoms of Barawa, Delamadugu, Kamadugu, Kurosaradu, Morifindu, Neya, and Nyedu.

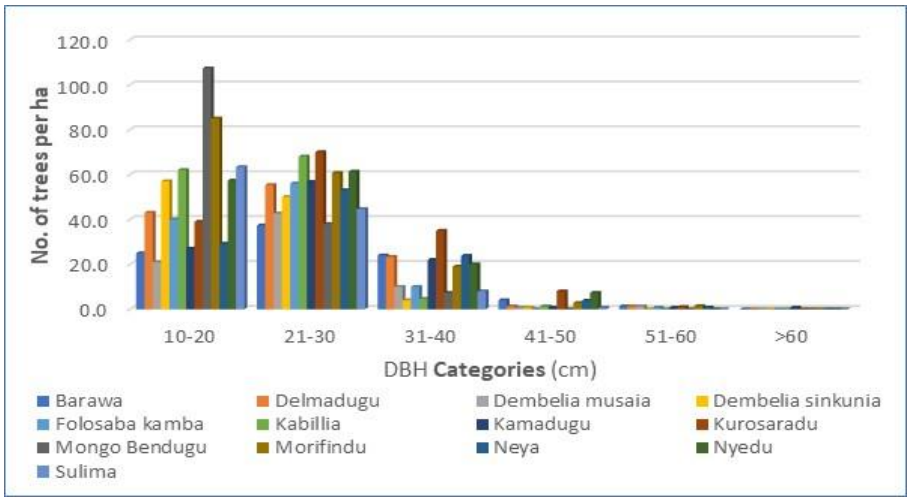

Figure 6.4.2 – Density of trees of different DBH categories in the Chiefdoms of the Falaba District

Potential Tree Stock

For the Falaba District, seedlings and saplings were combined during the survey. Seedlings and saplings were found in all Chiefdoms and plots sampled (Figure 6.4.3). In general, the density of seedlings and sapling were below the average expected density. Sulima and Dembelia-Musaia Chiefdoms have the highest density of seedlings and saplings for the highest counts per hectare of woodland enumerated in the District. Stump density per hectare (Figure 6.4.4) is highest in Neya and Dembelia-Musia Chiefdoms and lowest in Kamadugu Yiraia and Morifindu.

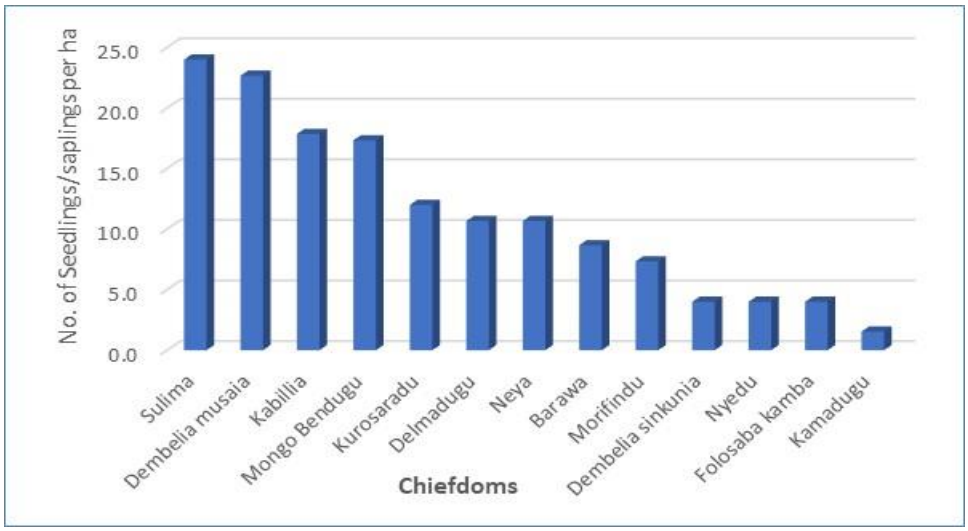

Figure 6.4.3 - Seedling and sapling density per ha in Falaba District.

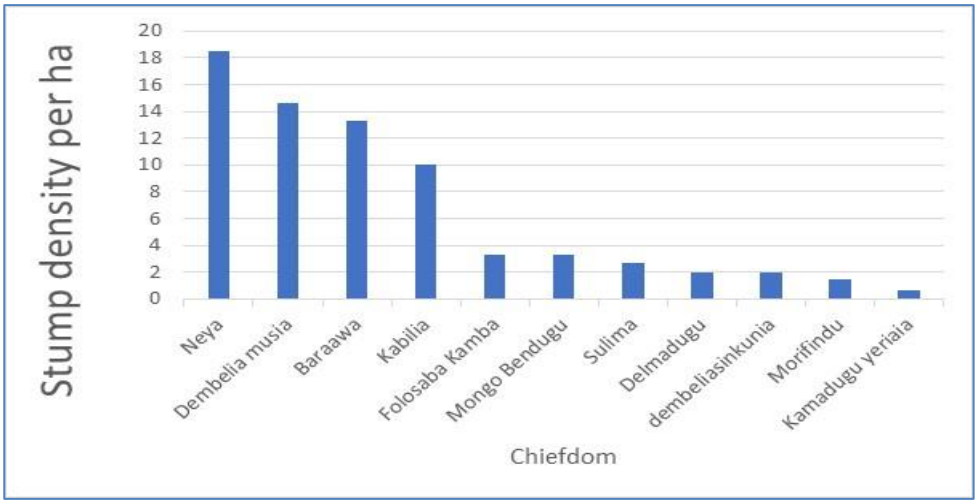

Figure 6.4.4 - Stump density per ha in Falaba district. Two of the Chiefdoms were excluded because of lack of data.

6.4.6 Evaluation of Impacts of Harvest

Control and monitoring of harvesting and exportation.

The Falaba District is one of the areas where *Pterocarpus erinaceus* woodland occurs in abundance. The activity is one of the main sources of income for many young people in the various Chiefdoms in the District.

Monitoring and supervision of these areas is done by the team of the Forest Management Unit in each of the Districts, with periodic visits from the Assistant Director of Commercial Unit in the Forestry Department in the Ministry of the Environment and Climate Change. This is to verify compliance with the Policies, Laws, and Regulations on Forestry, which will allow the Department to propose changes, adjustments and appropriate solutions that apply.
In some Chiefdoms, the Local Authorities have suspended the exploitation of *Pterocarpus erinaceus* for export purposes.

What is the impact of harvest on target population?

The impact of the harvest on target population is **MODERATE.**

In Falaba District, there has been considerable recovery of the woodland in many of the Chiefdoms affected. Although most of the trees with DBH within commercial stock have been harvested, the impact on the target population has been moderate because of the vast areas of woodland the District has. At the local level, the wood is used for various purposes as outlined below, but the impact of these local uses has been virtually negligible:

- Fencing – Farmers use *Pterocarpus erinaceus* to fence their crops and livestock, especially cattle (locally called worreh). The fence serves the purpose for protecting crops against pests and livestock against theft and straying.
- Construction work – the timber is considered to be tough and durable and so used for many local construction work.
- Roads and bridges - The woods are laid across drainages and trenches to connect roads, for the easy movement of vehicles, cattle, and goods

Estimation of an export quota

Export quota to be determined for the District.

6.4.7 Impact of Harvest on National Population

Impact of harvest is considered moderate but must be determined.

The Falaba District has among the most viable cover of *Pterocarpus erinaceus* woodland. Based on the data for all the thirteen Chiefdoms, the District holds significant cover of the species, with an equally significant proportion harvested.

No study on the species population has been conducted in the past therefore population trends cannot be estimated from this study. However, quantification of the impact of harvest on *Pterocarpus erinaceus* populations in the other Districts within the species range can assist in judging whether the national population is being depleted or not and the protection measures that should be reviewed and enforced.

6.4.8 Evaluate Impacts of Trade

What is the impact of legal and illegal trade on harvest area population and on species of concerned nationally?

There are no quantitative studies on the impact of legal and illegal trade on the natural populations of ***Pterocarpus*** *erinaceus* in the Falaba District. However, it is envisaged that the present study will give an insight into how legal and illegal logging can result in natural population decline. There is no evidence of harvesting now in the District.

Trade level in relation to harvest area.

The harvest of Pterocarpus erinaceus in Falaba District is for different purposes other than export/trade.

6.4.9 Evaluate Appropriate Rigour of Existing Management Measures

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

Review of Legislations

At the national level, see information in Chapter 8, Section 8.2 which explains the key legislations governing the harvesting of forest products at the national and regional levels in Sierra Leone.

These legislations are being reviewed to reflect current day realities.

Review of protection measures

There are no specific protection measures in place for *Pterocarpus erinaceus* woodland in the District from natural events such as fire and storms. Some level of protection exists against anthropogenic destruction, particularly with respect to logging and fire through the deployment of Rangers by the Government and Chiefdom bylaws in all Chiefdoms surveyed.

What are the key legislations governing the harvesting of forest products at the national and regional levels in Sierra Leone?

The following existing legal instruments govern the harvesting of forest products throughout Sierra Leone: - The Forestry Act of 1988 (Amended 2022), The Forestry Regulations of 1990, Forestry Development, Exploitation and Trade Reforms of 2010, and The Forestry Policy of 2010.

In compliance with the national legal instruments highlighted above, harvesting of the *Pterocarpus erinaceus* for exportation is generally done in accordance with Section 20 (Utilization of Community Forests) of The Forestry Act, 1988 and Section 8 (Submission of Logging Plans for Unclassified Forests) of The Forestry Regulations, 1990.

6.4.10 Review of Harvest Management

Based on the summary of harvest regime for *Pterocarpus erinaceus* in the Falaba District illustrated in Table 6.4.2, the following recommendations were made by the Scientific Authority to the Management Authority: -

- to institute a harvesting scheme with a long history of effective management. A well-regulated adaptive management is more likely to be sustainable than an unmanaged harvest.
- the development and adoption of both local and national management plan to build and gain political will to establish the process of sustainable use.

In addition, local traditional bylaws exist in all three Chiefdoms for management and protection purposes.

Artificial propagation

There is no artificial propagation of the specimen in the Districts, although there are unconfirmed claims of artificial propagation, but it was not observed during the field studies.

Non-lethal harvesting of fruits/flowers/seeds/leaves

Evidence exists that they are being harvested.

Non-lethal harvesting of bark/roots/wood

It was observed that farmers would remove the bark to allow the trees to shed their leaves to add fertility to the soils and improve their yields. The bark and leaves are also harvested for medicinal purposes. Dead branches of the wood were removed for use as fuel wood.

Removal of whole plant.

It was observed that the whole plants were removed or cut down to a very low level. This was mostly observed for slash and burn agriculture and charcoal production which involves complete clearing of the land.

Removal of whole bulb.
Not Applicable to *Pterocarpus erinaceus*

Killing of individual by removal of seeds, leaves, bark, roots, wood.
There was lot of dead stumps observed, which gives clear indication of the removal of the wood. The specimen studied in the case were unmanaged whilst sometimes, the harvested specimen was immature, most of the times they were mature. The relative level of uptake is unknown for both degrees of control, while the reason for take-off were both for subsistence and commercial purposes. The commercial destinations here can be any of the three; local, national, and international. The main products in this case were whole stems with some regulated degree of control while others were unmanaged. The relative level of uptake is unknown for regulated and unregulated control, while the reason for take-off were both for subsistence and commercial purpose.

Table 6.4.2 - Summary of Harvest Regime for *Pterocarpus erinaceus* in the Falaba District.

Species: *PTEROCARPUS ERINACEUS*	**Country (if applicable State or Province): SIERRA LEONE, NORTHERN PROVINCE, FALABA DISTRICT**
Date (of making Non-Detriment Finding): JUNE 2022	**Period to be covered by the finding: JUNE 2022 – MAY 2027**
Name: DR ABDUL BABATUNDE KARIM	**Position in Scientific Authority: HEAD**
Is the species endemic, found in a few countries only, or widespread? WIDESPREAD IN WEST AFRICA	
Conservation status of the species (if known) : IUCN Global status:___ENDANGERED_____National status:_CITES APPENDIX II SPECIES___Other_____	

Type of harvest	Main Product	Degree of Control	Demographic segment of population harvested			Relative level of off-take (include number or quantity if known)				Reason for off-take and percentage (if known)			Commercial destination and percentage (if known)		
			Immature	Mature	Sex	Low	Medium	High	unknown	Subsistence	Commercial	Others	Local	National	International
1.1 Artificial propagation	*P. erinaceus*	Regulated													
		Unregulated													
1,2 Non-lethal harvesting of fruits/flowers/seeds/ leaves	*P. erinaceus*	Regulated													
		Unregulated		✓	na	✓				20%	5%			✓	✓
1.3 Non-lethal harvesting of bark/roots/ wood	*P. erinaceus*	Regulated	✓	✓											
		Unregulated		✓	na	✓			✓	15%	5%		✓	✓	
1.4 Removal of whole plant	*P. erinaceus*	Regulated		✓	na		✓				70%				✓
		Unregulated		✓	na			✓		5%	30%	10%	✓	✓	✓
1.5 Removal of whole bulb	*P. erinaceus*	Regulated													
		Unregulated													
1.6 Killing of individual by removal of seeds, leaves, bark, roots, wood	*P. erinaceus*	Regulated													
		Unregulated	✓	✓	na				✓	10%	5%		✓	✓	

CHAPTER VII - RESULTS AND FINDINGS: NORTH-WESTERN REGION

7.0 REGIONAL COVERAGE

Pterocarpus erinaceus woodland is found in three Districts namely – Port Loko, Karene, and Kambia Districts in the North Western Region.

7.1 KAMBIA DISTRICT

7.1.1 Review Specimen Identification

Has the plant/specimen been correctly identified, and is the scientific name used compliant with the appropriate CITES standard?

In accordance with the details provided in Chapter 4, the species has been accurately identified. as *Pterocarpus erinaceus*.

At the District level, the local inhabitants identify the species with the following names in their local languages:

Temne – ***Gbenie***

Limba – ***Gbene***

Madingo – ***Bani-fere***

Fula – **Gbani**

7.1.2 Review of Compliance with Requirements for Artificial Propagation

Is the permit application for artificial propagated specimens?

Pterocarpus erinaceus occurred naturally in the Tonkolili District. Although there is no evidence of artificial propagation of the species for now, but plans are on the way to start.

7.1.3 Review of Relevant Exclusions and Previously Made Non-Detriment Finding

Are the specimens covered by CITES Appendix II?

YES, and *Pterocarpus erinaceus* is listed in CITES Appendix II.

Is the harvest or the export of wild-harvested specimens of P. erinaceus permitted?

Presently there is suspension on the export of any specimens of *Pterocarpus erinaceus* until an NDF is developed to advise that such export will not be detrimental to the survival of the species.

Has a science based NDF been made for *P. erinaceus* that is still valid and sufficient to evaluate the current application?

This is the very first time an NDF study is conducted in Sierra Leone for ***Pterocarpus*** *erinaceus*.

7.1.4 Evaluate of Conservation Concern

Considering conservation status assessments, what is the indicated severity of conservation concern?

The severity of conservation concern is considered HIGH,

7.1.5 Evaluation of Potential Biological Risk

What is the severity of biological risk?

Risk severity is HIGH.

Geographic distribution in the district

Pterocarpus erinaceus woodland occur in all Chiefdoms of Kambia District.

National/subnational population size and distribution

The ten Chiefdoms of Kambia District were visited for the survey, but sampling was carried out in only eight, where fifty-eight plots were chosen and from which 359 trees were counted.

Masungbala, Khonimakeh and Tonko-Limba Chiefdoms have the highest density of live trees enumerated from the District, with a range of between 74 and 89 trees per ha. The number of live trees per ha varies (Table 7.1.1 and Figure 7.1.1), which clearly indicates that the level of exploitation also varies from Chiefdom to Chiefdom.

Table 7.1.1 - No. of plots surveyed, number and density of live trees enumerated in the Kambia District.

Chiefdoms	No. of Plots	No. of live trees counted	Live trees per plot	Tree density per ha
Brimaia	8	30	4	38
Dixon	4	6	2	15
Khonimakeh	9	77	9	86
Mambolo	10	63	6	63
Masungbala	8	71	9	89
Munu-Talah	7	34	5	49
Samu	3	11	4	37
Tonko-Limba	9	67	7	74
TOTAL/AVERAGE	58	359	6	56

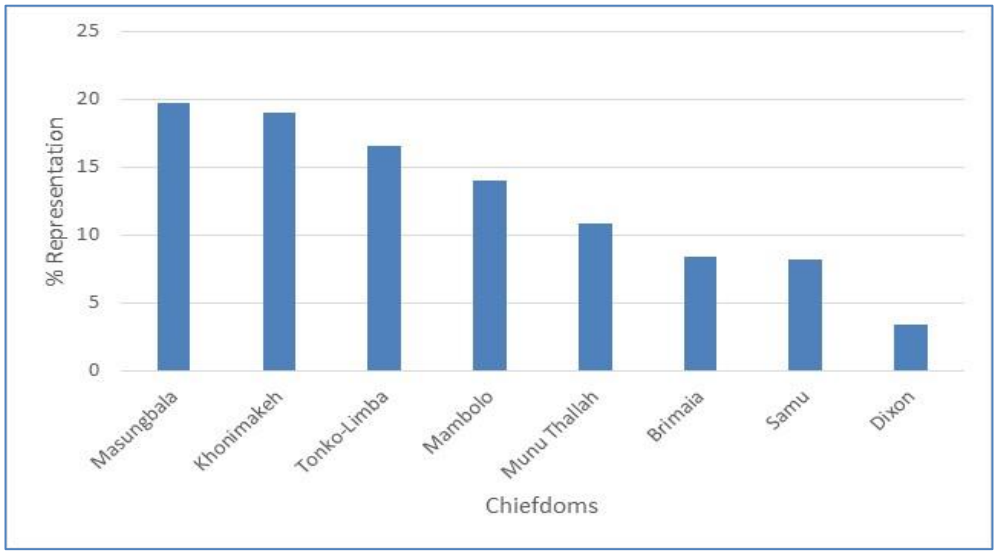

Figure 7.1.1 – Comparative distribution of tree densities (per ha) among Chiefdoms in the Kambia District.

Size structure of national/sub-national populations

Current Live Tree Stock

Pterocarpus erinaceus are found to be distributed into five DBH categories shown in Figure 7.1.2. The tree structure was different across all chiefdoms, but there is generally a higher number of trees with DBH between 10 and 20 cm in all Chiefdoms where the woodland occurs, accounting for 63.6% of all size categories. This indicates that a much younger tree physiognomy of *Pterocarpus erinaceus* woodland in the Kambia District, have emerged with seedlings or coppicing of stumps. Only 9.5% of the trees measured were within exploitable and marketable size bracket of >30 cm DBH (Figure 7.1.2).

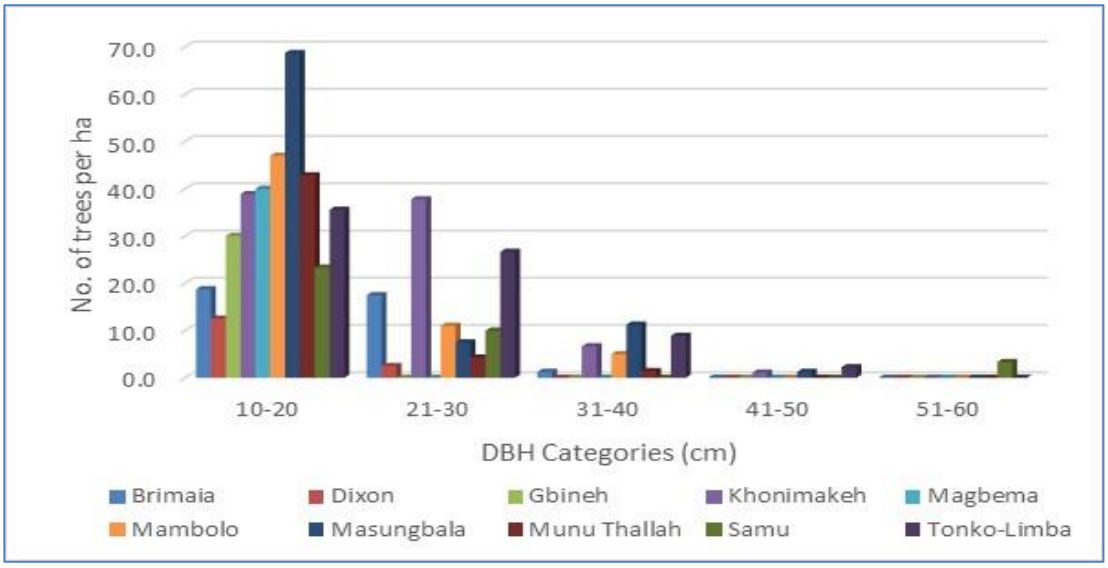

Figure 7.1.2 – Comparative distribution of tree of different DBH categories per ha, among Chiefdoms in the Kambia District.

Potential Stock based on Field Data.

Seedlings, saplings, and copping stumps are considered as potential future stock. Figure 7.1.3 shows the distribution of seedlings in the plots covered in each of the Chiefdoms where Pterocarpus woodland occurs. Dixon, Munu-Thallah and Tonko-Limba Chiefdoms recorded the highest density of seedlings of over 60 seedlings per ha. The lowest was at Khonimakeh Chiefdom with 26 seedlings per ha. In terms of stumps, Gbineh, Masungbala, Khonimakeh and Dixon Chiefdoms have a density range between 80 and 115 coppicing stumps per ha, and there

were low numbers of dead stumps across all plots enumerated in the District. This distribution is encouraging but would only serve as indications of the potential future stock in these Chiefdoms and District, if the necessary conservation actions are put in place and implemented. The key threats to the potential stock are wildfire, grazing and trampling by cattle, and charcoal production.

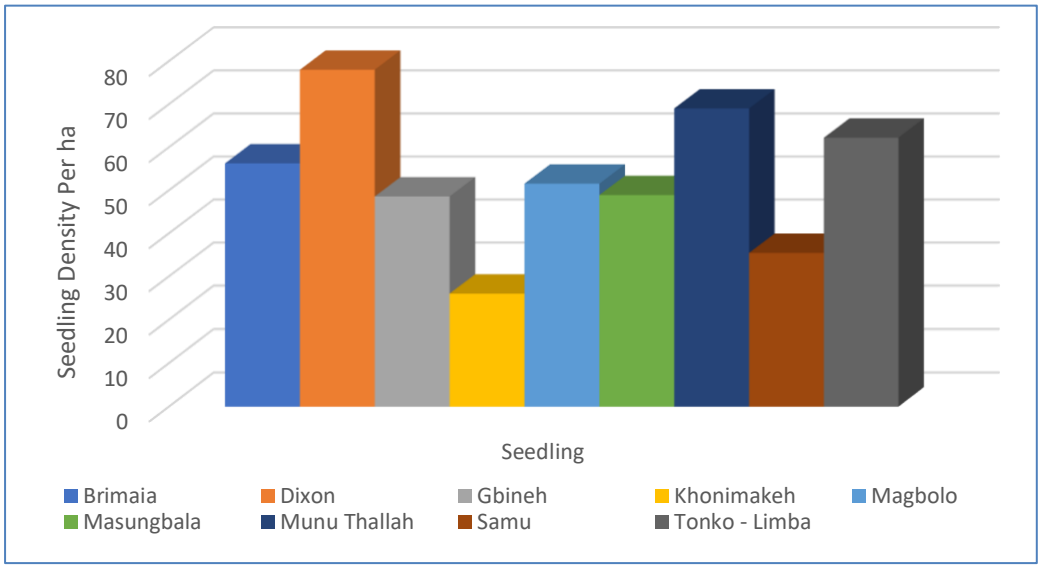

Figure 7.1.3 – Distribution of seedlings of *Pterocarpus erinaceus* among Chiefdoms in the Kambia District. Data on saplings (DBH<10cm) were negligible.

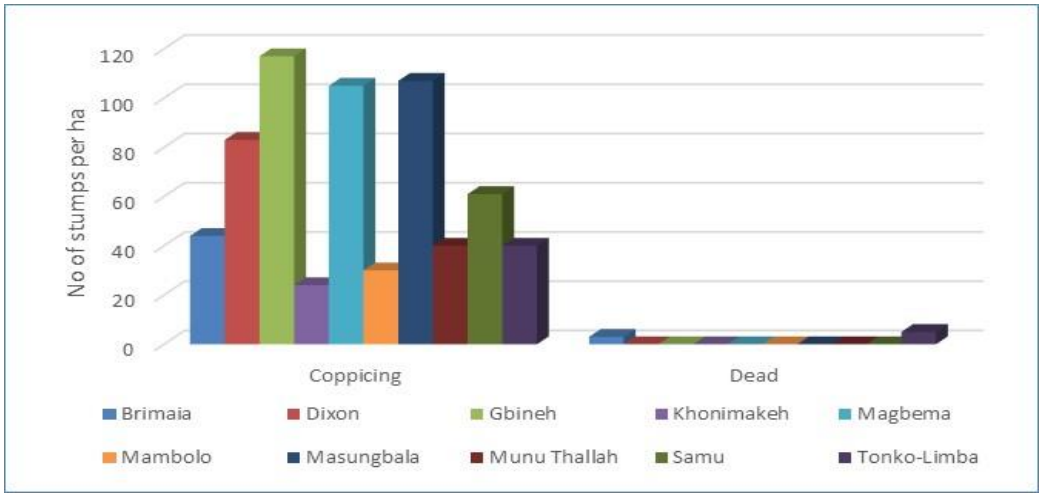

Figure 7.1.4 - Distribution of stumps regenerative potential of *Pterocarpus erinaceus* among Chiefdoms in the Kambia District.

7.1.6 Evaluation of Impacts of Harvest

Control and monitoring of harvesting and exportation.

Monitoring and supervision of this species is done by the team of the Forest Management Unit in each of the Districts, with periodic visits from the Assistant Director of Commercial Unit in the Forestry Department in the Ministry of the Environment and Climate Change. This is to verify compliance with the Policies, Laws, and Regulations on Forestry, which will allow the Department to propose changes, adjustments and appropriate solutions that apply.
In some Chiefdoms, the Local Authorities have suspended the exploitation of *Pterocarpus erinaceus* for export purposes.

What is the impact of harvest on target population?

The impact of the harvest on target population is HIGH.

Harvest of *Pterocarpus erinaceus* in the Kambia District has had serious consequences on the target population. Much of the mature stands have been harvested and farming is further reducing the potential for regeneration of the species. In the District exploitation is done for the following purposes: -

- Wood fuel – the wood is cut and used as fuelwood and for the production of charcoal.
- Fencing – Farmers use *Pterocarpus erinaceus* to fence their crops and livestock, especially cattle (locally called worreh). The fence serves the purpose for protecting crops against pests and livestock against theft and straying.
- Construction work – the timber is considered to be tough and durable and so used for many local constructions.
- Roads and bridges - The woods are laid across drainages and trenches to connect roads, for the easy movement of vehicles, cattle, and goods.
- Medicinal use – the bark and leaves are used by some communities for medicinal purposes.

Estimation of an export quota

Export quota to be determined for the District.

7.1.7 Impact of Harvest on National Population

Severity of harvest is HIGH.

No study on the species population has been conducted in the past therefore population trends cannot be estimated from this study. However, quantification of the impact of harvest on *Pterocarpus erinaceus* populations in the other Districts within the species range can assist in judging whether the national population is being depleted or not and the protection measures that should be reviewed and enforced.

7.1.8 Evaluate Impacts of Trade

What is the impact of legal and illegal trade on harvest area population and on species of concerned nationally?

There are no quantitative studies on the impact of legal and illegal trade on the natural populations of ***Pterocarpus*** *erinaceus* in the Kambia District. However, it is envisaged that the present study will give an insight into how legal and illegal logging can result in natural population decline. There is no evidence of harvesting now in the District.

Trade level in relation to harvest area.

The harvest of Pterocarpus erinaceus in Kambia District is for different purposes other than export/trade.

7.1.9 Evaluate Appropriate Rigour of Existing Management Measures

What management/protection measures are in place for the target species

Review of Legislations

At the national level, see information in Chapter 8, Section 8.2 which explains the key legislations governing the harvesting of forest products at the national and regional levels in Sierra Leone.

These legislations are being reviewed to reflect current day realities.

Review of protection measures

There are no specific protection measures in place for *Pterocarpus erinaceus* woodland in the District from natural events such as fire and storms. Some level of protection exists against

anthropogenic destruction, particularly with respect to logging and fire through the deployment of Rangers by the Government and Chiefdom bylaws in all Chiefdoms surveyed.

What are the key legislations governing the harvesting of forest products at the national and regional levels in Sierra Leone?

The following existing legal instruments govern the harvesting of forest products throughout Sierra Leone: - The Forestry Act of 1988 (Amended 2022), The Forestry Regulations of 1990, Forestry Development, Exploitation and Trade Reforms of 2010, and The Forestry Policy of 2010.

In compliance with the national legal instruments highlighted above, harvesting of the *Pterocarpus erinaceus* for exportation is generally done in accordance with Section 20 (Utilization of Community Forests) of The Forestry Act, 1988 and Section 8 (Submission of Logging Plans for Unclassified Forests) of The Forestry Regulations, 1990.

7.1.10 Review of Harvest Management

Based on the summary of harvest regime for *Pterocarpus erinaceus* in the Kambia District illustrated in Table 7.1.2, the following recommendations were made by the Scientific Authority to the Management Authority: -

- to institute a harvesting scheme with a long history of effective management. A well-regulated adaptive management is more likely to be sustainable than an unmanaged harvest.
- the development and adoption of both local and national management plan to build and gain political will to establish the process of sustainable use.

In addition, local traditional bylaws exist in all three Chiefdoms for management and protection purposes.

Artificial propagation

There is no artificial propagation of the specimen in Kambia Districts.

Non-lethal harvesting of fruits/flowers/seeds/leaves

Evidence exists that they are being harvested.

Non-lethal harvesting of bark/roots/wood

The bark is extracted for use as medicine.

Removal of whole plant.

It was observed that the whole plants were removed or cut down to a very low level. This was mostly observed for slash and burn agriculture and charcoal production which involves complete clearing of the land.

Removal of whole bulb.

Not Applicable to *Pterocarpus erinaceus*

Killing of individual by removal of seeds, leaves, bark, roots, wood.

The main products in this case were whole stems with regulated degree of control while others were unmanaged with reference to the height level where they were harvested. The regulated products were harvested sometimes immature, but most times matured, while the unmanaged products were harvested either immature or matured every time. The relative level of uptake is unknown for both degrees of control, while the reason for take-off were for both subsistence and commercial purposes.

Table 7.1.2 - Summary of Harvest Regime for *Pterocarpus erinaceus* in the Kambia District.

Species: *PTEROCARPUS ERINACEUS*	**Country (if applicable State or Province): SIERRA LEONE, NORTHERN PROVINCE, KAMBIA DISTRICT**
Date (of making Non-Detriment Finding): JUNE 2022	**Period to be covered by the finding: JUNE 2022 – MAY 2027**
Name: DR ABDUL BABATUNDE KARIM	**Position in Scientific Authority: HEAD**
Is the species endemic, found in a few countries only, or widespread? WIDESPREAD IN WEST AFRICA	
Conservation status of the species (if known) : IUCN Global status:___ENDANGERED_____National status:___CITES APPENDIX II SPECIES_____Other_____	

Type of harvest	Main Product	Degree of Control	Demographic segment of population harvested			Relative level of off-take (include number or quantity if known)				Reason for off-take and percentage (if known)			Commercial destination and percentage (if known)		
			Immature	Mature	Sex	Low	Medium	High	unknown	Subsistence	Commercial	Others	Local	National	International
1.1 Artificial propagation	*P. erinaceus*	Regulated													
		Unregulated													
1,2 Non-lethal harvesting of fruits/flowers/seeds/ leaves	*P. erinaceus*	Regulated													
		Unregulated		✓	na	✓				5%	10%			✓	✓
1.3 Non-lethal harvesting of bark/roots/ wood	*P. erinaceus*	Regulated	✓	✓											
		Unregulated		✓	na	✓			✓	10%	10%		✓	✓	
1.4 Removal of whole plant	*P. erinaceus*	Regulated		✓	na		✓				80%				✓
		Unregulated		✓	na			✓		5%	20%	15%	✓	✓	✓
1.5 Removal of whole bulb	*P. erinaceus*	Regulated													
		Unregulated													
1.6 Killing of individual by removal of seeds, leaves, bark, roots, wood	*P. erinaceus*	Regulated													
		Unregulated	✓	✓	na				✓	5%	10%		✓	✓	

7.2 KARENE DISTRICT

7.2.1 Review Specimen Identification

Has the plant/specimen been correctly identified, and is the scientific name used compliant with the appropriate CITES standard?

The species has been correctly identified in accordance with the information provided in Chapter 4, therefore it is scientifically identified as *Pterocarpus erinaceus*.

Locally the species is called various names depending on the ethnic group in the area, as follows:

Temne – ***Gbenie***

Limba – ***Gbene***

Madingo – ***Bani-fere***

Fula – **Gbani**

7.2.2 Review of Compliance with Requirements for Artificial Propagation

Is the permit application for artificial propagated specimens?

Pterocarpus erinaceus occurs naturally in the wild, and there was no evidence of artificial propagation. However, plans are on the way to initiate the process.

7.2.3 Review of Relevant Exclusions and Previously Made Non-Detriment Finding

Are the specimens covered by CITES Appendix II?

YES, and *Pterocarpus erinaceus* is listed in CITES Appendix II.

Is the harvest or the export of wild-harvested specimens of P. erinaceus permitted?

Presently there is suspension on the export of any specimens of *Pterocarpus erinaceus* until an NDF is developed to advise that such export will not be detrimental to the survival of the species.

Has a science based NDF been made for *P. erinaceus* that is still valid and sufficient to evaluate the current application?

This is the very first time an NDF study is conducted in Sierra Leone for ***Pterocarpus*** *erinaceus*.

7.2.4 Evaluate of Conservation Concern

The severity of conservation in Karene District is locally considered to be HIGH, based on anecdotal field observations. Most of the *Pterocarpus erinaceus* woodland have been exploited primarily for the timber. Although there is no immediate threat of extirpation of the species from the District, a long-term unsustainable exploitation may render these woodlands ecologically redundant. The situation is compounded by grazing and slash-and-burn agriculture, which in one way or the other suppress the growth of seedlings and prevent coppicing of stumps.

7.2.5 Evaluation of Potential Biological Risk

What is the severity of biological risk?

The biological risk severity of *Pterocarpus erinaceus* in the Karene District is HIGH

Geographic distribution in the district

All Chiefdoms in Karene District have *Pterocarpus erinaceus* woodlands and so surveys were carried out in all of them.

National/subnational population size and distribution

Table 7.2.1 and Figure 7.2.1 show the data collected on total live tree species enumerated per Chiefdom in the Karene District. To estimate the population at the District level, a total of sixty-nine plots were randomly chosen and surveyed with a total of 1576 live trees measured. The variation in plots number among Chiefdoms was based on the relative spatial distribution of *Pterocarpus* woodland among the chiefdoms where it occurs. The data reveals that Sanda Loko has the highest number of live tree species (482.7) enumerated per ha, followed by Lebie-Saygahun Chiefdom (362.5); the rest of the chiefdoms had between 100 and 200 live trees per

ha. This data indicates that the District accounts for the highest density of *Pterocarpus erinaceus* in the country.

Table 7.2.1 – No. of plots surveyed, number and density of live trees enumerated in the Karene District.

Chiefdoms	No. of Plots	No. of live trees counted	Live trees per plot	Tree density per ha
Buya	2	23	12	115
Gbanti	4	57	14	143
Lebei-Saygahun	4	145	36	363
Mafonda Makerembay	3	42	14	140
Romende	2	28	14	140
Sanda Loko	11	531	48	483
Sanda Magbolontor	4	79	12	198
Sanda-Tendaran	8	117	15	146
Sella-Limba	12	236	20	197
Tambakha-Simibungie	6	91	16	152
Tambakha-Yobangie	13	227	18	175
	69	1576	20	205

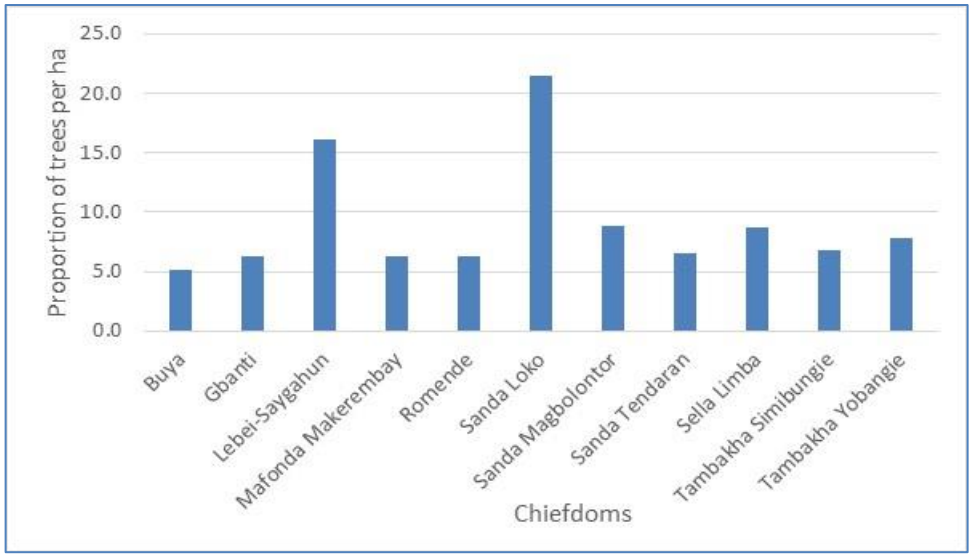

Figure 7.2.1 – Relative distribution of live trees from the chiefdoms of Karene District

Size structure of national/sub-national populations

Current Stock

Based on the data obtained during field survey, *Pterocarpus erinaceus* trees were found to be distributed into five DBH categories shown in Figure 7.2.2. The tree structure was different across all Chiefdoms, but there is generally a higher number of trees with DBH between 10 and 20 cm in all Chiefdoms where the woodland occurs, accounting for 63.6% of all size categories. This distribution is similar to that observed in Kambia District, indicating a young tree physiognomy of *Pterocarpus erinaceus* in the Karene District. Only few tree stands were observed that met the exploitable and exportable size categories of >30cm DBH, which also indicates that much of the commercial stock has been harvested.

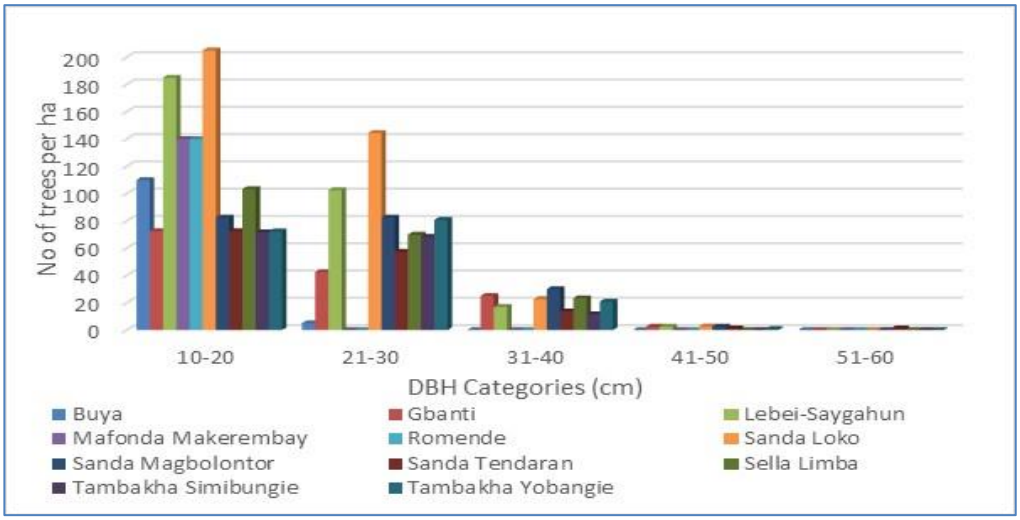

Figure 7.2.2 – Comparative distribution of trees of different DBH categories per ha, among Chiefdoms in the Karene District.

Potential Tree Stock

Seedlings, saplings and copping stumps are considered as potential future stock. Figure 7.2.3 shows the distribution of seedlings in the plots covered in each of the Chiefdoms where *Pterocarpus* woodland occurs in the Karene District. Dixon, Munu-Thallah and Tonko-Limba Chiefdoms recorded the highest density of seedlings of over 60 seedlings per ha. The lowest was at Khonimakeh Chiefdom with 26 seedlings per ha. In terms of stumps, Gbineh, Masungbala, Khonimakeh and Dixon Chiefdoms have a density range between 80 and 115 coppicing stumps

per ha, and there were generally lower numbers of dead stumps across all plots and Chiefdoms enumerated in the District (Figure 7.2.4). This distribution and status of seedlings, saplings and coppicing stumps in the District is encouraging but would only serve as indications of the potential future stock in these Chiefdoms and District, if the necessary conservation actions are put in place and implemented. The key threat to potential stock is wildfire, grazing and trampling by cattle, and charcoal production.

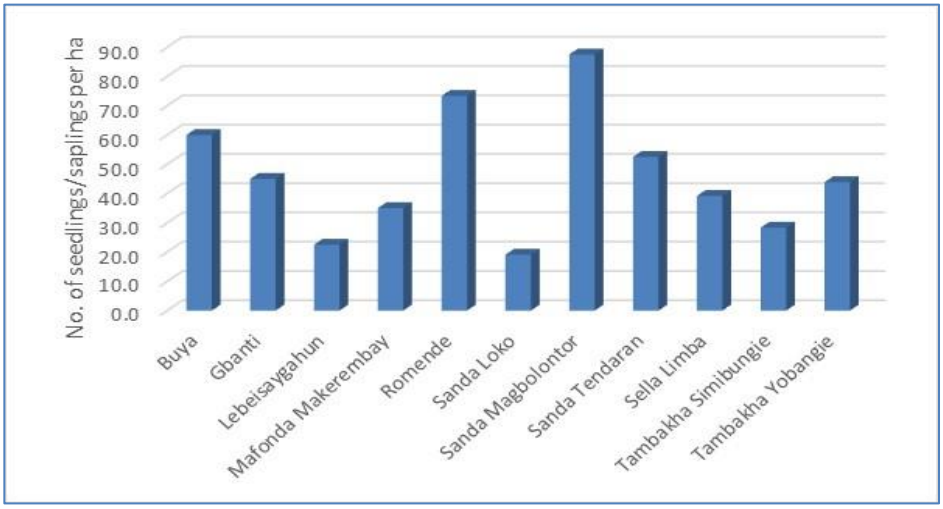

Figure 7.2.3 – Distribution of seedlings and saplings per ha encountered among chiefdoms in the Karene District.

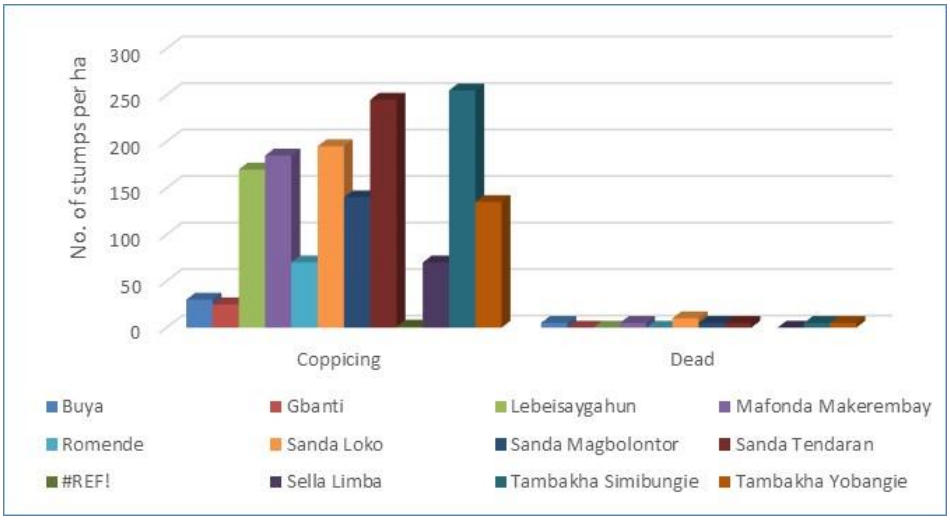

Figure 7.2.4 – Relative distribution and status of stumps among Chiefdoms in the Karene District.

7.2.6 Evaluation of Impacts of Harvest

Control and monitoring of harvesting and exportation.

The situation in the Karene District is similar to that in the other Districts of the North Western Region.

Monitoring and supervision of this species is done by the team of the Forest Management Unit in each of the Districts, with periodic visits from the Assistant Director of Commercial Unit in the Forestry Department in the Ministry of the Environment and Climate Change. This is to verify compliance with the Policies, Laws, and Regulations on Forestry, which will allow the Department to propose changes, adjustments and appropriate solutions that apply.
In some Chiefdoms, the Local Authorities have suspended the exploitation of *Pterocarpus erinaceus* for export purposes.

What is the impact of harvest on target population?
The impact of the harvest on target population is HIGH.

7.2.7 Impact of Harvest on National Population

Severity of wild harvest is HIGH

No study on the species population has been conducted in the past therefore population trends cannot be estimated from this study. However, quantification of the impact of harvest on *Pterocarpus erinaceus* populations in the other Districts within the species range can assist in judging whether the national population is being depleted or not and the protection measures that should be reviewed and enforced.

The Karene District is one of the strongholds of *Pterocarpus erinaceus* woodland in Sierra Leone, and it encompasses the Outamba-Kilimi National Park (OKNP), which is the largest area of the woodland under protection in the country. However, the population of the species within protected area, and the regenerative potential in its seedlings, sapling and coppicing stumps, provides greater level of certainty that the species is not under immediate threat of local extinction.

7.2.8 Evaluate Impacts of Trade

What is the impact of legal and illegal trade on harvest area population and on species of concerned nationally?

There are no quantitative studies on the impact of legal and illegal trade on the natural populations of ***Pterocarpus*** *erinaceus* in the Tonkolili District. However, it is envisaged that the present study will give an insight into how legal and illegal logging can result in natural population decline. There is no evidence of harvesting now in the District.

Trade level in relation to harvest area.

The harvest of Pterocarpus erinaceus in Karene District is for different purposes other than export/trade.

Magnitude and trend of national trade

See Chapter 8, Section 8.2

7.2.9 Evaluate Appropriate Rigour of Existing Management Measures

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

Review of Legislations

At the national level, see information in Chapter 8, Section 8.2 which explains the key legislations governing the harvesting of forest products at the national and regional levels in Sierra Leone.

These legislations are being reviewed to reflect current day realities.

Review of Protection Measures

In the Karene District, the OKNP, is a National Park and holds a significant proportion of woodland with a high population of the *Pterocarpus. erinaceus* species. The setting of fire, slash and burn agriculture, logging and all other unauthorized activities within the National Park described in the Act serve to protect the biodiversity and landscape. In addition, there are isolated evidence of strong protection in communities where traditional bylaws are strictly implemented.

What are the key legislations governing the harvesting of forest products at the national and regional levels in Sierra Leone?

The following existing legal instruments govern the harvesting of forest products throughout Sierra Leone: - The Forestry Act of 1988 (Amended 2022), The Forestry Regulations of 1990, Forestry Development, Exploitation and Trade Reforms of 2010, and The Forestry Policy of 2010.

In compliance with the national legal instruments highlighted above, harvesting of the *Pterocarpus erinaceus* for exportation is generally done in accordance with Section 20 (Utilization of Community Forests) of The Forestry Act, 1988 and Section 8 (Submission of Logging Plans for Unclassified Forests) of The Forestry Regulations, 1990.

7.2.10 Harvest Management

Based on the summary of harvest regime for *Pterocarpus erinaceus* in the Kambia District illustrated in Table 7.2.2, the following recommendations were made by the Scientific Authority to the Management Authority: -

- to institute a harvesting scheme with a long history of effective management. A well-regulated adaptive management is more likely to be sustainable than an unmanaged harvest.
- the development and adoption of both local and national management plan to build and gain political will to establish the process of sustainable use.

In addition, local traditional bylaws exist in all three Chiefdoms for management and protection purposes.

Artificial Propagation

No evidence of large-scale artificial propagation, but nursery preparation and planting of seedling has been done on a small scale.

Non-lethal harvesting of fruits/flowers/seeds/leaves

Evidence exists that they are being harvested.

Non-lethal harvesting of bark/roots/wood

A couple of observations were made where the back of the tree is removed.

Removal of Whole Plant.

The main products in this case were whole stems with regulated degree of control while others were unmanaged with reference to the height level where they were harvested. The regulated products were harvested sometimes immature, but most times matured, while the unmanaged products were harvested either immature or matured every time. The relative level of uptake is unknown for both degrees of control, while the reason for take-off were for both subsistence and commercial purposes.

Removal of Whole Bulb.

Not Applicable to *Pterocarpus erinaceus*

Killing of individual by removal of seeds, leaves, bark, roots, wood.

There is virtually no evidence of killing by removal of seeds or leaves. However, in a few isolated instances, the whole back has been removed for medicine which may lead to the death of the tree. Also, in some communities the tree is cut down for charcoal production and use as firewood.

Table 7.2.2 Summary of Harvest Regime for *Pterocarpus erinaceus* in the Karene District.

Species: *PTEROCARPUS ERINACEUS*	**Country (if applicable State or Province): SIERRA LEONE, NORTHWESTERN PROVINCE, KARENE DISTRICT**
Date (of making Non-Detriment Finding): JUNE 2022	**Period to be covered by the finding: JUNE 2022 – MAY 2027**
Name: DR ABDUL BABATUNDE KARIM	**Position in Scientific Authority: HEAD**
Is the species endemic, found in a few countries only, or widespread? WIDESPREAD IN WEST AFRICA	
Conservation status of the species (if known) : IUCN Global status:___ENDANGERED_____National status:___CITES APPENDIX II SPECIES_____Other_____	

Type of harvest	Main Product	Degree of Control	Demographic segment of population harvested			Relative level of off-take (include number or quantity if known)				Reason for off-take and percentage (if known)			Commercial destination and percentage (if known)		
			Immature	Mature	Sex	Low	Medium	High	unknown	Subsistence	Commercial	Others	Local	National	International
1.1 Artificial propagation	*P. erinaceus*	Regulated													
		Unregulated													
1,2 Non-lethal harvesting of fruits/flowers/seeds/ leaves	*P. erinaceus*	Regulated													
		Unregulated		✓	na	✓				15%	5%			✓	✓
1.3 Non-lethal harvesting of bark/roots/ wood	*P. erinaceus*	Regulated	✓	✓											
		Unregulated		✓	na	✓			✓	10%	10%		✓	✓	
1.4 Removal of whole plant	*P. erinaceus*	Regulated		✓	na		✓				70%				✓
		Unregulated		✓	na			✓		10%	30%	10%	✓	✓	✓
1.5 Removal of whole bulb	*P. erinaceus*	Regulated													
		Unregulated													
1.6 Killing of individual by removal of seeds, leaves, bark, roots, wood	*P. erinaceus*	Regulated													
		Unregulated	✓	✓	na				✓	10%	15%		✓	✓	

7.3 PORT LOKO DISTRICT

7.3.1 Review Specimen Identification

Has the plant/specimen been correctly identified, and is the scientific name used compliant with the appropriate CITES standard?

The species has been correctly identified in accordance with the information provided in Chapter 4, therefore it is scientifically identified as *Pterocarpus erinaceus*.

Locally the species is called various names depending on the ethnic group in the area, as follows:

Temne – ***Gbenie***

Madingo – ***Bani-fere***

Fula – **Gbani**

7.3.2 Review of Compliance with Requirements for Artificial Propagation

Is the permit application for artificial propagated specimens?

Pterocarpus erinaceus occurred naturally in the Port Loko District. Although there is no evidence of artificial propagation of the species for now, but plans are on the way to initiate the process.

7.3.3 Review of Relevant Exclusions and Previously Made Non-Detriment Finding

Are the specimens covered by CITES Appendix II?

YES, and ***Pterocarpus erinaceus*** is listed in CITES Appendix II.

Is the harvest or the export of wild-harvested specimens of P. erinaceus permitted?

Presently there is suspension on the export of any specimens of *Pterocarpus erinaceus* until an NDF is developed to advise that such export will not be detrimental to the survival of the species.

Has a science based NDF been made for *P. erinaceus* that is still valid and sufficient to evaluate the current application?

This is the very first time an NDF study is conducted in Sierra Leone for *Pterocarpus erinaceus*.

7.3.4 Evaluate of Conservation Concern

The severity of conservation concern in Port Loko District is locally considered to be HIGH, based on anecdotal field observations. This District comparatively has the lowest cover of *Pterocarpus erinaceus* woodland among all Districts covered in the surveys. The main threats to the species include the following: -

- Indiscriminate cutting down of trees of various diameter irrespective of their commercial viability, thereby reducing potential future matured stands.
- Clearing and burning of *Pterocarpus erinaceus* woodland vegetation for farming activities. This has left large number of dead stumps that were counted in many of the sampled plots.

7.3.5 Evaluation of Potential Biological Risk

What is the severity of biological risk?

Risk severity is HIGH

Geographic distribution in the district

The population of *Pterocarpus erinaceus* in the Port Loko District is the smallest among all Districts where it occurs in Sierra Leone. In fact, the species occurs in only two of the thirteen Chiefdoms in the Port Loko District.

National/subnational population size and distribution

Table 7.3.1 and Figure 7.3.1 shows the total plots established and total live tree species enumerated per chiefdom in the Port Loko District. To estimate the population at the District level, a total of 19 plots were randomly chosen and surveyed with a total of 64 live trees

measured. The variation in plots number was based on the relative spatial distribution of *Pterocarpus erinaceus* woodland among the Chiefdoms where it occurs. The data shows that plots in both Chiefdoms of Bureh and Kasseh have comparable densities of trees.

Table 7.3.1 – No. of plots surveyed, number and density of live trees enumerated in the Port Loko District.

Chiefdom	No. of Plots	No. of live trees counted	Live trees per plot	Tree density per ha
Bureh	7	23	3	33
Kasseh	12	41	4	34
TOTAL	19	64	4	34

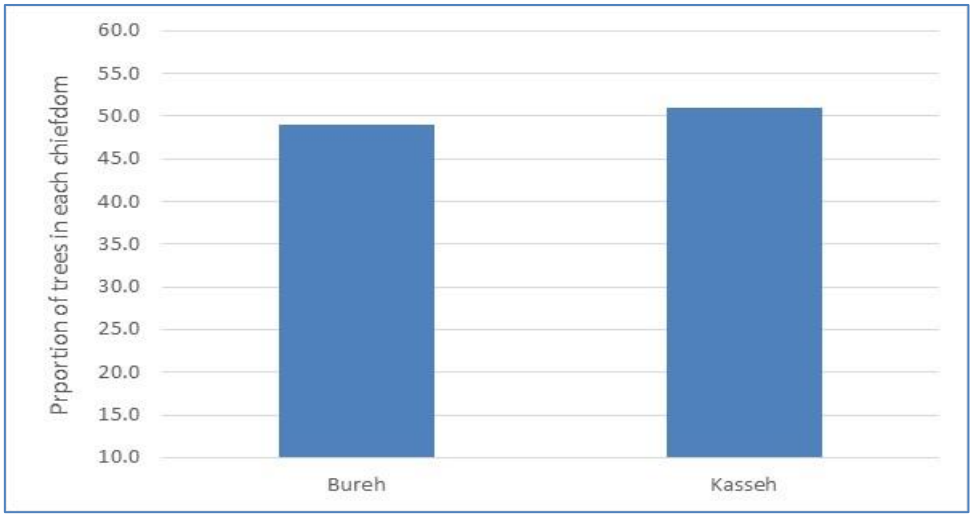

Figure 7.3.1 – Relative distribution of live trees among Chiefdoms in the Port Loko District.

Size structure of national/sub-national populations

Current stock

Based on the field data, *Pterocarpus erinaceus* trees enumerated were found to be distributed into five DBH categories shown in Figure 7.2.2. The tree structure between the two Chiefdoms, was virtually similar especially in terms of the distribution of the most common tree sizes of

DBH 10-20cm, 21-30 cm and 31-40 cm. The DBH 10-20cm category accounts for 84.9% of the trees enumerated, indicating a relatively young tree physiognomy in the *Pterocarpus erinaceus* woodland in the Port Loko District. This tree distribution and physiognomy is similar to those observed in the other Districts of Kambia and Karene in the North Western Region. The low number and absence of trees with DBH greater than 40cm is an indication of the high degree of logging in the District despite the low spatial extent of its *Pterocarpus erinaceus* woodland. Only Kasseh Chiefdom accounts for a few tree stands of DBH 41-50 cm, and when combined with only 15.1% of the tree stands of DBH 31-40 cm, The observation implies that the exploitable and exportable size categories of >30cm DBH are of limited distribution and much of the commercial stock have been harvested.

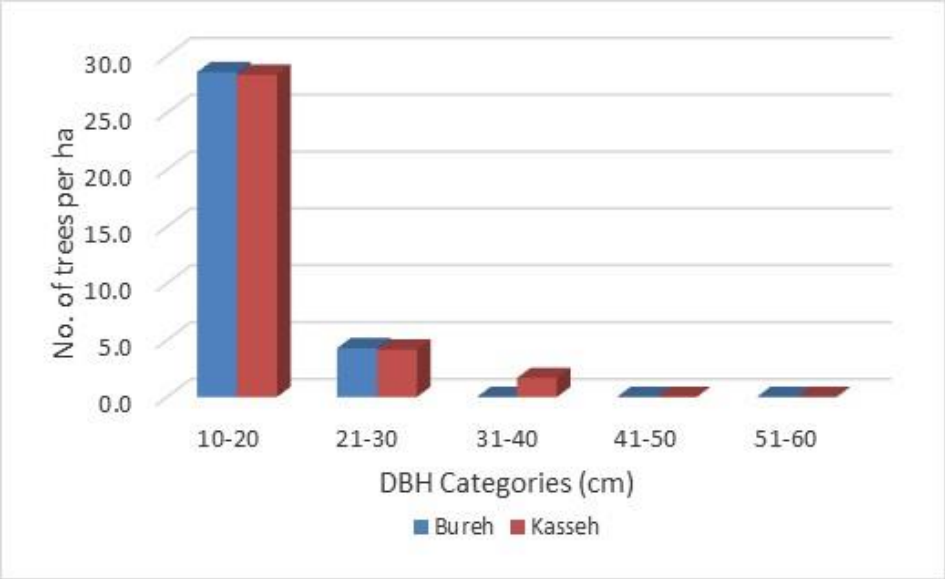

Figure 7.3.2 – Comparative distribution of trees of different DBH categories per ha, among Chiefdoms in the Port Loko District. Only two Chiefdoms had the woodland in the District.

Potential stock (regenerative potential)

Seedlings, saplings, and copping stumps are considered as potential future stock. Figure 7.3.4 shows the distribution of seedlings and saplings combined in the plots covered in each of the chiefdoms where *Pterocarpus erinaceus* woodland occurs in the Port Loko District. Both Chiefdoms of Bureh and Kasseh have almost the same number of seedlings/saplings ranging between 30 and 40 plants per ha. This density of potential stock is comparatively lower than

those recorded on Kambia and Karene Districts, indicating lower regeneration potential from seedlings and saplings. The situation regarding stump density is much lower compared to the other Districts in the Region and is probably a reflection of the generally low density of stands in the Port Loko District. Bureh Chiefdom accounts for all coppicing stumps enumerated, the number of dead stumps is the same in the other Chiefdom. The absence of any coppicing stumps in the Kasseh Chiefdom may also reflect the high degree of threats to *Pterocarpus erinaceus* woodland and a serious threat to its regeneration potential in the Chiefdom.

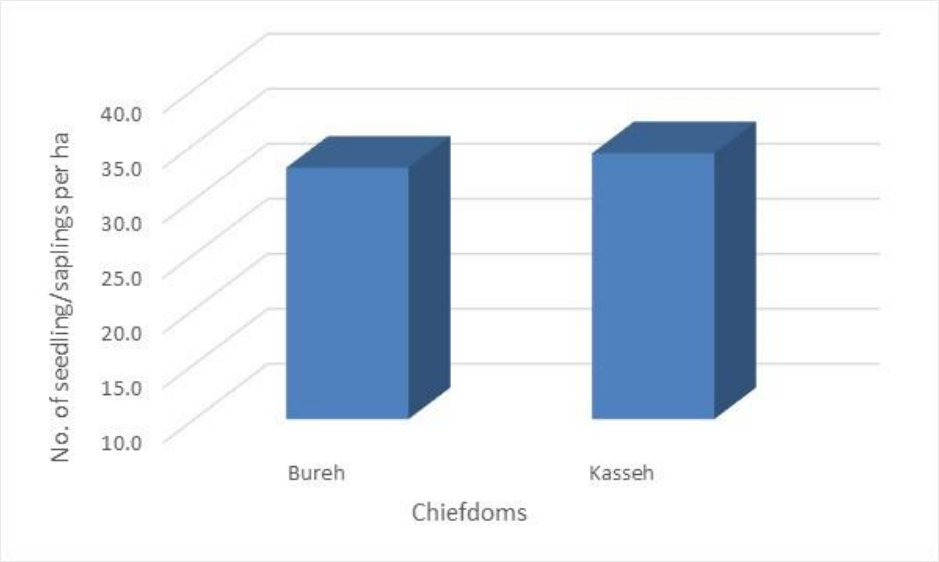

Figure 7.3.3 – Distribution of seedlings and saplings combined per ha among Chiefdoms in the Port Loko District.

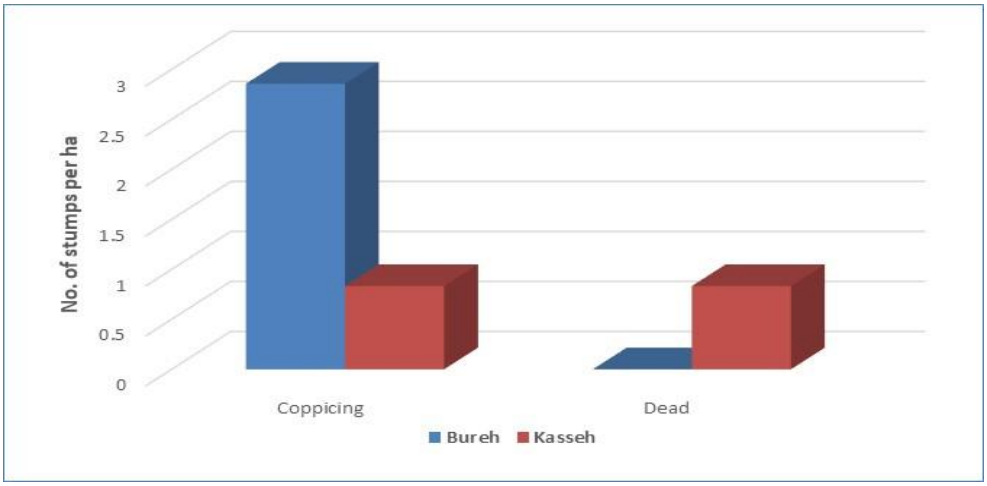

Figure 7.3.4 – Relative distribution and status of stumps among Chiefdoms in the Port Loko District

7.3.6 Evaluation of Impacts of Harvest

What is the impact of harvest on target population?

The impact of the harvest on target population is HIGH

The most important threat to *P. erinaceus* in the Port Loko District is over harvesting. No previous study had been conducted on the impact of the harvest of the species on the wild population in Port Loko District, but based on the findings of this study, trees with DBH between 21-30cm account for much greater proportion of the existing population (Figure 7.3.2). If not disturbed, a good number of these trees may, in the next decade, attain maturity, be reproductively active and would contribute to the future stock. Also, there was low density of stumps in the plots and the reasons for this is not immediately known.

7.3.7 Impact of Harvest on National Population

Severity of wild harvest MODERATELY HIGH

The data and general field observations indicate that Port Loko District is one of the areas where *Pterocarpus erinaceus* woodland has been intensively exploited in the past, although the District accounts for the lowest spatial extent among locations holding the woodland in the country. The low density of seedlings and low regenerative state of the stumps present a seemingly low outlook for the recovery of woodland in the foreseeable future. Considering the spatial extent in the District, the impact of harvest is devastating to the local population but the overall impact on the national population is relatively low.

7.3.8 Evaluate Impacts of Trade

What is the impact of legal and illegal trade on harvest area population and on species of concerned nationally?

There are no quantitative studies on the impact of legal and illegal trade on the natural populations of ***Pterocarpus erinaceus*** in the Port Loko District. However, it is envisaged that the present study will give an insight into how legal and illegal logging can result in natural population decline. There is no evidence of harvesting now in the District.

Trade level in relation to harvest area.

No specific information for Port Loko District on trade level in relation to harvest exists and so it would be difficult to determine at this stage.

Magnitude and trend of national trade

See Chapter 8, Section 8.2

7.3.9 Evaluate Appropriate Rigour of Existing Management Measures

What management/protection measures are in place for the target species

Review of Legislations

At the national level, see information in Chapter 8, Section 8.2 which explains the key legislations governing the harvesting of forest products at the national and regional levels in Sierra Leone.

These legislations are being reviewed to reflect current day realities.

Review of Protection Measures

There are no specific protection measures in place for *Pterocarpus erinaceus* woodland in the District from natural events such as fire and storms. Some level of protection exists against anthropogenic destruction, particularly with respect to logging and fire through the deployment of Rangers by the Government and Chiefdom bylaws in all Chiefdoms surveyed.

What are the key legislations governing the harvesting of forest products at the national and regional levels in Sierra Leone?

The following existing legal instruments govern the harvesting of forest products throughout Sierra Leone: - The Forestry Act of 1988 (Amended 2022), The Forestry Regulations of 1990, Forestry Development, Exploitation and Trade Reforms of 2010, and The Forestry Policy of 2010.

In compliance with the national legal instruments highlighted above, harvesting of the *Pterocarpus erinaceus* for exportation is generally done in accordance with Section 20 (Utilization of Community Forests) of The Forestry Act, 1988 and Section 8 (Submission of Logging Plans for Unclassified Forests) of The Forestry Regulations, 1990.

7.3.10 Harvest Management

Based on the summary of harvest regime for *Pterocarpus erinaceus* in the Port Loko District illustrated in Table 7.3.2, the following recommendations were made by the Scientific Authority to the Management Authority: -

- to institute a harvesting scheme with a long history of effective management. A well-regulated adaptive management is more likely to be sustainable than an unmanaged harvest.
- the development and adoption of both local and national management plan to build and gain political will to establish the process of sustainable use.

In addition, local traditional bylaws exist in all three Chiefdoms for management and protection purposes.

Artificial propagation

No evidence of artificial propagation exists in the District.

Non-lethal harvesting of fruits/flowers/seeds/leaves

Local communities are known to harvest the bark and leaves for medicinal purposes.

Non-lethal harvesting of bark/roots/wood

Local communities are known to harvest the bark for medicinal purposes, and the dry and fallen branches and dead wood are used for firewood.

Removal of Whole Plant

The main products in this case were whole stems with regulated degree of control while others were unmanaged with reference to the height level where they were harvested. The regulated products were harvested sometimes immature, but most times matured, while the unmanaged products were harvested either immature or matured every time. The relative level of uptake is unknown for both degrees of control, while the reason for take-off were for both subsistence and commercial purposes.

Removal of Whole Bulb

Not Applicable to *Pterocarpus erinaceus*

Killing of individual by removal of seeds, leaves, bark, roots, wood.

There is virtually no evidence of killing by removal of seeds or leaves. However, in a few isolated instances, the whole back has been removed for medicine which may lead to the death of the tree. Also, in some communities the tree is cut down for charcoal production and use as firewood.

Table 7.3.2 - Summary of Harvest Regime for *Pterocarpus erinaceus* in the Port Loko District.

Species: *PTEROCARPUS ERINACEUS*	**Country (if applicable State or Province): SIERRA LEONE, NORTHWESTERN PROVINCE, PORTLOKO DISTRICT**
Date (of making Non-Detriment Finding): JUNE 2022	**Period to be covered by the finding: JUNE 2022 – MAY 2027**
Name: DR ABDUL BABATUNDE KARIM	**Position in Scientific Authority: HEAD**
Is the species endemic, found in a few countries only, or widespread? WIDESPREAD IN WEST AFRICA	
Conservation status of the species (if known) : IUCN Global status:___ENDANGERED_____National status:___CITES APPENDIX II SPECIES_____Other_____	

Type of harvest	Main Product	Degree of Control	Demographic segment of population harvested			Relative level of off-take (include number or quantity if known)				Reason for off-take and percentage (if known)			Commercial destination and percentage (if known)		
			Immature	Mature	Sex	Low	Medium	High	unknown	Subsistence	Commercial	Others	Local	National	International
1.1 Artificial propagation	P. erinaceus	Regulated													
		Unregulated													
1,2 Non-lethal harvesting of fruits/flowers/seeds/leaves	P. erinaceus	Regulated													
		Unregulated		✓	na	✓				10%	10%			✓	✓
1.3 Non-lethal harvesting of bark/roots/ wood	P. erinaceus	Regulated													
		Unregulated	✓	✓	na	✓			✓	15%	20%		✓	✓	
1.4 Removal of whole plant	P. erinaceus	Regulated		✓	na		✓				60%				✓
		Unregulated		✓	na			✓		10%	40%	5%	✓	✓	✓
1.5 Removal of whole bulb	P. erinaceus	Regulated													
		Unregulated													
1.6 Killing of individual by removal of seeds, leaves, bark, roots, wood	P. erinaceus	Regulated													
		Unregulated	✓	✓	na				✓	5%	15%		✓	✓	

CHAPTER 8 – THE NATIONAL PERSPECTIVE PROCESSES AND REGULATIONS ON ROSEWOOD MANAGEMENT

8.1 REVIEW OF BIOLOGICAL CHARACTERISTICS, HARVEST AND EXPORTATION REGIMES

In conducting this Non-Detriment Finding, information was collected on the morphological data, types of harvest, the degree of control over the harvest, the segment of the population harvested, the level of total off-take (for domestic and international use), the reason for the harvest, and the end users of the harvest. It was observed that the data management system should be improved with reference to data availability at the point of harvest for the volume of harvest and the volume of export for each Concessionaire.

Though the species has high potential to coppice, regenerate and quickly dispersed by wind to many other areas, if harvesting of the trees for both domestic use and export, slash and burn agriculture, charcoal production are not properly managed in some Districts, mature stands that are commercially viable will not be the available soon.

The Government of Sierra Leone appointed a Sole Timber Agent in June 2018, charged with the responsibility to facilitate all timber exportation from the country in collaboration with the CITES Management Authority. The Timber Agent has handled the trade responsibly and paid all revenues emanating from tax levy on export of timber in full to the National Revenue Authority. This decision has yielded positive results on the trade due to its well-coordinated structure, insulating it from illegal dealings along the supply chain, with a particular focus on this species.

Table 8.1.1 – Biological and Management Characteristics (CITES Table 2 - Plot of Responses)

QUESTION NUMBER	QUESTION CATEGORY	QUESTIONS	RESPONSES 1 – 5
2.1	Biology	BIOLOGY - Life history	1
2.2		BIOLOGY - Niche breadth	2
2.3		BIOLOGY - Dispersal	1
2.4		BIOLOGY - Human tolerance	2
2.5	Status	STATUS - National distribution	2
2.6		STATUS - National abundance	2
2.7		STATUS - National population trend	2
2.8		STATUS - Information quality	3
2.9		STATUS - Major threat	4
2.10	Management	MANAGEMENT - Illegal off-take	1
2.11		MANAGEMENT - Management history	3
2.12		MANAGEMENT - Management plan	1
2.13		MANAGEMENT - Aim of harvest	4
2.14		MANAGEMENT - Quotas	3
2.15	Control	CONTROL - Harvest in PA	4
2.16		CONTROL - Harvest in strong tenure	3
2.17		CONTROL – Open access harvest	1
2.18		CONTROL - Confidence in harvest management	3
2.19	Monitoring	MONITORING - Monitoring method	3
2.20		MONITORING - Confidence in monitoring	2
2.21	Incentives	INCENTIVES - Effect of harvest	3
2.22		INCENTIVES - Species conservation incentive	2
2.23		INCENTIVES - Habitat conservation incentive	3
2.24	Protection	PROTECTION - Proportion protected from harvest	2
2.25		PROTECTION - Effectiveness of protection	3

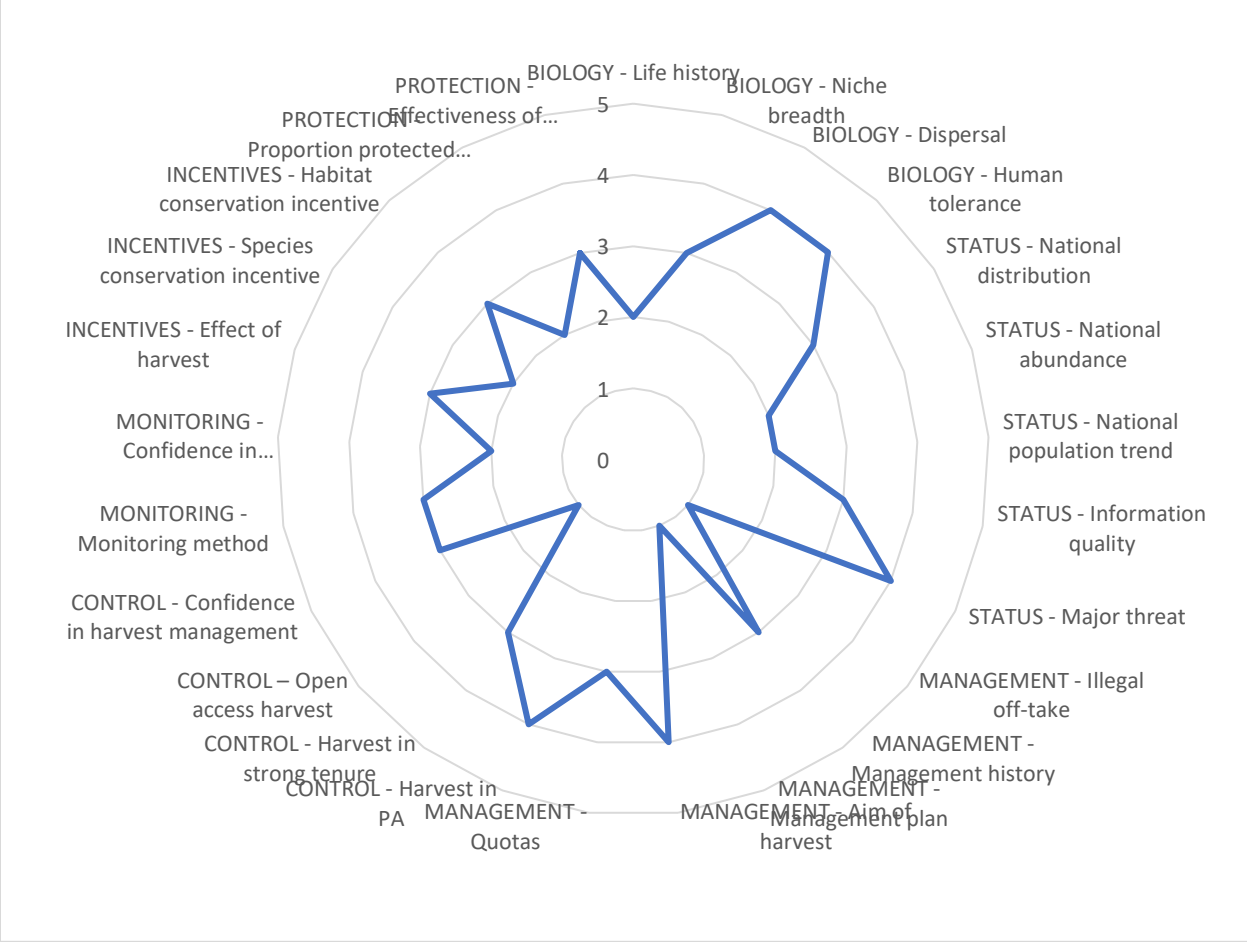

Figure 8.1.1 – Plot of responses to questions in Table 8.1.1: Scores of various parameters that determine Non-Detriment Findings.

Table 8.1.2 - Factors Affecting Management of the Harvesting Regime (CITES Table 2)

Biological characteristics: Plants only		
2.1. Life form: What is the life form of the species?	Annual	
	Biennial	
	Perennials (herbs)	
	Shrub and small trees (max. 12 m.)	
	Trees	✓
2.2. Regeneration potential: What is the regenerative potential of the species concerned?	Fast vegetatively	
	Slow vegetatively	✓
	Fast from seeds	
	Slow or irregular from seeds or spores	✓
	Uncertain	
2.3. Dispersal efficiency: How efficient is the species' dispersal mechanism?	Very Good	
	Good	
	Medium	
	Poor	
	Uncertain	✓
2.4. Habitat: What is the habitat preference of the species?	Disturbed open	
	Undisturbed open	
	Pioneer	
	Disturbed forest	
	Climax	✓
National status: Animals and plants		
2.5. National distribution: How is the species distributed nationally?	Widespread, contiguous in country	
	Widespread, fragmented in country	
	Restricted and fragmented	
	Localised	✓
	Uncertain	
2.6. National abundance: What is the abundance nationally?	Very abundant	
	Common	✓
	Uncommon	
	Rare	
	Uncertain	
2.7. National population trend: What is the recent national population trend?	Increasing	
	Stable	
	Reduced, but stable	✓
	Reduced and still decreasing	
	Uncertain	
2.8. Quality of information: What type of information is available to	Quantitative data, recent	✓
	Good local knowledge	

describe abundance and trend in the national population?	Quantitative data, outdated	
	Anecdotal information	
	None	
2.9 Major threats: What major threat is the species facing (underline following: overuse/ habitat loss and alteration/ invasive species/ other: and how severe is it?	None	
	Limited/Reversible	
	Substantial	✓
	Severe/Irreversible	
	Uncertain	
Harvest management: Animals and plants		
2.10. Illegal off-take or trade: How significant is the national problem of illegal or unmanaged off-take or trade?	None	
	Small	
	Medium	✓
	Large	
	Uncertain	
2.11. Management history: What is the history of harvest?	Managed harvest: ongoing with adaptive framework	
	Managed harvest: ongoing but informal	
	Managed harvest: new	
	Unmanaged harvest: ongoing or new	✓
	Uncertain	
2.12. Management plan or equivalent: Is there a management plan related to the harvest of the species?	Approved and coordinated local and national management plans	
	Approved national/state/provincial. management plan(s)	
	Approved local management plan	
	No approved plan: informal unplanned management	✓
	Uncertain	
2.13. Aim of harvest regime in management planning: What is harvest aiming to achieve?	Generate conservation benefit	
	Population management/control	
	Maximise economic yield	✓
	Opportunistic, unselective harvest, or none	
	Uncertain	
2.14 Quotas: Is the harvest based on a system of quotas?	Ongoing national quota: based on biologically derived local quotas	
	Ongoing quotas: “cautious” national or local	✓
	Untried quota: recent and based on biologically. derived local quotas	
	Market-driven quota(s), arbitrary quota(s), or no quotas	
	Uncertain	
Control of harvest: Animals and plants		
2.15. Harvesting in Protected Areas: What percentage of the legal national	High	
	Medium	

harvest, occurs in State-controlled Protected Areas?	Low	✓
	None	
	Uncertain	
2.16. Harvesting in areas with strong resource tenure or ownership: What percentage of the legal national harvest occurs outside Protected Areas, in areas with strong local control over resource use?	High	
	Medium	✓
	Low	
	None	
	Uncertain	
2.17. Harvesting in areas with open access: What percentage of the legal national harvest occurs in areas where there is no strong local control, giving *de facto* or actual open access?	None	
	Low	
	Medium	
	High	✓
	Uncertain	
2.18. Confidence in harvest management: Do budgetary and other factors allow effective implementation of management plan(s) and harvest controls?	High confidence	
	Medium confidence	✓
	Low confidence	
	No confidence	
	Uncertain	
Monitoring of harvest: Animals and plants		
2.19. Methods used to monitor the harvest: What is the principal method used to monitor the effects of the harvest?	Direct population estimates	
	Quantitative indices	
	Qualitative indices	
	National monitoring of exports	✓
	No monitoring or uncertain	
2.20. Confidence in harvest monitoring: Do budgetary and other factors allow effective harvest monitoring?	High confidence	
	Medium confidence	✓
	Low confidence	
	No confidence	
	Uncertain	
Incentives and benefits from harvesting: Animals and plants		
2.21. Utilisation compared to other threats: What is the effect of the harvest when taken together with the major threat that has been identified for this species?	Beneficial	
	Neutral	
	Harmful	✓
	Highly negative	
	Uncertain	
2.22. Incentives for species conservation: At the national level, how much conservation benefit to this species accrues from harvesting?	High	
	Medium	✓
	Low	
	None	
	Uncertain	

2.23. Incentives for habitat conservation: At the national level, how much habitat conservation benefit is derived from harvesting?	High	
	Medium	
	Low	✓
	None	
	Uncertain	
Protection from harvest: Animals and plants		
2.24. Proportion strictly protected: What percentage of the species' natural range or population is legally excluded from harvest?	> 15%	
	5-15%	✓
	< 5%	
	None	
	Uncertain	
2.25. Effectiveness of strict protection measures: Do budgetary and other factors give confidence in the effectiveness of measures taken to afford strict protection?	High confidence	
	Medium confidence	✓
	Low confidence	
	No confidence	
	Uncertain	
2.26. Regulation of harvest effort: How effective are any restrictions on harvesting (such as age or size, season or equipment) for preventing overuse)?	Very effective	
	Effective	✓
	Ineffective	
	None	
	Uncertain	

8.2 ASSESSMENT OF NATIONAL TRADE

8.2.1 National Process for the Trade in Pterocarpus erinaceus

Pterocarpus erinaceus, a deciduous legume tree of our savannas and dry forests is famous for producing one of the finest woods. Increasing demand for its high-value timber in the international market and fodder threatens existing natural stands. The wood is a beautiful, rich rose-red or dark brown, mottled with dark streaks (NAS 1979). It has a handsome, fine-grained appearance and is used for furniture (including stools and benches), decorative paneling, and parquet flooring. It is also used as construction wood and in carpentry for doors and window frames. It makes very good charcoal, which is highly valued by local blacksmiths. However, the tree fruits abundantly and is easy to propagate, making it a good candidate for reforestation programs. From 2016 to recent, there is only one tree species that is in high demand for export - ***Pterocarpus erinaceus***.

The mandate of the Forestry Department within the Ministry of the Environment and Climate Change is to sustain the efficient management and utilization of forest resources, and forest preservation of the forest environment for biodiversity conservation, research, and education in Sierra Leone.

The following existing legal instruments empowered the Forestry Department to carry out its mandate: -

The Forestry Act of 1988 (Amended 2022) is the primary legislation guiding the efficient management and regulation of forestry and classified and unclassified Forests in Sierra Leone and the establishment of a Reforestation Fund.

The Forestry Regulations of 1990 and other legal instruments that were developed and approved by Cabinet for the efficient management and utilization of timber and other forest products in Sierra Leone clearly outline the procedures for timber utilization, afforestation and reforestation management and the list of the timber species found in our forests across the country.

Forestry Development, Exploitation and Trade Reforms of 2010, standardize the processes and guidelines for leasing Forest Reserve and Community Forests, issuing logging permits, use of stumpage fees, benefit sharing from forest exploitation,

transportation of forest products, urban tree management services, export permits, import of chain saws and sawmills, registration of timber and wood product enterprises.

The Forestry Policy of 2010 presented policy statements, each having a set of strategies to implement and ultimately accomplish that policy statement. Successful implementation of most strategies will require participatory engagement of a range of stakeholders.

In compliance with the national legal instruments highlighted above, harvesting of the *Pterocarpus erinaceus* for exportation is generally done in accordance with Section 20 (Utilization of Community Forests) of The Forestry Act, 1988 and Section 8 (Submission of Logging Plans for Unclassified Forests) of The Forestry Regulations, 1990, according to the steps outlined below for Forest Utilization in Sierra Leone; -

- LEGAL RIGHT TO HARVEST

  A Company/Individual should apply to the Ministry of the Environment and Climate Change for either **Forest Concession/Timber Sales Agreement for a particular Forest Reserve or Community Forest,** which will be signed for and on behalf of the Chiefdom, District, Landowning Family, Company/Individual and endorsed by the Minister of the Environment or Director of Forestry. This is immediately followed by **Stock Inventory of the Forest Resources** within the Forest Concession/Timber Sales Agreement Area and the preparation of **Forest Harvesting Management and Reforestation Plan** and the **Annual Operations/Working Plan** for approval before harvesting starts.

  The Company/Individual shall furnish the Director of Forestry with a Performance Bank Guarantee from a recognized Bank as security for compliance with the Forest Concession/Timber Sales Agreement.

- TIMBER HARVESTING ACTIVITIES

  The Forest Concession/Timber Sales Agreement holder must uniquely number and record each tree on the stock survey and block map. The block map and stock survey are verified by the Forestry Department.

  Forest Concession/Timber Sales Agreement holders are only allowed to fell trees when they are in the possession of a valid **Annual Timber License**. This Licence can only be

obtained after they have among others, an **approved** A**nnual Operations/Working Plan** and an **approved Forest Harvesting Management and Reforestation Plan** covering the area to be harvested. The Annual Operations/Working Plan shall specify the volume and species of the annual coupe, or the annual block of harvest.

The following payments should be made to Government before timber is harvested from the Forest Concession/Timber Sales Agreement area for further distribution by the Ministry of the Environment as specified in the **Forestry Development, Exploitation and Trade Reforms of 2008:**

- **Land Lease Rent**
- **Stumpage**
- **Royalty**
- **Reforestation and Training**

- TIMBER TRANSPORT PERMIT

Process involved in the issuance of Timber Transport Permit is as follows: -

i. Application is made to Forestry Department to transport timber from one point to the other
ii. Applicant must have a Forest Concession/Timber Sales Agreement or, in the case of a private timber businessperson, an attestation from the Forest Concession/Timber Sales Agreement holder
iii. All timber being transported should have identification marks/codes stamped by Forestry Department showing the origin of the timber and the Forest Concession/Timber Sales Agreement holder
iv. M & E Officers in all the Districts will assist the Forestry Department to enforce
v. Defaulters will have their timber detained and allowed 48 hours for the payment of a penalty of four-fold the fees for timber transportation
vi. Failing to pay the penalty in (v) will lead to a forfeiture of the illegally transported timber.

- EXPORT

  Forest Concession/Timber Sales Agreement holders shall make available its processing facility in Freetown for checking volume calculations prior to determining the export levy. Permission to export will be granted to **only** the Company/Individual that have acquired Forest Concession/Timber Sales Agreement for a particular forest and will be contingent upon compliance with the **approved** A**nnual Operations/Working Plan** and the **approved Forest Harvesting Management and Reforestation Plan** and any other conditions that will be imposed out of necessity.

The quota system will be developed by the Ministry of the Environment and Climate Change and CITES Secretariat depending on the type of species to control the export of timber.

Research on available stock and forest inventory of all the forests where *Pterocarpus erinaceus* is found has always been of paramount importance, therefore the commitment in conducting this assessment in making a Non-Detriment Finding (NDF) and Legal Acquisition Finding (LAF) for *Pterocarpus erinaceus* in Sierra Leone will provide scientific information to justify that international trade from the country is not detrimental to the survival of the species and that the trade is compliant with Article IV of CITES.

8.2.2 Management Measures

Several measures are in place to prevent the illegal trade of *Pterocarpus erinaceus* from Sierra Leone, as follows:

- In 2018, Government appointed a Sole Timber Export Agent charged with the responsibility to facilitate all timber exportation from the country. This decision is yielding positive results on the trade due to its well-coordinated structure involving different stakeholders, insulating it from illegal dealings along the supply chain.
- Every year, government imposes five-month nationwide ban on logging and transporting of timber during the rainy season. For the year 2022, it went into effect from the 10 June to October.
- Reforestation of degraded forest landscapes nationwide by the end of 2023 through the ongoing Government funded National Tree Planting Project with reference to the East, North and North-West Regions, where *Pterocarpus erinaceus* is predominance. The overall objective of this Project is to increase our forest cover by planting 5 million assorted seedlings including *Pterocarpus erinaceus* as a priority species. This will ensure sustainability of this globally endangered species and serve as a mitigating measure aimed at minimizing the impacts of climate change and in fulfillment of the commitments in the country's Medium-Term National Development Plan and other international obligations.

- Local Authorities in the East, North and North-West Regions with savannas and dry forests are constantly engaged to develop and enforce byelaws for the control and reduction of Wildfires.

- Forest Management Units are found in each of the Districts where *Pterocarpus erinaceus* are mainly harvested. Each Unit is comprised of the District Forest Officer (DFO) who is the Head of Forestry in the District and assisted by Forest Rangers and Forest Guards who are deployed in the Chiefdoms within their respective Districts.

The Government of Sierra Leone will continue to enforce measures already in place aimed at preventing the timber trade from illegality, with a particular focus on *Pterocarpus erinaceus*.

Do existing management measures adequately mitigate harvest impacts and trade impacts for populations/subpopulations?

Yes, they do, and the Government of Sierra Leone will continue to enforce measures already in place aimed at preventing the timber trade from illegality, with a particular focus on *Pterocarpus erinaceus* and devise further methods to help effectively combat the illegal trade. The trade will further be sanitized based on the outcomes of the mandated findings – Non-Detriment Finding (NDF) and Legal Acquisition Finding (LAF).

8.3 TRACEABILITY AND CHAIN OF CUSTODY

8.3.1 Introduction to the traceability concept

The global trade in roundwood and other products originating from illegally extracted timber is a multi-billion-dollar industry. Indonesia alone lost $9 billion in revenue to the illegal timber trade between 2003 and 2014. While those involved in illegal timber trade flood the timber market with cheaper products, businesses sourcing legal timber lose profits and competitiveness. Therefore, in response to tackling this burning global scourge, the European Union (EU) – being one of the world's largest single importers of wood; initiated the "Forest Law Enforcement Governance and Trade – FLEGT – which is a strategy based primarily on Voluntary Partnership Agreements (VPAs) between European timber consuming countries and developing countries producing tropical timber". However, from prevailing trends in the timber export market; especially from African forests, it is evident that the EU-FLEGT is not enough to tackle illegal logging. Consequently, it becomes imperative for Governments and other stakeholders involved in combatting illegal timber trade to acquire the required capacities to trace timber logs back to the forests where they were harvested.

In the more modern and technologically advanced world that we are in today, the traditional paper-based log tracking system have proven inadequate, thus, the current circumstance requires more effective, and technology driven means of log tracking for efficient improvement in the traceability of logs from production sites to the end user – within or outside the country of origin.

The old paper-based system depended on the issuance of documents such as tree inspection certificates, log certificates, log permits, licenses to timber contractors and other key stakeholders involved in timber business and the issuance of log impression hammers to timber contractors – as a sign of authority to lift and transport logs. In addition, sawmills are expected to keep log registers to account for sawn logs.

Nevertheless, since the last decade, there has been increasing numbers of different technology-based approaches to logs traceability emanating from different parts of the world. The input required to drive each of these different technologies are as varied as the technologies themselves, but mostly, hand-held, and mobile devices are required to execute the tracking process. Typical

examples of existing technology-based log traceability systems are, Stardust**,** ONATRACK**,** TreeTAG**,** GWTS**,** SEINEF; and others are, Global Traceability Systems' Radix Tree and BVRio Responsible Timber Exchange**.**

8.3.2 Justification for a Traceability Mechanism

Within the past 4 years, Sierra Leone intensified the move to give more focused attention to environment related matters in the country and therefore established a new ministry for the environment in its quest to achieve this. Amongst other enviable reasons for this, was the transfer of the Forestry Department from the Ministry of Agriculture to the new Ministry of the Environment and Climate Change, to gain more momentum with the needed reforms that is required to reposition the country's Forestry Sector to maximize its environmental, social, and economic potentials.

Therefore, in addition to the review of the enabling policy and regulatory tools related to the Forestry Sector, the Ministry is currently undertaking stakeholder engagements in its ongoing reform of forestry operations in the country. At the heart of this process is the establishment of a formidable system that will not only ensure traceability of logs emanating from the country's forests, but also enshrine safeguards in the timber harvesting process. The traceability system that will be adopted must be one that is adaptable to existing socio-economic and technological capacities in the country.

The NDF process is never complete until a traceability mechanism is established that will be used to monitor the pathways of timber exploitation and marketing from the point of origin to exportation and shipment. Such a tracking mechanism do not only require the institution of technological mechanisms, but collaboration among stakeholders to implement the process and ensure that it is effective and creating the impacts. It will also enhance the effectiveness of the regulatory mechanisms and licensing system for controlled exploitation of the wood and improve revenue collection within the bounds of the established legal processes in the country.

8.3.4 Steps Towards Establishing an Effective Traceability Mechanism

The Government of Sierra Leone, through the Ministry of the Environment and Climate Change and its relevant agencies has shown keen interest and strong commitment to establish and operate an effective traceability and chain of custody system for *Pterocarpus erinaceus* and other timber species of global conservation concern. The following steps will be taken to ensure that this is done and implemented within a period of 12 months.

1. Establish standards to determine chain of custody and the sustainable exploitation and use of *Pterocarpus* woodlands.
2. Establish standards for compliance in the methods of exploitation, transportation, and financing mechanism for *Pterocarpus* timber.
3. Assess and determine the technological requirements and code systems that is applicable to the Sierra Leone situation. The technological requirements would address issues like certification of logs, tracing of sources and supply chain, identification of non-compliant products and enumeration of exportable quantities.
4. Establish a national committee for the implementation of the traceability mechanism, with strong scientific approach to ensure its efficiency. This would require a systematic engagement with the universities and other stakeholders in the scientific and management community in the timber trade, including relevant Environmental NGOs.

8.4 CONCLUSIONS AND RECOMMENDATIONS

8.4.1 CONCLUSION

West African Rosewood *Pterocarpus erinaceus* is a CITES-listed species in Appendix II and a native to Sierra Leone. Species under Appendix II are not necessarily threatened with extinction, but trade must be controlled to avoid utilization incompatible with their survival. A Non-Detriment Finding is required, which will help to determine the national quota before trade of the species is allowed. This was a great move to help protect the species in its natural state. In Sierra Leone, No Science No trade has been adopted for the protection of *Pterocarpus erinaceus.* It is found in all the Districts of the Northern and North-Western Regions and one District in the Eastern Region of the country.

The wild populations have seriously declined in many locations where surveys were done, and in many of the affected places, the woodland is now small and fragmented. Main threats to *Pterocarpus erinaceus* include but not limited to the following: - harvesting of the trees for both domestic use and export, slash and burn agriculture, charcoal production, grazing, removal of bark for medicinal purposes.

Though the situation is precarious for the species in many of the locations visited, there are viable and intact stock of *Pterocarpus erinaceus* in some locations and more especially in some parts of Koinadugu, Falaba, Karene, Kono and Tonkolili Districts.

Based on the data collected and the result of the analysis provided in Chapters 5 to 7, the respective conclusion on the NDF is given on Table 8.4.1, showing the fifty-three Chiefdoms surveyed.

Table 8.4.1 – Conclusion on the Status of The Non-Detriment Finding in the Study Areas.

PROVINCE	DISTRICT & NO. OF CHIEFDOM	CHIEFDOMS	CONCLUSION ON NDF
EASTERN PROVINCE	Kono District	Sandor	NEGATIVE
		Fiama	NEGATIVE
		Gbanekondor	NEGATIVE
		Lei	POSITIVE
		Mafindor	NEGATIVE
		Soa	POSITIVE
		Toli	POSITIVE
NORTHERN PROVINCE	Bombali District	Biriwa	NEGATIVE
		Gbendembu	NEGATIVE
		Kamaranka	NEGATIVE
	Tonkolili District	Dansogoia	POSITIVE
		Kholifa-Mabang	NEGATIVE
		Sambaia	POSITIVE
	Koinadugu District	Alkalia	POSITIVE
		Diang	POSITIVE
		Kamukeh	POSITIVE
		Nieni	POSITIVE
		Tamisso	POSITIVE
		Wara Wara Yagala	NEGATIVE
	Falaba District	Barawa	POSITIVE
		Delmadugu	POSITIVE
		Dembelia-Musaia	NEGATIVE
		Dembelia-Sinkunia	NEGATIVE
		Folosaba-Kamba	NEGATIVE
		Kabillia	NEGATIVE
		Kamadugu	POSITIVE
		Kurosaradu	POSITIVE
		Mongo Bendugu	NEGATIVE
		Morifindu	POSITIVE
		Neya	POSITIVE
		Nyedu	POSITIVE
		Sulima	NEGATIVE

PROVINCE	DISTRICT & NO. OF CHIEFDOM	CHIEFDOMS	CONCLUSION ON NDF
NORTH-WESTERN PROVINCE	Kambia District	Brimaia	NEGATIVE
		Dixon	NEGATIVE
		Khonimakeh	NEGATIVE
		Mambolo	NEGATIVE
		Masungbala	NEGATIVE
		Munu-Talah	NEGATIVE
		Samu	NEGATIVE
		Tonko-Limba	NEGATIVE
	Karene District	Buya	NEGATIVE
		Gbanti	POSITIVE
		Lebei-Saygahun	NEGATIVE
		Mafonda Makerembay	NEGATIVE
		Romende	NEGATIVE
		Sanda Loko	POSITIVE
		Sanda Magbolontor	POSITIVE
		Sanda Tendaran	NEGATIVE
		Sella Limba	NEGATIVE
		Tambakha-Simibungie	POSITIVE
		Tambakha-Yobangie	POSITIVE
	Port Loko District	Bureh	NEGATIVE
		Kasseh	NEGATIVE

8.4.2 RECOMMENDATIONS

It is therefore strongly recommended to develop relevant rules/regulations and ensure their stringent implementation to mitigate the threats and ensure that the species not only survive in the wild but that the stability of its populations is guaranteed in the near future. To ensure this happens, the following recommendation are proffered: -

i. A holistic review of the legislations relating to Forestry needs to be done, in the view to incorporate and domesticate CITES standards and processes that would ensure sustainable use and management of *Pterocarpus erinaceus* and other forest resources.

   Legislation should be reviewed and updated more frequently to keep up with changes in conservation and trade and to complement commitments made in global Conventions such as CITES and CBD. It is important for Sierra Leone to address the lack of legislative provisions for imported non-CITES-listed timber. This includes the need to allow Sierra Leone Customs and other law enforcement agencies to seize suspected illegal shipments for inspection and further action, and to verify legality throughout the supply chains.

ii. Develop regulations for implementation of the new Forest Law. Develop implementation regulations and measures that support the enforcement of traceability systems in the supply chain.

iii. Develop a Guideline on Sustainable Forest Management and Utilization for investors to ensure their forestry operations are legal and adhere to the laws of the country.

iv. There is need for thorough research on the biology, ecology and conservation needs of *Pterocarpus erinaceus* in Sierra Leone, and so investment in this area is a must, to ensure sustainability and viability of the productivity, harvest, and trade of the species in future. One key area of research would be to test options for artificial propagation of the species and restoration of the ecology of its woodland.

v. Strengthen forest patrolling operations by recruiting and deploying more Forest Rangers to monitor and supervise harvesting, particularly in Chiefdoms that have positive NDFs.

vi. It is strongly advised that no forms of commercial harvesting, farming and deliberate burning be allowed in Chiefdoms that have negative NDF for the next 10 years for effective regeneration and to ensure that potential stock grow to maturity and attain commercial viability in the foreseeable future. Future NDF will determine whether the harvest stands/populations of the species are in abundance and stabilized enough to allow regulated offtake that is not detrimental to the survival of the species.

vii. Legislation should be reviewed and updated more frequently to keep up with changes in conservation and trade and to complement commitments made in global Conventions such as CITES and CBD. It is important for Sierra Leone to address the lack of legislative provisions for imported non-CITES-listed timber. This includes the need to allow Sierra Leone Customs and other law enforcement agencies to seize suspected illegal shipments for inspection and further action, and to verify legality throughout the supply chains.

viii. Develop regulations for implementation of the new Forest Law. Develop implementation regulations and measures that support the enforcement of traceability systems in the supply chain.

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APPENDICES TO THE REPORT

These are presented as a separate document containing the processed data collected from the field for each of the nine districts.