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

Twenty-seventh meeting of the Plants Committee
Geneva (Switzerland), 8 – 13 July 2024

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.

2. All 16 known range States of *Pterocarpus erinaceus* are affected by the expedited application of the Article XIII process for West African rosewood. The present document focuses only on the eight cases of *Pterocarpus erinaceus* currently in the Review of Significant Trade (RST) process (four of which are also undergoing recommendations under the expedited application of Article XIII), as follows:

***Pterocarpus erinaceus*/country combinations currently in the Review of Significant Trade** (*) countries also undergoing Article XIII recommendations	**Trade suspension recommendation under the Article XIII process**
1) Benin	N/A
2) Burkina Faso	N/A
3) Gambia (the)*	The trade suspension shall remain in place until the conditions of paragraph 10 of Notification to the Parties No. 2022/045 are met. See also Notification to the Parties No. 2024/006.
4) Ghana	N/A
5) Guinea-Bissau*	The trade suspension shall remain in place until the conditions of paragraph 10 of Notification to the Parties No. 2022/045 are met. See also Notification to the Parties No. 2024/006.
6) Mali*	The trade suspension shall remain in place until the conditions of paragraph 10 of Notification to the Parties No 2022/045 are met. See also Notification to the Parties No. 2024/057 on the *partial* withdrawal of the recommendation to suspend trade. See also Notification to the Parties No. 2024/006.
7) Nigeria*	The trade suspension recommendation shall remain in place until the conditions of Notification to the Parties No. 2018/084 are met. See also Notification to the Parties No. 2024/006.
8) Sierra Leone	N/A

3. At the 26th meeting of the Plants Committee (PC26; Geneva, June 2023), the Secretariat introduced document PC26 Doc. 16.4 providing background and updates on the exceptional selection of *Pterocarpus erinaceus* in the RST process. At its 77th meeting, the Standing Committee considered document SC77

Doc. 33.2.3 (Rev. 1), which provided a complete overview of progress in the Article XIII and RST processes for all range States.

4. On 8 January 2024, the Secretariat published Notification to the Parties No. 2024/006 recapitulating the Article XIII and RST recommendations relevant to *Pterocarpus erinaceus* and reminding Parties of the current recommendation to suspend trade in the species with certain range States (i.e. Cameroon, the Central African Republic, Chad, the Gambia, Guinea-Bissau, Mali, Nigeria and Togo).

5. The outcomes of the present meeting will serve as a basis for the 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) on *Review of Significant Trade in specimens of Appendix-II species*. Following these intersessional consultations, the Secretariat will report to the Standing Committee at its 78th meeting (SC78; Geneva, February 2025) on the evaluation of the implementation of RST recommendations, in accordance with paragraph 1 l) of Resolution Conf. 12.8 (Rev. CoP18).

6. The document is structured as follows:

   a) Section 1 and Annex 1 in the present document provide updates on the implementation of RST recommendations by each selected range State. This includes an overview of the ongoing RST recommendations for the eight *Pterocarpus erinaceus* cases, the outcomes of SC77 for each of them, and a summary update on each situation since the publication of Notification to the Parties No. 2024/006 to the present time of writing, including any responses or progress received from the selected range States.

   b) Section 2 in the present document provides updates on the organization of the regional workshop on non-detriment findings (NDF) and legal acquisition findings (LAF) for *Pterocarpus erinaceus* range States, as requested by the Standing Committee at SC77.

Section 1: Updates on the implementation of RST recommendations by each selected range State[1]

7. As indicated above, for each of the eight *Pterocarpus erinaceus*/country combinations in the RST process, the Secretariat has summarized all relevant information in Annex 1 to the present document.

8. Some of the cases include substantial updates and additional information, available as additional annexes to the present document. To facilitate consideration of the summary in Annex 1 and the additional annexes referred to throughout, the following table provides an index of references:

***Pterocarpus erinaceus*/range State** (*) countries also undergoing Article XIII recommendations	**Complementary information to the summary of Annex 1**
1) Benin	- N/A
2) Burkina Faso	- N/A
3) Gambia (the)*	- Annex 2: Gambia's terms of reference for an NDF on *Pterocarpus erinaceus*.
4) Ghana	- Annex 3: Ghana's NDF on *Pterocarpus erinaceus* (i.e., information document SC77 Inf. 6). - Annex 4: Response of the Plants Committee's North American and European representatives to the intersessional consultations on Ghana and Sierra Leone's NDF.
5) Guinea-Bissau*	- Annex 5: Guinea-Bissau's outline of an NDF study for *Pterocarpus erinaceus*
6) Mali*	- N/A. See Notification to the Parties No. 2024/057
7) Nigeria*	- N/A
8) Sierra Leone	- Annex 6: Sierra Leone's updated NDF on *Pterocarpus erinaceus* - Annex 4: Response of the Plants Committee's North American and European representatives to the intersessional consultations on Ghana and Sierra Leone's NDF.

[1] ***(*)** countries also undergoing Article XIII recommendations*

9. In considering the summary in Annex 1, the Secretariat encourages the Plants Committee to pay particular attention to the *Pterocarpus erinaceus* cases for Ghana and Sierra Leone, as these relate to the intersessional decision-making process by the Plants Committee between SC77 and PC27, as requested by the Standing Committee at SC77.

Section 2: Updates on the organization of the regional workshop on NDFs and LAFs for *Pterocarpus erinaceus* range States

10. At SC77, the Standing Committee requested the Secretariat to organize a regional workshop on NDFs and LAFs for *Pterocarpus erinaceus* range States, thus adopting an integrated range-State approach in addressing NDFs and LAFs recommendations under the expedited Article XIII procedure and the RST process.

11. The Committee also requested the Secretariat to take into consideration the discussions at SC77 and to liaise with the Chairs of the Standing Committee and the Plants Committee on the preparations and the programme for the workshop.

12. On 3 May 2024, the Secretariat published Notification to the Parties No. 2024/059, announcing the regional workshop for range States of African rosewood (*Pterocarpus erinaceus*). The workshop will be held in person from 2 to 6 September 2024 in Douala (Cameroon). Information on the venue, substance and logistical matters, including financial assistance, is detailed in the Notification. The Secretariat is grateful to Cameroon for hosting the workshop and to the European Union for the funding provided in support of the workshop.

13. The Secretariat is in the process of developing the programme of the workshop and will provide further details on the substance of the preparations at the present meeting. In addition to the discussions at SC77, the Secretariat is also considering suggestions thus far shared by the Plants Committee representatives and other experts.

14. The Secretariat notes that progress achieved in the implementation of other Decisions will provide useful information for the workshop discussions on matters relevant to the development of NDFs and the implementation of outstanding RST recommendations for certain range States. Particularly, the Secretariat draws the attention of the Plants Committee to the progress in the implementation of Decision 19.243 and the "Report on the conservation and trade of CITES-listed rosewood tree species [Leguminosae (Fabaceae)]" available in document PC27 Doc. 27 and Decision 19.132 on *Non-detriment findings* and the new guidance on NDFs for tree species in document PC27 Doc. 16 / AC33 Doc. 16.

Recommendations

15. The Plants Committee is invited to:

    a) consider the present document and the progress made by *Pterocarpus erinaceus* range States in the implementation of relevant RST recommendations contained in Section 1 and Annex 1 to the present document;

    b) support the Secretariat in monitoring and facilitating the implementation of the RST recommendations for the eight *Pterocarpus erinaceus*/county combinations covered in the present document, by providing specific inputs on the progress achieved thus far;

    c) note the update on the organization of a regional workshop on NDFs and LAFs for *Pterocarpus erinaceus* range States contained in Section 2 to the present document; 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 SC78, in accordance with paragraph 1 k) of Resolution Conf. 12.8 (Rev. CoP18).

UPDATES ON *PTEROCARPUS ERINACEUS*/COUNTRY COMBINATIONS
IN PREPARATION FOR THE SECRETARIAT'S REPORTING TO THE STANDING COMMITTEE AT SC78

A. *Pterocarpus erinaceus*/country combination (*) countries also undergoing Article XIII recommendations	**B. Recommendation of the PC and SC**	**C. Update of implementation of recommendations (including range State responses) since SC77 and/or the publication of** Notification to the Parties No. 2024/006 (8 January 2024)
1) Benin	<u>Short term recommendations</u> 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. <u>Long term recommendations</u> 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:	Through Notification to the Parties No. 2024/006 and a letter dated 7 February 2024, the Secretariat communicated to Benin the recommendations of the Standing Committee at SC77 for this case. At the time of writing, the Secretariat is seeking confirmation from Benin on the maintenance of the zero-export quota for *Pterocarpus erinaceus* for 2024 and 2025 [see recommendations a) and f) of column B]. The Secretariat will provide any updates on the matter of the zero-export quota through an oral update at PC27. To the knowledge of the Secretariat, there are no further updates to report on the remaining ongoing recommendations.

A. *Pterocarpus erinaceus*/country combination (*) countries also undergoing Article XIII recommendations	B. Recommendation of the PC and SC	C. Update of implementation of recommendations (including range State responses) since SC77 and/or the publication of Notification to the Parties No. 2024/006 (8 January 2024)
	- 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.	

A. *Pterocarpus erinaceus*/country combination (*) countries also undergoing Article XIII recommendations	B. Recommendation of the PC and SC	C. Update of implementation of recommendations (including range State responses) since SC77 and/or the publication of Notification to the Parties No. 2024/006 (8 January 2024)
	Outcome of PC26 e) The Plants Committee acknowledged the progress made by Benin in implementing the short-term recommendation (paragraph a) and recommended that the remaining recommendations be addressed as a case study at the NDF workshop. **Outcome of SC77** f) Provided that this Party maintains its voluntary zero export quota, the Standing Committee: i) acknowledged the progress made by Benin in implementing the RST short-term recommendation (paragraph a); ii) recommended that the remaining RST recommendations be addressed as a case study at the NDF workshop; and iii) recommended the retention of the short- and long-term RST recommendations b) through d).	
2) 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	Through Notification No. 2024/006 and a letter dated 7 February 2024, the Secretariat communicated to Burkina Faso the recommendations of the Standing Committee at SC77 for this case. At the time of writing, the Secretariat is seeking confirmation from Burkina Faso on the maintenance of the zero-export quota for *Pterocarpus erinaceus* for 2024 and 2025 [see recommendations a) and f) of column B]. The Secretariat will provide any updates on the matter of the zero-export quota through an oral update at PC27. To the knowledge of the Secretariat, there are no further updates to report on the remaining ongoing recommendations.

A. *Pterocarpus erinaceus*/country combination (*) countries also undergoing Article XIII recommendations	B. Recommendation of the PC and SC	C. Update of implementation of recommendations (including range State responses) since SC77 and/or the publication of Notification to the Parties No. 2024/006 (8 January 2024)
	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,	

A. *Pterocarpus erinaceus*/country combination (*) countries also undergoing Article XIII recommendations	B. Recommendation of the PC and SC	C. Update of implementation of recommendations (including range State responses) since SC77 and/or the publication of Notification to the Parties No. 2024/006 (8 January 2024)
	- 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. **Outcome of PC26** e) The Plants Committee acknowledged the progress made by Burkina Faso in implementing the short-term recommendation (paragraph a) and recommended the retention of the long-term recommendations. **Outcome of SC77** f) Provided that this Party maintains its voluntary zero export quota, the Standing Committee: i) acknowledged the progress made by Burkina Faso in implementing the RST short-term recommendation (paragraph a); and ii) recommended the retention of the short- and long-term RST recommendations b) through d).	
3) Gambia (the)*	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	Through Notification to the Parties No. 2024/006 and a letter dated 7 February 2024, the Secretariat communicated to the Gambia the recommendations of the Standing Committee at SC77 for this case. As a reminder, the Gambia is undergoing a trade suspension recommendation for *Pterocarpus erinaceus* under the Article XIII process. With regards to matters relevant to the legal acquisition findings

A. *Pterocarpus erinaceus*/country combination (*) countries also undergoing Article XIII recommendations	B. Recommendation of the PC and SC	C. Update of implementation of recommendations (including range State responses) since SC77 and/or the publication of Notification to the Parties No. 2024/006 (8 January 2024)
	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. <u>Long term recommendations</u> 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);	(LAF), the Gambia has included in its response a request to allocate a one-time export quota of 10,000 m3 of processed and semi processed logs, resulting from the accumulation of stranded logs over the last four to five years. The Secretariat is following up on this request in close consultation with the Chair of the Standing Committee. Updates on this will be reported at the 78th meeting of the Standing Committee (SC78). It is important to note that this request for a one-time export quota of 10,000 m3 covers multiple species – both listed and not listed under CITES – of which only an estimated 478 m^3 are *Pterocarpus erinaceus.* With regards to the elements of the Gambia's response strictly relating to the implementation of RST recommendations, the Gambia has also submitted terms of reference (ToR) for an NDF study on *Pterocarpus erinaceus* for consideration and feedback of the Plants Committee at the present meeting. These ToRs are available in Annex 2 to the present document.

A. *Pterocarpus erinaceus*/country combination (*) countries also undergoing Article XIII recommendations	B. Recommendation of the PC and SC	C. Update of implementation of recommendations (including range State responses) since SC77 and/or the publication of Notification to the Parties No. 2024/006 (8 January 2024)
	- 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. **Outcome of PC26** e) The Plants Committee noted that no progress has been made by the Gambia in the implementation of the recommendations contained in Annex 1 and recommended that the Secretariat reports to SC77 that the recommendations (short-term and long-term) have not been implemented. The Committee further noted that a recommendation to suspend trade is already in place under Article XIII. **Outcome of SC77** f) The Standing Committee: i) agreed to maintain the recommendation to suspend commercial trade in specimens of the species *Pterocarpus erinaceus* from the Gambia under	

A. *Pterocarpus erinaceus*/country combination (*) countries also undergoing Article XIII recommendations	B. Recommendation of the PC and SC	C. Update of implementation of recommendations (including range State responses) since SC77 and/or the publication of Notification to the Parties No. 2024/006 (8 January 2024)
	the expedited application of Article XIII until the conditions of paragraph 10 of Notification to the Parties No. 2022/045 are met; ii) noted that no progress has been made by the Gambia in the implementation of the RST recommendations contained in the Annex to document SC77 Doc. 33.2.3 (Rev. 1); and iii) agreed that the short-term and long-term recommendations a) through d) have not been implemented.	
4) 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).	Through Notification No. 2024/006 and a letter dated 2 February 2024, the Secretariat communicated to Ghana the recommendations of the Standing Committee at SC77 for this case. Through a letter dated 28 February 2024, Ghana confirmed its commitment to maintaining a zero-export quota for 2024, as reflected in the CITES website. This is relevant to recommendations a) and f). As requested by the Standing Committee [sub-recommendation iii), f)], on 9 February 2024, the Secretariat initiated an intersessional consultation process with the Plants Committee through its Chair to review the NDF submitted by Ghana (see information document SC77 Inf. 6, and Annex 3 to the present document), and informed the Chair of the Standing Committee of the outcomes. As part of its preliminary views, the Plants Committee commended Ghana's progress in the implementation of the RST recommendations. The PC acknowledged that Ghana identified what it considers a conservative quota. However, the PC identified gaps in the NDF that require being addressed prior to making a final determination on the volumes proposed for export as an alternative to the zero-export quota currently in place. The proposed quota by Ghana for *Pterocarpus erinaceus*, informed by its NDF in SC77 Inf. 6, is of 23,000 m^3 [presumably wood from standing

A. *Pterocarpus erinaceus*/country combination (*) countries also undergoing Article XIII recommendations	B. Recommendation of the PC and SC	C. Update of implementation of recommendations (including range State responses) since SC77 and/or the publication of Notification to the Parties No. 2024/006 (8 January 2024)
	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.	trees], and an additional 40,000 m3 [presumably wood] for off-reserve underwater (Volka Lake) operations. The PC representatives from European and the North American regions identified clarification needs on the criteria that informed the proposed quota by Ghana, as contained in Annexes 4 and 5. On 24 May 2024, the Plants Committee agreed on the following steps, to reach a definitive recommendation in this case at PC27: 1) The Secretariat to convey the requested clarifications to Ghana (by attaching the responses *as received* from the European and NAR representatives) and encourage a response ahead of PC27, allowing sufficient time for updates to be presented by the Secretariat either via an Addendum or an oral report under agenda item PC27 Doc. 15.3 (present document); 2) At the request of the PC Chair, the Secretariat to liaise with representatives of Africa to ensure their views on both NDFs are consolidated and ready to present ahead of PC27. 3) Final clarifications to be considered at PC27, and if pertinent, discussed in the framework of an in-session working group, provided Ghana will be registered to participate. 4) Aim for a final recommendation from the Plants Committee on the proposed quota (including revisions thereof) associated to Ghana's NDF (Annex 4) to be concluded at PC27 (and on the record). 5) PC27 results on this matter to be reported to the Chair of the Standing Committee, as they are relevant to the next step, which would relate to the associated LAF for any PC-recommended or supported quotas for Ghana and Sierra Leone.

A. *Pterocarpus erinaceus*/country combination (*) countries also undergoing Article XIII recommendations	B. Recommendation of the PC and SC	C. Update of implementation of recommendations (including range State responses) since SC77 and/or the publication of Notification to the Parties No. 2024/006 (8 January 2024)
	Outcome of PC26 e) The Plants Committee acknowledged the progress made by Ghana in implementing the short-term recommendation (paragraph a) and recommended the retention of the long-term recommendations. **Outcome of SC77** f) Provided that this Party maintains its voluntary zero export quota, the Standing Committee: i) acknowledged the progress made by Ghana in implementing the short-term RST recommendation (paragraph a); ii) recommended the retention of the short- and long-term RST recommendations b) through d); and iii) requested the Secretariat to initiate an intersessional consultation process with the Plants Committee through its Chair to review the NDF submitted by Ghana, and inform the Chair of the Standing Committee about the outcomes.	This would mean that the intersessional consultation process would carry over and close at the present meeting, under the discussions of the present document (PC27 Doc. 15.3). At the time of writing, the Secretariat is coordinating with Ghana the submission of the requested clarifications and will provide an update at the present meeting on any progress achieved.
5) Guinea-Bissau*	Short term recommendations Within 30 days: a) Establish a zero export quota for all trade in *Pterocarpus erinaceus* and communicate the quota to the Secretariat for publication on the national export quota section of the CITES website. This quota shall remain in place and be renewed annually until such time as applicable recommendations have been implemented. b) Prior to revising the zero export quota, communicate the basis for the non-detriment finding taking into account the concepts and non-binding guiding principles in Resolution Conf. 16.7 (Rev. CoP17) and in line with paragraph c), to the Secretariat and members of the Plants Committee through its Chair, for	Through Notification to the Parties No. 2024/006 and a letter dated 15 February 2024, the Secretariat communicated to Guinea-Bissau the recommendations of the Standing Committee at SC77 for this case. In March 2024, Guinea-Bissau submitted its response as available in Annex 5 to the present document. This response is relevant to both the Article XIII and RST processes and includes a workplan towards the implementation of relevant LAF and NDF-related recommendations, including a draft budget of around USD 259,000.

A. *Pterocarpus erinaceus*/country combination (*) countries also undergoing Article XIII recommendations	B. Recommendation of the PC and SC	C. Update of implementation of recommendations (including range State responses) since SC77 and/or the publication of Notification to the Parties No. 2024/006 (8 January 2024)
	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,	In the final section of its response, Guinea-Bissau has included an outline of an NDF study, for consideration and feedback of the Plants Committee at the present meeting.

A. *Pterocarpus erinaceus*/country combination (*) countries also undergoing Article XIII recommendations	B. Recommendation of the PC and SC	C. Update of implementation of recommendations (including range State responses) since SC77 and/or the publication of Notification to the Parties No. 2024/006 (8 January 2024)
	- 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. **Outcome of PC26** e) The Plants Committee noted that no progress has been made by Guinea Bissau in the implementation of the RST recommendations and recommended that the Secretariat reports to SC77 that the recommendations (short-term and long-term) have not been implemented. The Committee further noted that a recommendation to suspend trade is already in place under Article XIII. **Outcome of SC77** f) The Standing Committee: i) agreed to maintain the recommendation to suspend commercial trade in specimens of the species *Pterocarpus erinaceus* from Guinea-Bissau under the expedited application of Article XIII until the conditions of paragraph 10 of Notification to the Parties No. 2022/045 are met; ii) noted that no progress has been made by Guinea-Bissau in the implementation of the RST recommendations contained in the Annex to document SC77 Doc. 33.2.3 (Rev. 1); and iii) agreed that the short-term and long-term recommendations a) through d) have not been implemented.	

A. *Pterocarpus erinaceus*/country combination (*) countries also undergoing Article XIII recommendations	B. Recommendation of the PC and SC	C. Update of implementation of recommendations (including range State responses) since SC77 and/or the publication of Notification to the Parties No. 2024/006 (8 January 2024)
6) Mali*	Short term recommendations Within 30 days: a) Establish a zero export quota for all trade in *Pterocarpus erinaceus* and communicate the quota to the Secretariat for publication on the national export quota section of the CITES website. This quota shall remain in place and be renewed annually until such time as applicable recommendations have been implemented. b) Prior to revising the zero export quota, communicate the basis for the non-detriment finding taking into account the concepts and non-binding guiding principles in Resolution Conf. 16.7 (Rev. CoP17) and in line with paragraph c), to the Secretariat and members of the Plants Committee through its Chair, for their agreement. No exports should occur until the quota has been published on the Secretariat's website. Long term recommendations Within two years c) With the support of the Secretariat, in consultation with the Plants Committee, and taking account of regional and other expertise and experience, establish a science-based non-detriment finding taking into account the concepts and non-binding guiding principles in Resolution Conf. 16.7 (Rev. CoP17). The non-detriment finding could, *inter alia* include the following elements: - science-based studies on the status of the species (e.g. population size/ stem density, trends, DBH distribution, annual increment rates), for example as part of a national forestry assessment; - national/and or local management plans (that include harvest management considerations) with clear monitoring requirements;	Through Notification to the Parties No. 2024/006 and a letter dated 15 February 2024, the Secretariat communicated to Mali the recommendations of the Standing Committee at SC77 for this case. With regards to recommendations e) and f), on 29 April 2024, the Secretariat published Notification to the Parties No. 2024/057 on the partial withdrawal of recommendation to suspend trade in the context of the expedited application of Article XIII for *Pterocarpus erinaceus* . As stated in this Notification, out of the export quota of 55,384.8 m3 accepted by the Plants Committee at PC26, Mali presented a legal acquisition finding for a volume of 40,000.00 m3 of *Pterocarpus erinaceus*. Following the review of this legal acquisition finding, the Secretariat and the Chair of the Standing Committee are satisfied that Mali presented evidence of legal acquisition findings for a total volume of 39,950.4 m3. Therefore, the recommendation to suspend trade for Mali is partially withdrawn with immediate effect with regard to this volume of 39,950.4 m3 of *Pterocarpus erinaceus*. The recommendation to suspend commercial trade in specimens of the species *Pterocarpus erinaceus* from Mali under the expedited application of Article XIII remains in effect for all other specimens of *Pterocarpus erinaceus* until the conditions of paragraph 10 b) of Notification to the Parties No. 2022/045 are met. Consequently, additional evidence of legal acquisition findings will be required for remaining volumes of *Pterocarpus erinaceus*.

A. *Pterocarpus erinaceus*/country combination (*) countries also undergoing Article XIII recommendations	B. Recommendation of the PC and SC	C. Update of implementation of recommendations (including range State responses) since SC77 and/or the publication of Notification to the Parties No. 2024/006 (8 January 2024)
	- 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. **Outcome of PC26** e) The Plants Committee acknowledged the significant progress made by Mali in implementing the long-term recommendations and accepted that the NDF presented by Mali supports the quota requested. The Committee further noted that a recommendation to suspend trade is already in place under Article XIII and that trade can only resume once this suspension is lifted. The Committee further recommended that the Secretariat publish any potential future quota proposed by Mali in round wood equivalent.	

A. *Pterocarpus erinaceus*/country combination (*) countries also undergoing Article XIII recommendations	B. Recommendation of the PC and SC	C. Update of implementation of recommendations (including range State responses) since SC77 and/or the publication of Notification to the Parties No. 2024/006 (8 January 2024)
	Outcome of SC77 f) The Standing Committee: i) acknowledged the significant progress made by Mali in implementing recommendations under the expedited application of Article XIII and long-term RST recommendations; ii) noted that the Plants Committee accepted that the NDF presented by Mali supports the quota of 55,384.8 m^3 requested by Mali; iii) recommended that the Secretariat publish any potential future quota proposed by Mali in round wood equivalent; iv) noted the incremental progress made by Mali in the preparation of the legal acquisition findings for *Pterocarpus erinaceus*; and v) agreed to maintain the recommendation to suspend commercial trade in specimens of the species *Pterocarpus erinaceus* from Mali under the expedited application of Article XIII until Mali finishes providing the 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) as required in paragraph 10 (b) of Notification to the Parties No. 2022/045.	
7) Nigeria*	Short term recommendations Within 30 days: a) Establish a zero export quota for all trade in *Pterocarpus erinaceus* and communicate the quota to the Secretariat for publication on the national export quota section of the CITES website. This quota shall remain in place and be renewed annually until such time as applicable recommendations have been implemented.	Through Notification No. 2024/006 and a letter dated 7 February 2024, the Secretariat communicated to Nigeria the recommendations of the Standing Committee at SC77 for this case. In the framework of the Compliance Assistance Programme (CAP), as reported in document SC77 Doc. 33.2.3 (Rev. 1), Nigeria continues to make progress in undertaking an NDF study to meet relevant Article XIII and RST recommendations. The CAP Agreement between Nigeria and

A. *Pterocarpus erinaceus*/country combination (*) countries also undergoing Article XIII recommendations	B. Recommendation of the PC and SC	C. Update of implementation of recommendations (including range State responses) since SC77 and/or the publication of Notification to the Parties No. 2024/006 (8 January 2024)
	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. <u>Long term recommendations</u> 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	the Secretariat was signed on 13 September 2023 and its implementation is ongoing. Progress on the outcomes related to the development of non-detriment findings for *Pterocarpus erinaceus*, particularly relevant to the implementation of RST-related recommendations, as well as progress on other recommendations are expected to be available in time for the Secretariat's report to the Standing Committee at SC78.

A. *Pterocarpus erinaceus*/country combination (*) countries also undergoing Article XIII recommendations	B. Recommendation of the PC and SC	C. Update of implementation of recommendations (including range State responses) since SC77 and/or the publication of Notification to the Parties No. 2024/006 (8 January 2024)
	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. **Outcome of PC26** e) The Plants Committee acknowledged the progress made by Nigeria in implementing the short-term recommendation (paragraph a) and recommended the retention of the long-term recommendations. The Committee further noted that a recommendation to suspend trade is already in place under Article XIII. **Outcome of SC77** f) The Standing Committee: i) agreed to maintain the recommendation to suspend commercial trade in specimens of the species *Pterocarpus erinaceus* from Nigeria under Article XIII until the following conditions are met:	

A. *Pterocarpus erinaceus*/country combination (*) countries also undergoing Article XIII recommendations	B. Recommendation of the PC and SC	C. Update of implementation of recommendations (including range State responses) since SC77 and/or the publication of Notification to the Parties No. 2024/006 (8 January 2024)
	A. The Party concerned makes a scientifically based non-detriment finding for trade in the species to the satisfaction of the Secretariat and the Chair of the Plants Committee, having regard to Resolution Conf. 16.7 (Rev. CoP17) on *Non-detriment findings* 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. CoP19) on *Legal acquisition findings*. ii) acknowledged the progress made by Nigeria in implementing the short-term RST recommendation (paragraph a); and iii) recommended the retention of the short- and long-term recommendations a) through d).	
8) Sierra Leone	Short term recommendations Within 30 days: a) Establish a zero export quota for all trade in *Pterocarpus erinaceus* and communicate the quota to the Secretariat for publication on the national export quota section of the CITES website. This quota shall remain in place and be renewed annually until such time as applicable recommendations have been implemented. b) Prior to revising the zero export quota, communicate the basis for the non-detriment finding taking into account the concepts and non-binding guiding principles in Resolution Conf. 16.7 (Rev. CoP17) and in line with paragraph c), to the Secretariat and members of the Plants Committee through its Chair, for their agreement. No exports should occur until the quota has been published on the Secretariat's website.	Through Notification No. 2024/006 and a letter dated 2 February 2024, the Secretariat communicated to Sierra Leone the recommendations of the Standing Committee at SC77 for this case. As requested by the Standing Committee [sub-recommendation iii), f)], on 9 February 2024, the Secretariat initiated an intersessional consultation process with the Plants Committee through its Chair to review the NDF submitted by Sierra Leone (see Annex 6 to the present document) and informed the Chair of the Standing Committee about the outcomes. As part of its preliminary views, the Plants Committee commended Sierra Leone's progress in the implementation of the RST recommendations. The PC acknowledged that Sierra Leone identified what it considers a conservative quota. However, the PC identified gaps in the NDF that

A. *Pterocarpus erinaceus*/country combination (*) countries also undergoing Article XIII recommendations	B. Recommendation of the PC and SC	C. Update of implementation of recommendations (including range State responses) since SC77 and/or the publication of Notification to the Parties No. 2024/006 (8 January 2024)
	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	require being addressed prior to making a final determination on the volumes of *Pterocarpus erinaceus* proposed for export. As a precautionary measure, Sierra Leone proposed a harvestable quota of *Pterocarpus erinaceus* of 76,324.5 m^3 [of presumably wood specimens] which is half of the volume that was determined from the inputs used. The PC representatives from the European and North American regions indicated that some clarifications were needed on the criteria that informed the proposed quota by Sierra Leone, as contained in Annex 4. On 24 May 2024, the Plants Committee agreed on the following steps, to reach a definitive recommendation in this case at PC27: 1) The Secretariat to convey the requested clarifications to Sierra Leone (by attaching the responses *as received* from the European and NAR representatives) and encourage a response ahead of PC27, allowing sufficient time for updates to be presented by the Secretariat either via an Addendum or an oral report under agenda item PC27 Doc. 15.3 (present document); 2) At the request of the PC Chair, the Secretariat to liaise with representatives of Africa to ensure their views on both NDFs are consolidated and ready to present ahead of PC27. 3) Final clarifications to be considered at PC27 and, if pertinent, discussed in an in-session working group, provided Sierra Leone will be registered to participate. 4) Aim for a final recommendation from the Plants Committee on the proposed quota (including revisions thereof) associated to Sierra Leone's updated NDF (Annex 6) to be concluded at PC27 (and on the record).

A. *Pterocarpus erinaceus*/country combination (*) countries also undergoing Article XIII recommendations	B. Recommendation of the PC and SC	C. Update of implementation of recommendations (including range State responses) since SC77 and/or the publication of Notification to the Parties No. 2024/006 (8 January 2024)
	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. **Outcome of PC26** e) The Plants Committee acknowledged the progress made by Sierra Leone in implementing the short-term recommendation (paragraph a) and the significant progress made in delivering the long-term recommendations. **Outcome of SC77** f) Provided that this Party maintains its voluntary zero export quota, the Committee: i) acknowledged the progress made by Sierra Leone in implementing the short-term RST recommendation (paragraph a); ii) recommended the retention of the short- and long-term RST recommendations b) through d); iii) further acknowledged the significant progress made in delivering the long-term recommendations; and iv) requested the Secretariat to initiate an intersessional consultation process with the Plants Committee through its Chair to review the NDF submitted by Sierra Leone, and inform the Chair of the Standing Committee about the outcomes.	5) PC27 results on this matter to be reported to the Chair of the Standing Committee, as they are relevant to the next step, which would relate to the associated LAF for any PC-recommended or supported quotas for Ghana and Sierra Leone. This would mean that the intersessional consultation process would carry over and close at the present meeting, under the discussions of the present document (PC27 Doc. 15.3). At the time of writing, the Secretariat is coordinating with Sierra Leone the submission of the requested clarifications and will provide an update at the present meeting on any progress achieved.

DRAFT TERMS OF REFERENCE FOR A NON-DETRIMENTAL FINDING FOR*SPECIES* (AFRICAN ROSEWOOD) OR ANY OTHER SPECIES IN THE GAMBIA

Introduction and Context

CITES is the global instrument for regulating the international trade in plants and animals to ensure such trade does not threaten their survival. Countries that are Parties to CITES apply a common set of international rules to allow the legal international trade of CITES-listed species. Countries cannot trade in the 35,000 CITES-listed species with other CITES Parties unless they trade consistently within CITES requirements. One of the key requirements for trade in species listed in Appendix 2 of CITES is the Non-Detrimental Finding for the species concerned.

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."

The Rosewood trade is now the most lucrative illegal operation in wild fauna and flora according to the United Nations Office for Drug and Crime (UNODC). Between 2005 and 2014, the global cumulative value of seized illegal Rosewood was higher than seized rhino horns, parrots, marine turtles and pangolins combined.West Africa in general and the Gambia in particular are hard hit by the illegal trade in rosewood. According to a BBC report, China has imported more than 300,000 metric tons of West African rosewood from The Gambia since 2017.In June 2020, the nonprofit organization Environmental Investigation Agency (EIA) released the results of its three-year investigation into the Senegal-Gambia-China rosewood trafficking. Amongst its findings, the report states that the Gambia reported $471 million less in exports of rosewood than its trading partners declared as imports between 2010 and 2018. In other words, the export figures declared by the Gambia do not add up with the import figures declared by China. What is clear however, is that this trade has been in existence since 2005 and despite the various trade suspensions implemented within the Country in 2017, the resource is steadily being depleted. There is an absence of data on which to base analysis of sustainability of this trade as the national stocks of Pterocarpus erinacaeus are unknown. Consequently, it is virtually impossible to establish sustainable quotas for harvest and trade in Species from the Gambia.

In order to define these quotas and comply with existing CITES resolutions, it is expedient to conduct Non-Detrimental Findings for rosewood species in the Gambia. The present Terms of Reference will guide the design and implementation of a NDF assessment of trade in rosewood from the Gambia.

Goal, Objectives and Approach

The main goal of this Terms of Reference (ToR) is to guide the consultant who will conduct a Non-Detrimental Finding on the long term ecological and economic sustainability of the trade in rosewood from the Gambia, and overall compliance with its CITES commitments. As such, two main objectives are identified, which include:

1. Providing a tool for rapid and standardized assessments of the impact of extraction for commercial purposes, on Species populations in the Gambia; and
2. Reducing subjectivity in decision-making with regards to allowable extraction rates that will ensure the survival of the populations of origin.

The assessment team is expected to implement a methodology that is based on the principle of risk assessment. In keeping with the requirements for an NDF as defined by CITES, they will analyze eight (8) different parameters which include species biology and life-history characteristics; species distribution / range; population structure, status and trends; threats; historical and current species-specific levels and patterns of harvest and mortality(types of harvest); adaptive management strategies; monitoring and conservation status. Specifically, the following must be considered in conducting NDF on the sustainability of international trade in Species (Species):

- 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 consultant 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;
- he/she 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;

Duration of assignment

The entire assignment should be conducted between **18th April and the 15th May 2024.**

Personnel

Except with prior written approval of the Client, the Contractor may not assign or transfer the services or any part of the service to another party. Unless otherwise agreed, the Client shall approve of any change in the personnel assigned to the Services.

Tasks and deliverables

The contractor is expected to design and implement an assessment and thereafter provide the client with hard and soft copy versions of the final NDF report

Ownership of Work

Reports and all relevant data complied or prepared in the course of the Services shall be the property of the Client unless otherwise decided by the Client. The Contractor may retain a copy thereof, provided, however, that such material shall not be used by the Contractor for purpose unrelated to the Contract without prior written approval of the Client.

Qualification

The Contractor (s) is expected to have the following qualifications:
MSc or equivalent in Forest ecology, Forestry Policies, or other NRM policy related subjects;
Track record in design and supervision of research;

- Ability to work and write in English is preferred;
- Prior experience in wildlife conservation and CITES related issues would be appreciated;
- Female candidates will be preferred in cases of equal capacity amongst several candidates.

Propose table of Content for NDF & LAF

Propose table of content by the last meeting of the Authorities in January 2024 that should be considered as indicative and thus subject to review as NDF & LAF work commences. Though emphasize is given to Pterocarpus erinaceaus but the table of content should be the same for all other species.

Table of Content

Original language: English SC77 Inf. 6

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

Seventy-seventh meeting of the Standing Committee
Geneva (Switzerland), 6–10 November 2023

REPORT ON NON-DETRIMENTAL FINDINGS OF PTEROCARPUS ERINACEUS IN GHANA

1. This document has been submitted by Ghana in relation to agenda item 33.2.*

* *The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CITES Secretariat (or the United Nations Environment Programme) concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.*

FORESTRY COMMISSION
(WILDLIFE DIVISION)
P. O. BOX MB 239 ACCRA, GHANA
TEL: (233- 21) 401210/ 401227/ 401216/ 401231/ 401249
FAX: (233- 21) 401179
E-MAIL: info_wd@hq.fcghana.com

11th September, 2023

THE SECRETARY GENERAL
CITES
GENEVA
SWITZERLAND

Dear Sir/Madam,

SUBMISSION OF NON-DETRIMENTAL FINDINGS FOR PTEROCARPUS ERINACEUS BY GHANA

In March 2022, the CITES Secretariat issued Notification 2022/021, inviting Range States of Pterocarpus erinaceus to either: a) Submit a Non-Detriment Finding (NDF) and Legal Acquisition Finding (LAF) to the Secretariat, or b) Publish a voluntary Zero Export Quota for commercial trade in specimens of the species.

Despite strong and consistent population monitoring programs and other conservation initiatives to protect the species within its range, including a rapid study developed and submitted as an initial NDF for the species in September 2021, Ghana adopted a precautionary approach to species conservation by requesting the Secretariat to publish a Zero Export Quota for Commercial Trade in the Species until a detailed Non-Detrimental Findings (NDF) and Legal Acquisition Finding Report are provided for the species.

Pursuant to this, Ghana has undertaken a comprehensive study and developed an NDF for the species.

We hereby submit Ghana's NDF for consideration by the Plants Committee and approval by the Standing Committee. Ghana is also committed to adopting all the recommendations enumerated in the NDF report, including the establishment of a national annual quota of 23,000 m^3 and 40,000 m^3 for off-reserve and underwater (Volta Lake) operations, respectively, when accepted.

Please acknowledge receipt.

Yours faithfully,

BERNARD ASAMOAH-BOATENG
(EXECUTIVE DIRECTOR)

cc: **The Chairperson, Plant Committee**

The Chief of Science

Forestry Commission

REPORT ON NON-DETRIMENTAL FINDINGS OF PTERICARPUS ERINACEUS IN GHANA

BY

RESOURCE MANAGEMENT SUPPORT CENTRE

&

FACULTY OF RENEWABLE NATURAL RESOURCES

KWAME NKRUMAH UNIVERSITY OF SCIENCE TECHNOLOGY

RMSC

AUGUST, 2023

Contributors
Kofi Affum-Baffoe
Samuel Ayesu (PhD)
Jones Agyei Kumi (PhD)
Prof. Samuel Kingsley Oppong (PhD)
James Oppong

ACKNOWLEDGEMENT

The successful completion of this report would not have been possible without the support of individuals and institutions. We are most grateful to the Chief Executive of the Forestry Commission and the Executive Director of the Wildlife Division (CITES Management Authority) for their immense support for the study. We are also grateful to Mr Richard Kuutah Ninnoni, Mr Yaw Atuahene, Mr Mohammed Yakubu. Dr Lawrence Akpalu, Mr George Rockson Odame and Mr Emmanuel Sarpong for providing critical comments and guidance in the preparation of the report. Special appreciation to the field teams who undertook field data collection exercise.

TABLE OF CONTENT

Lists of Figures

List of Tables

ACRONYMS

CITES	Convention on International Trade in Endangered Species
CSR	Clark Sustainable Resources
EIA	Environmental Impact Assessment
FC	Forestry Commission
FSD	Forest Services Division
GNA	Ghana News Agency
GPS	Global Positioning System
HFZ	High Forest Zone
IWT	Ghana's Inland Water Transport
LV	Lake Volta
MTV	Mean Tree Volume
NASA	National Aeronautics and Space Administration
NDF	Non Detrimental Findings
RMSC	Resource Management Support Centre
TIDD	Timber Industry Development Division
USAID	United States Agency for International development
VRA	Volta River Authority
WABiCC	West Africa Biodiversity and Climate Change

EXECUTIVE SUMMARY

Background

Pterocarpus erinaceus commonly referred to as African Rosewood occurs mainly in the forest savannah transitional zone and parts of the northern savannah woodland of Ghana. The species is currently listed in the Appendix II of CITES. The listing of the species in Appendix II means that (among other issues), any further exploitation, transportation and trade in the species has to meet permitted quotas and must be based on recommendations of valid non-detrimental findings (NDF). In 2017 and 2021, inventories of the species were conducted in areas where the species are commonly found to determine the stocking levels. As an interim measure to ensure sustainable harvesting, felling quotas were recommended for all the political districts where the species were found using the static volumes (m^3) estimated from the survey. Harvesting however, went on without adequate regulation of felling quotas. In recent times, estimates from inventories were characterized by large uncertainties making them largely unreliable from sustainable resource management perspective. In an effort to pursue sustainable management of *Pterocarpus erinaceus*, inventory of the species was carried out in August 2022 with the view of updating the results of the 2021 static inventory to determine the current status of the species. The purpose of the assessment was to conduct a Non-Detrimental Findings (NDF) study on *Ptericarpus erinaceus* to determine whether trade levels were sustainable.

Methodology

The approach used was desk study involving review of existing reports/maps and field measurements using rectangular plots of 40m x 1000m. The plots were randomly laid in rosewood endemic areas in the different political districts. A felling quota system based on a number of assumptions, were used to determine number of stems and volume of trees that could be considered for felling annually at the national and district levels. Given that there is virtually no information locally on the growth dynamics and mortality, as much as possible a precautionary approach was adopted to generate conservative estimates. To regulate harvesting of the species, annual felling quotas were recommended based on three scenarios: 50year, 40years and 30years. The 50-year was adopted for the implementation of annual felling quotas in off reserve in the endowed areas (terrestrial areas). A 16-year felling quota was recommended for the underwater stands in the Volta Lake based on a study conducted in 2007.

Key findings

The study shows that the stocking and stand volume for species in most endowed areas has reduced significantly between 2013 and 2022. The mean stem numbers and volume per km^2 estimates showed a decline. Total stem numbers above the felling limit (of all stems ≥ 20 cm dbh) were estimated to be 5,264,465.85 stems with equivalent standing volume of 2,900,996.00 m^3. Trends in natural regeneration show that the rate of decline reduced from 72% between 2017-2021 to 9% 2021-2022, indicating a positive effect of the implementation of the conservation measures. The felling quota per annum approach per Political District of the endemic zones of Ghana using three

different life spans (felling cycles) of 50, 40 and 30 years gave a volume of 23,207.97 m^3, 29,009.96 m^3 and 38,679.95 m^3 annual felling quota respectively.

Recommendations

The bans on rosewood harvesting, zero quota and other conservation measures have immensely contributed improving regeneration as well as the capacity of the species to adapt to various shocks including wildfires, over harvesting, etc. To further enhance the management of the species in both on and off reserve areas, the following suggestions are made;

a. A conservative national felling quota per annum using a 50-year cycle is proposed as a precautionary measure.

b. To ensure the sustainable exploitation of *Ptericarpus erinaceus* in off reserve areas (terrestrial), a quota system is proposed for adoption and implementation by the Forestry Commission as a means of regulating the harvesting of Rosewood.

c. An indicative national felling quota of **23,207.97 m^3** (terrestrial land outside forest reserves) is proposed. This proposed quota should not be exceeded.

d. For **underwater rosewood** in the Volta Lake, an indicative felling quota of **40,000m^3** per annum has been proposed for a period of 16years. This is consistent with the objectives of the Revised National Transport Policy (2020), the Volta Lake Strategic Plan (2010 – 2014) and the Draft Volta Lake Master Plan 2014.

e. Therefore, the proposed annual aggregate quota for off reserve areas (terrestrial) and under water rosewood harvesting in Ghana to be **63,207.97 m^3.** Barring any changes in policy and other unforeseen circumstances, the proposed harvesting quotas is expected to be implemented for 16years until the underwater stock is depleted. After which, the 23,207.97 m^3 will remain operational based on the fifty (50) year scenario.

f. Additional permanent sample plots should be established in the savannah environment in both on and off reserves to monitor the dynamics of the species and other species of economic importance.

g. Increase the population of *Pterocarpus erinaceus* in off reserve areas through upscale of existing plantation trials in the savanna and transition zone of Ghana where the species predominantly occurs

h. The national quota which is to be implemented by the Forest Services Division, should be monitored by RMSC and endorsed by the representative of CITES in Ghana.

i. The Forestry Commission gradually integrate harvesting of *Ptericarpus erinaceus* into existing wood tracking system for documentation and traceability

j. Increase awareness creation on wildfires in order to reduce the frequency of occurrence and severity in the savanna and transition zones

k. Promote the adoption of more efficient technologies and alternative species for charcoal production. Also, encourage the establishment of woodlots to meet the energy needs of local people

1.0 INTRODUCTION

1.1 Background

The term Rosewood is a name for a wide array of hardwoods native to the tropical areas of Southeast Asia, Africa, Central and South America which comprises of selected species of the genera Dalbergia ('true rosewood') and Pterocarpus (substitute rosewood) (Dumenu and Bandoh, 2016). *Pterocarpus erinaceus* is a deciduous legume tree of African savannas and dry forests famous for producing one of the finest woods in its native region. *Pterocarpus erinaceus* is one of the common species of rosewood exploited in Ghana. The species mainly occurs in the forest savannah transitional zone and parts of the northern savannah woodland ecological zone of Ghana. The species was formerly mainly used for charcoal production by the local people to generate income. It is however, now a threatened species as its demand as timber especially, has been on the increase in the last decade leading to massive exploitation and export in the form of billets to the Asian countries particularly China (Dumenu and Bandoh, 2016).

West Africa's Rosewoods, after their classification as Hongmu (Redwood) suffered overexploitation as exports rose dramatically to meet the demand for Chinese classical furniture, between 2010 and 2016, compared to rosewood exports before 2010 (USAID and WABiCC, 2021). The high unsustainable exploitation levels of the species in the last decade demand that mechanisms are put in place to regulate its exploitation. Led by Senegal, 10 West African countries, the European Union and Chad successfully lobbied for listing of the rosewood *Pterocarpus erinaceus* in Appendix II of CITES in 2017. This means (among other issues), any further exploitation, transportation and trade in the species has to meet permitted quotas and must be based on recommendations of valid non-detrimental findings (NDF) (USAID and WABiCC, 2021).

There is therefore the urgent need to control exploitation levels of the species and bring it to sustainable levels. The new approach, following the 2017 Rosewood inventory, was the adoption of district level felling quotas as a means of regulating harvesting levels. This is a similar approach to the off-reserve annual felling quotas which were developed for all forest districts within the Ghana High Forest Zone (GHFZ) after a national inventory had been conducted. This was an approach to regulate the off-reserve timber resources in 1996 (FC, 1996). The rationale was that felling quotas should be adopted to regulate harvesting levels in all rosewood endemic areas of Ghana until efforts are made to understand better the ecology and population dynamics (increment, mortality and recruitment rates) of the species.

1.2 Submerged tree resources under the Volta Lake

Water bodies have been an amazing mode of transport for carrying people and/or goods within and across regional, national and continental borders. A lot of countries still depend on inland water transport for the transportation of bulk and general cargo across lakes/rivers over long distances (Boadu *et al*., 2021). Similarly, Ghana's Inland Water Transport (IWT) system managed

by Volta Lake transport Company (VLTC) has been in operation for decades. Regardless of the long years of operation, one of the main challenges facing IWT is the removal of underwater stems and stumps of dead trees causing a lot of boat accidents on the lake.

Lake Volta (LV) dominates the territory of the West African state of Ghana. Formed by the construction of the Akosombo Dam over the River Volta between 1961 and 1965, it has an area of 8,482 sq km. The river has divisions of Black Volta, the White Volta, and the Red Volta. In the north-western part of Ghana, the Black Volta forms the frontiers between the Burkina Faso, Ivory Coast and Ghana. In the southern part of Ghana, the Volta River flows through Akwapim-Togoland highlands, and enters the Atlantic Ocean at the Gulf of Guinea at Ada. The reservoir named 'Lake Volta' has a stretch of water from Akosombo in the eastern region to the northern part of Ghana (NASA, 2018).

LV does not only serve as the main source of water to power Ghana's biggest hydroelectric dam; the Akosombo dam, but also provides the main medium through which goods and people are transported from one point to the other on Ghana's inland waters (NASA, 2018). It is Ghana's major navigable river which is sourced from Bobo Dioulasso highlands of Burkina Faso and covers an extensive area thereby making the lake the biggest man-made lake in the world with respect to surface area. It flows through major towns like Yeji, Dambai, Kpando, Kete Krachi, etc. that depend on the use of this water body for their livelihood and business activities.

The Revised National Transport Policy (2020), the Volta Lake Strategic Plan (2010 – 2014) and the Draft Volta Lake Master Plan 2014 recognizes that, one of the safety aspects that need to accompany the development of an integrated transport system on Volta Lake is the continuation of tree stump removal programme prioritizing the main navigational channels.

Approximately two million people live along the shores of the lake, with 80,000 people making a living directly from fishing. The lake contributes 85% of the country's aquaculture production and 16% of the wild fish catch. A total of 3,500km^2 of dense forest area were flooded during the dam's construction. The submerged trees remain standing, and hardwood timber is perfectly preserved. Protruding tree stumps limit the lake's navigability, repeatedly cause fatalities, and limit the scope for recreation and aquaculture (World Bank, 2015).

According to Fitzgerald (2008) and Thrower et al (2007), Ghana has submerged over 14 million cubic meters of rot resistant hardwoods such as Rosewood, Mahogany, Odum and Ebony trees (refer to Annex V for details on volume estimates for submerged rosewood) when they created the Volta Lake. Owing to the lack of oxygen under water, the trees typically do not deteriorate, keeping their outstanding, often old-growth, character and physical properties.

In February 2006, the Government of Ghana and the Volta River Authority (VRA) signed an agreement with Clark Sustainable Resources (CSR) Developments, a Canadian firm

(Ablordeppey, 2009). The said agreement granted a concession to CSR Developments to harvest trees from the submerged forests in the Volta Lake. This is to be done in two Phases, a Preparatory Phase and a Commercial Phase. It is estimated that the Lake is home to timber resources worth 2.8 billion dollars (Ghana News Agency, 2011).

1.3 Progress and challenges with compliance with CITES requirements in Ghana

A recent study conducted on rosewood in 2021 in the various West Africa countries including Ghana highlighted a number of challenges confronting most countries in meeting CITES requirements (USAID and WABiCC, 2021). In Ghana's case, the progress made and challenges being confronted are summarized below:

- A ban has been in place on harvest and export of rosewood since March 2019, only stocks of salvaged and confiscated rosewood auctioned by the government (Forestry Commission) can be exported.
- Government reiterates that key elements of CITES are being followed. A recent report (2020) on Ghana by **EIA** seems to indicate a net-downward trend in rosewood exports to China. This was as result of a ban on the exploitation of the species which led Ghana to take a zero quota and therefore no harvesting, transport and export of the species is permitted
- Independent observers, however, presented a mixed picture of permit issuances not backed by non-detrimental findings (NDFs), as recently as July2019, although at that point, rosewood exports were trending downward.
- Civil society observers believe that increased transparency in CITES compliance will be of benefit to the process, to weed out illegal exports that seem to continue even under enforcement of bans and absence of NDF studies.
- One proposal for the Ghana High Forest Zone by the Resource Management Support Center (RMSC) of the Forest Commission is to institute felling quotas to regulate harvesting levels in all rosewood endemic areas until NDF efforts can generate results of ecology and population dynamics (covering increment, mortality and recruitment rates) of the species.

1.4 Rationale for the study

In 2019, a ban was imposed by the Government of Ghana on the harvesting, transporting and export of Rosewood. The ban is a measure taken by the government to stop illegal harvesting, transporting, processing, trading and exporting of rosewood and control its exploitation. The ban remains in force and the Minister for Lands and Natural Resources has directed the Forestry Commission to cease the issuance of the Convention on international Trade in Endangered Species (CITES) permits for the export of rosewood from Ghana except stocks of salvage and confiscated rosewood from the field auctioned by the Forestry Commission with approval from the Minister of Lands and Natural Resources. The CITES Secretariat issued Notification 2022/021, of 28th

March 2022 inviting range States of Pterocarpus erinaceus to either: a.) Submit a Non-Detriment Finding (NDF) and Legal Acquisition Finding (LAF) to the Secretariat or request the Secretariat to publish a voluntary zero export quota for commercial trade in *Pterocarpus erinaceus*. Ghana, agreed to adopt a precautionary approach to the species conservation by requesting the Secretariat to publish a Voluntary Zero Export Quota for commercial trade in the species until a detailed non-detriment finding (NDF) and legal acquisition finding (LAF) reports are provided for the species. In recent times, there have been calls for the ban to be lifted but this needed to be situated within a risk assessment and risk management context. To provide the basis for such an action, a Non Detriment Findings report needed to be prepared to determine whether exploitation could be sustainable based on available information on the current status and management of species. This report therefore seeks to provide detailed data and information (robust NDF) on Pterocarpus erinaceus and also provide the CITES Secretariat with information required to assess the implementation of Article IV, paragraphs 2(a), 3 and 6(a) of the convention with regard to harvesting and trade of the species.

1.5 Objectives

To conduct a Non-Detrimental Findings (NDF) study on *Ptericarpus erinaceus* to determine whether trade levels were sustainable.

Specific objectives

The specific objectives of the study are:

1. To estimate static volume (m^3) and stocking of Rosewood in the endemic areas of Ghana.
2. To determine sustainable harvesting levels for all the endemic areas (political districts).
3. To assess the effectiveness of implemented conservation measures on the species sustainability

2.0. NON- DETRIMENT FINDING DECISION-MAKING (NDF) PROCESS AND INSTITUTIONS IN GHANA

2.1 Process

The Faculty of Renewable Natural Resources, College of Agriculture and Natural Resources, Kwame Nkrumah University of Science and Technology, Kumasi (KNUST) is the Scientific Authority for CITES in Ghana. Non-Detriment Findings (NDF) are conducted to objectively examine aspects such as species distribution and habitats, population status and trends, harvest techniques, and the volume and effect of trade on target species. The outcome results in either a positive or negative recommendation to Ghana's CITES Management Authority which is the Wildlife Division of the Forestry Commission. To conduct an NDF, the Scientific Authority generally goes through a number of cycles, as shown in Figure 1. It begins with a preliminary examination to determine whether a comprehensive, science based NDF is required for the species and specimens involved. If a science based NDF is required, conservation considerations and potential biological threats must be assessed. These assessments provide the framework of risk in which the harvest, trade, and management should be examined (Figure 1). The method is then followed by a comprehensive examination of harvest impacts and trade impacts relevant to the species in question, as well as an assessment of whether the management mechanisms in place are stringent enough to reduce the concerns, risks, and impacts identified.

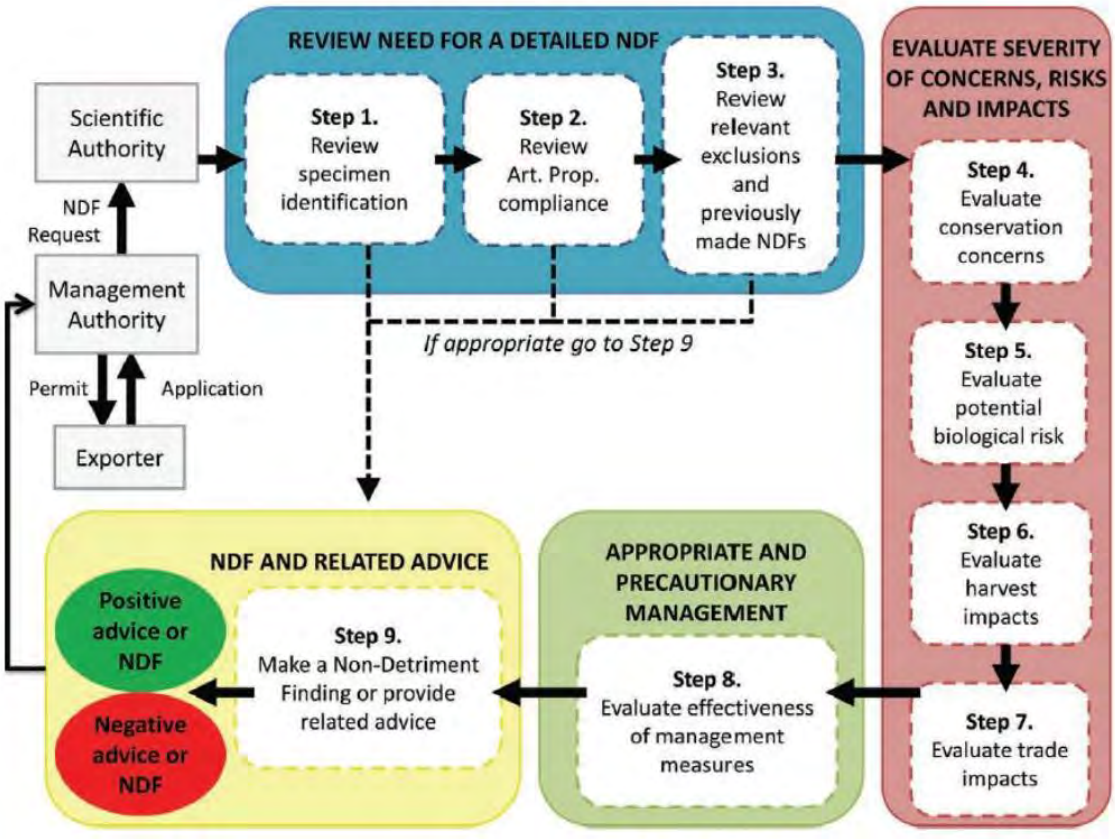


Figure 1 Simplified pathway adopted by the Scientific Authority for making NDF for Timber/Tree species listed in CITES Appendix II Adopted from Wolf et al. 2018)

2.2 Collaborating Institution

The CITES Scientific Authority in Ghana co-ordinates NDF for species that are commercially harvested in Ghana. It coordinates the efforts of various governmental and non-governmental research organizations as well as work with private organizations. The following agencies made contributions to this report on the NDF for *Ptericarpus erinaceus*.

• **Resource Management Support Centre of the Forestry Commission (RMSC)** is the technical and research wing of the Forestry Commission (FC) with responsibility to explore, develop, facilitate and support the implementation and monitoring of effective and affordable forest management systems in Ghana. The Centre as part of its mandate conducts inventories of populations across distribution range of all species in Ghana. The Centre collaborated with the Scientific Authority to perform the NDF for the species.

• **Wildlife Division of the Forestry Commission (WD):** It is responsible for management and conservation of Wildlife Protected Areas and Zoos in Ghana. The WD is the CITES Management Authority in Ghana and responsible issuing CITES permit.

• **Forest Services Division of the Forestry Commission (FSD):** The Forest Services Division is in charge of implementing policies, rules, regulations, and procedures in place to guide the management and utilization of Ghana's forest resources. The awarding of licenses to harvest wood is a key operation of the FSD under Ghana's Legality Assurance System (GhLAS). These rights are divided into four categories: 1. Timber Utilization Contracts, 2. Timber Utilization Permits, 3. Salvage Permits, and 4. Special Permits. Before all trees could be transported, the FSD is the authority to issue (Log Measurement Conveyance Certificate-LMCC) which is the legal document that permits transportation of logs overland.

• **Timber Industry Development Division of Forestry Commission (TIDD)**: TIDD is responsible for establishing guiding price systems for the vetting of contracts of export of wood products. It conducts pre-shipment inspection and examination of wood products and issue permits for the export of timber and wood products. TIDD is also responsible for publishing market intelligence in order to inform industry, government and public regarding pricing, trade and product trends that could impact on the sector, track the movement of logs from forest gates after the issuance of conveyance certificates. While TIDD provides management and technical training for the wood industry and undertake the certification and registration of authorized timber graders and establish levels of certification for such graders, it also monitors the supply of lumber to the local market by recognized millers with the support of the Forest Services Division. Additionally, TIDD advises on approvals to establish new processing mills and register timber processors and traders in timber and wood products and collaborate with international and timber associations on marketing and utilization of wood products as well as coordinate foreign technical assistance aimed at improving efficiency in the industry.

2.3 Monitoring of export levels of species

The monitoring structures for harvesting and trade in timber resources are shown in Figure 2. RMSC monitors the harvesting of trees in Ghana through endorse of yields and periodically undertakes post audits. The FSD monitors volumes harvested and conveyed for processing or export through the issuing Conveyance Certificate (LMCC) systems. Export volumes are monitored by TIDD. The WD issues CITES permits for Timber in trade in endangered species listed in the CITES Appendices. The Custom Division of the Ghana Revenue Authority (GRA) at the Tema and Takoradi ports monitor export containers and documentation for specified tree volumes. Currently, Ghana is implementing a system or systems (Ghana Wood Tracking System) to verify that timber products for shipment have been legally-produced and that only shipments verified as such are exported to the international market. The system for verification includes checks of compliance in order to provide assurance that the timber products destined for export to the international market have been legally produced and that legality licences are not issued in respect of shipments of timber that have not been legally-produced or are of unknown sources.

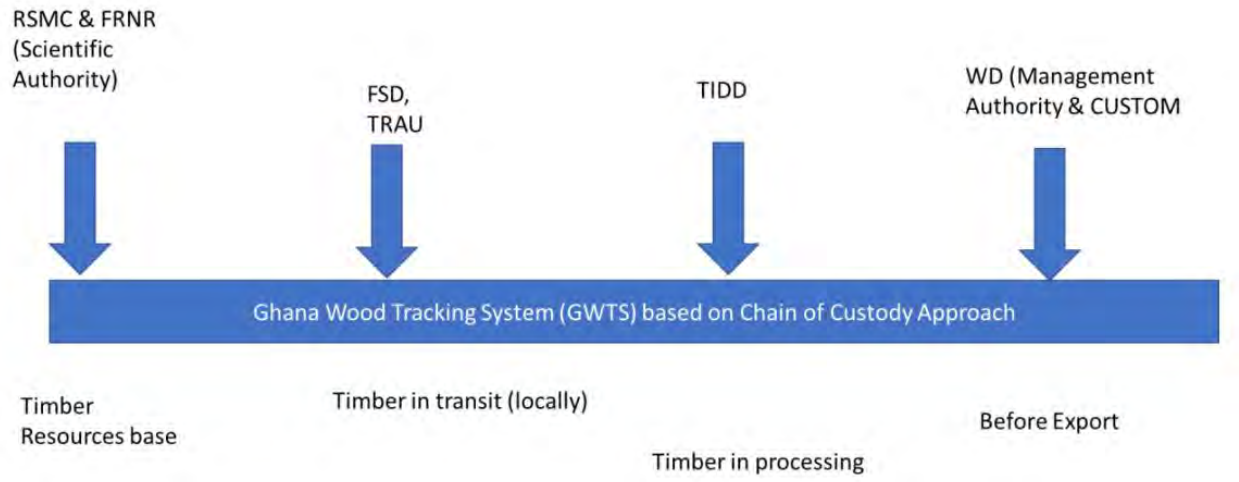


Figure 2 Mechanisms for monitoring population and volumes of *Ptericarpus erinaceus* in Ghana

3.0 ECOLOGY, EXPLOITATION AND TRADE

3.1 Botany and Ecology of *Pterocarpus erinaceus*

Pterocarpus erinaceus is a deciduous legume tree of African savannas and dry forests famous for producing one of the finest woods in its native region (Hutchinson *et al*., 1958). The species belongs to the family Fabaceae. It is a medium-sized, deciduous tree 12-15 m tall, bole often of poor form, strongly fluted and gnarled, with numerous, plank-like buttresses (Hutchinson *et al*., 1958). The bark surface is finely scaly fissured, brown blackish with thin inner bark. The crown +is usually dense and domed with branchlets often lenticel led. Old stems are often hollow. It is commonly found in open forest and wooded savannah. This species together with *Parkia biglobosa* is said to be one of the main components of the remnants of the former dense Sudanian forest. The species occurs in areas with altitudes of 0-600 m, mean annual temperature of 15-32 deg. C, mean annual rainfall of 600-1200 mm (Aubreville, 1950). It grows on shallow soils and growth tends to be stunted on poor soils (Hutchinson *et al*., 1958; Aubreville, 1950). The wood has a fine-grained appearance and once seasoned, maintains shape very well. The tree readily regenerates after cutting, and once established it requires very little attention. *Pterocarpus erinaceus* is a prolific seed producer and is easy to propagate by planting nursery-raised seedlings or rooted cuttings. The fruit, an indehiscent pod, must be cracked open. There are about 3500 unshelled seeds per kg (19,800 per kg if shelled). The recommended seed pretreatment is immersion in water at room temperature for 18–24 hours, or in sulfuric acid for 30–60 minutes and then in tap water for 5–10 minutes (Roussel, 1996). The species produces good quality charcoal and therefore usually extensively exploited for charcoal production.

3.2 Exploitation and Trade

Commercial harvesting and trade in rosewood in Ghana over the years has been restricted to the off-reserve areas. A review of information based on permits issued by the Forestry Commission revealed that the export volumes of the species increased from 77962.5 m^3 in 2017 to 113,253.05 m^3 in 2019 (Figure 3). However, there was a sharp decline in export volumes between 2019 and 2022 due to a temporal ban placed on rosewood harvesting by the Government of Ghana. Moreover, in 2021 a salvage permit issued by the Minister of Lands and Natural Resources under LI 2254, Section 29 to pave way for a developmental project resulted in the harvesting of 716 m^3 of rosewood.

Figure 3 Export volumes based on permits issued by the CITES Management Authority in Ghana, Source, WCMC-UNEP, August 2023

4.0 METHODOLOGY

4.1 Study area description

The species occurs in the Savanna and transitional (Dry Semi-deciduous) zone of Ghana (Figure 3). The Savannah ecosystem is much drier than the southern areas of Ghana, due to its proximity to the Sahel region. The vegetation consists predominantly of grass, sparsely distributed drought-resistant trees including baobabs and acacias. The dry season occurs between December and April whiles the wet season is between July and November with an average annual rainfall of 750mm to 1050 mm. The highest temperatures are reached at the end of the dry season. However, the Harmattan winds from the Sahara blows frequently between December and the beginning of February. The temperatures can vary between 14 °C at night and 40 °C during the day.

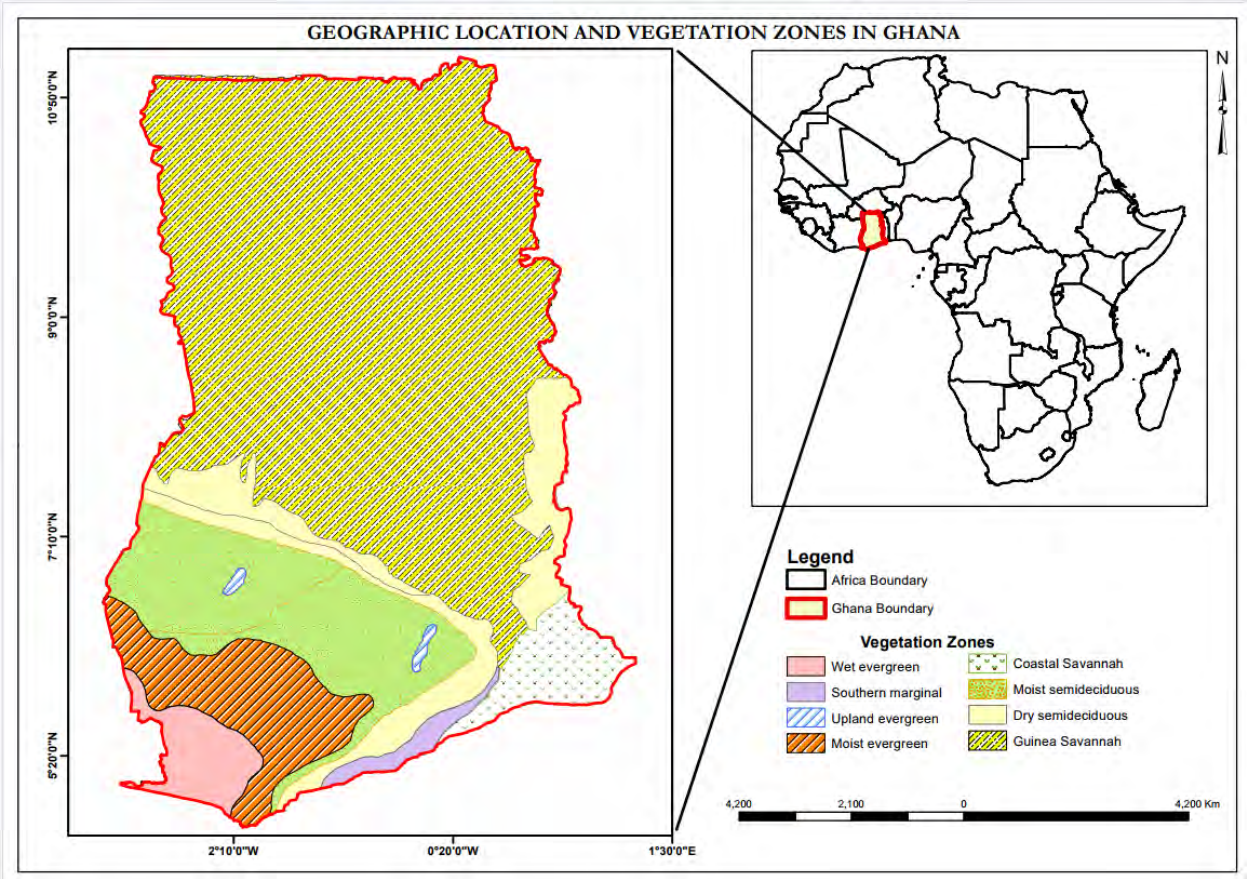


Figure 4 Geographic location and vegetation zones of Ghana

4.2 Selection of sites

A total of twenty-six political districts were selected for the field assessment (Figure 5). The selection of these districts was based on a review of past inventories and interviews with the district forestry staff. These areas were considered to have significant stocks of *Pterocarpus erinaceus*. The selected districts were mapped by the Mapping and GIS Unit, Resource Management Support Centre to guide the field teams in the distribution of sampling plots.

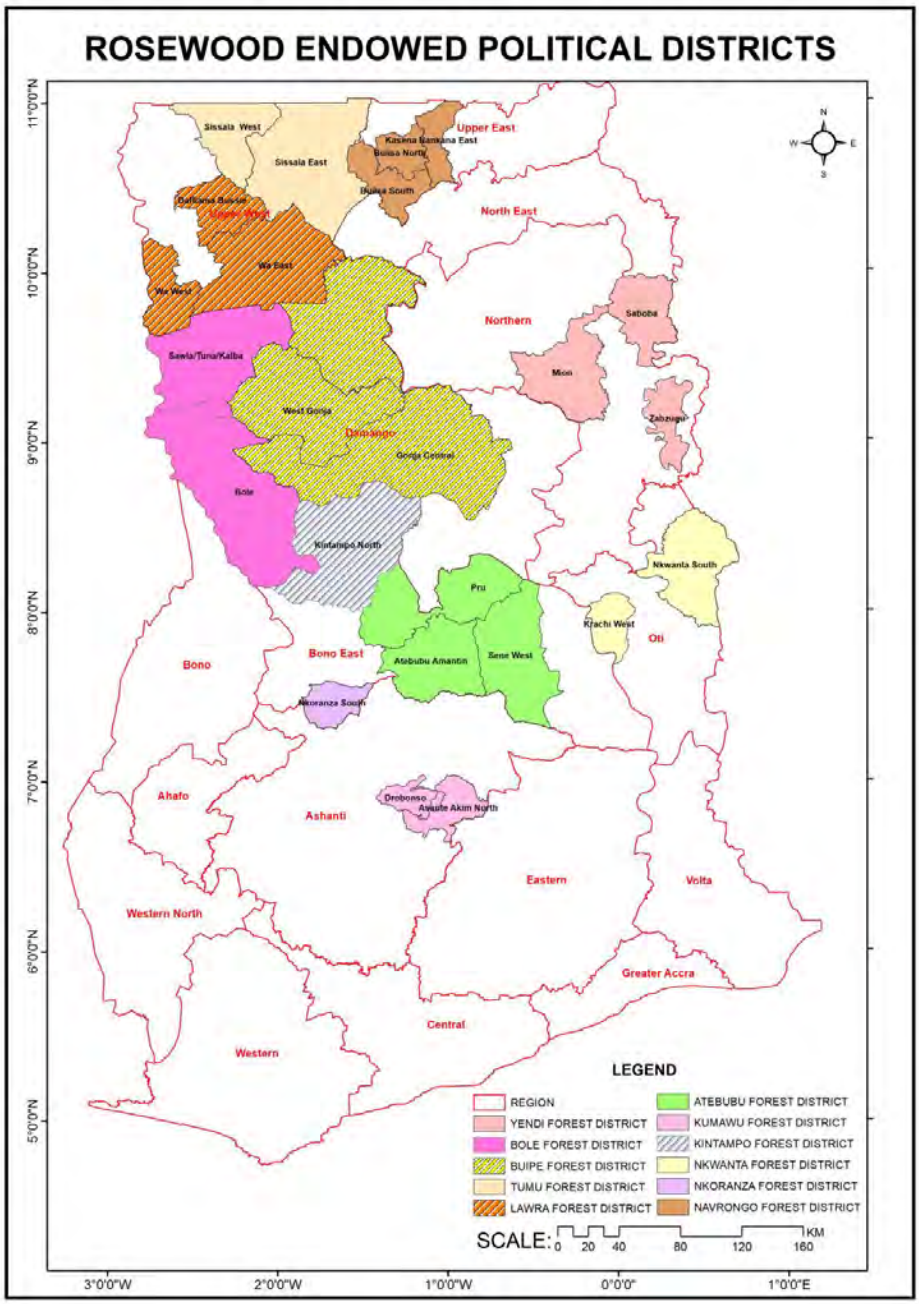


Figure 5 Spatial distribution of rosewood endemic districts

4.3 Desk study

Prior to the field measurement, a review of the methods used for 2013 and 2017 assessment of *Pterocarpus erinaceus* was undertaken to guide the development of sampling procedures for the current study. Subsequently, RMSC liaised with the FSD district offices in the savannah and transitional zones of Ghana to determine where the species occurred in relatively substantial quantities.

4.4 Sampling procedures

Plot size and shape: rectangular plots of size 40 m by 1000 m (i.e., four ha) and sub-divided into 10 quadrats or subplots of 40 m by 100 m were used (Figure 6). These long plots enabled the team to capture data in all the various land use types associated with off reserve areas.

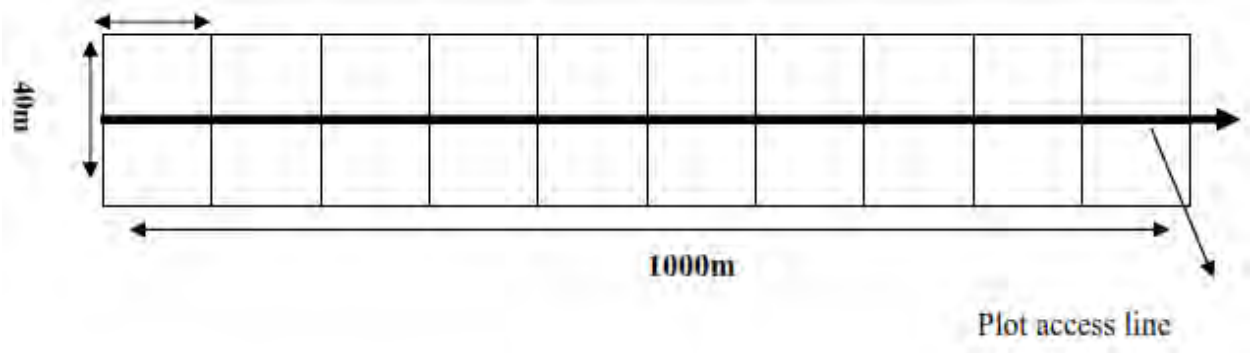


Figure 6 Sample plot layout

Sampling Intensity: Three (3) to five (5) plots depending on the extent of the resource were laid per forest district. In each forest district, the sample plots were distributed across the different political districts in order to capture representative data on species. A forest district is usually made up of a number of political districts.

Plot location and demarcation: Using 1:50,000 topo-sheets of the targeted area, the coordinates of the plots starting points were located. To enhance plot location on the field by the demarcation teams, the starting point of each plot as well as their direction were first identified and constructed on a photocopied topo-Sheet of the site at the office. In each stand, the starting point for each plot was randomly selected.

With the assistance of GPS for direction and machetes for access, these starting points were located on the ground. Similarly, plot directions were also identified using compasses and GPS. Machetes were used for cutting plots access lines. Beacons were placed at each 100 m length along the access line indicating the end of a particular subplot and the beginning of a new subplot (e.g., end of subplot 1, beginning of subplot 2). The demarcation team also determined the major land use type together with terrain condition in each of the 40 by 100 m subplot.

Plot Enumeration: In each plot, all Rosewood trees greater than 10 cm were identified and their diameter at breast height (dbh) measured and recorded. Sapling sampling, where trees between 2 to 9.9 cm diameters were also captured in subplot 1 and 10.

Plate 1 Diameter measurement of rosewood using diameter tape and calipers

4.5 Data entry and analysis

Data captured was keyed into access database and edited to correct errors. Mean stem numbers per ha including their standard errors were generated per Forest District. Mean volume (m^3) per ha including their standard errors for each Forest District were generated using an existing volume equation.

$$\mathbf{V}= 0.0004634(d^{2.201})$$

Where: V= tree volume, d= diameter at breast height

Approach for District Felling Quotas

Extraction per year per Forest/Political District scenarios (Felling Quotas) were generated for discussion and final adoption by FC and other key stakeholders. In proposing the annual felling quota estimates per Political District, the following assumptions were made:

- Only the static estimates of stem numbers/volume (m^3) were used. Thus, the proposal excluded or did not factor in the dynamics (increment, regeneration / recruitment, mortality rates) of the species. This is because information on these parameters were not available.
- In the estimation of net area of vegetation cover for each District Assembly, 60% of the gross area of each Political District was designated as settlement/barelands, forest reserves and national parks. These areas were excluded from the total area of the political district used in the calculation of total stocking (stems and volumes).

- First, static volume/stem estimates per ha were generated for all the political districts and six Rosewood endemic regions namely, Upper East, Upper West, Northern, Volta, Brong Ahafo and Ashanti.
- The size of each Political district (ha) was obtained from the GIS/Mapping Department of RMSC. This was used to estimate total stem numbers and corresponding volume (m^3) of each Political District.
- A retention of 40% of the total stems/volume (m^3) above felling limit (20 cm dbh) per Political District were maintained to cater for conservation, and destructions caused by wildfire, clearance for farming and domestic use.
- 20% of the total stems/volume (m3) above felling limit per Political District was again maintained to cater solely for charcoal production. partly because of the various administrative Rosewood bans at given periods.
- Of the remaining stock (40%) of stems/volume (m^3) above felling limit, three scenarios with an assumed lifespan of 30, 40, and 50 years were used in determining the annual felling quotas.
- **District Quotas:** The annual total of the felling quotas for Political Districts within the Forest District are to be added to generate the Forest District Quota. The felling quotas should be administered by the district offices of the Forest Services Division. This will promote better collaboration between the District Assemblies and Forestry Commission and enhance protection and monitoring of the resources.
- **National Quota:** All the assigned district quotas were summed up to give the national quota, which shall be monitored by RMSC and endorsed by the representative of CITES in Ghana.
- **Scenario:** Three scenarios of 30years, 40years and 50years were used as the felling cycles for the rosewood. Due to inadequate information on mortality rate, recruitment and growth rate of the species, a conservative scenario of 50years was selected out of the three options for the national and district quotas.

5.0 RESULTS

5.1 Diameter class

The stem numbers per km^2 grouped according to diameter classes averaged for all the districts were averaged and generally, the diameter class distribution followed the negative exponential curve typical of natural stands (Figure 7). In most districts, trees recorded were below 40 cm dbh. Large trees greater than or equal to 40cm dbh were recorded in Pru, Sene West, Central Gonja, West Gonja, Biakoye, Wa East, Wa West, Nkwanta South, Saboba and Zabzugu districts (see Annex I for details). Figure 6 shows that about 50% of the trees in the 10-19.9 cm diameter class able to grow to the next diameter class (20-29.9cm dbh) i.e. equal to or above the minimum felling diameter.

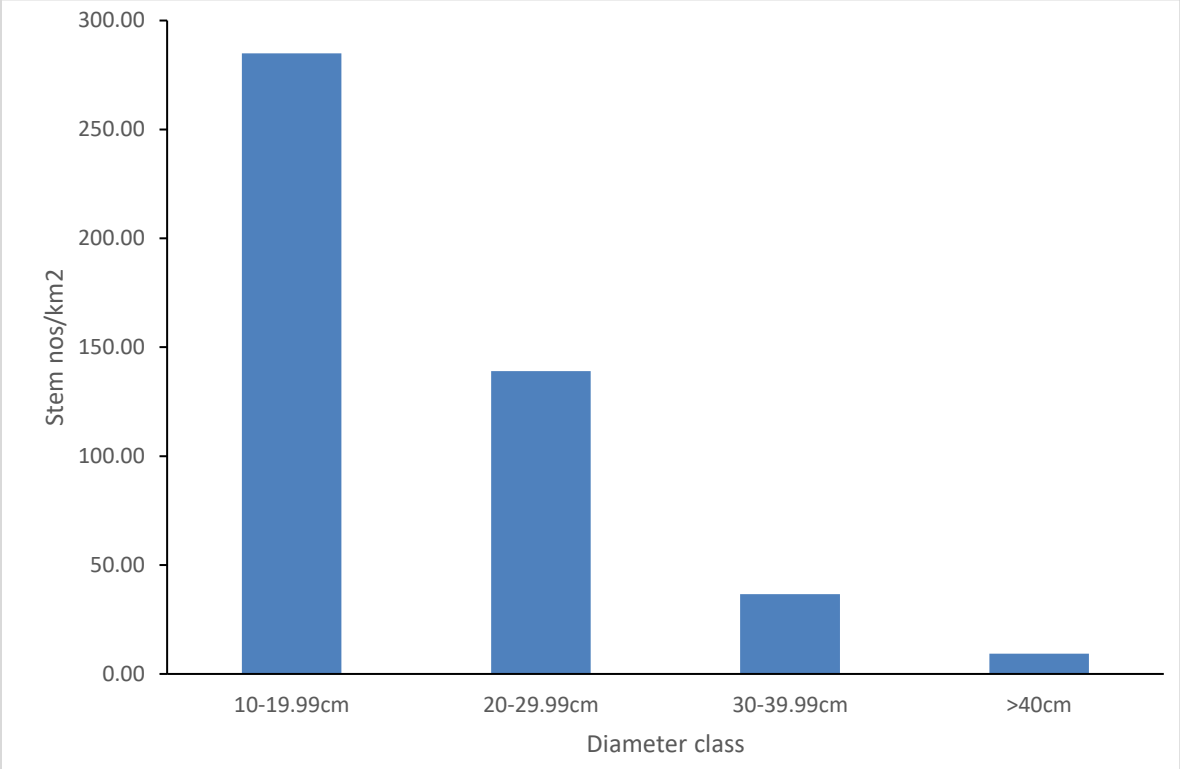


Figure 7 Mean stem number per km2 diameter class distribution for all the political

5.2 Natural regeneration

Advanced regeneration (10-19.9 cm dbh) for the various districts were pooled and averaged to provide an indication of regeneration performance of *Pterocarpus erinaceus*. Regeneration for the species in most political districts was generally good and particularly high in the Kintampo North, Drobonso, Bole, Pru, Nkwanta South and Zabzugu. The performamce of species was poor in Saboba, Navrongo, Builsa South and Kassena Nakana with estimates below 70 stems per km^2 (See Annex I for details). Figure 8 shows a decline in regeneration by 72% between 2017 and 2021.

Between 2021 and 2022 there was reduction of about 9% in natural regeneration. This shows a relatively small reduction in natural regeneration compared to the benchmark value for the year 2017. This improvement in the percentage of natural regeneration reduction could be attributed to the implementation of conservation measures that were prescribed in 2021 NDF report.

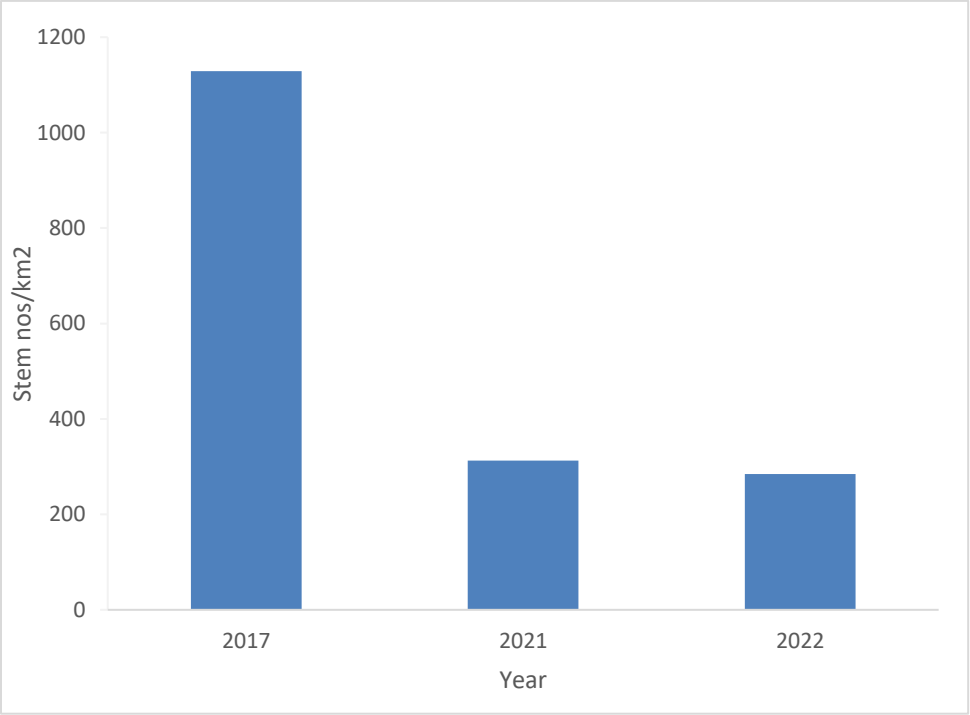


Figure 8 Natural regeneration per km2 across all the districts

5.3 Mean estimates

Mean value per km^2 (100 ha) estimates were generated for stem number and stand volume. Mean stem numbers per km^2 above the felling limit (greater than or equal to 20 cm dbh) and its equivalent mean volume estimates are presented in Table 1. The Northern region recorded the highest mean stem numbers of 211 stems per km^2. The Upper East region recorded the least figure of 154 stems per km^2. Mean volume estimates were rather highest in Volta region with 168 m^3 per km^2 while Ashanti region recorded the lowest average stand volume of 83 m^3 per km^2. Mean stem numbers and volume per km^2 estimates for the various political districts are presented in Annexes I and II. Mean tree volume (MTV) per tree has reduced from $1m^3$ in 2017 to $0.71m^3$ in 2021 and 0.55 m^3 in 2022.

Table 1: Mean stem numbers and mean volume (m3) per 100 ha estimates of rosewood grouped according to regions.

Region	Stems>=Flimit	Sampling error (%)	Vol>=Flimit	Sampling error (%)
ASHANTI	185	1.6	83.5	4.2
BRONG AHAFO	190.2	17.5	107.6	19.3
NORTHERN	211	9.7	151.29	11.4
UPPER EAST	154	21.0	118.4	21.0
UPPER WEST	179.25	21.8	135	17.1
VOLTA	193	4.0	168.67	2.1

5.4 Variation in rosewood stockings

A trend analysis of the mean stem numbers and stand volume estimates for 2017 and 2021 showed a downward trend in stem numbers above the felling limit (≥20cm dbh) in all the rosewood endowed regions (Figures 9 & 10). This information indicates the stocking of rosewood has declined over the years except in the Volta region. The trend pin points to the fact that existing regulatory mechanisms aimed at controlling the exploitation of the species over the years have not been largely effective.

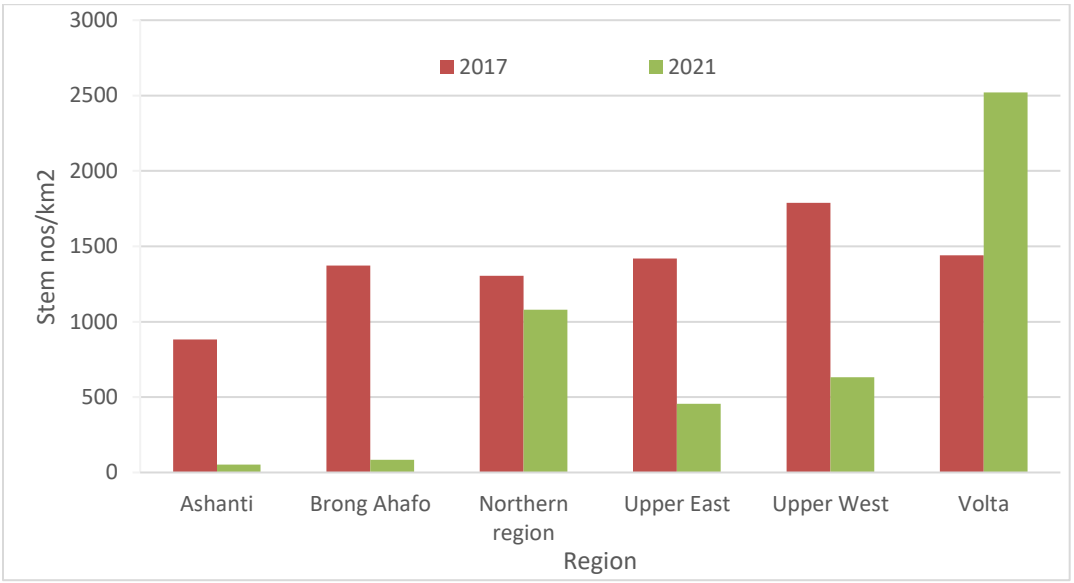


Figure 9 Comparison of stem numbers per km2 of rosewood in 2017 and 2021 for six regions in Ghana

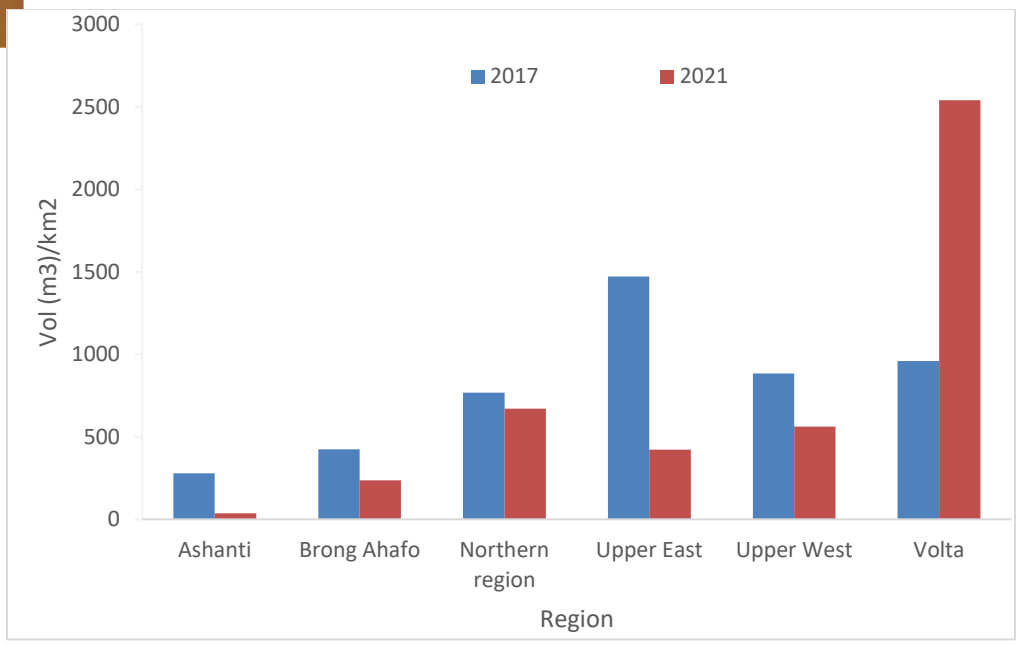


Figure 10 Comparison of volume per km2 of rosewood in 2017 and 2021 for six regions in Ghana

5.5 Total stem and volume estimates

Total standing volume of all stems ≥ 20 cm dbh was estimated to be 2,900,996.00 m^3 with an estimated stem numbers of 5,264,465.85 stems (Annex III). Total stem numbers and stand volume above the felling limit were very high in the East Gonja, West Gonja (584,137.89), Central Gonja (513,003.33), Bole (361,993.59) and Kintampo North (304,477.74) among others (Table 2).

Table 2 Total stems and volume estimates for five endowed political districts

Region	**Political district**	**Total stem ≥ 20cm**	**Total volume (m^3)≥ 20cm**
Northern	East Gonja	589,113.00	324,632.07
Northern	West Gonja	584,137.89	321,890.53
Northern	Central Gonja	513,003.33	282,691.66
Northern	Bole	361,993.59	199,477.40
Brong Ahafo	Kintampo North	304,477.74	167,783.16

5.6 Felling Quota Estimates

5.6.1 National and District Felling Quotas

Felling quotas were estimated for the various political districts based on several considerations. These felling quotas were done with the view to suggest a regulatory mechanism to make of rosewood harvesting in Ghana sustainable. Annual felling quotas estimate based on three scenarios (felling cycles) of 50, 40 and 30 years gave stem numbers of 42,115.73 stems, 52,644.66 stems and 70,192.88 stems for the annual felling quotas respectively. The equivalent in volume is 23,207.97 m^3, 29,009.961m^3 and 38,679.95m^3 for 50, 40 and 30 years respectively (Annex III). The national felling quota was further disaggregated for the twenty-six (26) Political districts that were surveyed. Table 3 shows the ranking of the first five Political districts with the highest felling quota among the three scenarios. The East Gonja District recorded the highest annual felling quota followed by West Gonja, Central Gonja, Bole and Kintampo North in that order. In terms of the proposed annual felling quota for rosewood, these five political districts, out of the total of twenty-six, contribute approximately 45% to both stems and stand volume.

Table 3 First five Political Districts with the highest proposed felling quota per annum

No.	Political district	Scenario 1 (50years)		Scenario 2(40years)		Scenario 3(30years)	
		Stem nos.	Vol (m^3)	Stem nos	Vol (m^3)	Stem nos	Vol (m^3)
1	East Gonja	4,712.90	2,597.06	5,891.13	3,246.32	7,854.84	4,328.43
2	West Gonja	4,673.10	2,575.12	5,841.38	3,218.91	7,788.51	4,291.87
3	Central Gonja	4,104.03	2,261.53	5,130.03	2,826.92	6,840.04	3,769.22
4	Bole	2,895.95	1,595.82	3,619.94	1,994.77	4,826.58	2,659.70
5	Kintampo North	2,435.82	1,342.27	3,044.78	1,677.83	4,059.70	2,237.11

3.6.2 Trends in national felling quotas

National felling quotas proposed over a 50-year felling period have reduced between considerably between 2017 and 2022 (Figure 11). The proposed quotas show a decline of 45% between 2017 from 116,237 m^3 to 52,916 m^3.

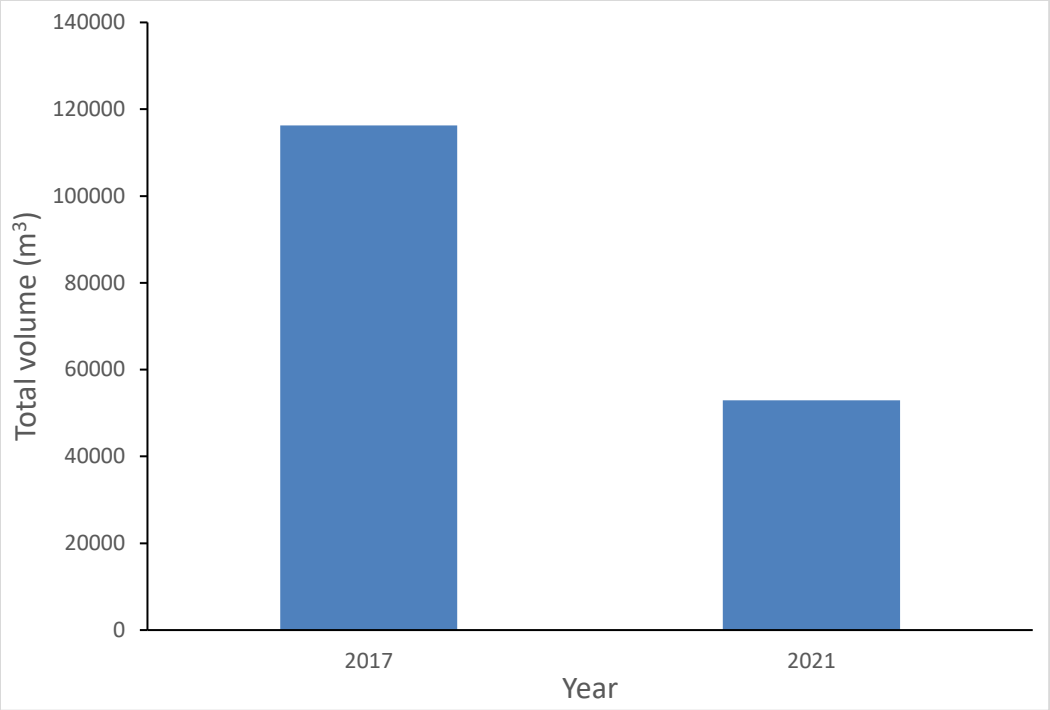


Figure 11 National felling quotas for Rosewood in m3 for 2017 and 2021

5.7 Estimates for rosewood underwater

A study conducted on trees under water within the Volta Basin in 2007 by Volta River Authority (VRA) and the Forestry Commission (FC) revealed that there were large quantities of submerged Ptericarpus erinaceus (rosewood) trees in the lake (Thrower et al., 2007) (see Annex V for details on methodology and volume statistics). The underwater rosewood is distributed within an estimated area of 116,167 ha in the Volta Lake. The total is divided into four Lots according to their locations. Their distribution is either discontinuous (scattered) or wooded (dense). Estimated mean volume across Lots was 5.52 m^3/ha. The total stand volume for all Lots was therefore estimated to be 641,242 m^3 (Table 3). It is estimated that 40,000 m^3 of rosewood will be harvested per annum within the Volta Lake in Ghana. The harvesting of underwater rosewood is expected to be completed within sixteen (16) years barring any eventualities.

Table 4 Projection for Underwater Harvesting of *Pterocarpus erinaceus* (Rosewood) in Volta Lake

Description (Location)	Discontinuous	Wooded	Mean Volume (m^3/ha)	Volume (m^3) Discontinuous	Volume (m^3) Wooded	Total volume (m^3)
Lot 2	2,867	21,882	5.52	15,825.84	120,788.64	136,614.48
Lot 3	6,045	24,657	5.52	33,368.40	136,106.64	169,475.04
Lot 4	9,024	15,498	5.52	49,812.48	85,548.96	135,361.44
Lot 5	7,959	28,235	5.52	43,933.68	155,857.20	199,790.88
Total	**25,895**	**90,272**		**142,940**	**498,301**	**641,242**

5.7 Threats

- Wildfire incidence was observed in almost all sites visited.
- Charcoal production and farming were identified as a major threat to rosewood conservation
- Illegal chainsawing activities

Plate 3: Felled rosewood trees for charcoal production

6.0 DISCUSSION

The study was designed to capture information on stand characteristics in a way that was representative of the range of the species in Ghana. However, it is important to highlight that the field teams could not undertake assessment in most of the riparian areas where a substantial quantity of the existing stands occur could not be accessed during the inventory period due to flooding or inundation of the riverbanks. These areas were excluded during the inventory due to inaccessibility. Harvesting of *Pterocarpus erinaceous* between 2013 and 2017 in the off-reserve areas was initially ad-hoc and poorly regulated. These deficiencies in the implementation of regulatory measures for the harvesting of rosewood have significantly contributed to decline in the species population and volume. Subsequently, steps were taken to address these gaps in implementation to ensure sustainable management of the species. Interim measures included a series of moratorium (ban) on rosewood exploitation in the off-reserve areas in Ghana. Additionally, in recent times other actions including awareness creation, plantation trials, development of electronic App for issuance and tracking of CITES permit, among others are being implemented. Three scenarios for annual quota implementation have been proposed based on fieldwork and ecology of the species – 30years, 40years and 50 years. Among the three scenarios, the 50-year option was selected because it was considered to be conservative. The selection of the 50-year scenario was informed by limited information on the dynamics and ecology of the species coupled with limited information on mortality. The proposed felling quota for the 50-year scenario is 23,207.97 m^3 to be implemented only in off reserve areas. The annual harvesting quota does not include populations of the species that occur in over 80 forest reserves and national parks in Ghana. The forest reserves and national parks serve as gene banks and refugia for a significant population of the species (Annexes for details). For the underwater rosewood trees in the Volta basin, an annual quota of 40,000m^3 is projected for a 16-year period. As earlier indicated in the report, there have been concerns over the accidents caused on the Volta Lake and the danger posed by the submerged trees and recommendations made in Revised National Transport Policy (2020), the Volta Lake Strategic Plan (2010 – 2014) and the Draft Volta Lake Master Plan 2014 made for their removal.

7.0 SPECIES MANAGEMENT AND CONSERVATION MEASURES

Policies and laws: Several laws have been enacted that prescribes procedures, punitive measures and structures to regulate the commercial exploitation of trees in Ghana. Notable among them is the Timber Resources Management Act, 1997 (No. 547 of 1997) and amended in 2002 (Act 617 of 2002) and the Subsidiary Legislation on Timber Resources Management and Legality Licensing Regulation LI 2254 of 2017. The LI 2254 outlines conditions under wood sourced and/or processed in Ghana could be issued with a license for sale within Ghana or for export from Ghana. The implementation of Ghana's Legality Assurance Systems also considers the legal framework that governs the management, enforcement, and trade of the species (FC, 2017). The Parliament of Ghana has passed the Wildlife Resource Management bill into law pending Presidential assent. The law seeks among others to domestic the implementation in Ghana.

Ban on rosewood exploitation: In 2019, a ban was imposed by the Government of Ghana on the harvesting, transporting and export of Rosewood except stocks of salvage and confiscated rosewood auctioned by the Forestry Commission with approval from the Minister of Lands and Natural Resources. The ban is a measure taken by the government to stop illegal harvesting, transporting, processing, trading and exporting of rosewood and control its exploitation. The ban remains in force and the Minister for Lands and Natural Resources has directed the Forestry Commission to cease the issuance of the Convention on international Trade in Endangered Species (CITES) permits for the export of rosewood from Ghana.

Wildfire education: Extensive annual wildfire sensitization and education continue to be undertaken during the dry season in several communities in the savanna and transitional zones. This has been intensified through the implementation of projects (Examples, Shea Landscape Restoration Project, Africa Landscape Restoration Initiative (AFR100) and Ghana Landscape Restoration and Small-Scale Mining Project). These include the establishment and training (Fire management techniques) of fire volunteer squads in selected communities.

Energy efficient technologies for charcoal production: Energy-efficient technologies have been implemented through number of projects in the savanna and transitional zones since 2019 in selected communities. For example, the "Forest Landscape Restoration through a Sustainable Wood Energy Value Chain" has benefitted over 400,000 people and over a million dependents are engaged in charcoal production in the northern and transitional zones of Ghana (Energy Commission, 2006; GSS, 2019). The project supports therefore farmers and charcoal producers in the wood energy value chain to increase efficiency in the charcoal production process aiming at avoiding tree biomass wastage and reduced deforestation.

Quota system: To ensure the sustainable exploitation of the Rosewood trees in Ghana, the Forestry Commission has established quota system to set annual thresholds.

Exclusion of wild populations in protected areas: Presently, rosewood exploitation is restricted to off reserve areas. This excludes wild populations located in Wildlife Parks and forest reserves.

Voluntary Partnership Agreement (VPA): The Government of Ghana as part of the VPA has put in place a robust wood tracking system in collaboration with EU to monitor the exploitation of trees in Ghana. The rationale is to ensure that all harvested trees for trade are sourced legally from a sustainably managed forest. The wood tracking has been in use over the last five years and has been useful in monitoring compliance with existing laws and regulatory mechanisms.

Development of electronic permitting system/App: The Wildlife Division which is the CITES Management Authority of Ghana in collaboration with the ICT directorate of the Forestry Commission are developing a robust software App for the issuance of the CITES permit in Ghana. The electronic permit system is expected to provide interface for the other institutions like Customs, TIDD including importers to verify the authenticity of the permits at various entry and exit points as well as destination countries.

Restoration: The Forestry Commission has initiated rosewood trials across three (3) ecological zones (Northern Savannah and Dry Semi-Deciduous) and outside its native range in the Moist Semi- Deciduous Forest of Ghana. The trails are aimed at studying the growth dynamics and the feasibility of establishing large-scale commercial plantations across the country. The 87.2 ha of Rosewood trials established within the three (3) ecological zones in the previous years in eight (8) forest districts within six (6) regions were maintained. In 2021, an additional area of 57.0 ha was established in eight (8) forest districts (Dormaa, Bibiani, Lawra, Goaso, Bechem, Sunyani, Assin Fosu and Nkawie). The Commission intends to expand the total area of rosewood plantation through a number of programmes and projects.

Plate A two-year old *Ptericarpus erinaceus* (rosewood) stand in the Bosomkese Forest Reserve. Source. RMSC, 2023

8.0 RECOMMENDATIONS

Pterocarpus erinaceus is one of the key remnants species of the former dense Sudanian forest. The species is mainly found in the savanna and dry forest which are considered vulnerable ecosystems. These ecosystems are particularly prone to wildfires and therefore prescriptions in the past for felling of trees in these areas have been very restrictive in order to minimize its impact. The study did not cover rosewood populations in Protected Areas such as forest reserves and national parks where the species is known to occur extensively, but commercial harvesting not permitted (Annex V). Taking into account, the conservation measures initiated so far and other ecological consideration, the following actions are suggested to ensure the sustainable management of *Pterocarpus erinaceus* in Ghana:

i. A conservative national felling quota per annum using 50-year life span scenario should be adopted until they are reviewed as more information particularly on the dynamics of the

species has been fully addressed. Thus, an indicative national felling quota of 23,207.97 m^3 (terrestrial land outside forest reserves) is proposed.

ii. For underwater rosewood in the Volta Lake, an indicative felling quota of 40,000m^3 per annum has been proposed for a period of 16years. This is consistent with the objectives of the Revised National Transport Policy (2020), the Volta Lake Strategic Plan (2010 – 2014) and the Draft Volta Lake Master Plan 2014.

iii. Therefore, the proposed annual aggregate quota for off reserve areas (terrestrial) and under water rosewood harvesting in Ghana to be **63,207.97 m^3.** Barring any changes in policy and other unforeseen circumstances, the proposed harvesting quota is expected to be implemented for 16years until the underwater stock is depleted. After which, the 23,207.97 m^3 will remain operational over the fifty (50) year scenario.

iv. The annual quota should be strictly adhered to through surveillance and a tracking system put in place by the Forestry Commission at the local and national levels. Ensure that exploitation of Rosewood meets the Appendix II requirements of CITES.

v. Additional permanent sample plots should be established in the savannah environment in both on and off reserves to monitor the population dynamics (recruitment, mortality and growth) of the species.

vi. Increase the population of *Pterocarpus erinaceus* through extensive restoration or plantation programmes in the savanna and transition zone.

vii. The felling Political Districts quotas should be administered by the district offices of the Forest Services Division. This will promote better collaboration between the District Assemblies and Forestry Commission and enhance protection and monitoring of the resources.

viii. The national quota which will be implemented by the Forest Services Division, should be monitored by RMSC and endorsed by the representative of CITES in Ghana.

ix. The Forestry Commission gradually integrate harvesting of Ptericarpus erinaceus into existing wood tracking system for documentation and traceability.

x. Increase awareness creation on wildfires in order to reduce the frequency of occurrence and severity in the savanna and transition zones.

xi. Promote the adoption of more efficient technologies and alternative species for charcoal production. Also, encourage the establishment of woodlots to meet the energy needs of local people.

9.0 CONCLUSION

The assessment of the *Pterocarpus erinaceus* is a major initiative that has provided an update report on the status of the species in off reserve areas (terrestrial) as well as those under water trees in the Volta Lake. There is also a considerable stock of dead underwater (submerged) rosewood in the Volta Basin that should be included in the annual felling quotas determined for the terrestrial off-reserve stock. Implementation of the existing Volta Lake master plan which prescribes the removal of underwater trees as the only way to prevent boat accidents will be very critical to saving lives. If the prescribed annual felling quotas are adhered to (50-year cycle for the terrestrial rosewood trees) and implementation of conservation measures are sustained, harvesting of the species will be sustainable. The introduction and fast adaptation of *Ptericarpus erinaceus* outside its native range in the Moist Semi deciduous ecological zone of Ghana, where precipitation is higher gives a positive indication for the development of the species through plantation establishment.

Limitations of the study

Even though illegal harvesting of rosewood has contributed significantly to the placement of the species under Appendix II of CITES, the inadequacies in the dynamics of the species highlighted earlier led to adoption of a **precautionary approach (conservative estimates)** to the determination of annual quotas for the species in off reserve areas. There is also lack of information on the dynamics and general ecology of rosewood and many other tree species in the savannah zone of Ghana. This has been a major limitation in determining allowable cut of many savannah species. When this information has been gathered and analyzed then we will be in a better position to understand increment, mortality and regeneration behavior of the species.

10.0 REFERENCES

Ablordeppey, S. D. (2009, October 6). 'Tree Stumps now Useful'. *The Daily Graphic*, p.16.

Aubreville, A. 1950. Flore forestière soudano-guinéenne. A.OF – Cameroun-AEF. Société d'Editions Géographiques, Maritimes et Coloniales, Paris. 523 p.

Boadu, S., Otoo, E., Boateng, A. & Koomson, A. D. (2021). Inland Waterway Transportation (IWT) in Ghana: A case study of Volta Lake Transport.

Dumenu, W. K. and Bandoh, W. N. 2016 Exploitation of African Rosewood (*Pterocarpus erinaceus*) In Ghana: A Situation Analysis. Ghana J. Forestry, Vol. 32, 1 – 15

Energy Commission (2006). Strategic National Energy Plan—2006-2020 (SNEP). Accra. Available from http://energycom.g

Fitzgerald, E. (2008). *Underwater Timber Logging*. Article retrieved online on January 22, 2012 from the World Wide Web: http://www.ecologSy.com/2008/09/09/underwater-timber-logging/.

FC, 1996 Report on the Off reserve forest inventory project in Ghana. Prepared for DFID (UK).

Ghana News Agency. (2011). NGO against removal of Tree Stumps in Volta Lake. Article retrieved online on May 15, 2012:http://edition.myjoyonline.com/pages/news/201007/48832.php

Ghana Statistical Service (2019). Ghana Living Standard Survey 6 Report.

Hutchinson, J., J.M. Dalziel, and R.W.J. Keay. 1958. Flora of west tropical Africa. Vol. 1, part 2. Crown Agents for Overseas Governments and Administrations, London. 531 p.

ICRAF. 1998. Agroforestry tree database (CD ROM). ICRAF, Nairobi.

NASA (2018). Lake Volta, Ghana. Visible Earth. NASA. Retrieved 7 March 2018, Retrieved from https://en.wikipedia.org/wiki/Volta_River.

RMSC, 2013. Report on rosewood (*Krayie)* inventory. A technical report submitted by a joint RMSC FSD Team.

RMSC, 2017. Static inventory of Rosewood Resources in endowed areas in Ghana: An approach to regulating its exploitation in Ghana. A technical report submitted by RMSC.

Roussel, J. 1996. Pépinière et plantations forestières en Afrique tropicale sèche. ISRA/CIRAD, Dakar, Senegal. 435 p.

USAID/West Africa Biodiversity and Climate Change (WA BiCC), (2021). West Africa Rosewoods Synthesis Report: Conservation Status, CITES Compliance, and Priorities for Protecting Rosewoods in West Africa, 2nd Labone Link, North Labone, Accra – Ghana. 49 pp.

Thrower, J. S. Siisi-Wilson, E. & Bilijo, N. 2007 Volta Lake Timber Inventory Program: Initial Resource Valuation. Clarke Sustainable Resource Development Ltd.

VRA and FC, 2007 Volta Lake Timber Inventory Program – Initial Timber Inventory

World Bank (2015). Volta river basin strategic action programme implementation project.

11.0 ANNEXES

Annex I Mean stem numbers per km^2 grouped according to diameter classes for Rosewood. September, 2022

Region	District Assembly	Forest District	Total area (Km2)	Net area (Km2) - 40%	STEM10	STEM20	STEM30	STEM40	STEM50	STEM60	STEM>60	STEMTOT	FELLSTEM
Ashanti	Asante Akyem North	Kumawu	1126.72	450.7	100.0	250.0	140.0	17.5	0.0	0.0	0.0	507.5	157.5
Ashanti	Drobonso	Kumawu	3867.42	1547.0	265.0	541.3	136.3	16.3	0.0	0.0	0.0	958.8	152.5
Brong Ahafo	Pru	Atebubu	2309.65	923.9	120.0	572.5	240.0	40.0	2.5	0.0	0.0	975.0	282.5
Brong Ahafo	Sene West	Atebubu	4110.13	1644.1	110.0	295.0	105.0	17.5	0.0	0.0	0.0	527.5	122.5
Brong Ahafo	Nkoranza North	Kintampo	1003.86	401.5	344.0	632.0	216.0	36.0	1.0	0.0	0.0	1229.0	253.0
Brong Ahafo	Sene East	Atebubu	4110.13	1644.1	226.7	360.0	155.0	16.7	1.7	0.0	0.0	760.0	173.3
Brong Ahafo	Kintampo North	Kintampo	4832.98	1933.2	157.1	432.9	112.1	8.6	0.0	0.0	0.0	710.7	120.7
Northern	Central Gonja	Buipe	8142.91	3257.2	60.0	246.7	190.0	46.7	6.7	8.3	1.7	560.0	253.3
Northern	West Gonja	Buipe	9272.03	3708.8	76.0	151.0	163.0	26.0	11.0	9.0	6.0	442.0	215.0
Northern	Saboba	Yendi	1819.65	727.9	40.0	40.0	85.0	45.0	15.0	15.0	0.0	240.0	160.0
Northern	Zabzugu	Yendi	2365	946.0	100.0	335.0	208.3	63.3	1.7	1.7	0.0	710.0	275.0
Northern	Bole	Bole	5745.93	2298.4	470.0	597.5	105.0	26.3	2.5	0.0	0.0	1201.3	133.8

Northern	East Gonja	Yendi	9,351	3740.4	100.0	535.0	235.0	22.5	0.0	0.0	0.0	892.5	257.5
Northern	Sawla Tuna Kaba	Bole	4223.21	1689.3	220.0	425.0	165.0	17.5	0.0	0.0	0.0	827.5	182.5
Upper East	Tongo	Bolgatanga	867	346.8	20.0	152.5	142.5	72.5	10.0	0.0	0.0	397.5	225.0
Upper East	Builsa North	Navrongo	816.91	326.8	20.0	60.0	22.5	17.5	5.0	0.0	0.0	125.0	45.0
Upper East	Builsa South	Navrongo	1241.99	496.8	30.0	62.5	80.0	55.0	12.5	0.0	0.0	240.0	147.5
Upper East	Navrongo	Navrongo	1704.6	681.8	320.0	205.0	130.0	80.0	5.0	0.0	0.0	740.0	215.0
Upper East	Kassena Nakana	Navrongo	767	306.8	260.0	60.0	105.0	30.0	5.0	0.0	0.0	460.0	140.0
Upper West	Wa East	Lawra	3633.13	1453.3	100.0	225.0	225.0	18.3	1.7	3.3	0.0	573.3	248.3
Upper West	Wa West	Lawra	1554.42	621.8	153.3	66.7	73.3	15.0	11.7	6.7	1.7	328.3	108.3
Upper West	Sissala East	Tumu	4613.5	1845.4	95.0	151.3	171.3	55.0	17.5	0.0	2.5	492.5	246.3
Upper West	Sissala West	Tumu	1913.35	765.3	120.0	52.5	75.0	32.5	0.0	7.5	0.0	287.5	115.0
Volta	Biakoye	Jasikan	1105.9	442.4	68.0	319.0	134.0	46.0	18.0	5.0	1.0	591.0	204.0
Volta	Nkwanta South	Nkwanta	2134.25	853.7	40.0	307.5	85.0	75.0	15.0	2.5	0.0	525.0	177.5
Volta	Krachi West	Nkwanta	930.28	372.1	70.0	332.5	115.0	57.5	22.5	2.5	0.0	600.0	197.5

Annex II Mean volume estimates per km^2 grouped according to diameter classes for Rosewood. September, 2022

District Assembly	Total area (Km2)	Net area (Km2)- 40%	<9.99cm	10-19.99cm	20-29.99cm	30-39.99cm	40-49.99cm	50-59.99cm	VOL>60cm	VOLTOT	TotF lim Vol
Asante Akyem North	1126.72	450.69	2.78	46.37	70.34	16.45	0.00	0.00	0.00	135.94	86.79
Drobonso	3867.42	1546.97	10.68	91.79	62.50	17.55	0.00	0.00	0.00	182.52	80.05
Pru	2309.65	923.86	6.33	99.70	119.69	40.31	4.07	0.00	0.00	270.10	164.07
Sene West	4110.13	1644.05	4.89	50.77	49.80	17.64	0.00	0.00	0.00	123.09	67.43
Nkoranza North	1003.86	401.54	12.63	102.57	106.66	39.31	1.61	0.00	0.00	262.78	147.58
Sene East	4110.13	1644.05	9.84	63.90	77.93	16.68	2.67	0.00	0.00	171.02	97.29
Kintampo North	4832.98	1933.19	5.47	75.26	54.07	8.13	0.00	0.00	0.00	142.93	62.19
Central Gonja	8142.91	3257.16	1.78	50.48	95.80	48.98	15.55	23.91	7.13	243.62	191.37
West Gonja	9272.03	3708.81	2.64	29.13	85.04	28.37	20.58	25.34	27.30	218.40	186.63
Saboba	1819.65	727.86	2.16	6.31	48.90	50.49	28.73	49.57	0.00	186.16	177.68
Zabzugu	2365	946.00	3.49	67.99	110.75	65.29	3.39	4.72	0.00	255.63	184.15
Bole	5745.93	2298.37	18.59	94.65	50.84	26.54	4.14	0.00	0.00	194.76	81.52
East Gonja	9,351	3740.40	3.14	98.59	116.72	21.88	0.00	0.00	0.00	240.33	138.60
Sawla Tuna Kaba	4223.21	1689.28	7.74	66.48	79.68	18.54	0.00	0.00	0.00	172.43	98.22
Talensi	867	346.80	0.86	31.15	82.98	73.22	15.88	0.00	0.00	204.08	172.08
Builsa North	816.91	326.76	0.78	11.72	9.35	19.10	8.72	0.00	0.00	49.66	37.17
Builsa South	1241.99	496.80	1.49	14.12	40.47	57.85	22.60	0.00	0.00	136.52	120.91
Navrongo	1704.6	681.84	9.69	45.20	68.53	89.91	8.27	0.00	0.00	221.60	166.71
Kassena Nakana	767	306.80	8.33	10.98	57.25	29.85	8.27	0.00	0.00	114.67	95.37
Wa East	3633.13	1453.25	3.57	40.05	108.24	20.02	2.61	8.55	0.00	183.05	139.43
Wa West	1554.42	621.77	3.46	12.52	39.38	15.47	23.15	18.30	6.40	118.68	102.70

Sissala East	4613.5	1845.40	3.62	30.29	89.80	58.45	34.30	0.00	16.43	232.89	198.98
Sissala West	1913.35	765.34	4.55	9.11	42.77	35.59	0.00	20.75	0.00	112.76	99.11
Biakoye	1105.9	442.36	2.65	62.66	72.92	47.06	31.00	14.72	3.87	234.88	169.57
Nkwanta South	2134.25	853.70	1.38	70.63	47.06	79.56	28.51	7.03	0.00	234.16	162.15
Krachi West	930.28	372.11	2.80	77.52	67.46	58.74	40.54	7.36	0.00	254.42	174.10

Annex III Annual felling quotas for three scenarios of 50years, 40years and 30years for Rosewood. September, 2022

Region	District Assembly	Forest District	Total area (Km2)	Net area (Km2)-40%	TOTSTEMS> 20cn dbh	TOTVol> 20cn dbh	60% deducted from stock> 20cm		Scenario 1 (50years)		Scenario 2 (40years)		Scenario 3 (30years)	
							Stem >=FLT	Volume >=FLT	Stem >=FLT	Vol >=FLT	Stem >=FLT	Vol >=FLT	Stem >=FLT	Vol >=FLT
Ashanti	Asante Akyem North	Kumawu	1126.72	450.688	70,983.36	39,115.54	28,393.34	15,646.22	567.87	312.92	709.83	391.16	946.44	521.54
Ashanti	Drobonso	Kumawu	3867.42	1546.968	243,647.46	134,262.49	97,458.98	53,705.00	1,949.18	1,074.10	2,436.47	1,342.62	3,248.63	1,790.17
Brong Ahafo	Pru	Atebubu	2309.65	923.86	145,507.95	80,182.49	58,203.18	32,073.00	1,164.06	641.46	1,455.08	801.82	1,940.11	1,069.10
Brong Ahafo	Sene West	Atebubu	4110.13	1644.052	258,938.19	142,688.48	103,575.28	57,075.39	2,071.51	1,141.51	2,589.38	1,426.88	3,452.51	1,902.51
Brong Ahafo	Nkoranza North	Kintampo	1003.86	401.544	63,243.18	34,850.30	25,297.27	13,940.12	505.95	278.80	632.43	348.50	843.24	464.67
Brong Ahafo	Sene East	Atebubu	4110.13	1644.052	258,938.19	142,688.48	103,575.28	57,075.39	2,071.51	1,141.51	2,589.38	1,426.88	3,452.51	1,902.51
Brong Ahafo	Kintampo North	Kintampo	4832.98	1933.192	304,477.74	167,783.16	121,791.10	67,113.26	2,435.82	1,342.27	3,044.78	1,677.83	4,059.70	2,237.11
Northern	Central Gonja	Buipe	8142.91	3257.164	513,003.33	282,691.66	205,201.33	113,076.67	4,104.03	2,261.53	5,130.03	2,826.92	6,840.04	3,769.22
Northern	West Gonja	Buipe	9272.03	3708.812	584,137.89	321,890.53	233,655.16	128,756.21	4,673.10	2,575.12	5,841.38	3,218.91	7,788.51	4,291.87
Northern	Sabobа	Yendi	1819.65	727.86	114,637.95	63,171.51	45,855.18	25,268.60	917.10	505.37	1,146.38	631.72	1,528.51	842.29

North ern	Zabzu gu	Yendi	2365	946	148,995. 00	82,104.04	59,598.0 0	32,841.6 1	1,191. 96	656.83	1,489. 95	821.04	1,986. 60	1,094. 72
North ern	Bole	Bole	5745.9 3	2298.3 72	361,993. 59	199,477.4 0	144,797. 44	79,790.9 6	2,895. 95	1,595. 82	3,619. 94	1,994. 77	4,826. 58	2,659. 70
North ern	East Gonja	Yendi	9,351	3740.4	589,113. 00	324,632.0 7	235,645. 20	129,852. 83	4,712. 90	2,597. 06	5,891. 13	3,246. 32	7,854. 84	4,328. 43
North ern	Sawla Tuna Kaba	Bole	4223.2 1	1689.2 84	266,062. 23	146,614.2 0	106,424. 89	58,645.6 8	2,128. 50	1,172. 91	2,660. 62	1,466. 14	3,547. 50	1,954. 86
Upper East	Tongo	Bolgata nga	867	346.8	54,621.0 0	30,099.03	21,848.4 0	12,039.6 1	436.97	240.79	546.21	300.99	728.28	401.32
Upper East	Builsa North	Navron go	816.91	326.76 4	51,465.3 3	28,360.09	20,586.1 3	11,344.0 4	411.72	226.88	514.65	283.60	686.20	378.13
Upper East	Builsa South	Navron go	1241.9 9	496.79 6	78,245.3 7	43,117.29	31,298.1 5	17,246.9 2	625.96	344.94	782.45	431.17	1,043. 27	574.90
Upper East	Navro ngo	Navron go	1704.6	681.84	107,389. 80	59,177.40	42,955.9 2	23,670.9 6	859.12	473.42	1,073. 90	591.77	1,431. 86	789.03
Upper East	Kasse na Nakan a	Navron go	767	306.8	48,321.0 0	26,627.40	19,328.4 0	10,650.9 6	386.57	213.02	483.21	266.27	644.28	355.03
Upper West	Wa East	Lawra	3633.1 3	1453.2 52	228,887. 19	126,128.8 1	91,554.8 8	50,451.5 2	1,831. 10	1,009. 03	2,288. 87	1,261. 29	3,051. 83	1,681. 72
Upper West	Wa West	Lawra	1554.4 2	621.76 8	97,928.4 6	53,963.70	39,171.3 8	21,585.4 8	783.43	431.71	979.28	539.64	1,305. 71	719.52

Upper West	Sissala East	Tumu	4613.5	1845.4	290,650.50	160,163.63	116,260.20	64,065.45	2,325.20	1,281.31	2,906.51	1,601.64	3,875.34	2,135.52
Upper West	Sissala West	Tumu	1913.35	765.34	120,541.05	66,424.42	48,216.42	26,569.77	964.33	531.40	1,205.41	664.24	1,607.21	885.66
Volta	Biakoye	Jasikan	1105.9	442.36	69,671.70	38,392.75	27,868.68	15,357.10	557.37	307.14	696.72	383.93	928.96	511.90
Volta	Nkwanta South	Nkwanta	2134.25	853.7	134,457.75	74,093.25	53,783.10	29,637.30	1,075.66	592.75	1,344.58	740.93	1,792.77	987.91
Volta	Krachi West	Nkwanta	930.28	372.112	58,607.64	32,295.87	23,443.06	12,918.35	468.86	258.37	586.08	322.96	781.44	430.61
Total			**83,562.95**	**33,425.18**	**5,264,465.85**	**2,900,996.00**	**2,105,786.34**	**1,160,398.40**	**42,115.73**	**23,207.97**	**52,644.66**	**29,009.96**	**70,192.88**	**38,679.95**

Assumptions

1. Population dynamics (increment, regeneration / recruitment, mortality rates) are not included in the analysis
2. 60% of the gross area of each District Assembly is designated as settlements, protected areas/forest reserves,
3. Only stems above felling limit (20 cm dbh) were used for the analysis
4. 60% retention of all stems above Felling Limit to cater for destruction such as, wildfire, clearance for farming, charcoal burning, domestic use
5. The 50years scenario was selected among the three scenarios dur inadequate information on growth rate , mortality rate and recruitment of the *Pterocarpus erinaceus*

Annex IV Addendum

Under water rosewood inventory in the Volta Basin in Ghana

Kete Krachi Timber Recovery (KKTR) was granted a permit to salvage under water trees in the Volta Basin by the Minister of Lands and Natural Resources in 2010. These were submerged trees which died about 60years ago during the construction of the Akosombo Hydro electric dam in 1961. A study conducted in 2007 estimated the under water rosewood volume to be 640,855m^3 (Volta Lake Timber Inventory Program – Initial Timber Inventory, September 2007 Population Status, Trade and Sustainable Management of African Rosewood in Ghana- Forestry Commission , September 2021). The underwater rosewood have a different appearance from the terrestrial rosewood in Ghana and therefore make them easy to differentiate. This feature will help in monitoirng to prevent abuse of harvesting permits.

Annex IV Correspondence, methodology and statistics on under water trees in the Volta Basin

KETE KRACHI TIMBER RECOVERY

Mr. John Allotey
Chief Executive, Forestry Commission
Accra

September 30th, 2022

Dear Sir:

KKTR's Exemptions to Export Rosewood, Ghana's Submission to CITES At November's COP 19 in Panama City

I trust this letter finds you well.

I write to follow up on a report that we understand is presently being compiled for presentation to CITES at the above-referenced COP 19, concerning determination of sustainable export volumes for Ghana's rosewood.

As you know, in the course of KKTR's operations we regularly salvage quantities of rosewood from Lake Volta, being submerged trees that died 60+ years ago, so extraction of same has no impact on Ghana's remaining living rosewood stocks. In recognition of this, the Ministry of Lands and Natural Resources in February of 2022 directed that KKTR be granted an exemption from the ban on rosewood export so as to enable us to conduct our commercial operations per our April 2010 salvage concession agreement.

We estimate that Lake Volta contains ~640,000m³ in recoverable rosewood roundlogs (Sources: Population Status, Trade and Sustainable Management of African Rosewood in Ghana - Forestry Commission, September 2021; Volta Lake Timber Inventory Program - Initial Timber Inventory, September 2007), and are eager to assist in the completion of the report to be presented at COP 19 to ensure that it appropriately represents Lake Volta as a source of rosewood that should be exempted from both export restrictions and calculations of any quotas determined for land-based rosewood. As you appreciate, at this juncture in the economic life of our nation, all foreign exchange earnings are crucial, and we stand ready to do our part to realise this neglected national resource.

I trust the above is in order, we are at your disposal to discuss, and thank you in advance for your consideration.

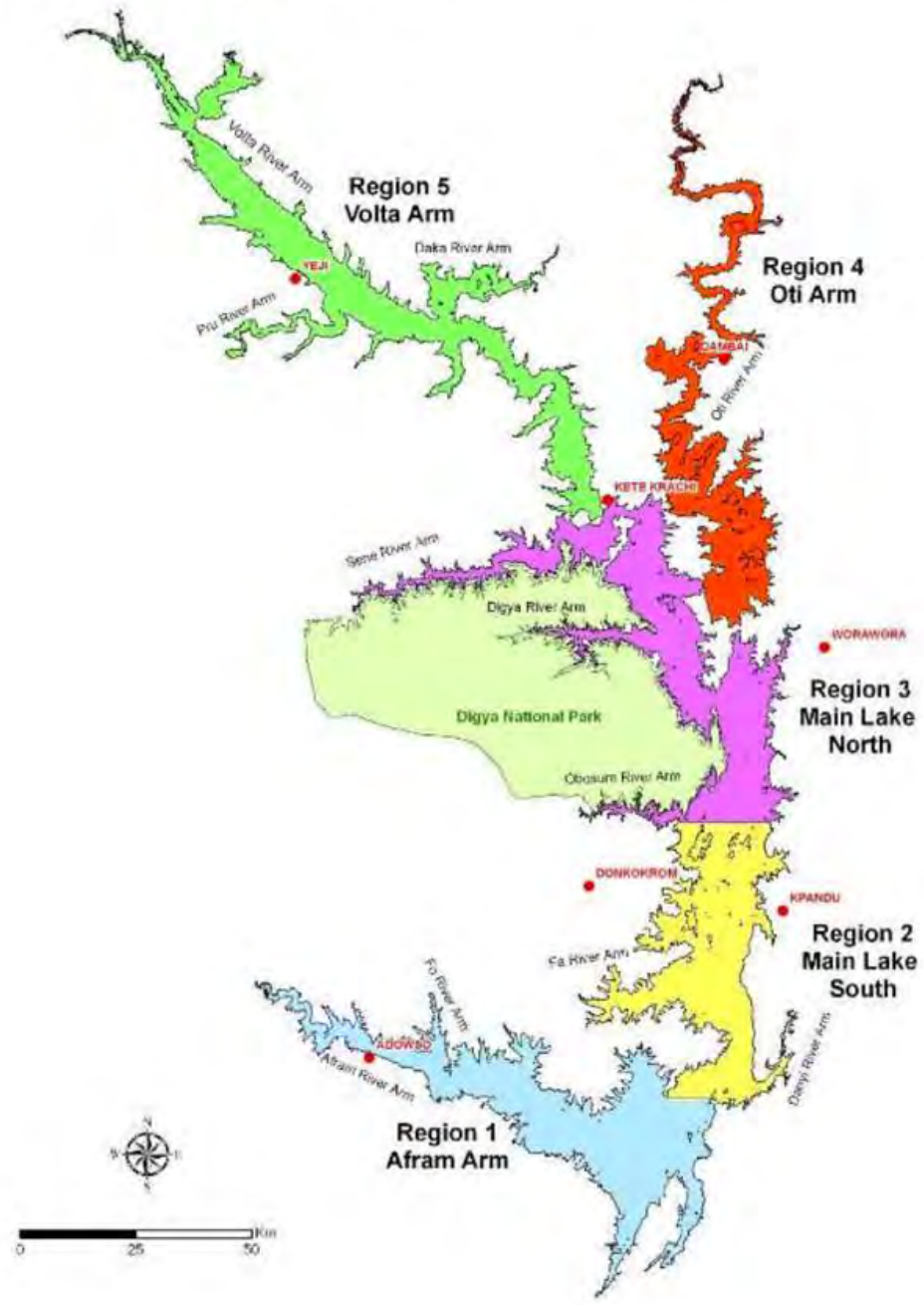
Elkin Pianim
CEO

Copy:

Honourable Samuel A. Jinapor, Ministry Of Lands And Natural Resources
Mr. Yoofi Grant, CEO, Ghana Investment Promotion Center

5 Abafun Crescent, Accra, Ghana. Tel:+233 302 768960-61; Fax:+233 302 768966
Company Number: CS453572014

- The Five Regions of Volta Lake



Source. Thrower et al. 2007

2. Information Sources

2.1 Aerial Photographs & Maps

Aerial Photographs

We acquired 1,750 aerial photographs taken in 1946/47 by the British Royal Air Force (RAF) of the lake area prior to flooding. These are high resolution black and white photos with scales ranging from about 1:25,000 to 1:30,000 (Appendix 1).

Maps

We also acquired the 1:50,000 scale maps made those photos with features updated to 1954. Those maps include geographic features, water features (rivers and creeks), improvements (towns, roads, etc.), contour lines (50 ft intervals), and vegetation mapping symbols (Appendix 2).

Identifying Forested Areas

We identified and mapped the location of closed-canopy forest areas from the photos and maps in Regions 1, 2, 3, and 4 (Appendix 3). Mapping for Region 5 is underway and will be completed near the end of 2007. We used the vegetation symbols on the maps to cross-reference with the location of forested area on the photos to precisely locate and map closed-canopy forest areas. This gives us an accurate location and estimate of size of these areas that are now submerged in the lake.

We did not identify the spatial location of the potentially commercial areas of wooded savanna. That may be done in subsequent phases of mapping and photo interpretation.

Change Before Flooding

We do not believe that any significant changes would have occurred to the forest area identified on these maps and photos in the eight or nine years from the time the maps were published in 1954 to 1962 when flooding of the lake began. Two of the retired forestry experts we interviewed worked in the Afram River area prior to flooding and specifically noted that no commercial timber harvesting was occurring in the area at that time. The area had relatively poor access and commercial timber harvesting in the southern wetter forests (more valuable) had not yet progressed into the northern drier forests (less valuable at that time). They also noted that local villagers would take the occasional tree for local use using pit sawing methods.

Source. Thrower et al. 2007

2.2 *Inventory Data*

Source

The inventory data used in this process were obtained from Dr. William Hawthorne at Oxford University. The data were originally taken under the Ghana National forest inventory completed from 1986 to 1990. Dr. Hawthorne worked in the data collection and analysis on that inventory.

The data were collected in temporary sample plots in Forest Reserves including Afram Headwaters, Afrensu-Brohuma, Awura, Asubima, Chirimfa, Bandai Hills South, Kwamisa, Mankrang, Opro River, and Tain 2. These reserves were selected by Dr. Hawthorne as ones in drier than average, transition areas, and savanna areas from the larger group of Forest Reserves in the dry semi-deciduous (DS) forest type. The intent was to ensure that the summaries, that we use to represent the average of large areas, included these areas and was not biased to better stocked and more classic DS forest types.

Modification to the Data

Most experts consulted noted that the Reserves included in these summaries would have had one and possibly two logging entries prior the data being collected for the National Inventory, and that the area that now flooded would not have had any large scale commercial timber harvesting. This was confirmed by two retired Forestry Commission staff that worked in the area prior to flooding. Consequently, we add a small number of large trees to the data to partially account for those expected differences. These additions were 14 trees per square km (14 trees/100 ha or 0.14 trees/ha) which was about 4.0 m^3/ha (Table 1). We reviewed these additions with some experts and they believe they are reasonable and probably conservative.

Source. Thrower et al. 2007

Volume Reduction for Decay & Defect

We estimated the volume of trees in the inventory data using the equations developed for the Ghana National Forest Inventory (Wong and Blackett 1994). We assigned the mid-point of each 30 cm diameter class to each tree in the class and estimated bole (outside bark) volume using the overall average equation for Zone 1 (defined by Wong and Blackett). Equations are given for specific species groups, but they do not cover all species and thus we used the overall average equation to avoid bias.

We reduced those volumes by 10% to account for bark volume and defect as recommended by Wong and Blackett. We did not make the log-log correction for the back transformation, which reduced the volume by an additional 4%. This was to account for additional internal and some external rot that may have occurred in the trees while submerged. The resulting net volumes are used in these summaries.

Volume Reduction for Silt Accumulation

We did not make any volume reduction for the possibility of silt accumulation on the lake floor (which may require felling trees at some point above the original ground line). Although this is a possibility, we have no information to suggest this is the case. Furthermore, sonar images of the lake floor in Afram Arm suggest that silt accumulation is minimal and should not impact harvesting operations.

2.3 Expert Opinion

Process

We reviewed the inventory data with active and retired operational and research personnel at the Forest Research Institute of Ghana (FORIG) and the Forestry Commission (Ministry of Lands and Forests) in Ghana. The review included the estimates for volume (m^3/ha), species composition (volume by species and species groups), and diameter distributions (numbers of trees/ha by diameter class, species, and species groups). We also spent considerable time with Dr. Hawthorne at Oxford University collating and reviewing these data. The contribution of these experts was essential in developing these estimates and provided frequent *logical checks* of the data, summaries, and assumptions that we made throughout this process.

All experts agreed that the summaries give a reasonable expectation of what to find – on average – in Region 1 and 2 of the lake. Some experts were familiar with Region 3

Source. Thrower et al. 2007

and suggested that the information should be applicable to the closed-canopy forest in that area.

Contributors

The experts directly consulted and who provided major contributions to this process included:

Dr. William Hawthorne, Oxford University
Dr. Joseph Cobbinah, FORIG
Dr. Andrew Oteng-Amoako, FORIG
Dr. Ernest Foli, FORIG
Dr. Joseph Ofori, FORIG
Dr. Victor Agyeman, FORIG
Mr. Edward Obiaw, Forestry Commission
Mr. Kofi Affum Baffoe, Forestry Commission
Mr. Francis Balfour Agurgo, Forestry Commission
Mr. Charles Dei-Amoah, Forestry Commission
Mr. Oppon Sasu, Forestry Commission
Mr. K.K.F. Ghartey, Retired inventory officer, Forestry Commission
Mr. Bimah, Forestry Commission (Ho Forest Regional Manager)
Mr. E.K. Afanyade, Retired Regional Forestry Officer, Forestry Commission
Mr. A.A. Duah, Retired Technical Forestry Officer, Forestry Commission
Dr. E.A. Abeney, Senior Lecturer, KN University of Science and Technology

Others contacted, directly or indirectly, for general or supporting information included:

Dr. Valerie Lemay, Professor of Forestry, University of British Columbia
Dr. Gary Bull, Professor of Forestry, University of British Columbia
Mr. Olman Serrano, Tropical Forestry Expert, Food and Agriculture Organization
Mr. Schalk Kapp, Forestry Consultant, South Africa
Dr. Geldenhuys, Professor of Forestry, Stellenbosch University, South Africa
Dr. Cris Brack, Professor of Forestry, Australian National University
Dr. R. Hughes, Retired Professor of Tropical Botany and Wetlands of Africa
Dr. Mark Ashton, Professor of Tropical Forest Ecology, Yale University
Dr. Jefferson Hall, Smithsonian Tropical Research Institute
Dr. Michael Swaine, Professor of Tropical Forest Ecology, University of Aberdeen
Dr. A.Y. Omule, Consultant in Tropical Forest Inventory
Dr. Jacob Boateng, Research Scientist, BC Ministry of Forests

Source. Thrower et al. 2007

- Volume by Forest Type and Region

Region	Forest Type	Variant	Area (ha)	Of Region	Of Lake	Volume (m^3)	Of Region	Of Lake
1	DS	Closed Canopy	40,688	31%	7%	3,824,672	85%	27%
	DS	Discontinuous	2,889	2%	0%	135,783	3%	1%
	WS	Wooded	22,174	17%	4%	554,344	12%	4%
	Other	Non Forested	67,417	51%	11%			
	Total		133,168	100%	23%	4,514,799	100%	32%
2	DS	Closed Canopy	17,939	16%	3%	1,686,266	71%	12%
	DS	Discontinuous	2,867	3%	0%	134,749	6%	1%
	WS	Wooded	21,882	20%	4%	547,055	23%	4%
	Other	Non Forested	66,531	61%	11%			
	Total		109,219	100%	18%	2,368,070	100%	17%
3	DS	Closed Canopy	22,983	17%	4%	2,160,402	70%	15%
	DS	Discontinuous	6,045	5%	1%	284,115	9%	2%
	WS	Wooded	25,647	19%	4%	641,174	21%	5%
	Other	Non Forested	77,977	59%	13%			
	Total		132,652	100%	22%	3,085,691	100%	22%
4	DS	Closed Canopy	12,476	15%	2%	1,172,744	59%	8%
	DS	Discontinuous	9,024	11%	2%	424,128	21%	3%
	WS	Wooded	15,498	18%	3%	387,455	20%	3%
	Other	Non Forested	47,121	56%	8%			
	Total		84,119	100%	14%	1,984,327	100%	14%
5	DS	Closed Canopy	10,612	8%	2%	997,536	48%	7%
	DS	Discontinuous	7,959	6%	1%	374,076	18%	3%
	WS	Wooded	28,235	21%	5%	705,869	34%	5%
	Other	Non Forested	85,845	65%	15%			
	Total		132,651	100%	22%	2,077,480	100%	15%
All	DS	Closed Canopy	104,698		18%	9,841,620		70%
	DS	Discontinuous	28,784		5%	1,352,851		10%
	WS	Wooded	113,436		19%	2,835,897		20%
	Other	Non Forested	344,891		58%			
	Total		591,809		100%	14,030,368		100%

Source. Thrower et al. 2007

Annex V Profiles of Forest Reserves and National Parks found within the natural range of *Pterocarpus erinaeus* in Ghana

No.	Name of Reserve	Area/Size (km2)	Latitude	Longitude	Conservation area
1	Tain Tributaries I	30.56	7 25'N	2 14'W	Forest reserve
2	Yaya	51.28	7 27'N	2 08'W	Forest reserve
3	Nsemre	18.1	7 32'N	2 12'W	Forest reserve
4	Sawsaw	62.94	7 36'N	2 10'W	Forest reserve
5	Tain II	509.19	7 35'N	2 30'W	Forest reserve
6	PamuBerekum	189.1	7 25'N	2 56'W	Forest reserve
7	Bosomoa	170.94	7 55'N	1 49'W	Forest reserve
8	Buru	302.3			Forest reserve
9	Klemu Headwaters	10.88	6 46'N	0 31'E	Forest reserve
10	Abutia Hills	8.99			Forest reserve
11	Kpandu Range West	35.5	5 45'N	0 17'E	Forest reserve
12	Togo Plateau	150	7 14'N	0 25 'E	Forest reserve
13	Ho Hills	0.2			Forest reserve
14	Kpando Plantation	0.44			Forest reserve
15	Odome River	16.06	7 19'N	0 29'E	Forest reserve
16	Kabo River	135.97	7 37'N	0 26'E	Forest reserve
17	Apepesu	60.6	7 50'N	0 35'E	Forest reserve
18	Asuokoko River	116.03	7 47'N	0 25'E	Forest reserve
19	Chai River	182.3	8 02'N	0 26'E	Forest reserve
20	Bopona	61.75			Forest reserve
21	Sisili Central	155.09			Forest reserve
22	Gia	21.7			Forest reserve
23	Kanjarga-Fumbisi	12.95			Forest reserve
24	Chasi	72.52			Forest reserve
25	Chiana	43.59			Forest reserve
26	Tankara	4.82			Forest reserve
27	Asebiliki	38.85			Forest reserve
28	Dedoro	3.11			Forest reserve
29	Saboro Gov't	0.28			Forest reserve
30	Kologu-Naga	45.33			Forest reserve
31	Kadembali	23.85			Forest reserve
32	Sisiili North	82.88			Forest reserve
33	Wiaga	9.84			Forest reserve
34	WiagaKandema	67.34			Forest reserve
35	Pogi	26.06			Forest reserve
36	Red Volta West	281.59			Forest reserve
37	Nyokoko Plantation	0.41			Forest reserve
38	Takwindi East	193.21			Forest reserve
39	Takwiddi West	119.14			Forest reserve
40	Bumbuga	4.14			Forest reserve
41	Bumbuga Ex Blk 1	0.41			Forest reserve
42	Morago West	39.76			Forest reserve
43	Basua Bridge (Proposed)	2.18			Forest reserve
44	Red Volta East	217.61			Forest reserve
45	Zamse Hills BLK 1 & 2	10.13			Forest reserve

46	Zamse Plantation	2.28			Forest reserve
47	Upper TamneBlk 1 - 5	17.28			Forest reserve
48	Gambaga East	127.53			Forest reserve
49	Gambaga South West 1	115			Forest reserve
50	Gambaga South West 2	222.22			Forest reserve
51	Morago River	88.06			Forest reserve
52	Nasia Tributaries	314.69			Forest reserve
53	Tamale FuelwoodBlk 1 & 2	2.2			Forest reserve
54	Tamale waterworks	1.41			Forest reserve
55	Sinsangblewini	73.8			Forest reserve
56	Education Plantation	2.6			Forest reserve
57	Biligu	56.7			Forest reserve
58	Daka	2.6			Forest reserve
59	Kulupene	2.2			Forest reserve
60	Karaga	24.5			Forest reserve
61	Bombi	1.48			Forest reserve
62	Damongo Scarp	39.37			Forest reserve
63	Kenikeni	512.98			Forest reserve
64	Nyembong	4.66			Forest reserve
65	Yerada	424.81			Forest reserve
66	Yakombo	1210.95			Forest reserve
67	Kumbo	164.49			Forest reserve
68	Lambo	113.39			Forest reserve
69	Pudo	51.8			Forest reserve
70	Chira	41.44			Forest reserve
71	Tumu	54.39			Forest reserve
72	Mawbia	129.5			Forest reserve
73	Kulpawn Headwaters	155.3			Forest reserve
74	Pulumbugala	39.21			Forest reserve
75	Tapania Tributaries	46.62			Forest reserve
76	Poli	35.61			Forest reserve
77	Kamba	37.56			Forest reserve
78	Lawra Station	1.27			Forest reserve
79	BagwonBawo	64.73			Forest reserve
80	Nandom	1.86			Forest reserve
81	Kulpawn Tributaries	99.95			Forest reserve
82	Ambalaara	99.95			Forest reserve
83	Nuale	51.8			Forest reserve
84	Bambule	204.09			Forest reserve
85	Bomfobri Wildlife Sanctuary	53.1	6 54’-7 01’N	1 08’-1 13’W	Wildlife Protected Area
86	Digya National Park	3,478.30	7 06’-7 44’N	0 06’-0 42’W	Wildlife Protected Area
87	Bui National Park	1,820.60	8 01’-8 50’N	2 12’-2 33’W	Wildlife Protected Area
88	Kogyae Strict Nature Reserve	385.7	7 00’-7 21’N	1 00’-1 13’W	Wildlife Protected Area
89	Shai-Hill Resource Reserve	53	5 85’-5 97’N	0 38’ 9 06’E	Wildlife Protected Area
90	Kalakpa Resource Reserve	320.2	6 18’-6 29’N	0 18’-0 31’E	Wildlife Protected Area
91	Kyabobo National Park	222	8 17’–8 31’N	0 31’–0 44’E	Wildlife Protected Area

92	Mole National Park	4,840.00	9 11'–10 10'N	1 22'-2 13'W	Wildlife Protected Area
93	Gbele Resource Reserve	565.4	10 22'-10 44'N	2 03'–2 12'W	Wildlife Protected Area

Review of *Pterocarpus erinaceus* Non-detriment Findings for Ghana and Sierra Leone

Ruben Boles, CITES Plant Committee member
Prepared in consultation with colleagues from the North American Region

March 2024

I am pleased to provide comments on NDF documents prepared by Ghana and Sierra Leone for *Pterocarpus erinaceus* as part of an intersessional Plants Committee consultation. In preparing this review, I consulted within the North American Region for views and these views are represented in the document.

I recognize the extensive efforts of both countries to produce their respective NDFs and significantly advance the aim of sustainable management for this species. Overall, I advise that additional follow up with Ghana and Sierra Leone is needed before the Plants Committee recommendations b,c, and d under the RST process are met. I look forward to a continued dialogue once both countries have had an opportunity to provide additional information.

Ghana

The NDF produced by Ghana develops district-level and national felling quotas informed by a 2022 inventory data. Ghana has incorporated a number of precautionary elements in its "off-reserve" national felling quota of 23,207.97 m^3 including:

- Excluding portions of the "off-reserve" lands from the quota calculation for conservation, charcoal production, potential future losses from fire, land clearing, etc.
- opting for a 50-year rotation period

The proposed quota may appear to be conservative, but the recent decline in resource availability is a significant concern. Despite the moratorium in 2019, there was a 72% decline in regeneration between 2017 and 2021 (Section 5.2). The charts in Section 5.4 appear to show an overall reduction in the number and volume of trees over the same period, and the following is noted in the NDF: "The trend pinpoints to the fact that existing regulatory mechanisms aimed at controlling the exploitation of the species over the years have not been largely effective." To ensure that the quota is not detrimental to the species and that the scientific basis for the quota is clear, I recommend that the Plants Committee request:

- additional information regarding what management or regulatory measures are failing and what threats are the primary cause of this decline, and how the NDF takes this into account.
- additional information and/or analysis be included to evaluate whether the current 20 cm minimum felling diameter (noted in section 5.1) is appropriate given the ongoing decline described in the NDF.
- Information on aspects of life history and forestry practises that are not addressed in the NDF:
    - What is the age or stage of maturity?
    - How does the stage of maturity compare to the optimal MDE?

- How many seed-bearing trees are required for a healthy, regenerating stand, and how has past harvest of seed-bearing trees impacted natural regeneration?
- Does *P. erinaceus* thrive under low impact logging? Should mature trees be safeguarded from non-timber harvesting activities (for example, leaf collection)?

In addition, the NDF acknowledges significant information gaps and other limitations concerning *P. erinaceus*. I note the following from Section 9.0 (Conclusion): "There is also lack of information on the dynamics and general ecology of rosewood and many other tree species in the savannah zone of Ghana. This has been a major limitation in determining allowable cut of many savannah species. When this information has been gathered and analyzed then we will be in a better position to understand increment, mortality and regeneration behavior of the species." It is important for Ghana to address these deficiencies and to generate more comprehensive and updated data on the species' biology, growth, mortality rate, recruitment, among others, so that, in line with adaptive management, quotas can be further revised and strengthened as new information becomes available.

With regard to the underwater rosewood, I suggest a similar adaptive management approach. The current calculations were based on an estimated mean volume across Lots (5.52 m3/ha; see Section 5.7). Following the harvest of the first 40,000 m^3, new information will be available to confirm or adjust such estimates, including the actual amount of wood available after "cleaning" (i.e. removing bark, defects, rotten wood, etc.).

I recommend that the Plants Committee:

- confirm with Ghana how often information will be reviewed and the NDF updated.

Three national annual harvest/export quotas have been proposed in the NDF: one for off-reserve wood, one for underwater wood, and an aggregate of the two. To ensure that any national quota(s) published on the CITES website will be clear and understandable for Parties, the Plants Committee should consider the following aspects in relation to the proposed quotas, in consultation with the Secretariat:

- recommend that the volumes associated with any quotas for "off-reserve" versus "underwater" woods be published separately on the CITES website;
- consider on the CITES quota website referring to the "underwater" wood as *salvaged wood* and inquire whether there is a more suitable (understandable) term to use than "off-reserve"
- recommend CITES export permits clearly indicate which part of the quota the export relates to; and
- consider issuing a Notification to Parties so that all Parties can be made aware of the two quotas, how they will be published on the CITES website, and how they will be implemented on CITES permits, and referring to this Notification on the CITES quota page (as was done for Guinea-Bissau in 2018).

Sierra Leone

The NDF prepared by Sierra Leone is developed in a way that answers key questions following the 9-step NDF process. It is based on the best available information to date, which includes field data as well as modelling efforts. Sierra Leone describes improvements in their processes to collect and analyze population parameters as well as the collaborative work to set up a traceability and inventory management system.

The NDF reports on district-level and national annual harvestable quotas of standing volume based on inputs from national level plots, and on the results of a digital traceability system for the species in a pilot study carried out in the Tambaha Simibuyie Chiefdom, Karene District. As a precautionary measure, Sierra Leone is submitting to the CITES Secretariat a harvestable quota of 76,324.5 m^3, which is half of the value that was determined from the inputs used.

Additional information is needed before the harvest quota as presented can be supported. I recommend that the Plants Committee ask Sierra Leone to provide clarification on the following:

- What is the scientific basis to support extrapolating the data obtained from the pilot study (Tambaha Simibuyie Chiefdom, Karene District) to the entire population of the species in Sierra Leone across all districts?
- Does the export quota account for domestic uses of the resource (e.g., charcoal production) or losses (e.g., wildfire, land conversion)?

The NDF suggests that optimal minimal diameter of exploitation (MDE) is 35cm for most cases but falls short of recommending this. By not recommending a uniform conservative MDE, the NDF is suggesting that a range of felling from 25-40 cm could be acceptable. I recommend that the Plants Committee ask Sierra Leone to clarify:

- Whether they are recommending a uniform MDE of 35cm dbh across all districts, and how this would be addressed by the law which allows a 30cm MDE.

The predictive modeling analysis draws from multiple data sources, but the methodologies and ground-truthing are not well documented. I am concerned that the predictive modeling and in particular the size class distributions could reflect that a substantial portion of mature individuals have been removed from the population. I recommend that the Plants Committee ask Sierra Leone to provide:

- additional information regarding the methods and ground-truthing to inform the predictive modeling analysis, and
- additional discussion on the population structure and how this is addressed in the NDF.

Certain details regarding life history and forestry practises are not addressed in the NDF. I suggest that the Plants Committee ask Sierra Leone to provide more information on the following:

- What is the age or stage of maturity?
- How does the stage of maturity compare to the optimal MDE?
- How many seed-bearing trees are required for a healthy, regenerating stand, and how has past harvest of seed-bearing trees impacted natural regeneration?

- Does *P. erinaceus* thrive under low impact logging? Should mature trees be safeguarded from non-timber harvesting activities (for example, leaf collection)?

It is important for Sierra Leone to employ an adaptive management approach to incorporate new data & analyses as they become available and to periodically update management and the NDF. I recommend that the Plants Committee:

- confirm with Sierra Leone how often information will be reviewed and the NDF updated.

The legal status and disposition of the "pre zero export quota harvested stocks" of *P. erinaceus* referred to in SC77 Doc. 33.2.2, paragraph 8, is not clear. For example, Sierra Leone's NDF does not provide information about the harvested wood in question such as the volume, timing, and location of harvest. The pre zero export quota harvested stocks should be included for discussion in the intersessional consultation process suggested by the Secretariat that will review the NDF submitted by Sierra Leone.

Maria Isabel Camarena Osorno

From: Ursula.Moser@blv.admin.ch
Sent: 25 March 2024 15:23
To: Maria Isabel Camarena Osorno; Dejana Radisavljevic
Cc: Thea Henriette Carroll; Bruno.Mainini@blv.admin.ch; Matthias.Loertscher@blv.admin.ch
Subject: AW: Proposal for intersessional decision-making by the Plants Committee / Proposition relative à la prise de décisions intersessions par le Comité pour les plantes / Propuesta de adopción de decisiones del Comité de Flora entre períodos de sesiones

Dear all,

I hereby send the following feedback regarding the **NDFs submitted by Sierra Leone and Ghana:**

We welcome the information in the NDF Documents in Annex A and B submitted by Ghana and Sierra Leone. We recognize the progress made by both parties in implementing the short-term recommendations (paragraph a) and we also see that progress is made in improving and increasing amongst others sustainability in forest management and protection of *Pterocarpus erinaceus*.

The long-term recommendations have been addressed and the requirements have been partially implemented or are in the process of being implemented in the future.

The steps 4-8 of the NDFs are not yet finished and still have some gaps. Basic data from the NDFs are therefore missing for a discussion about lifting the zero-export quota. Until the finalized NDFs are available, we recommend maintaining the existing short and long-term RST recommendations. As soon as new findings are available, the lifting of the zero-export quotas can be discussed again.

Kind regards
Ursula

****

Ursula Moser, Biologist
Scientific Officer

CITES MA of Switzerland and Lichtenstein

International Affairs
Species Concervation in international Trade
Federal Food Safety and Veterinary Office FSVO

Schwarzenburgstrasse 155, 3003 Bern, Switzerland
Telephone +41 (0)58 462 25 41
www.cites.ch
cites@blv.admin.ch

GOVERNO DA
GUINÉ-BISSAU

MINISTÉRIO DO AMBIENTE, BIODIVERSIDADE E AÇÃO CLIMÁTICA

CONVENÇÃO INTERNACIONAL SOBRE COMERCIO DAS ESPÉCIES DA FAUNA E DA FLORA SELVAGENS AMEAÇADAS DE EXTINCAO

Ref: March, 2024

CITES Secretariat
Palais des Nations
Avenue de la Paix 8-14,
1211 Genève 10,
Switzerland

Examen du commerce significatif de spécimens d'espèces inscrites à l'Annexe II [Résolution Conf. 12.8 (Rev. CoP18)] du 7 février 2024

Sr. Antonio Pansau Ndafa
Ponto Focal CITES
Guiné-Bissau

Examen du commerce significatif de spécimens d'espèces inscrites à l'Annexe II [Résolution Conf. 12.8 (Rev. CoP18)] du 7 février 2024

Nous accusons réception de la masse ci-dessus de la part du Secrétariat de la CITES. La Guinée-Bissau a certainement respecté les notifications de la CITES et mis en œuvre diverses activités pertinentes à la CITES. Cela est conforme à l'application accélérée des recommandations de l'article XIII et de la RST concernant les espèces de l'Annexe II, en particulier Pterocarpus erinaceus.

Contents

1. Preface

En ce qui concerne les progrès accomplis dans la mise en œuvre des recommandations de l'article XIII pour certains États de l'aire de répartition de Pterocarpus erinaceus, y compris ceux qui font actuellement l'objet de recommandations de RST, le Comité a convenu des recommandations suivantes concernant la Guinée-Bissau afin de maintenir la recommandation de suspendre le commerce des spécimens de l'espèce Pterocarpus erinaceus en provenance de Guinée-Bissau jusqu'à ce que les conditions énoncées au paragraphe 10 de la notification aux Parties n° 2022/045 soient remplies. Il a également noté qu'aucun progrès n'a été accompli par la Guinée-Bissau dans la mise en œuvre des recommandations relatives à la TSR contenues dans l'annexe du document SC77 Doc. 33.2.3 (Rév. 1) et que les recommandations à court et à long terme de ce qui précède n'ont pas été mises en œuvre.

Par conséquent, les recommandations pertinentes à court terme demandées dans la notification n° 2022/045 comprennent l'établissement d'un quota d'exportation zéro pour tout le commerce de Pterocarpus erinaceus et la communication du quota au Secrétariat pour publication et, avant de réviser le quota d'exportation zéro, la communication de la base de la conclusion de non-préjudice en tenant compte des concepts et des principes directeurs non contraignants de la Résolution Conf. 16.7 (Rév. CoP17) et conformément au paragraphe c), au Secrétariat et aux membres du Comité pour les plantes par l'intermédiaire de son Président.

En ce qui concerne les progrès accomplis dans la mise en œuvre des recommandations relatives à la RST contenues dans l'annexe du document SC77 Doc. 33.2.3 (Rév. 1) et la mise en œuvre des recommandations de l'article XIII pour certains États de l'aire de répartition de Pterocarpus erinaceus, la Guinée-Bissau a accompli des activités entre janvier 2022 et décembre 2023 détaillées dans le tableau 1.

2. Breve Perfil du País

La République de Guinée-Bissau est l'un des plus petits pays de la côte de l'Afrique de l'Ouest située à 1200N et 1500W, bordée par le Sénégal au nord et la République de Guinée (Guinée-Conakry) au sud et à l'est. Il couvre une superficie de 36 125 km² avec une superficie totale de terre : 28 120 km² et d'eau : 8 005 km². Une population d'environ 2 078 820 habitants (2023 est.) avec une densité moyenne d'environ 57 personnes/km² sur la base de l'estimation de la population de 2023 et le taux annuel d'augmentation de la population est d'environ 2,5. Malgré la petite taille du pays et de sa population, il existe plus de 20 groupes ethniques en Guinée-Bissau. La capitale Bissau a une population de plus de 664 000 habitants et est située sur la côte, sur la rive nord de l'estuaire du Rio Gêba qui est l'un des plus grands fleuves du pays. Sur le plan administratif, le pays est divisé en neuf régions (regiões) et 36 districts (secteurs).

C'est un pays tropical, généralement chaud et humide, saison des pluies de type mousson (juin à novembre) avec des vents du sud-ouest, saison sèche (décembre à mai) avec des vents d'harmattan du nord-est. La majeure partie du pays reçoit des précipitations annuelles allant de 1 500 à 2 000 mm, mais la partie sud du pays est beaucoup plus humide avec des précipitations

moyennes supérieures à 2 000 mm. Les précipitations sont très saisonnières, avec une saison sèche de sept mois de novembre à mai. La température moyenne du mois le plus frais dans la capitale, Bissau, est de 25°C tandis que celle du mois le plus chaud est de 28°C.

L'un des pays les plus pauvres du monde, la Guinée-Bissau dépend principalement de l'agriculture et de la pêche. Les récoltes de noix de cajou ont augmenté de façon remarquable ces dernières années, et le pays se classe désormais au sixième rang pour la production de noix de cajou. La Guinée-Bissau exporte du poisson et des fruits de mer ainsi que de petites quantités d'arachides, de palmistes et de bois. Le riz est la principale culture et aliment de base. Avant la guerre, la réforme du commerce et la libéralisation des prix étaient les éléments les plus fructueux du programme d'ajustement structurel du pays sous le parrainage du FMI. Le resserrement de la politique monétaire et le développement du secteur privé ont également commencé à redynamiser l'économie. En raison des coûts élevés, l'exploitation du pétrole, du phosphate et d'autres ressources minérales n'est pas une perspective à court terme. Cependant, la prospection pétrolière en mer a commencé et pourrait générer des revenus indispensables à long terme. L'inégalité de la répartition des revenus est l'une des plus extrêmes au monde.

Pays, tels qu'un taux de pauvreté élevé et un revenu national brut par habitant de 1 025 USD, placent le pays dans une position de dépendance totale à l'égard de ses ressources naturelles limitées. Environ 75 % de la population est impliquée dans l'agriculture, principalement la riziculture dans des conditions humides, en combinaison avec d'autres cultures dans la zone forestière. La production de noix de cajou et la récolte des produits de palme fournissent beaucoup de revenus en espèces. La pêche artisanale, la collecte de mollusques et de crustacés sont des activités importantes dans toute la zone côtière. La pêche est la deuxième industrie d'exportation la plus importante du pays.

À l'intérieur des terres, le terrain est vallonné et bas. La frange côtière est bordée par une savane buissonnante ou une savane herbacée humide à laquelle succèdent à certains endroits des forêts, mais aujourd'hui, le plus souvent des terres agricoles, des buissons et d'autres végétaux secondaires. Le caractère des forêts change du sud au nord, de petites zones du sud-est possédant de hautes forêts à canopée fermée, notamment le Khaya senegalensis, le Pterocarpus erinaceus et l'Afzelia africana, exploités commercialement. Ceux-ci sont remplacés par des zones de forêt plus sèche et de savane boisée qui s'enfonce plus à l'intérieur des terres, tandis que dans certaines parties du nord, il y a de vastes peuplements de palmiers à huile (Elaeis spp.). La déforestation est principalement due à la dépendance du pays à l'égard de la production de charbon, de l'incinération de la brousse et du système agricole sur brûlis.

Por isso, a Guiné-Bissau ratificou a Convenção sobre a Diversidade Biológica (CDB), a Convenção de Ramsar (RAMSAR), a Convenção sobre o Comércio Internacional de Espécies Ameaçadas de Extinção (CITES), a Convenção sobre as Espécies Migratórias (CMS), a Convenção de Combate à Desertificação (CCD) e a Convenção-Quadro sobre as Alterações Climáticas (FCC). Participa no Programa Homem e Biosfera da UNESCO, no âmbito do qual o Arquipélago dos Bijagós foi designado como Reserva da Biosfera.

3. Gestion des ressources naturelles en Guinée-Bissau

Le pays compte encore plus de 60% de couverture forestière naturelle, principalement des forêts de Guinée dominées par des essences de bois précieuses d'acajou (khaya), de bois de rose (Pterecapaus) et d'afzelia. Selon l'évaluation forestière nationale (NFA) de 1985 et l'estimation de 2021, plus de 70 % de la superficie du pays restait encore boisée avec des forêts fermées. En conséquence, la Guinée-Bissau est l'un des pays les plus riches en biodiversité du Sahel avec un niveau élevé d'endémisme qui se reflète dans de nombreuses flores et taxons d'animaux, notamment des amphibiens, des reptiles, des oiseaux et des primates. Cette richesse naturelle est également moins menacée par le taux de déforestation.

En Guinée-Bissau, comme dans de nombreux pays africains, la gestion des ressources naturelles, en particulier forestières, a toujours été de la responsabilité du gouvernement. La plupart des systèmes existants d'utilisation des terres étaient exclusivement orientés vers la production de biens agricoles destinés à la consommation immédiate. Depuis quelques années, le rôle que peuvent jouer d'autres acteurs dans la gestion des ressources naturelles, notamment les populations locales et les associations, est reconnu comme remplaçant l'approche classique de conservation de la nature basée sur le maintien de la diversité biologique telle qu'elle est, déconnectée de son environnement humain.

Les autorités politiques et gouvernementales ont compris que la responsabilité de la gestion et de la conservation des ressources doit de plus en plus être déléguée aux communautés locales. En 1991, par exemple, le concept de « foresterie communautaire » a été introduit dans une loi forestière qui a modifié la loi coloniale. D'autres problèmes sont les suivants;

- La Guinée-Bissau abrite d'innombrables forêts sacrées, où l'abattage d'un arbre est strictement interdit par la communauté.
- Des efforts sont également en cours pour développer des forêts communautaires dans les communautés qui ne reconnaissent pas le concept de forêts sacrées, et les imprégner d'une compréhension et d'un respect similaires pour l'environnement.
- Malgré ces efforts, le pays a connu une vague d'exploitation forestière illégale à la suite d'un coup d'État en 2012, ce qui a entraîné l'imposition d'une interdiction de l'exploitation forestière en 2015.
- L'interdiction expirant en mars 2020 et les élections ayant lieu la même année, les positions du gouvernement ont induit des changements.

En novembre 1992, le Département des forêts a élaboré une politique forestière à long terme visant à promouvoir la gestion et l'utilisation rationnelle des ressources forestières en Guinée-Bissau, qui a été approuvée en 1997. Afin d'adapter la législation à l'objectif, à l'orientation et aux exigences fixés dans la politique forestière, il est nécessaire d'élaborer une nouvelle législation forestière, notamment dans les domaines suivants:

- l'engagement des communautés dans la gestion des ressources naturelles et des forêts par le transfert des droits de propriété à la population rurale;

- Renforcement des capacités au sein du département forestier afin de décentraliser la gestion forestière.
- Depuis lors, la Guinée-Bissau a eu recours au partenariat public-privé (PPP) par le biais de la gestion forestière de concession dans la plupart des régions.

Jalon des activités mises en œuvre par la Guinée Bissau

Table 1: Milestone of activities implemented by Guinea Bissau

No	Activité	année	quantité	Remarque / NOTE
01	CITES Autorité Rencontre	2022	2	Semesterial rencontre
02	Rencontre avec Jean Lagarde, consultante internationale, et Sofie Herman Flensborg, de l'Unité des projets et de la vulgarisation de l'Agente de programme.	2022	2	Réunion tenue à Panama à l'intervalle de la CdP-19
03	Réunion de travail avec les ministres de l'Agriculture et de l'Environnement sur l'élaboration d'une NDF sur Pterocarpus erinaceus de Guinée Bissau	2022	1	Réunion instructif
04	Embaucher un consultant travaillant sur Afzelia Africana	2023	1	Consultant International
05	Demande de quota volontaire d'afzelia africain	2023	1 espèce	Annuel
06	Publication du quota volontaire d'Afzelia africana	2023	30,699 m^3	Quota annuel publié le 19 juin 2023
07	Réunion virtuelle sur les moyens spéciaux d'adopter pour Pterocarpus erinaceus en Afrique de l'Ouest	2023	2	articipants : Parties à la CITES de Afrique de l'Ouest
08	Réunion d'information avec le ministre de l'Agriculture sur la nécessité d'élaborer des FDN pour Pterocarpus	2023	1	Réunion instructif
09	Réunion de consultation virtuelle pour l'élaboration de NDF sur Pterocarpus erinaceus en Afrique de l'Ouest	2024	1	
10	Questionnaire sur l'évaluation des espèces inscrites à l'Annexe I	2024	1	

4. Plans de travail à court et à long terme

Sur la base de la lettre du Secrétariat datée du 7 février 2024 sur l'examen du commerce important de spécimens d'espèces inscrites à l'Annexe II [Résolution Conf. 12.8 (Rev. CoP18)] et de la référence aux recommandations des notifications n° 2024/006 et n° 2022/050, les autorités de la CITES de Guinée-Bissau se sont mises d'accord sur le plan de travail ci-joint, tel que détaillé dans le tableau ci-dessous 2. Les besoins budgétaires indicatifs du plan de travail

sont soumis à l'adoption du Ministère et du Bureau de la CICE. Il faut également comprendre que le plan de travail n'est pas rigide, mais qu'il peut s'adapter aux changements au fur et à mesure que les travaux se déroulent. L'important est que les horaires soient respectés par tous.

Sur la base des recommandations de la Notification n° 2022/050 et du SC77 Doc. 33.2.3 (Rév. 1), le bureau de la CITES de Guinée-Bissau a élaboré un plan de travail global tel que détaillé dans le tableau ci-dessous. Les exigences budgétaires du plan de travail seront examinées en deux volets ; 1) Il s'agira d'un financement d'initiation fourni par le gouvernement de Guinée-Bissau en collaboration avec les sociétés concessionnaires et 2) les différents éléments restants pourront être soutenus par le Secrétariat de la CITES. Il faut également comprendre que le plan de travail n'est pas rigide, mais qu'il peut s'adapter aux changements au fur et à mesure que les travaux se déroulent. L'important est que les horaires soient respectés.

Table 2: Work du travail

Activité	Responsabilité	calendrier	Rremarque
Tâches à accomplir en 2024/2025			
Réunion des autorités CITES (élargie)	- CITES Focal Point	4 – 8 Mars	Le comité doit tenir compte des entreprises privées et des consultants
Réunion du groupe de travail de la CITES pour travailler sur les conditions de référence et les publicités NDF et LAF et dvertisement	- CITES Focal Point - Adverts	4 – 8 Mars	Un groupe de travail de cinq personnes au maximum. Travaillera sur des documents techniques tels que TOR pour NDF
Travaux sectoriels sur les rapports nationaux 2021, 2022	- CITES Focal Point	11 – 22 Mars	
Rapport national final de l'expert-conseil principal	- CITES Focal Point	26 - 28 Mars dernier	
Recrutement d'experts et d'un chef d'équipe consultant NDF	- Focal Point	26 Mars - 1 Avril	Sur la base du mandate (TDR)
3 Refreshment training of sectoral experts on NDF	- Focal Point - Consultor Líder - CITES - Secretariat	1 – 5 Avril	
3 Formation de recyclage d'experts sectoriels sur les FDN	- CITES Focal Point	8 – 22 Avril	
Révision NDF, y compris la fixation du quota d'exportation	- National Autorite	23 – 30 Avril	Le travail nécessiterait un bon nombre d'experts et il est recommandé de solliciter l'appui technique et financier de la CITES, le tout sous la direction d'un chef d'équipe national et d'un consultant international
Revue nationale / scientifique NDF et	- Group de travail	6 – 10 Mai	Il sera important de couvrir un éventail d'experts de différents domaines. Les

révision du quota d'Afzelia 2024/25			examens doivent être limités dans le temps.
National Validation (2 days) and submission to CITES	- Minister - PS - Focal Point	13 – 16 Mai	Il faut veiller à ce que les communautés soient bien et adéquatement représentées
Recruitment of Consultant Team Leader LAFs	- Working Group	20 – 24 Mai	Sur la base du mandate (TDR)
Elaboration of LAFs	- Working Group	27 Mai – 4 Juli	Sur la base du mandate (TDR)
National / Technical Review LAFS	- Working Group	9 – 12 Juli	Doit s'assurer de saisir les problèmes de traçabilité
Validation nationale (2 jours) et soumission à la CITES	- Minister - PS - Focal Point	15 – 19 Juli	Il faut veiller à ce que les communautés soient bien et adéquatement représentées
Rapport de mise en œuvre du commerce d'Afzelia en 2023/24	- Focal Point	1 Aout – 20 Sept	Signatures Monsieur le Ministre, Point focal et Directeur des Forêts
2023 Report Anuel	- Focal Point - Autorite National	1 Aout – 20 Sept	Obligatoire
Formation des formateurs (3 jours)	- CITES Focal Point	1 – 10 Oct	Une formation spéciale est requise pour des établissements spécifiques
Formation progressivement	- CITES Focal Point	8 Oct – 25 Nov	Formation de masse pour le personnel de terrain
Formation d'experts et d'organismes chargés de l'application de la loi	- CITES Focal Point	25 Nov – 10 Dec	Paquet spécial pour certaines institutions concernées
Réunion des autorités CITES (élargie)	- Focal Point	12 – 31 Dec	
Réunion du groupe de travail de la CITES	- CITES Focal Point	12 – 31 Dec	

4.1 Financial Requirement

Le programme CITES et les autorités se sont efforcés d'être à la pointe de la situation afin de s'assurer que les obligations du pays au titre de la Convention soient mises en œuvre de manière satisfaisante. Le Bureau de la CITES, avec le soutien financier de l'un des groupes de la concession, a lancé le programme avec un soutien financier pour élaborer l'établissement des quotas volontaires d'Afzelia africana 2023/24. Les autres programmes, soutenus financièrement par la CITES, travailleront à l'élaboration du Rapport national 2023. Le rapport national de 2023 comprendra un plan financier pour l'année ou les années suivantes.

Table 3: Budget indicatif du plan de travail 2024/25

No	Aactivité	Implementation calendrie (trimestriel)		Coût unité (@ taux du change $1 = 601CFA)	Budget Totale
		2024			

		Q1	Q2	Q3	Q4	**Cost composant**[1]	CFA	US$	CFA	US$
1	Réunion des autorités CITES (élargie)					Refreshment	grosse somme	grosse somme	120,200	200
2	Réunion du groupe de travail de la CITES pour travailler sur les conditions de référence et les publicités NDF et LAF et dvertisement					Refreshment	grosse somme	grosse somme	120,200	200
3	Travaux sectoriels sur les rapports nationaux 2021, 2022					Consultants Experts Réunions / formations Logistique Hal	grosse somme	grosse somme	12,020,000	20,000
4	Rapport national final de l'expert-conseil principal					Consultants Experts valide	grosse somme	grosse somme	12,020,000	20,000
5	Recrutement d'experts et d'un chef d'équipe consultant NDF					Consultants Experts	grosse somme	grosse somme	18,030,000	30,000
6	3 Refreshment training of sectoral experts on NDF					Consultants Experts Réunions / formations Logistique Hal	grosse somme	grosse somme	721,200	1200
7	3 Formation de recyclage d'experts sectoriels sur les FDN					Consultants Experts valide	grosse somme	grosse somme	12,020,000	20,000
8	Révision NDF, y compris la fixation du quota d'exportation					Experts	grosse somme	grosse somme	781,300	1,300
9	Revue nationale / scientifique NDF et révision du quota d'Afzelia 2024/25					Autorites Experts	grosse somme	grosse somme	6,010,000	10,000
10	National Validation (2 days) and submission to CITES					Autorites Valide	grosse somme	grosse somme	6,010,000	10,000
11	Recruitment of Consultant Team Leader LAFs					Consultant /Experts	grosse somme	grosse somme	18,030,000	30,000
12	Elaboration of LAFs					Consultant Experts	grosse somme	grosse somme	721,,200	1200
13	National / Technical Review LAFS					Experts Autorite	grosse somme	grosse somme	12,020,000	20,000
14	Validation nationale (2 jours) et soumission à la CITES					Autorite Valide	grosse somme	grosse somme	781,300	1,300

[1] Detail calculations are available for N^{0} 1 – 4 and the rest will be completed latest by the 1st April, 2024

15	Rapport de mise en œuvre du commerce d'Afzelia en 2023/24					Consultant Experts	grosse somme	grosse somme	18,030,000	30,000
16	2023 Report Anuel					Experts	grosse somme	grosse somme	12,020,000	20,000
17	Formation des formateurs (3 jours)					Consultants Experts Réunions / formations Logistique Hal	grosse somme	grosse somme	12,020,000	20,000
18	Formation progressivement					Experts Réunions / formations Logistique Hal	grosse somme	grosse somme	7,212,000	12,000
19	Formation d'experts et d'organismes chargés de l'application de la loi					Consultants Experts Réunions / formations Logistique Hal	grosse somme	grosse somme	6,010,000	10,000
20	Réunion des autorités CITES (élargie)					Experts Réunions / formations Logistique Hal	grosse somme	grosse somme	781,300	1,300
21	Réunion du groupe de travail de la CITES					Refreshment	grosse somme	grosse somme	480,800	800
Total									**155,959,500**	**259,500**

Un montant total de 155 959 500,00 FCFA, soit 259 500,00 dollars, est nécessaire pour mettre en œuvre les obligations du pays pour cette année 2024, y compris l'exigence de la formation progressive et l'élaboration des rapports annuels et des FDN et FAL. Sur ce montant, la Guinée Bissau, en collaboration avec le secteur privé (en particulier les sociétés concessionnaires), apportera des fonds à hauteur de 129 455 400 francs CFA, soit 215 400 dollars, et la CITES est instamment invitée à soutenir un financement de 26 504 100 francs CFA, soit 44 100 dollars, pour soutenir les différentes formations. La CITES est approchée par la présente pour faciliter le financement des formations, entre autres.

5. Processus de constatation de lien de non-préjudice (NDF)

5.1 Introduction : Pterocarpus erinaceus – Constatation de non-préjudice (NDF))

La formulation d'une conclusion de commerce non préjudiciable (NDF) pour l'importation et l'exportation en vertu de la Convention sur le commerce international des espèces de faune et de flore sauvages menacées d'extinction (CITES) est une disposition légale. Les autorités scientifiques des États membres sont responsables de la formulation et de l'approbation des constatations de commerce non préjudiciable. La Guinée-Bissau n'a pas encore adopté le texte réglementaire établissant formellement l'Autorité scientifique, mais une Autorité de gestion et juridique (Science) est créée, comme l'exige la convention CITES, en tant qu'organe décisionnel final qui conseille le gouvernement sur le commerce d'exportation de la flore et de la faune jusqu'au décret nº 3/2017. Le Comité scientifique comprend des experts qui superviseront la formulation d'un avis de non-préjudice (NDF) de Pterocarpus erinaceus en Guinée Bissau. Les

données nécessaires à l'élaboration de ce NDF proviennent d'études réalisées dans le cadre de la mise en œuvre des activités de gestion forestière de concession, des activités de mise en œuvre de la CITES et de l'utilisation de rapports et de travaux scientifiques effectués sur l'espèce.

En raison de la surexploitation de son aire de répartition naturelle, P. erinaceus est une espèce de plus en plus rare dans les écosystèmes d'Afrique de l'Ouest et du Centre et est menacée d'extinction pour diverses raisons, mais en raison d'une gestion non durable de son habitat. En ce qui concerne le commerce international, P. erinaceus est l'un des bois les plus précieux des forêts sèches d'Afrique de l'Ouest, en raison de sa texture, de sa couleur et de ses qualités technologiques, qui en font un bois idéal pour la fabrication de meubles, de lambris décoratifs, de parquets, d'ustensiles divers, d'instruments de musique, médicinaux, etc. C'est également une source importante de bois-énergie, de pratiques agroforestières et de fourrage pour le bétail dans les communautés pastorales de son aire de répartition. Pour gérer les conséquences de leur surutilisation, des mesures adéquates sont essentielles pour leur conservation et leur gestion durable. C'est pourquoi la communauté internationale a inscrit l'espèce à l'Annexe II de la CITES afin d'éviter que le commerce international n'ait de graves répercussions négatives sur l'espèce, l'écosystème et les populations humaines qui en dépendent dans les États de l'aire de répartition.

Dans ce contexte, il est essentiel de disposer de données socio-économiques et dynamiques actualisées sur l'ensemble de son aire de répartition afin de prendre les bonnes décisions pour sa conservation et son utilisation durable. Ainsi, certains travaux scientifiques ont été réalisés dans ses états d'aire de répartition qui sont plus ou moins erratiques et assez localisés. L'exploitation intensive subie ces dernières années dans l'ensemble des États de l'aire de répartition a conditionné plusieurs États de l'aire de répartition à suspendre l'exploitation et la commercialisation de l'espèce et la CITES à recommander une suspension conditionnelle du commerce. Bien que ces suspensions aient eu un impact important sur le potentiel commercial de l'espèce, il est nécessaire de disposer de données à jour pour définir un plan de gestion et un rapport (NDF) efficaces qui garantiront la conservation et l'utilisation durable de l'espèce.

Sur la base des résultats des dernières réunions de l'Autorité scientifique, des actions concrètes ont été proposées pour la conservation et la gestion durable de l'espèce en Guinée-Bissau. Il s'agit notamment de :

- la protection de tous les peuplements riverains abritant l'espèce dans les forêts ouvertes et les savanes boisées afin d'en assurer la stricte conservation;
- la mise en œuvre d'opérations intensives de restauration écologique de l'espèce dans les savanes arbustives et les forêts-galeries,
- le développement d'un mécanisme de suivi écologique à long terme, et
- la mise en œuvre de programmes de renforcement des capacités des acteurs à différents niveaux

Ces actions devraient servir de base au développement durable de la conservation et de la gestion durable de P. erinaceus en Guinée Bissau, d'où de très bons éléments de NDF.

5.2 Résumé

Les ressources forestières ont toujours joué un rôle clé dans le bien-être des populations. Les écosystèmes forestiers d'Afrique sont reconnus comme les plus grands et les plus riches en termes d'abondance et de diversité des espèces végétales. Ainsi, ils remplissent d'importantes fonctions écologiques et socio-économiques pour les populations rurales et urbaines. La plupart de ces écosystèmes sont constitués de ressources phytogénétiques très demandées et éventuellement menacées.

Pterocarpus erinaceus est une espèce d'arbre polyvalente originaire des forêts semi-arides et guinéennes d'Afrique. Pterocarpus erinaceus est une légumineuse ligneuse vivace de la famille des Fabaceae qui pousse naturellement en Afrique de l'Ouest et centrale. P. erinaceus est une espèce de bois d'œuvre précieuse originaire des forêts naturelles semi-arides de la savane soudano-guinéenne d'Afrique de l'Ouest. Il est répandu dans la zone de savane qui s'étend du Sénégal et de la Gambie au Tchad et à la République centrafricaine (Bonkoungou, 1999). L'espèce se trouve dans des peuplements naturels dans les zones soudanienne et guinéenne de la Guinée-Bissau.

D'un point de vue écologique, il est important dans les systèmes agroforestiers traditionnels en formant des relations symbiotiques avec Rhizobium pour fixer l'azote dans le sol. Il est utilisé en pharmacopée et surtout comme aliment du bétail à la fin de la saison sèche lorsque l'enherbement devient indisponible, car les feuilles sont riches en protéines. Ces dernières années, il y a eu une augmentation significative du commerce du bois de P. erinaceus. D'importantes quantités de bois de cette essence ont été exportées d'Afrique de l'Ouest vers l'Asie, en particulier vers la Chine. Il en résulte une réduction du stock sur pied des populations de l'espèce dans son écosystème naturel. Selon la CITES (2018), les données disponibles sur les tendances des populations de P. erinaceus montrent des signes d'augmentation de la réduction des stocks, accentuée par l'exploitation liée au commerce international. En Guinée-Bissau, la densité moyenne se situe entre 30 et 50 arbres/ha selon la zone forestière.

Parmi les espèces d'arbres recensées depuis la récente évaluation forestière nationale (NFA), P. erinaceus a été enregistré comme la deuxième espèce d'arbre à bois la plus fréquente parmi les dix premières, mais la réduction du stockage actuel est le résultat d'une exploitation intensive dans le passé pour la production de charbon de bois et de bois au cours de la période 2012-2015 en raison de l'anarchie après le coup d'État de 2012. Au cours de la période, l'ensemencement a été affecté négativement par la réduction des tiges par hectare d'arbres matures de P. erinaceus dans certaines régions.

C'est sur la base de la réduction rapide du stock de P. erinaceus que l'espèce a été inscrite à l'Annexe II de la CITES afin d'éviter que le commerce international n'ait de graves répercussions négatives sur l'espèce, sur l'écologie des forêts sèches d'Afrique de l'Ouest et sur les populations humaines qui en dépendent. De plus, l'UICN classe P. erinaceus dans la Liste rouge des espèces menacées (En voie de disparition A3d) en raison de la réduction (≥ 50 %) de la population prévue,

déduite ou supposée à l'avenir sur la base des niveaux d'exploitation réels ou potentiels de l'espèce (UICN 2022).

De nombreux travaux scientifiques ont été effectués sur l'espèce dans l'ensemble de son aire de répartition, mais la plupart de ces travaux ont été menés de manière éparse et assez localisée. Aussi, l'exploitation intensive subie par l'espèce ces dernières années, et qui a contraint plusieurs pays de l'aire de répartition à suspendre l'exploitation et la commercialisation de l'espèce.

5.3 Proposer une table des matières pour NDF

Proposer d'ici la dernière réunion des autorités en janvier 2024 une table des matières qui devrait être considérée comme indicative et donc sujette à révision au fur et à mesure que les travaux du NDF commenceront.

TABLE DES MATIERES

PC27 Doc. 15.3
Annex 6

UPDATED NON-DETRIMENT FINDING (NDF) AND LEGAL ACQUISITION FINDING (LAF) REPORT FOR WEST AFRICAN ROSEWOOD *PTEROCARPUS ERINACEUS* IN SIERRA LEONE

CITES SCIENTIFIC AUTHORITY
SIERRA LEONE

AUGUST 2023

STEP 1 - REVIEW SPECIMEN IDENTIFICATION

Rationale

Proper identification of *Pterocarpus erinaceus* at the national and local levels is essential to its management, sustainable harvest, and trade of the species. It is also important in establishing sound data on its presence, density and standing volume to facilitate the setting up of harvestable volumes and ensure that such take-offs are sustainable and are within CITES compliance. The need for the species to be correctly identified in other areas of Sierra Leone where it is found is relevant to the various local approaches to its management and conservation. Although it is generally harvested for trade, the tree, or parts of it are used for other purposes such as medicinal, wood, charcoal, and fodder for cattle.

Key Question

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* 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.

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.

The 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. The seed kidney-shaped, flat to slightly thickened, c. 10 mm × 5 mm, smooth, red to dark brown. Seedling with epigeal germination and the cotyledons are leafy.

In Sierra Leone the species is identified using various similar names by the different tribes in the Districts and Regions across its range, as follows:

Kono (Eastern Province) – *Gbenie*

Temne (Northern and Northwestern Provinces) – *Gbenie*

Limba (Northern Province) – *Gbene*

Koranko (Northern Province) – *Gbene*

Madingo (Northwestern Province) – *Bani-fere*

In general, based on field experience and observations, there is common understanding of the identity of the species even among local people in most villages and settlements in these Regions. In fact, among some of the local people and the Forest Rangers, there is a concept that there are two subspecies (or morphological varieties) which they refer to as the red one and the white one. This need to be verified by thorough field assessment and analysis of the phenotypic and genotypic features of these suspected varieties.

STEP 2 - REVIEW COMPLIANCE WITH REQUIREMENTS FOR ARTIFICIAL PROPAGATION

Rationale

The artificial propagation of *Pterocarpus erinaceus* assumes paramount significance due to its potential for yielding substantial, long-term economic, and ecological advantages. The species, known for its valuable timber and ecological contributions, warrants meticulous attention toward its sustained propagation. In past endeavors, attempts were made to establish nurseries within concession areas, albeit with limited success. This lack of accomplishment can be attributed, in part, to the ad hoc nature of these initiatives and the conspicuous absence of a well-structured scientific methodology and approach in conducting these trials.

Efforts to propagate *Pterocarpus erinaceus* artificially represent a significant stride in forest management practices, particularly in regions where this species holds ecological and economic prominence. To fully unlock the benefits of artificial propagation, it is imperative to address the historical inadequacies in prior nursery establishment initiatives. By adopting a scientifically rigorous approach, one that incorporates a systematic methodology and adheres to established protocols, the success rate of nurseries within concession areas can be substantially enhanced.

Moreover, such a meticulous approach can encompass various facets of propagation, including the selection of appropriate germplasm, precise nursery management techniques, consideration of ecological and silvicultural factors, and rigorous monitoring and evaluation protocols. In this regard, scientific rigor is indispensable in ensuring that artificial propagation initiatives not only bolster the economic potential of *Pterocarpus erinaceus* but also contribute to its conservation and sustainable management within concession areas.

The prospects of artificial propagation of *Pterocarpus erinaceus* are both promising and imperative for long-term economic and ecological benefits. To navigate toward success in this endeavor, a well-structured, scientifically grounded methodology is of paramount importance. By rectifying the shortcomings of past initiatives and embracing a systematic approach, the propagation of *Pterocarpus erinaceus* can emerge as a cornerstone in the sustainable management of this invaluable species within concession areas.

Key Questions

Is the permit application for artificially propagated specimens?
Answer - No.

Is export of the artificially propagated specimens of this species permitted by national or relevant sub-national legislation?
Answer – Yes, but no successful artificial propagation is evident now.

If specified as artificially propagated, do timber specimens meet all requirements for artificial propagation?
Answer – Not applicable, because none exists now.

STEP 3 - REVIEW OF RELEVANT EXCLUSIONS AND PREVIOUSLY MADE NDFS

Rationale

There is need to understand whether the specimen is excluded from regulation by an annotation to the species listing in the CITES Appendices; if harvest or export is prohibited by national legislation; or if the export permit application is consistent with previous science-based findings. Since no previous NDF has been carried out, none of these conditions would apply for the species in Sierra Leone.
However, in response to the Notification to the Parties N^{o} 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 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 Zero Export Quota was accepted, and publication has been made on the national export quota section of the CITES website.

Key Questions

Are the timber specimens applied for covered by CITES Appendix II?

Yes, *Pterocarpus erinaceus* is covered by CITES Appendix II. This includes all products obtained from the plant, whether alive or dead, such as logs, sawn wood, veneer sheets, plywood and transformed wood, specified in the provisions of the Convention.

Is the harvest or the export of wild-harvested specimens of this species permitted by national or relevant sub-national legislation or regulation?

Yes, the harvest and export of the species is permitted by national and relevant sub-national legislation and regulation. Based on the provision in the Forestry Act of 1988 (Amended in 2022), the harvest and export of *Pterocarpus erinaceus* is permitted nationally and at subnational levels. The legislations and regulations also make provision for the prohibition of harvest and export whenever the need arise, particularly in situations where exploitation may need to be curtailed as options for the management and conservation measures for the species.

Has the Scientific Authority previously made a science-based NDF for this species that is still valid and is sufficient to evaluate the specimens for the current export permit application?

No previously made science-based NDF was made by the Scientific Authority. However, during the preparation of the NDF that is currently being reviewed, District and Chiefdom level data were obtained, and the analysis and assessment showed that logs were harvested through a legal permit and licensing process instituted by the Forestry Department of the Ministry of the Environment and Climate Change, Government of Sierra Leone.

STEP 4 - EVALUATE CONSERVATION CONCERNS

Rationale

The most important conservation concern for *Pterocarpus erinaceus* in Sierra Leone is the harvest of the species for the purpose of export of semi-processed logs or transformed wood. Thus, the need to prepare an NDF for *Pterocarpus erinaceus* in Sierra Leone is justifiable because its harvest and export contributes significantly to the foreign exchange earnings and thus the economy of the country. Therefore, its continued viability and sustainable management is a must if the country should continue to benefit from the harvesting of the species.

Key Question

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

In Sierra Leone, the severity of conservation concern was evaluated through the study, and it is assessed to be "Medium". 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, 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.

It is critical to understand the impact of harvesting on the survival of the species based on its biological characteristics.

STEP 5 - EVALUATE POTENTIAL BIOLOGICAL RISKS OF PTEROCARPUS ERINACEUS

Rationale

Understanding the potential biological risks associated with the wild harvest of *Pterocarpus erinaceus* is crucial for assessing the impact on its survival. Certain biological characteristics can make a species more susceptible to detrimental effects of harvesting and trade. The objective of Step 5 is to evaluate the potential biological risks associated with the wild harvest of *Pterocarpus erinaceus*. This assessment will help us understand the impact of harvesting on the survival of the species based on its biological characteristics.

Action

In this step, we focused on analyzing key factors that contribute to the potential risk of harvesting on the species' survival. By considering these biological attributes, we aim to determine the severity of risk associated with the harvest. Considering the factors related to the species distribution, population, and habitat that influence the potential risk of harvest on the survival of *Pterocarpus erinaceus* populations we will determine whether the severity of risk for each factor is "Low," "Medium," "High," or "Unknown."

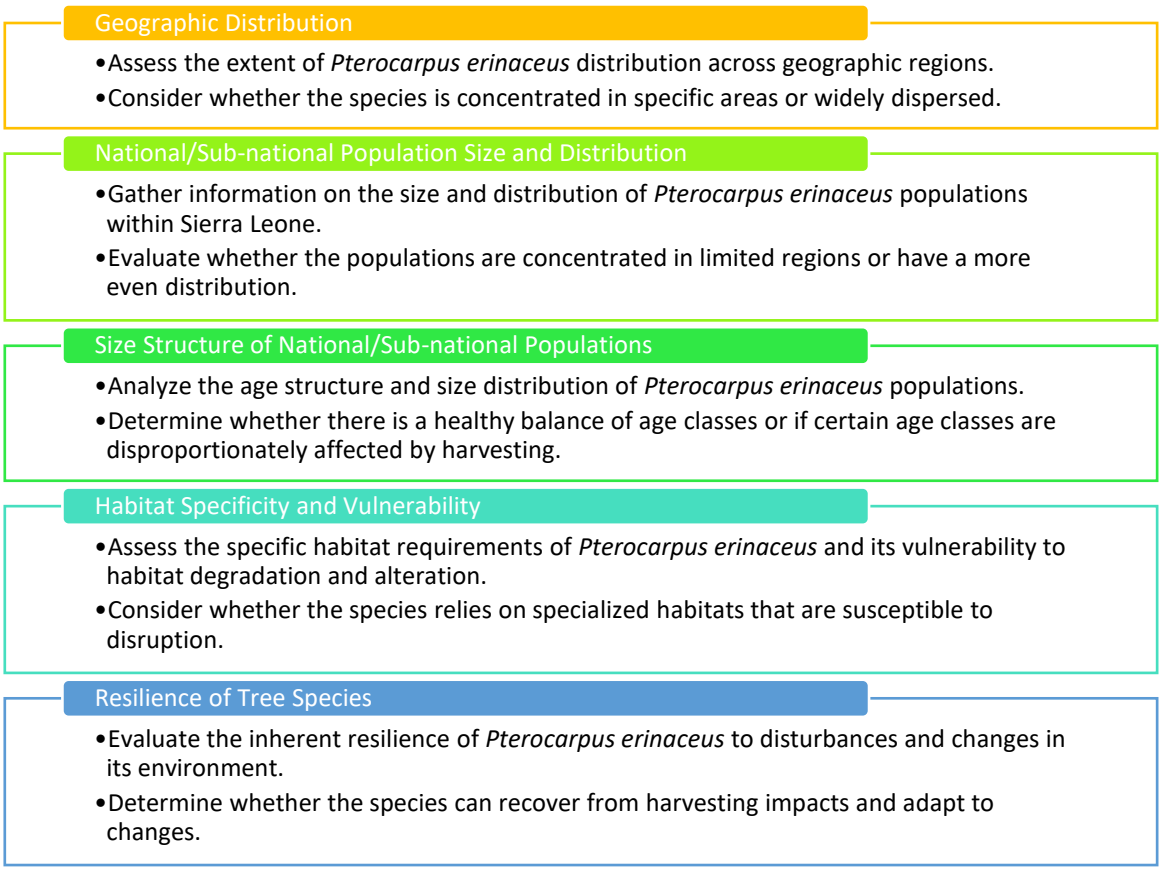


Figure 5.1. Workflow for evaluating the biological risks

1. Geographic Distribution

To comprehensively assess the geographic distribution of *Pterocarpus erinaceus*, we turned to a synthesis of regional studies that collectively provide insights into the species' range across different countries. These studies, cited below, have contributed crucial data that form the foundation of our understanding of the species' distribution patterns:-

Dimobe, Kangbéni et al. (2022):

- This study focuses on the impact of climate change on *Pterocarpus erinaceus* in Burkina Faso.
- The research provides valuable insights into the distribution of the species within Burkina Faso and highlights the anthropogenic threats it faces.

Biaou, Séverin et al. (2023):

- This study enhances our understanding of the species by incorporating intraspecific variation into distribution models.
- By considering genetic variability, the study provides a refined perspective on how *Pterocarpus erinaceus* responds to climate change across West Africa.

Adjonou, Kossi et al. (2020):

- This research assesses the vulnerability of African Rosewood, including its distribution and response to climate change in West Africa.
- The study's findings contribute to our understanding of how the distribution of *Pterocarpus erinaceus* may be influenced by changing climatic conditions.

Segla, N. K. et al. (2016):

- Focusing on population structure and minimum felling diameter, this study provides insights into the species' distribution and its exploitation potential in arid and semi-arid climates of West Africa.
- The research aids in characterizing the species' range and its suitability for sustainable management.

GBIF Database:

- The Global Biodiversity Information Facility (GBIF) serves as a valuable resource for species distribution data.
- The data available in this database further contributes to our understanding of the geographic range of *Pterocarpus erinaceus*.

By synthesizing data from these studies and cross-referencing them with the GBIF database, we have gained a more comprehensive and accurate understanding of the geographic distribution of *Pterocarpus erinaceus*. The collective insights from these sources offer a holistic view of the species' presence and range across the region.

Our commitment to assessing the geographic distribution of *Pterocarpus erinaceus* has led us to compile, analyze, and synthesize data from multiple credible sources. This integrated approach ensures that our understanding of the species' range is robust and well-informed, serving as a critical foundation for subsequent stages of the Non-Detriment Finding process.

Risk severity	Indicator
Medium	According to various regional studies (Figure 5.2 and 5.3) the distribution is restricted to a medium sized region comprising the following countries

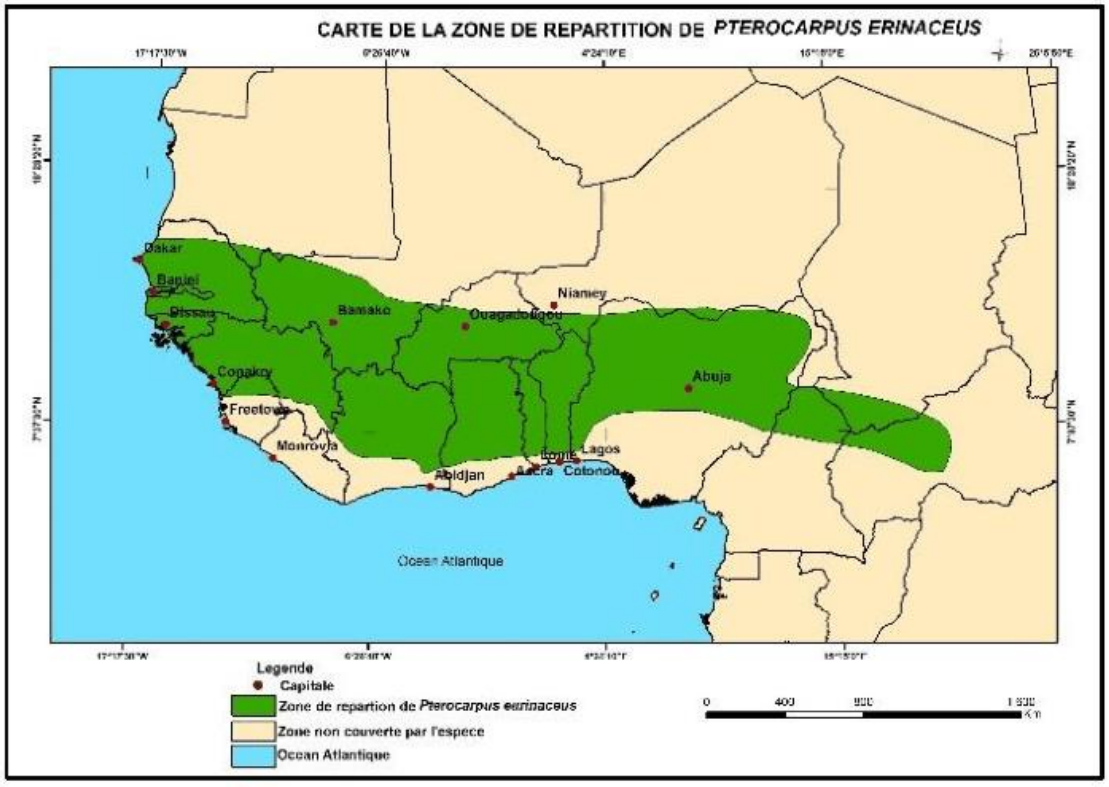


Figure 5.2. Distribution of *Pterocarpus erinaceus* (Adjonou et. al, 2020)

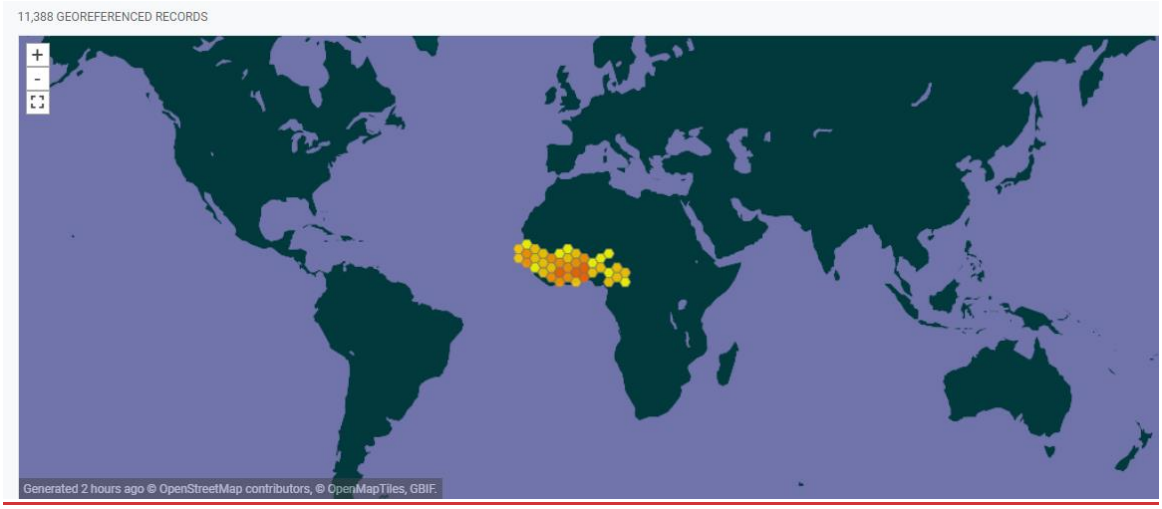


Figure 5.3. Distribution of *Pterocarpus erinaceus* based on https://www.gbif.org/species/5349317

Data sources and cross-validation:

Dimobe, Kangbéni, et al. "Climate change aggravates anthropogenic threats of the endangered savanna tree *Pterocarpus erinaceus* (Fabaceae) in Burkina Faso." *Journal for Nature Conservation* 70 (2022): 126299.

Biaou, Séverin, et al. "Incorporating intraspecific variation into species distribution models improves climate change analyses of a widespread West African tree species (*Pterocarpus erinaceus* Poir, Fabaceae)." *Global Ecology and Conservation* 45 (2023): e02538.

Adjonou, Kossi, et al. "Vulnerability of African Rosewood (*Pterocarpus erinaceus*, Fabaceae) natural stands to climate change and implications for silviculture in West Africa." *Heliyon* 6.6 (2020).

Segla, N. K., et al. "Population structure and minimum felling diameter of *Pterocarpus erinaceus* Poir in arid and semi-arid climate zones of West Africa." *South African Journal of Botany* 103 (2016): 17-24.

2. National /Sub-national Population Size and Distribution

To comprehensively assess the national and sub-national population size and distribution of *Pterocarpus erinaceus*, we employed a sophisticated approach that harnessed the power of modern technology and advanced data analysis techniques. Our commitment to accuracy and efficiency led us to utilize a regression analysis based on machine learning (Figure 5.4), a methodology that provided robust insights into the species' population dynamics.

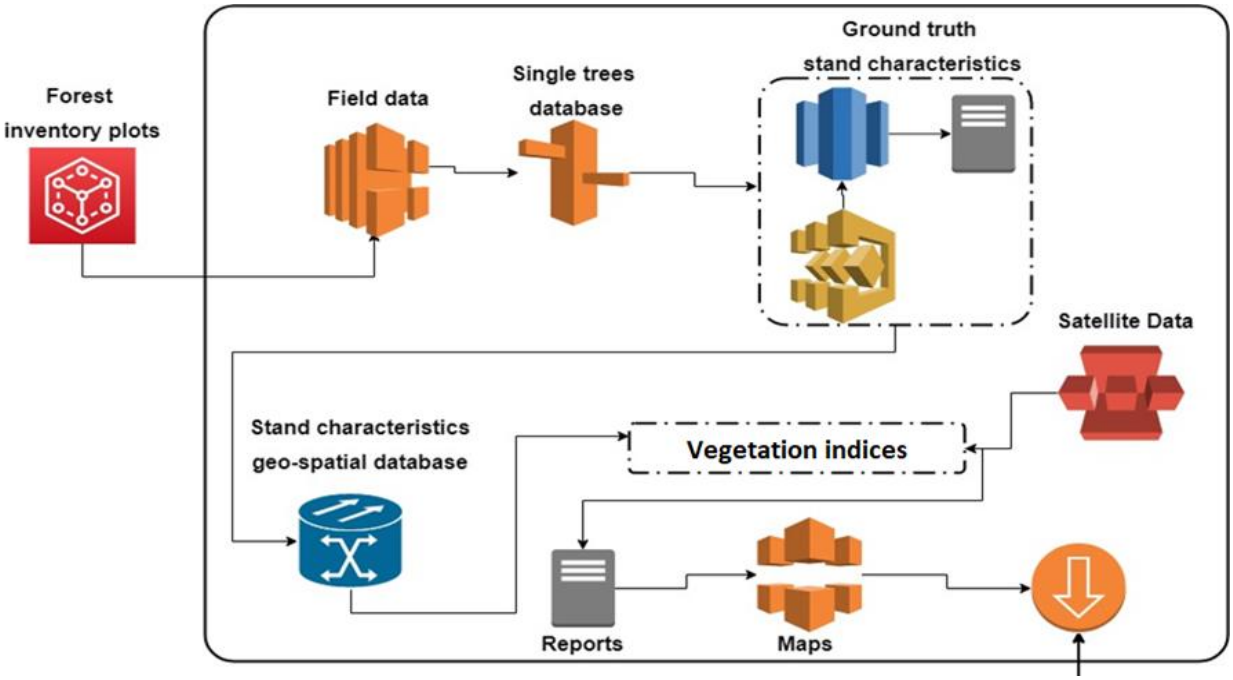


Figure 5.4. Machine learning workflow

Methodology:

- Data Compilation:

We compiled a rich dataset comprising various factors that could influence the population size and distribution of *Pterocarpus erinaceus*.
This dataset included vegetation indexes, climatic data, digital elevation models, and ground truth inventory data of *Pterocarpus erinaceus* across the nation.

- Supervised Random Forest Algorithm:

To analyze this complex dataset, we employed the supervised random forest (RF) machine learning algorithm.
RF is well-suited for handling multi-dimensional datasets and capturing complex relationships within them.
This algorithm was executed on the Google Earth Engine (GEE) cloud computing platform, allowing us to harness its immense processing power and scalability.

- Pixel-Based Analysis:

We adopted a pixel-based analysis approach, breaking down the study area into smaller units for in-depth analysis.
Each pixel was treated as a data point, and the algorithm learned patterns and relationships among the various input variables.

- Predictive Modeling:

Our analysis aimed to predict the population size and distribution of *Pterocarpus erinaceus* in different geographical areas (Figure 5.5).
The algorithm learned from the ground truth inventory data, utilizing known locations of *Pterocarpus erinaceus* to predict its presence in other areas.

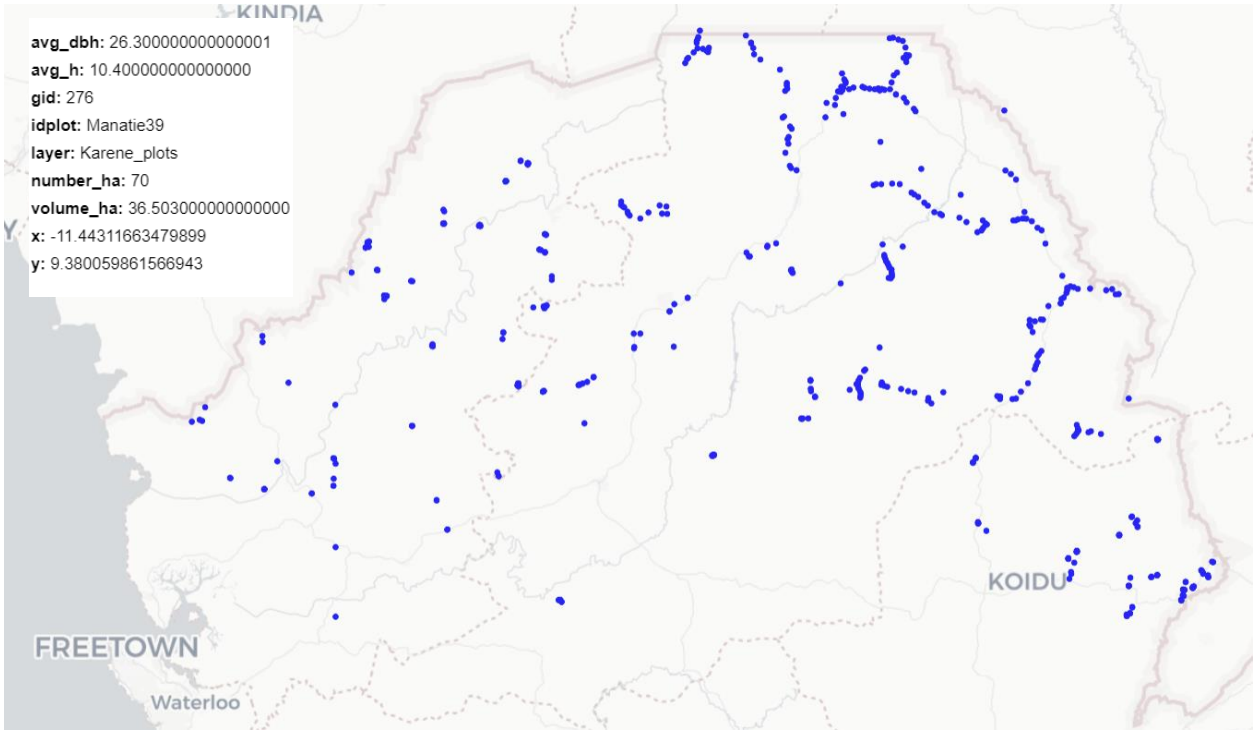
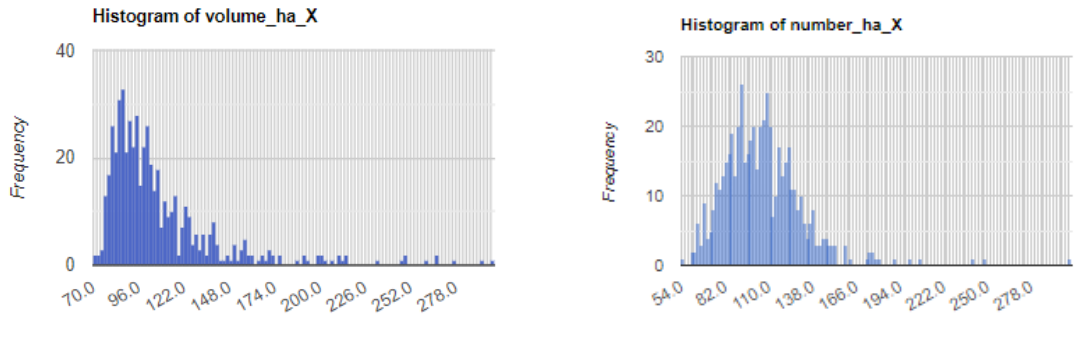


Figure 5.5. Distribution of plot and dependent variables inside each plot used for prediction

- Regression Analysis and Insights:

The machine learning model performed regression analysis, creating a predictive model that estimated the population size based on input variables Figure 5.6.



RMSE
128.0876146305439

MAE
-39.26850178247583

RMSE
101.54238424428165

MAE
15.298453400727155

Figure 5.6. Histograms of validation data, Root Mean Square Error, Mean Absolute Error of the prediction made for volume and number of trees

By analyzing the model's outputs, we gained valuable insights into how various factors contribute to the species' distribution patterns.
Through our innovative utilization of advanced technology and machine learning, we have taken a significant step toward understanding the population dynamics of *Pterocarpus erinaceus*. This methodology sets a benchmark for data-driven conservation efforts and contributes to our commitment to sustainable resource management.

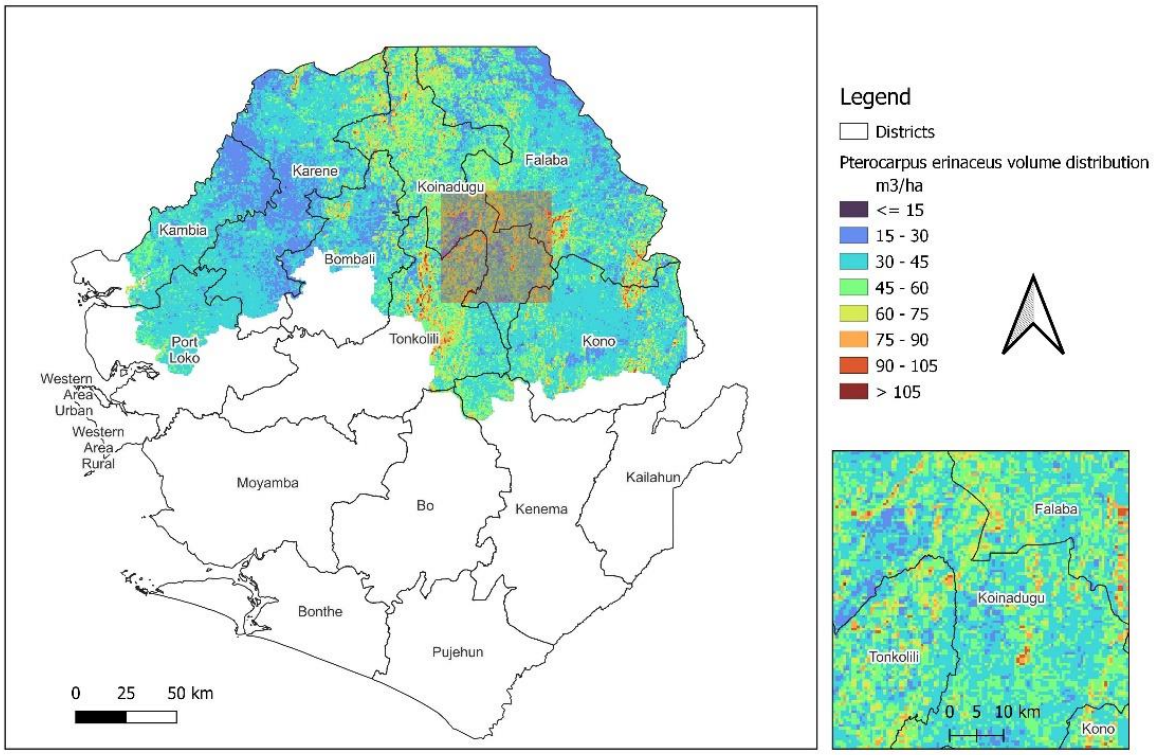


Figure 5.7. National distribution expressed in standing volume as m^3/ha produced from machine learning regression based on field plots

Risk severity	Indicator
Medium	National population is medium-sized. Sub populations are unevenly distributed across the country. (Figure 5.7)

3. Size Structure of National / Sub-national Populations

The tree distribution at national level shows a reverse J-shaped curve, with a high number of small trees and a decreasing number of trees with increasing size. This is evident from the field plots, which show that the majority of trees have a DBH (diameter at breast height) of less than 24 cm. The R2 value of 0.9181 indicates that the reverse J-shaped curve is a good fit for the data, meaning that the majority of the trees are accurately represented by the curve.
The reverse J-shaped curve is a good sign for the health of the population because it indicates that there are many small trees, which are the most likely to reproduce. This means that the population is likely to be sustainable in the long term.

Risk severity	Indicator
Low	Size classes are distributed in a way that shows a high potential for recruitment and high levels of regeneration, which is in a reverse J-shaped curve. The reverse J-shaped curve describes a negative exponential distribution of numbers of individuals in size classes with high numbers of small trees and decreasing numbers of trees with increasing size of classes (Figure 5.8 and Figure5.9)

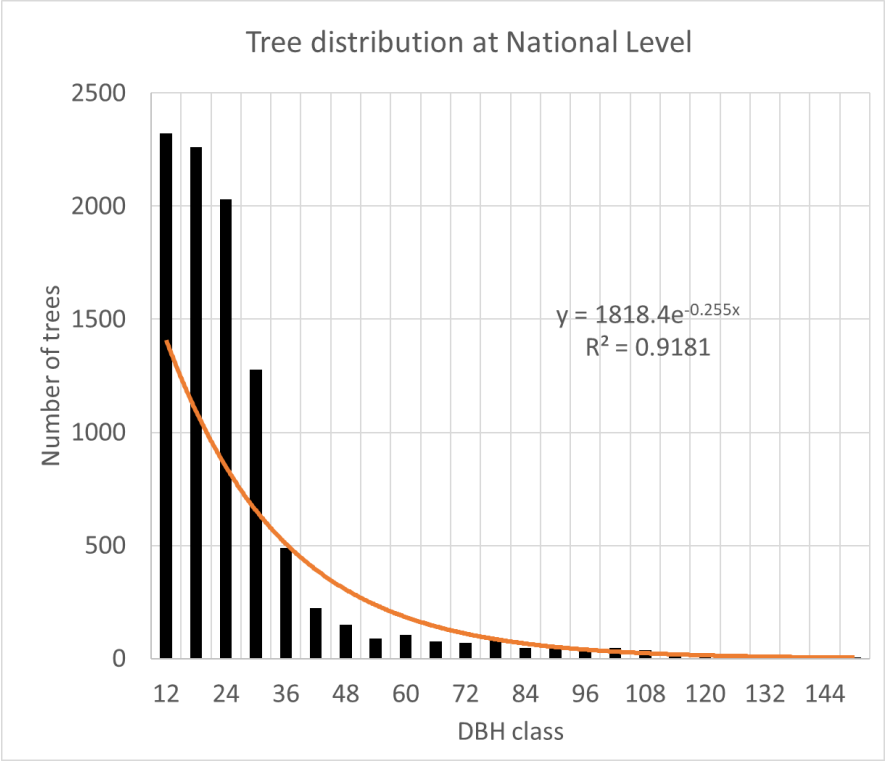


Figure 5.8. Size structure of *Pterocarpus erinaceus* at national level

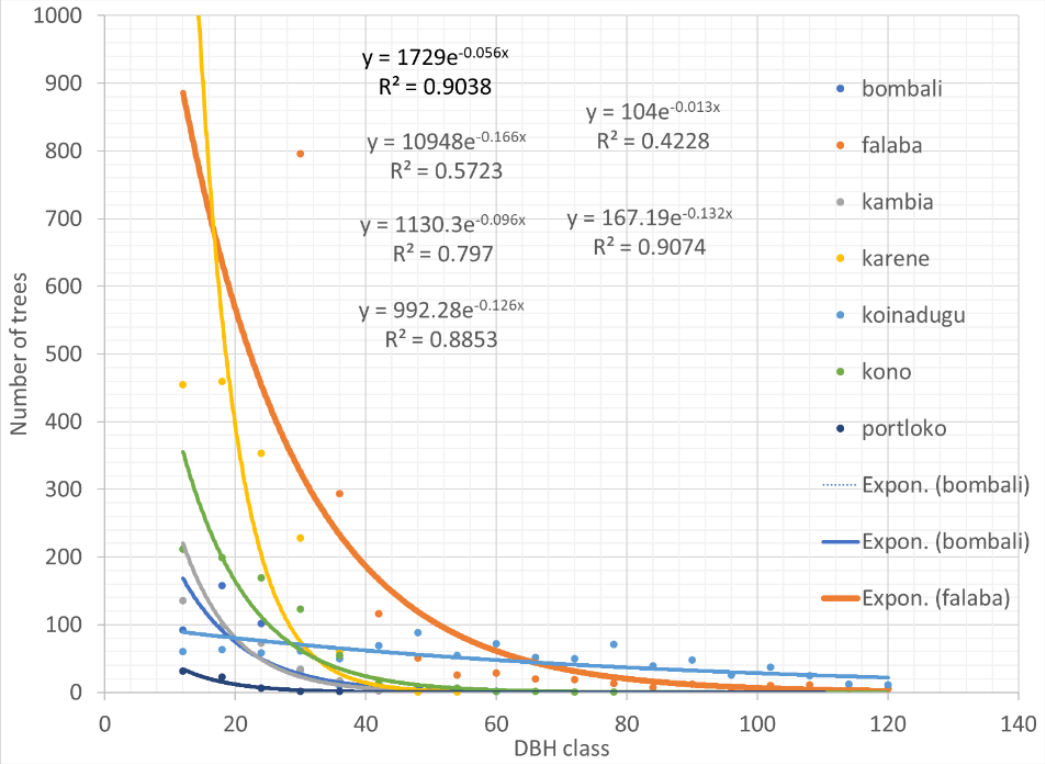


Figure 5.9. Size structure of *Pterocarpus erinaceus* at District level

4. Habitat Specificity and Vulnerability

Risk severity	Indicator
Medium	Species is adapted to a few stable habitat types, or ecological zones across its range not having a high proportion of the landscape cover, or it is adapted to a variety of habitat types that are declining in size and / or deteriorating in quality (Figure 5.10).

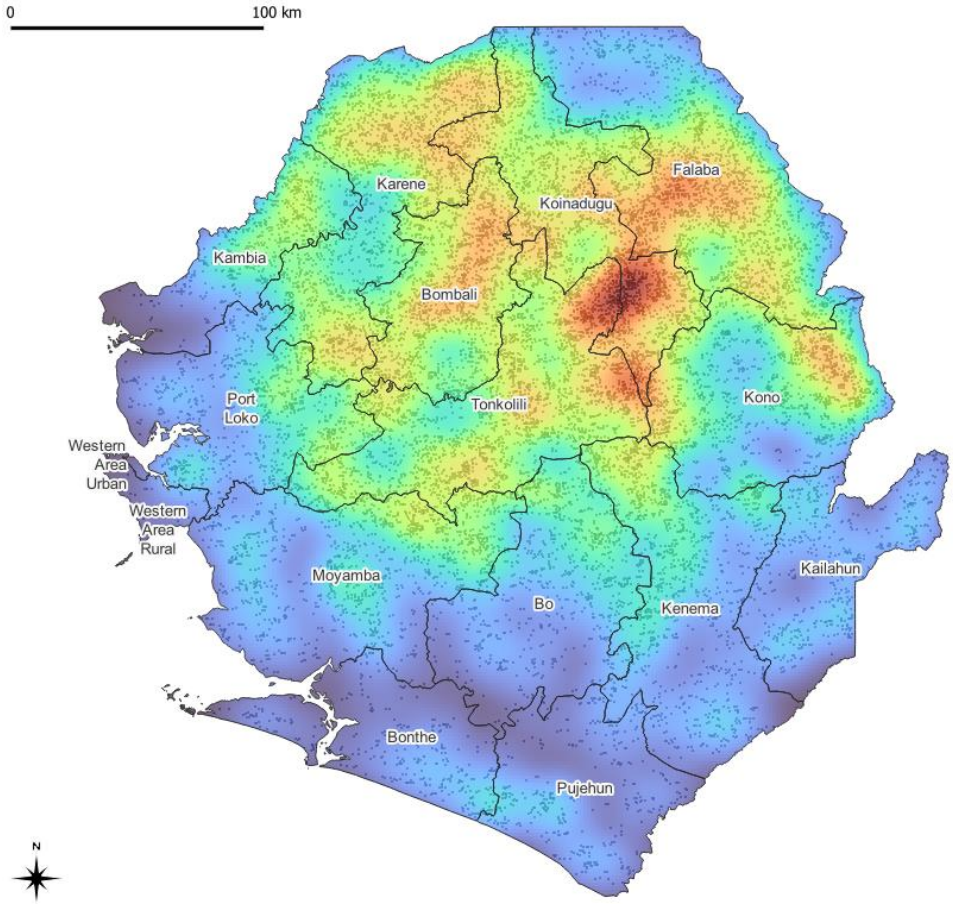


Figure 5.10. Detected fires by MODIS in 2022 the areal of *Pterocarpus erinaceus* at national level

5. Resilience of Tree Species

African padauk, in Sierra Leone is a subject of ecological and environmental significance. *Pterocarpus erinaceus*, a deciduous tree species native to various parts of Africa, including Sierra Leone, exhibits notable characteristics that contribute to its resilience in the face of various environmental challenges. Here are some key aspects of its resilience:-

- **Drought Tolerance**: *Pterocarpus erinaceus* has shown a remarkable ability to withstand periods of drought. Its deep-rooted system enables it to access water from deeper soil layers during dry spells, ensuring its survival even in arid conditions.
- **Adaptability to Different Soils**: This species demonstrates versatility in terms of soil adaptation. It can grow in a range of soil types, from sandy soils to clayey soils, which enhances its ability to thrive in various ecological niches.
- **Natural Regeneration**: *Pterocarpus erinaceus* exhibits effective natural regeneration mechanisms. The production of viable seeds and their dispersal by wind or animals contributes to the species' ability to colonize new areas and recover from disturbances.
- **Resistant to Pests and Diseases**: While not entirely immune, *Pterocarpus erinaceus* displays a degree of resistance to common pests and diseases. This attribute reduces its vulnerability to outbreaks that can decimate other tree species.
- **Fire Resistance**: The bark of *Pterocarpus erinaceus* possesses some fire-resistant qualities, which can protect the tree during periodic wildfires that are common in some ecosystems.

- **Slow Growth and Longevity**: *Pterocarpus erinaceus* tends to grow slowly but can reach significant sizes and ages. This slow growth rate, combined with its longevity, allows it to persist in landscapes over extended periods, even in the face of changing environmental conditions.
- **Ecological Importance**: This species often plays a keystone role in ecosystems by providing habitat and sustenance for various wildlife species. Its ecological significance contributes to its resilience by fostering mutualistic relationships within ecosystems.

STEP 6 - EVALUATE IMPACTS OF HARVEST FOR *PTEROCARPUS ERINACEUS*

Rationale

Step 6 of the CITES Non-Detriment Finding (NDF) process is crucial as it focuses on evaluating the actual impacts of wild harvest on the harvested populations, referred to as the "target population." Understanding these impacts is essential because they represent the most significant effects of trade and assessment on the species. Moreover, the evaluation extends to determine whether the harvest practices negatively affect the national population of the species and the broader ecosystem in which it resides.

This step is used to identify and assess these impacts by considering available information about the harvest practices employed and their intensity. The severity of these impacts dictates the quality of information required, the level of management rigor, and the precautionary measures.

Action

Within this action plan, we follow a comprehensive evaluation of the impacts of harvest on the target population, the national population, and the ecosystem, ensuring that trade practices align with conservation goals.

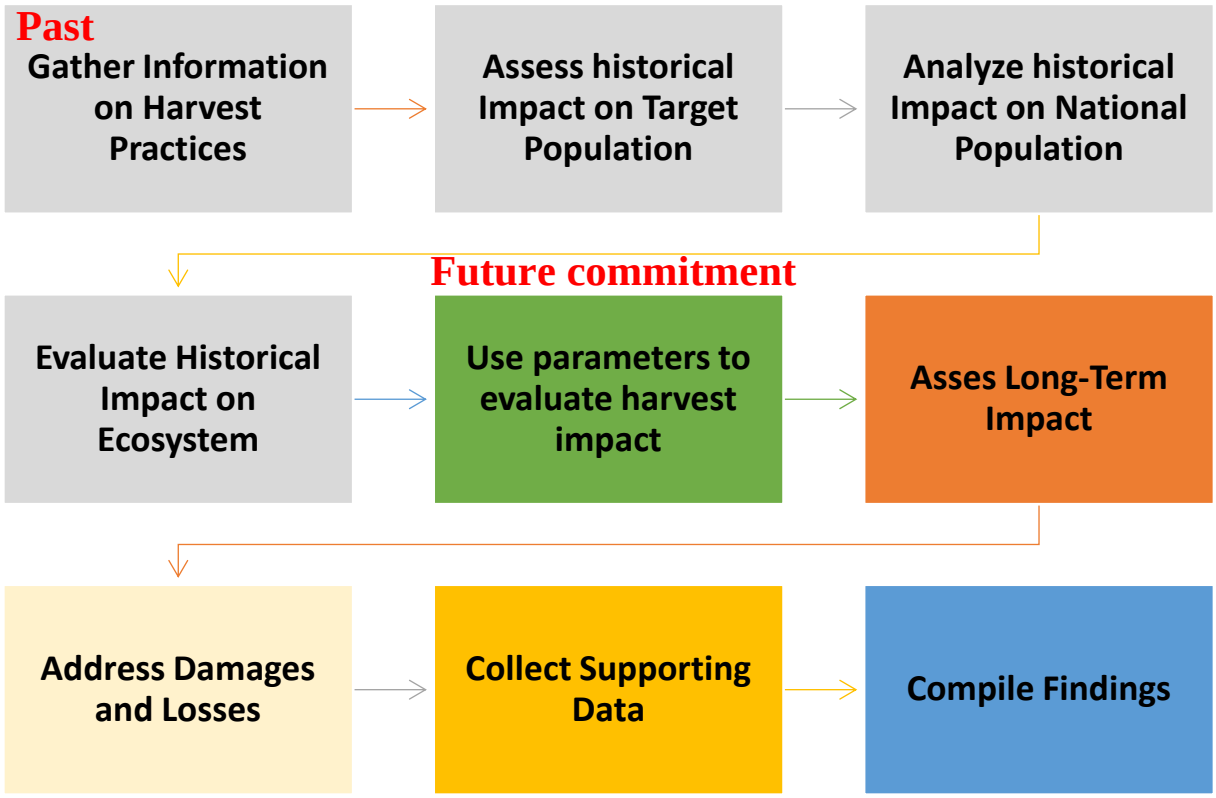


Figure 6.1. Workflow for evaluating the impact of harvest

Inside the workflow the following guiding principles and objectives will be set:-

- **Gather Information on Harvest Practices:**
  - Collect comprehensive data on the existing harvest practices for the species.
  - Include details on logging methods, cutting diameter thresholds, cutting/logging cycles, and annual allowable cut.
- **Assess Impact on Target Population:**
  - Evaluate how the harvest practices affect the target population.
  - Focus on whether the volume or number of trees harvested, along with other losses like mortality, exceed the recruitment rate.
  - Consider the recruitment by size classes to gauge regeneration capacity.
- **Analyze Impact on National/Sub-national Population:**
  - Examine the impact of harvest on the national/sub-national population of the species.
  - Consider the cumulative effects of all ongoing harvest activities, including legal and illegal logging.
- **Evaluate Impact on Ecosystem:**
  - Assess how the harvest practices impact the ecosystem in which the species is found.
  - Consider the broader ecological consequences, such as changes in habitat structure, effects on other species dependent on the same ecosystem, and alterations to ecosystem services.
- **Use the objective parameters to evaluate harvest impact:**
  - Area covered by the management plan, distinguishing between forest types.
  - Minimum cutting diameter, ensuring it complies with legal standards.
  - Cutting/logging/rotation cycle, understanding its implications for regeneration.
  - Annual allowable cut, considering its relation to growth rates.
  - Number of individuals and density of the species, examining distribution patterns.
  - Size distribution, analyzing age and size correlations.
  - Growing stock, accounting for the volume of timber.
  - Growth rate (increment), focusing on relevant size classes.
  - Mortality rate, including natural mortality.
  - Size class at maturity, comparing it to the minimum cutting diameter.
- **Asses Long-Term Impact:**
  - Emphasize the long-term impact of harvest operations.
  - Ensure that sustainable forestry practices are in place and that they do not constantly reduce the stock.
  - Verify that the volume of trees planned for harvest does not exceed the growth rate of the remaining stand.
- **Address Damages and Losses:**
  - Account for damages during harvesting, as well as losses during transport and stockpiling in the forest.
- **Collect Supporting Data:**
  - Ensure that the data collected for evaluating harvest impacts are robust and supported by sound inventory methods, monitoring, and data sources.
- **Compile Findings:**
  - Summarize the findings of the impact assessment.
  - Categorize the severity of harvest impacts as "Low," "Medium," "High," or "Unknown."

- Exercise caution and apply stricter requirements for information quality and management rigor if the severity of risks identified in previous steps (Steps 4 and 5) is higher.

Current Harvest Practices

While most conservation efforts in Sierra Leone are diligently concentrated on safeguarding traditional forests, it's crucial to acknowledge and address the often-neglected, woody savanna ecosystems. These expansive woodlands extend across northern Sierra Leone and, to a lesser extent, along the coastal regions. Within these densely wooded savannas, which were eloquently described in the "1975" monograph as "Woodland with fairly closed canopy; trees up to 15 m tall with an undergrowth of tall grasses up to 3 m tall," historical practices of unregulated *Pterocarpus erinaceus* harvesting for export have raised significant concerns. In the past, this valuable species was not formally recognized as a forest resource in Sierra Leone, leading to a simplified monitoring procedure of harvesting activities that posed a threat to the delicate equilibrium of these unique ecosystems. However, it's worth noting that the landscape has evolved, and there has been a notable shift in the approach to harvesting practices, as all the actors are committed to a sustainable management of *Pterocarpus erinaceus* resource.

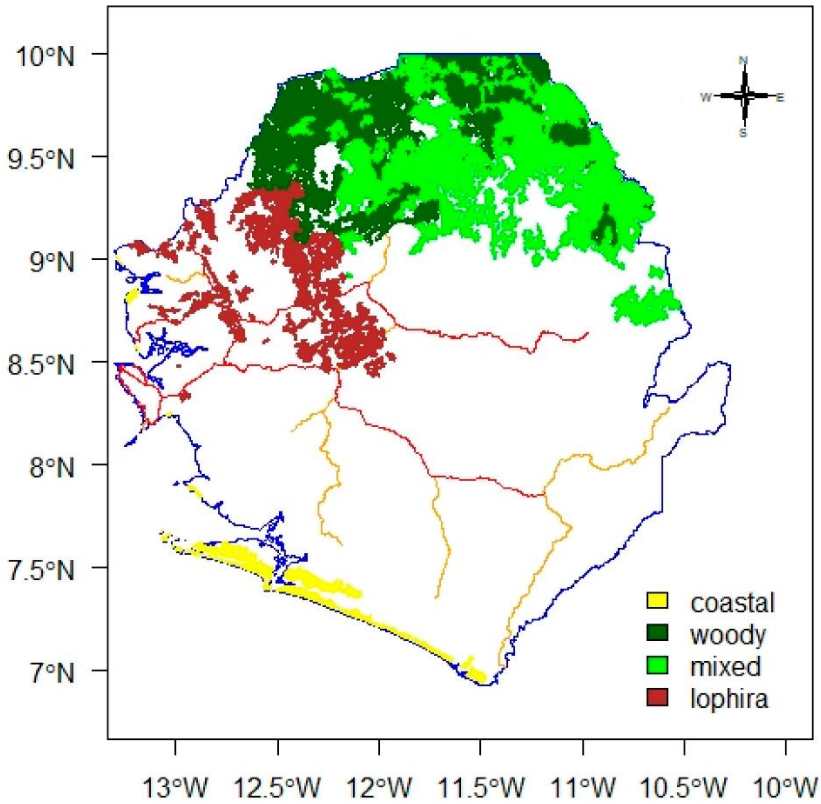


Figure 6.2 The extent of the savanna woodlands in Sierra Leone (Wadsworth, R.A.; Lebbie, A.R. What Happened to the Forests of Sierra Leone? *Land* **2019**, *8*, 80. https://doi.org/10.3390/land8050080).

Presently, all harvesting activities have come to a halt, marking a pivotal moment in the sustainable resource management journey. The contemporary approach to harvesting *Pterocarpus erinaceus* in these woodlands is distinctly characterized by a commitment to sustainable practices. These practices encompass a comprehensive set of principles, including:-

- Deliberate delineation of areas under management plans, with due consideration to various forest types within these regions.
- Adherence to legally mandated minimum cutting diameters, ensuring full compliance with established standards.
- A profound understanding of the implications of cutting and rotation cycles on regeneration dynamics.
- Calculating the annual allowable cut while taking into account growth rates and sustainable management principles.
- Diligent examination of species distribution patterns, particularly density and dispersion.
- Comprehensive analysis of size and age correlations within the population, shedding light on regeneration prospects.
- Thorough accounting for the volume of timber resources available within these woodlands.
- A focus on relevant size classes when assessing growth rates, considering their influence on sustainable practices.
- Inclusion of natural mortality rates as a vital factor in sustainable forest management.
- Rigorous comparisons between size classes at maturity and the minimum cutting diameter to ensure responsible harvesting practices.

This transformative shift in approach signifies a collective commitment to the preservation of these woody savanna ecosystems and the invaluable *Pterocarpus erinaceus* species habitat. The transition from a simplified monitoring procedure of harvesting activities to sustainable practices is a statement to the evolving conservation ethos in Sierra Leone, setting a promising course for the future of these unique woodlands.

Historical Impact on *Pterocarpus erinaceus* Population

In Sierra Leone's past, the *Pterocarpus erinaceus* harvesting mechanism was based on a workflow adapted to the national context. District Forest Units, led by District Forest Officers (DFOs), oversaw forestry activities within Districts. DFOs reported to the national Director of Forestry, ensuring alignment between District and National Forestry Programs.

Pterocarpus erinaceus was primarily found in Community Forests, and Timber Sales Agreements were established through collaboration between Paramount Chiefs, Local Authorities, and select Companies. These agreements covered vital habitat areas. Monitoring and supervision occurred through Forest Management Units in Districts. Periodic visits by the Assistant Director of the Commercial Unit in the Forestry Department of the Ministry of the Environment and Climate Change to ensure compliance with Forestry Regulations, allowing for necessary adjustments.

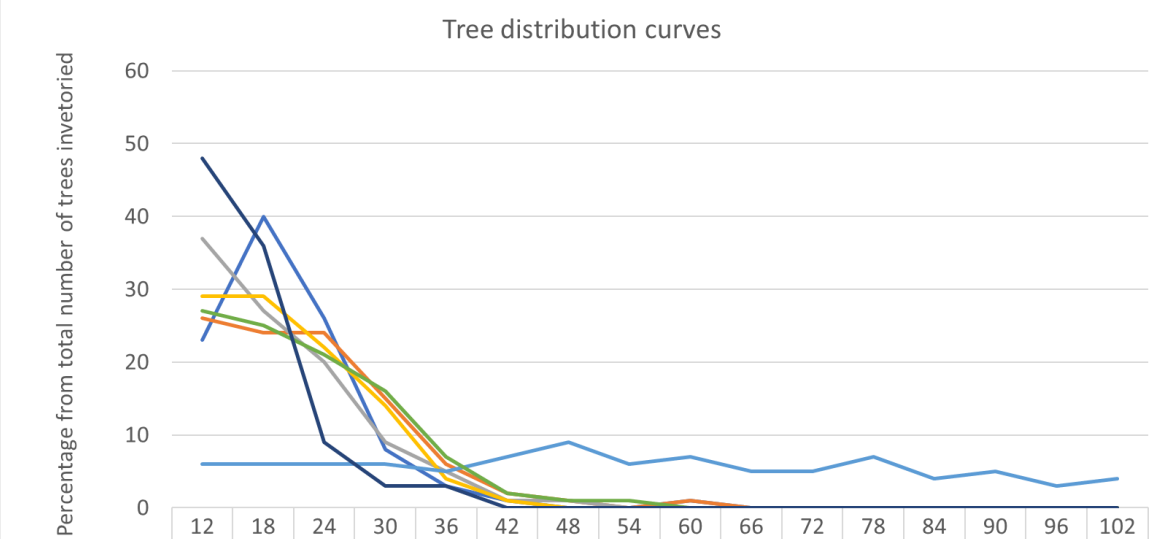
To regulate and oversee the trade, the government appointed a Sole Timber Agent in 2018, responsible for timber exports in collaboration with the CITES Management Authority. This agent ensured transparency and full revenue remittance.

In the past, Sierra Leone's *Pterocarpus erinaceus* harvesting system, while collaborative, did not employ key parameters to evaluate its impact comprehensively. Parameters like area covered by the management plan, distinctions between forest types, cutting/logging/rotation cycles, annual allowable cuts, species density, size distribution, growing stock, growth rates, mortality rates, and size class at maturity were not systematically used for impact evaluation, with the exception of the minimum cutting diameter, which was subject to legal standards.

Recognizing the need for a more holistic assessment of the harvest impact, a recent field survey was conducted at the District level. This survey aimed to capture the current situation, allowing for a more comprehensive evaluation of the species' harvesting practices. This proactive approach demonstrates

Sierra Leone's commitment to evolving and adopting contemporary conservation practices that consider the full spectrum of impact factors.

An insightful analysis of the Size Class Distribution of *Pterocarpus erinaceus* trees in various Districts has revealed intriguing patterns. The data, represented as percentages of trees within specified DBH (Diameter at Breast Height) classes, shed light on the state of these woodlands. The DBH classes, starting from 12 cm and progressing at 6 cm intervals, provide a comprehensive view of the population's structure (Figure 6.3).



	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102
Bombali	23	40	26	8	3	1	0	0	1	0	0	0	0	0	0	0
Falaba	26	24	24	15	6	2	1	0	1	0	0	0	0	0	0	0
Kambia	37	27	20	9	5	1	1	0	0	0	0	0	0	0	0	0
Karene	29	29	22	14	4	1	0	0	0	0	0	0	0	0	0	0
Koinadugu	6	6	6	6	5	7	9	6	7	5	5	7	4	5	3	4
Kono	27	25	21	16	7	2	1	1	0	0	0	0	0	0	0	0
Portloko	48	36	9	3	3	0	0	0	0	0	0	0	0	0	0	0

Figure 6.3. Size class distribution of the trees showing different exponential curves , the numbers represent the DBH classes in cm.

One remarkable observation is the prevalence of a reverse J-shaped curve in most Districts. This suggests that historical harvesting practices, alongside other activities such as burning and charcoal production, have not significantly impacted the natural structure of the inventoried *Pterocarpus erinaceus*. This is an encouraging sign, indicating a degree of resilience within the *Pterocarpus erinaceus* populations in these areas.

However, two Districts stand out from this trend. In Koinadugu District, the distribution across DBH classes is relatively uniform, with less than 10% of trees in each class. This could signify a unique ecological context or previous management practices specific to this region.

Conversely, Bombali District displays a deficiency in the lower diameter classes, potentially indicating past harvesting practices that skewed the size distribution. Further investigation and monitoring are crucial to better understand these nuances and ensure sustainable management for *Pterocarpus erinaceus* across Sierra Leone.

Future developments in evaluating the impact of harvests in order to Assess Long-Term Impact, Address Damages and Losses and Collect Supporting Data

A. Setting up management plans on established concession areas

This future development will be based on the following steps:-

1. **Resource Assessment:** Assess *Pterocarpus erinaceus* availability, health, and ecological factors.
2. **Legal Compliance:** Ensure legal land tenure and regulatory compliance.
3. **Stakeholder Engagement:** Engage with stakeholders for input and local community involvement.
4. **Concession Planning:** Define boundaries and gather baseline data.
5. **Sustainable Management Plan:** Develop a plan for harvesting, regeneration, and conservation.
6. **Environmental Impact Assessment:** Evaluate and mitigate environmental and social impacts.
7. **Monitoring and Adaptation:** Implement a monitoring system and adapt strategies as needed.
8. **Community Benefits and Certification:** Support local communities, seek forest certification, and ensure compliance.

B. Setting up an exploratory inventory system at section level

Statistical grid sampling will be placed in order to determine at section level the following;-

- Number of individuals and density of the species, examining distribution patterns.
- Size distribution, analyzing age and size correlations.
- Growing stock, accounting for the volume of timber.
- Growth rate (increment), focusing on relevant size classes.
- Mortality rate, including natural mortality.

The current number of plot will be increased and established based on the natural distribution of *Pterocarpus erinaceus.*

C. Determination of Minimum Diameter of Exploitation (MDE), rotation cycle for *Pterocarpus erinaceus* at regional level

1. Introduction

The methodology outlines the process for determining the Minimum Diameter of Exploitation (MDE) for *Pterocarpus erinaceus* in Sierra Leone. The MDE is a critical parameter for regulating sustainable harvesting practices. The establishment of the Minimum Diameter of Exploitation (MDE) for harvesting is grounded in the principles of sustainable forest management. At its core, this practice aims to strike a harmonious balance between extracting forest resources and conserving the ecological health and vitality of the forest ecosystem.

It revolves around the idea of nurturing the forest ecosystem, safeguarding its biodiversity, and maintaining its natural processes. By defining an MDE, we ascertain that trees below a certain diameter threshold are spared from harvesting. This allows these younger trees and seedlings to thrive undisturbed, facilitating natural regeneration.

Furthermore, the MDE seeks to maintain the population structure of the tree species. It ensures that an adequate number of mature trees remain within the population to produce seeds, promote genetic diversity, and enable natural recruitment. This, in turn, sustains the population and supports the long-term health of the forest.

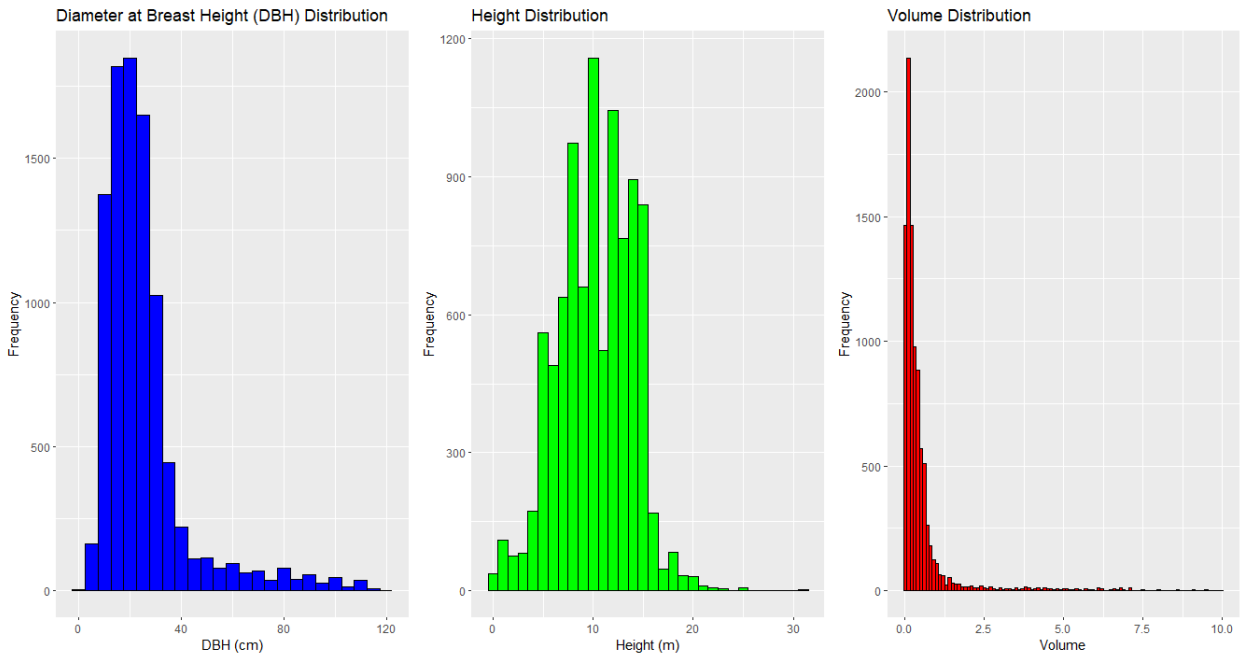
Crucially, the concept of MDE also acts as a bulwark against overharvesting. It prevents the excessive removal of trees, particularly the larger, older ones, which can lead to population declines and even local extinctions. Moreover, it aligns with the philosophy of sustained yield forestry, where the forest's capacity to provide resources is safeguarded for the future. By allowing trees to reach a specified maturity before harvest, the MDE ensures a consistent and sustainable supply of timber and other forest products.

The determination of MDE is not a one-size-fits-all approach. It takes into account the unique characteristics, growth rates, and ecological needs of the target species. It also considers the influence of environmental factors, such as climate, soil conditions, and local ecology, which may vary from one region to another.

Ultimately, establishing an MDE is a dynamic and adaptive process. It involves continuous monitoring, data analysis, and adjustments as ecological conditions evolve. This ensures that the forest remains resilient and capable of providing resources for generations to come while preserving its ecological integrity.

2. Data Collection and Preparation

Gather comprehensive data on *Pterocarpus erinaceus* populations, including Diameter at Breast Height (DBH), Height (H), and Volume (Figure 6.4). Ensure data quality and accuracy. Data from *P. erinaceus* populations in the study areas were collected by means of forest inventories. The sampling was based on the random method. The random method was based on 1000 m^2 (40m×25m) sampling units at regular intervals of 200 m, randomly defined in populations dominated by *P. erinaceus*. In all cases the DBH ≥ 10 cm measurements were performed using a tree caliper for large diameters or a tape measure for medium and small stems. Forest characteristics were assessed by calculating the average diameter, the total average height. A total number of 9510 trees were samples in the field.



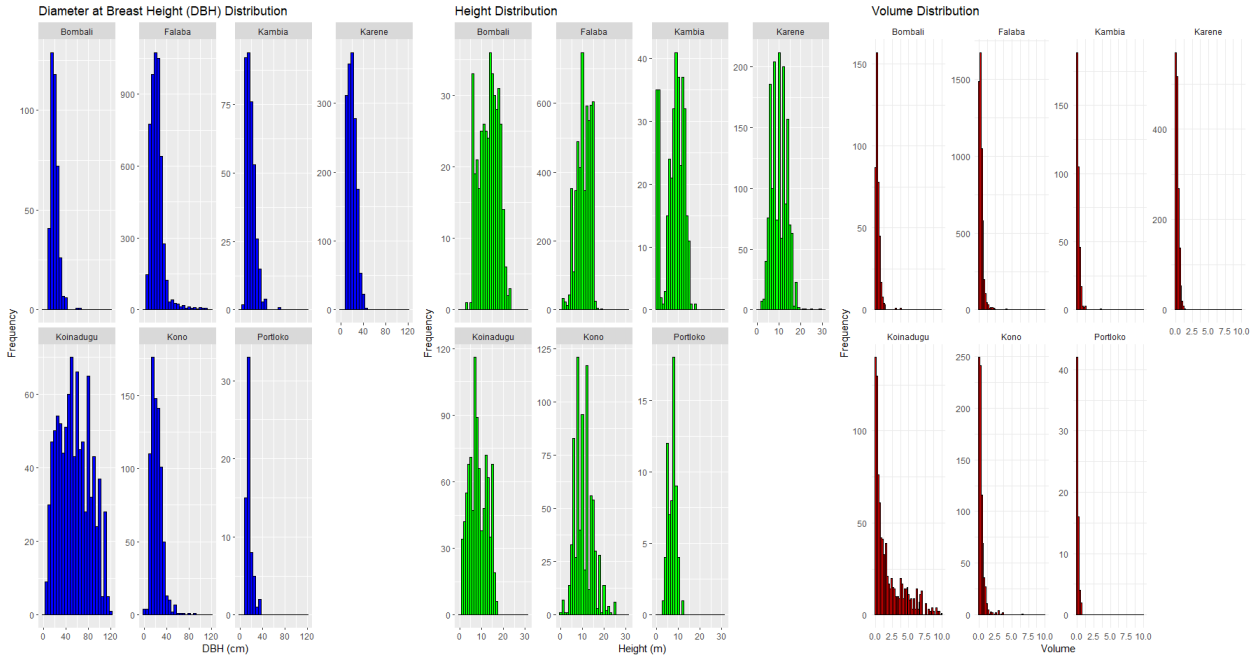


Figure 6.4. DBH, Height and Volume histogram distribution at national and regional level

3. Basal Area Distribution Analysis

Analyze the basal area distribution per diameter class for *Pterocarpus erinaceus*. Identify the modal distribution and assess the ecological conditions in different Districts of Sierra Leone (Figures 6.5 and 6.6).

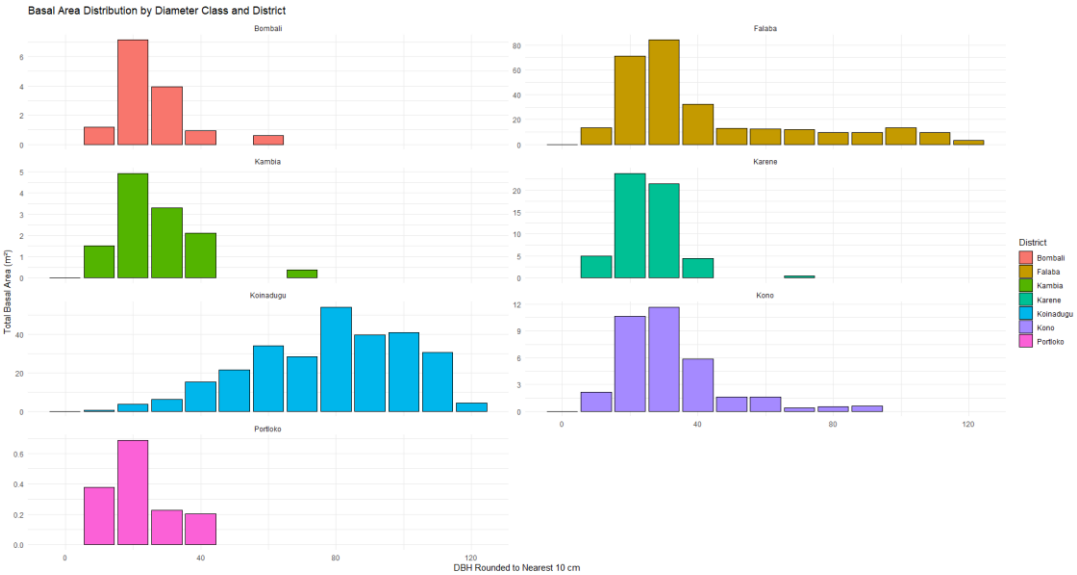


Figure 6.5. Basal area distribution at District level

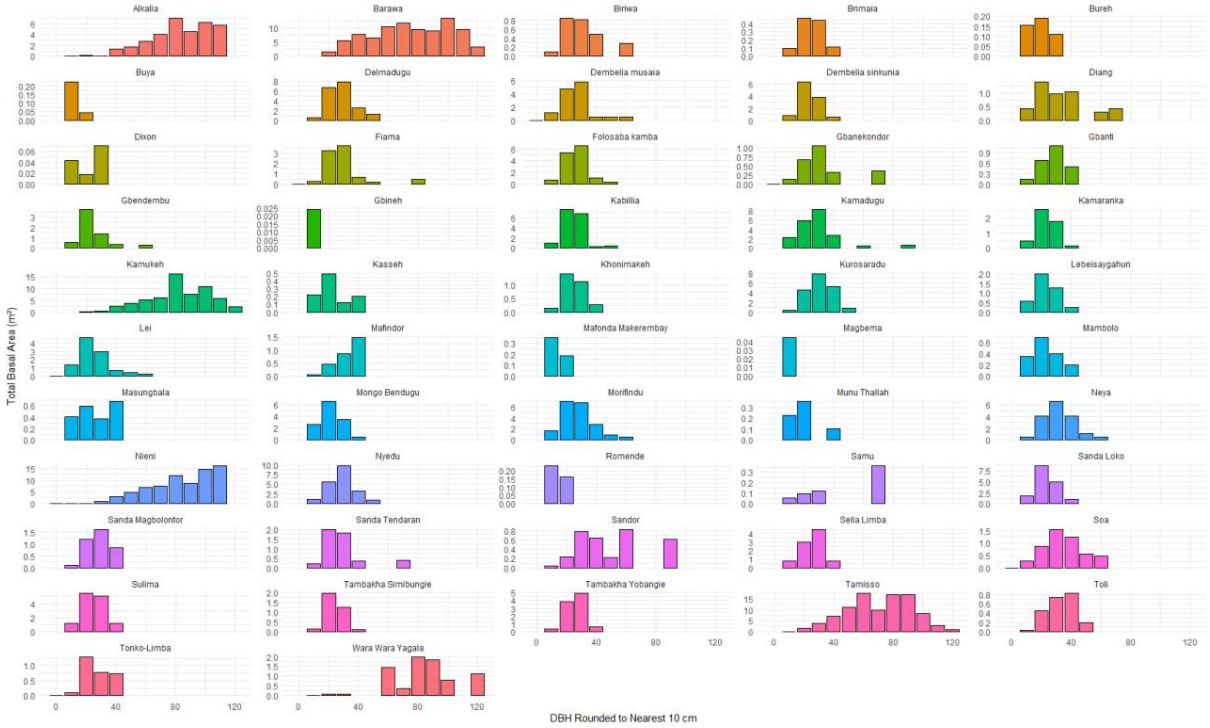


Figure 6.6. Basal area distribution at Chiefdom level

4. Iterative MDE Calculation

The determination of the Minimum Diameter of Exploitation (MDE) for *Pterocarpus erinaceus* in Sierra Leone is based on a well-established methodology. This methodology draws from the work of Durrieu de Madron and Forni (1997) and has been adapted and refined by Sokpon and Biaou (2002), as well as Sokpon et al. (2006). The fundamental principle underlying this approach is to ensure sustainable harvesting practices that account for the growth rate and the diametric structure of the *P. erinaceus* species.

Here is a step-by-step explanation of how the MDE and rotation cycle are determined:-

- **Initial Diameter Classes**: The process begins with an assessment of various diameter classes, typically including classes such as 25 cm, 35 cm, 45 cm, and 55 cm. These classes serve as initial reference points.
- **Restoration Percentage:** To establish a sustainable rotation cycle, it is crucial to calculate the restoration percentage of the original exploitable basal area for the *P. erinaceus* species. This restoration percentage is informed by factors like the extent of exploitation damage, diameter growth of trees, and mortality of individual population members.
- **Iterative MDE Testing:** The MDE is not fixed but is determined iteratively. Initially, an MDE is selected, often based on the diameter classes mentioned earlier.
- **Restoration Assessment:** The restoration percentage is calculated based on the transition time or rotation. The transition time represents the duration required to move all individual trees in a specific diameter class to a diameter higher than the selected MDE.
- **Restoration Percentage Evaluation:** The restoration percentage is a critical parameter in this process. If the calculated restoration percentage falls below a certain threshold (typically less than 50%), it suggests that restoration efforts are insufficient, and the MDE needs adjustment.
- **Iterative Refinement:** To achieve sustainable exploitation, the MDE is adjusted upwards, and the restoration percentage is recalculated. This iterative process continues until an MDE is

identified that not only prevents over-exploitation but also facilitates the restoration of the *P. erinaceus* species to a healthy and viable state.

- **Transition Time and Restoration Percentage Formulas:** The formulas employed for determining the transition time and the restoration percentage are derived from the work of Durrieu de Madron and Forni (1997). Specifically, the transition time (T) is calculated as follows:

$$T = \frac{MDE - D_{bi}}{AAM}$$

Here, T represents the transition time in years, MDE is the Minimum Diameter of Exploitation, D_{bi} is the diameter of the lower bound of the relevant class, and AAM is the average annual growth.

- The restoration percentage (P) is computed using the formula:

$$P = \frac{[(G_0\ (1-\Delta)](1-\propto)^T}{G_p} \times 100$$

In this equation, P signifies the restoration percentage of the number of trees initially exploited. G_0 is the basal area of the diameter classes immediately below the MDE, Gp is the exploitable basal area, alpha represents the annual mortality rate, and delta is the damage rate due to exploitation.

This methodology ensures that the rotation cycle for harvesting *P. erinaceus* trees takes into account not only the economic aspects of exploitation but also the ecological sustainability of the species. By iteratively adjusting the MDE based on restoration percentages, it strives to strike a balance between resource utilization and species preservation.

5. Restoration Percentage Calculation

Calculate the restoration percentage of the original exploitable basal area, considering factors such as exploitation damages, diameter growth, and mortality of population individuals.

6. Iterative Testing of Diameter Classes

Iterate through various diameter classes, including 25 cm, 35 cm, 45 cm, and 55 cm, to determine the MDE. Increase the MDE iteratively until a restoration percentage exceeding 50% is achieved.

7. Transition Time Calculation

Calculate the transition time ('T'), representing the time required to move all individuals in one diameter class to a diameter higher than the MDE.

8. Restoration Percentage Estimation

Estimate the restoration percentage ('P') of the number of trees initially exploited using the calculated values. This percentage provides insights into population restoration.

9. Final MDE Determination

When setting up a transition period of 50 years – optimal MDE is 35 cm in most of the Districts, therefore the rotation cycle of 20 years and a MDE of 35 ensures the restoration percentage over 50% (values show in red in table below).

	MDE 20		MDE 25		MDE 30		MDE 35		MDE 40	
	P%	T	P%	T	P%	T	P%	T	P%	T
BOMBALI	7.34	12.8	30.7	22.8	90.8	32.8	221	42.8	420	52.8
FALABA	3.69	20	10	30	24	40	46.2	50	72.4	60
KAMBIA	10.4	20	26	30	57.2	40	108	50	194	60
KARENE	8.08	10	25.1	20	59.9	30	158	40	569	50
KOINADUGU	0.154	20	0.371	30	0.848	40	1.18	50	1.93	60
KONO	4.48	28	12.4	38	28.2	48	58.5	58	106	68
PORTLOKO	27.5	10	92.5	20	141	30	385	40	348	50

D. Establish quota of annual allowable cut

Establishing a quota for the annual allowable cut (AAC) of *Pterocarpus erinaceus*, commonly known as African rosewood or African padauk, involves determining the maximum sustainable level at which this valuable timber species can be harvested from a given forest or concession area while maintaining its population and ecosystem health. The AAC is a crucial component of sustainable forest management and conservation efforts. Here's a step-by-step definition of how to establish an AAC for *Pterocarpus erinaceus*:

- **Resource Assessment:**

Conduct a comprehensive assessment of the *Pterocarpus erinaceus* resource within the forest or concession area. This includes quantifying the population size, distribution, age structure, and health of the species.

- **Ecological Considerations:**

Evaluate the ecological characteristics of the forest ecosystem where *Pterocarpus erinaceus* occurs. Consider factors such as soil quality, hydrology, wildlife habitat, and biodiversity.

- **Legal and Regulatory Framework:**

Review and understand the relevant national and international laws, regulations, and agreements governing the harvest and trade of *Pterocarpus erinaceus*. Ensure compliance with CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) if applicable.

- **Harvest Impact Assessment:**

Assess the potential ecological impact of timber harvesting on *Pterocarpus erinaceus* and the broader ecosystem. Evaluate how various harvest scenarios may affect tree regeneration, biodiversity, and soil stability.

- **Define Sustainability Objectives:**

Establish clear sustainability objectives for *Pterocarpus erinaceus*. Determine the desired population size, age structure, and overall health of the species over time.

- **Calculation of AAC:**

Utilize scientific modeling and data analysis to calculate the AAC. This involves estimating the maximum volume or number of *Pterocarpus erinaceus* trees that can be sustainably harvested each year without depleting the population or causing ecological harm.
Consider factors such as:-

  - Growth and recruitment rates of *Pterocarpus erinaceus*.
  - Mortality rates due to natural causes and harvesting.
  - Regeneration capacity and success.
  - Desired stock levels (e.g., maintaining a certain population density or age distribution).
  - Ecological resilience and recovery time.

- **Monitoring and Adaptive Management:**

Implement a robust monitoring and data collection program to track the status of *Pterocarpus erinaceus* populations, ecosystem health, and compliance with sustainability objectives.
Apply adaptive management principles, adjusting the AAC as new data and insights become available.

- **Stakeholder Engagement:**

Involve local communities, indigenous groups, conservation organizations, universities, timber associations and relevant authorities in the AAC determination process. Consider their knowledge, interests, and concerns.

- **Periodic Review:**

Periodically review and update the AAC based on the latest research, monitoring results, and changes in ecological conditions or legal frameworks.

Indicator	Status	Explanation
Harvest impact severity on harvest population	Unknown	• The current inventory and monitoring data show that the amount of timber harvested is close or equal to annual re-growth, but needs to be expanded. The current data show that in most of the regions constant regeneration and re-growth into higher diameter classes should be a safe assumption. • Stand structure of accompanying species as potential competitors under altered conditions after harvest operations needs to be observed and possibly managed.
Harvest impact severity on national population	Unknown	• The current monitoring data is not in place to show that the population(s) of the target species have been stable over the years, but the actual distribution revealed by the monitoring data is closer to a natural inverse J curve showing an indirect stability over the years. • Harvest operations may impact the viability of sub-populations e.g. the species' distribution is scattered and uneven in (partly) low numbers and interconnection between sub-populations is questionable.

Harvest impact severity on ecosystem	Unknown	• Target species may be confused with other species leading to their accidental harvest. • Harvest practices are occasionally disruptive to non-target species or ecosystem. • Harvest has a moderate effect on resources available for other species.

STEP 7 - EVALUATE IMPACTS OF TRADE FOR *PTEROCARPUS ERINACEUS*

Rationale

Impacts of wild harvest to the harvested populations ("target population") has been considered in Step 6.

Step 7 of the CITES Non-detriment Findings (NDF) process is crucial as it focuses on evaluating the actual impacts of trade on the harvested populations.

Understanding these impacts is essential because it allows the Scientific Authority and the Management Authority a data set to evaluate trends and adjust management strategies for legal and sustainable trade of the species. Moreover, the evaluation extends to determine the impact from illegal harvest practices that can negatively affect population of the species and the broader ecosystem in which it resides.

This step is used to identify and assess these impacts by considering available information about the trade for international export and the national uses. The severity of these impacts dictates the quality of information required, the level of management rigor, and the precautionary measures necessary to identify and curtail unsustainable trade volumes.

Action

Within this action plan, we use statistics from CITES permit allocations and the volumes of export from 2016, when *Pterocarpus erinaceus* was uplisted to CITES Appendix II with no annotation, up to the imposition of the zero-quota export in 2022 to indicate trends in trade. Local and domestic trade is considered based on traditional and historical uses. Impacts of Illegal logging and trade are evaluated based on areas of harvest, logistics and access to export.

International Trade: Export

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).

Due to the trends of "Hongmu" and the 2016 listing of the Dalbergia genus, the international trade of *Pterocarpus erinaceus* increased significantly across all range states. International exports increased exponentially from Sierra Leone.

The impact of trade on the species in Sierra Leone can be considered HIGH.
International trade far exceeds all other national and traditional demands for the species.

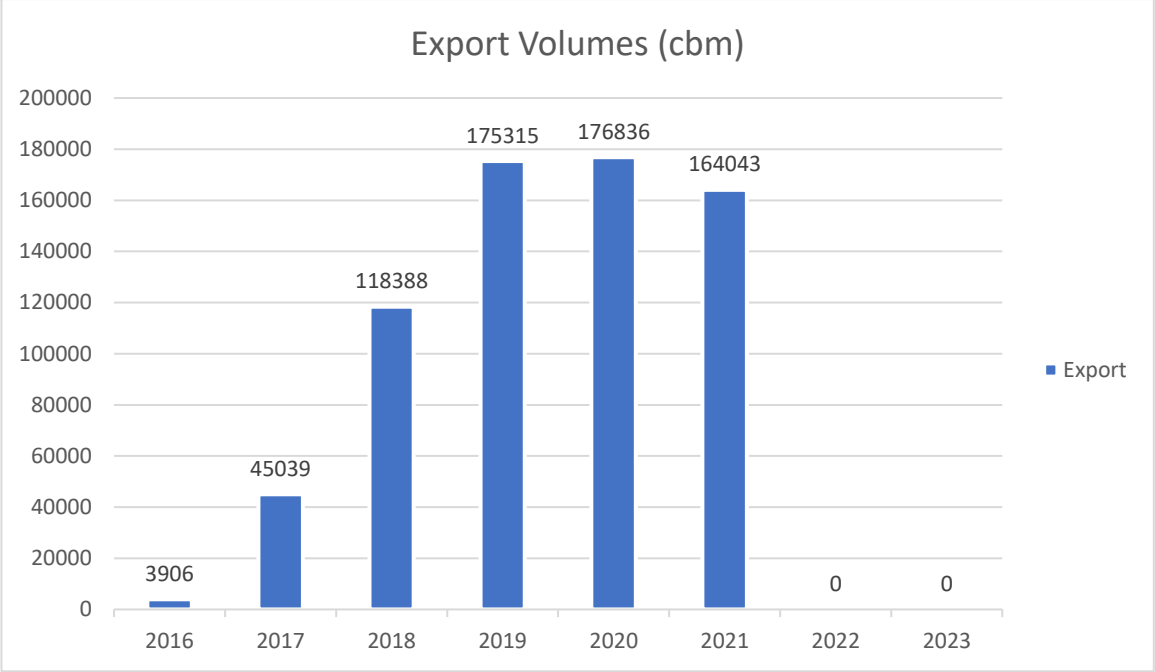


Figure 7.1. Export volumes for the period 2016-2023

National Trade and Traditional Demand

As outlined in the Annex of specific uses at the District level, *Pterocarpus erinaceus* timber is in demand for fencing, construction work – houses and roads, firewood, charcoal, medicine, and fodder.

The impact on the species from the national trade is unknown and will be analyzed further as management plans and traceability systems are instituted for establishing harvestable volumes for export through the NDF and CITES Appendix II regulations.

There is a growing trend for charcoal, and this can be considered one of the key impacts from national trade that needs further analysis. It is unclear whether the trends for domestic demand, such as charcoal, should be considered trade or subsistence threats that are apparent from slash and burn and woodland clearance for agriculture.

Illegal Trade

The impact of illegal trade on the species is UNKOWN and in need of analysis through implementing traceability systems and based on the German Nine Step questions. There is no clear data on the impacts of illegal trade and moreover, there are no pending prosecutions at the national or district level for illegal logging of the species. The Forest Department takes an active role of investigating all local infractions.

Historically, there are only four companies that were issued licences to harvest *Pterocarpus erinaceus*. Each was allocated a licence in a different region of distribution of the species and had sole contracts with the Chiefdoms in each region. These areas are monitored at the local level.

Based on the volumes of export through the issuance of CITES Permits from 2016-2021, it is apparent that the large volumes of wood were exported through the official channel of the Management Authority.

There are potential border crossings that are porous towards Guinea where illegal trade could occur, but this would be a low impact in comparison with direct exports for international trade.

The completion of this NDF and institution of the traceability system will be a key deterrent for mitigating illegal trade.

Future developments in evaluating the impact of trade in order to Assess Long-Term Impact, Address Damages and Losses and Collect Supporting Data

E. Standardizing sustainable management plans and instituting traceability system

Trade impacts will be managed through the following processes currently under development from completing this NDF.

- Concession areas will be demarcated through grids and rotations that are based on the species harvest impacts and measures for improving regeneration and conservation.

- Sierra Leone has invested and is committed to implement a comprehensive technologically advanced traceability system that will be used to complete inventories and establish a sustainable harvestable quota.

- Management system standards will include mechanisms for monitoring forests for international trade as well as local trade use and demand.

F. Establish quota of annual allowable cut

The digital traceability system will be used for inventory management and establishment of Minimum Diameter of Exploitation (MDE) at the Chiefdom, District and National levels.

G. Institute Legal Acquisition Findings (LAF) Procedures for All Trade

Trade impacts will be mitigated through the implementation of the Management Authority LAF procedures. All data will be collected in the Management Authorities data base and centralized for access and analysis.

Indicator		
International trade impact severity on harvest population	High	Target species is in high demand for export level trade.
Trade impact from national demand	Unknown	Target species has multiple uses domestically but the actual national trade impact needs to analyzed.
Impact from Ilegal trade	Unknown	Target species is vulnerable to illegal trade but impact is unknown. There are no pending prosecutions at the national or local district level for illegal logging of the species.
Trade impact severity on national population	Unknown	Target species has a wide range of distribution in Sierra Leone. Even in harvested areas population is present.

Trade impact severity on ecosystem	Unknown	Target species may be confused with other species leading to their accidental harvest. • Harvest practices are occasionally disruptive to non-target species or ecosystem. • Harvest has a moderate effect on resources available for other species. National legislation strictly prohibits harvesting in Protected Areas, including the largest National Park (Outamba Kilimi) in northern Sierra Leone where there is pristine *Pterocarpus* woodland ecosystem.

STEP 8 - EVALUATE APPROPRIATE RIGOUR OF EXISTING MANAGEMENT MEASURES

Rationale

To assess the status of *Pterocarpus erinaceus* in Sierra Leone and whether conservation and biological risks are mitigated, as well as harvesting and trade impacts assessed and identified in the previous steps of this NDF assessment process, there is a need to assess the rigour of current management measures and make recommendations on their improvement.

Key Questions to Answer

The evaluation of the existing management measures and their rigour has only been made after having gone through steps 4 and 7, assessing the conservation concern, intrinsic biological risk, exploitation impact and commercial impact of *Pterocarpus erinaceus*.

Information Sources

All Species / Specimens Requiring a Detailed NDF	**Species with Medium, High, and Unknown Severity of Concern, Risk, or Impact Identified in Steps 4-7**	**Species with High and Unknown Severity of Concern, Risk, or Impact Identified in Steps 4-7**
Routine verifications: • Export permit application • Conservation status assessments specifying existing management • Information on existing quotas (and the basis for setting them), monitoring of harvest and trade levels and impacts, enforcement • National legislation (conservation, harvest, trade of species concerned)	**Existing qualitative information:** • Approved local / national / state / provincial management plan(s) • Interviews with harvesters, traders, resource managers, enforcement officers, and other stakeholders along the supply chain • Harvester instructions, including harvest practices, impact mitigation measures, volume, and quality controls	**Existing quantitative information:** • GIS layers of harvesting areas and land tenure • Quantitative monitoring in protected and harvest areas • Quantitative monitoring of domestic and export trade • Quantitative off-take thresholds (e.g., estimates of maximum sustainable yield, minimum viable - population)

As recommended by the 9-step NDF assessment Guidelines for *Pterocarpus erinaceus* in Sierra Leone the following actions were carried out to collect quality information from various sources:

- Routine checks on export permit applications and verification of the volumes mentioned in the permits and comparison with the quotas established for extraction in the management plans, as well as the harvesting and marketing levels reported by four companies that

extracted *Pterocarpus erinaceus* in Community Forests from Karene District (Tambaka Simibuyie Chiefdom) Kono District (Toli Chiefdom), Koinadugu District (Sengbeh Chiefdom) and Falaba District (Dembelia Musaia Chiefdom), between 2018 and 2021.

- Review of existing legislation in Sierra Leone, namely the Forestry Act of 1989 and the Forestry Regulations of 1990, following the sections and sub-sections referring to forest management measures relevant to this assessment. This analysis centralizes a list of observations based on the current legislation, but also a series of measures that the Government of Sierra Leone is undertaking to improve it, by adding provisions that will considerably contribute to the sustainable management of forest resources and help adapt the rigour of management measures to the current context of *Pterocarpus erinaceus* species and other CITES-listed species. The future legal provisions will also define the framework for the development and implementation of a National Forest Traceability System, which will help to collect data to support appropriate management measures and sustainable forest policies.

- Verification of local management plans and monitoring practices, required by legislation for the exploitation of areas under concession to companies, were also checked, while national plans, although mentioned in the Forestry Act, have not yet been carried out. Management plans for Samaya (Karene), Toli (Kono), Bendugu (Koinadugu) and Dembelia Musaia (Falaba) Community Forests were reviewed to identify the current level of rigour of management measures stipulated there.

- Harvest practices were assessed through verification of the above-mentioned management plans and contracts, where harvesting methods and operations were described per each of the four companies that harvested in Karene, Kono, Koinadugu and Falaba Districts.

- Interviews with stakeholders in all Districts and Chiefdoms where *Pterocarpus erinaceus* is distributed were also conducted and the results presented in this NDF report. This allowed us to collect anecdotal information on the local knowledge regarding the target species, on informal management and protection measures, which differ from one Chiefdom or District to another.

- Review of basic GIS layers (kmz. Formats) and raster maps generated in four harvested areas in Karene, Kono, Koinadugu and Falaba Districts, representing Community Forests from the Chiefdoms of Samaya, Toli, Sengbeh and Dembelia Musaia, harvesting sections/compartments and harvesting areas (point formats). GIS layers of Districts, Chiefdoms and Sections at national level are also available from different governmental sources.

- Review of Excel spreadsheets with quantitative information regarding harvested trees and generated logs, as well as export trade for the four companies that harvested in Karene, Kono, Koinadugu and Falaba Districts – ERA Investment, Liberation Logistics Investment, MANS Sierra Leone LTD and Global Logistics Services, between 2018 and 2021.

- Compiled a synthesis of regional studies providing insights into the species' range and distribution patterns across the neighboring countries.

- Used the Global Biodiversity Information Facility (GBIF) as a valuable resource for species distribution data.

- Compiled a rich dataset of various factors that influence the population size and distribution of *Pterocarpus erinaceus*, such as vegetation indexes, climatic data, digital elevation models and ground truth inventory data.

- Employed various advanced analysis technologies to create distribution models in Sierra Leone, such as Supervised Random Forest Algorithm (RF) machine learning algorithm to handle the multi-dimensional datasets and their complex relationships; Pixel-Based Analysis; Predictive Modeling and Regression Analysis to predict population size and distribution and a methodology for determining Minimum Diameter of Exploitation (MDE).

Information on how the quotas and minimum exploitable diameters have previously been established in each harvest areas, monitoring of harvest levels and impacts, as well as quantitative monitoring of harvest, estimates of maximum sustainable yields and minimum viable populations is missing or incomplete.

KEY FINDINGS FROM STEPS 4-7

Following the completion of steps 4-7 of the 9-step process, the findings related to each step are briefly presented below to serve as a context for the assessment of step 8 of the management measures for *Pterocarpus erinaceus*.

Step 4. Evaluation of Conservation Concern

Internationally, the severity of conservation concern for *Pterocarpus erinaceus* is considered **HIGH** (Adjonou *et al.*, 2020).

Locally, there are differences among countries, as well as within a country. For example, within Sierra Leone differences in distribution, tree densities per ha and distributions by diameter category were identified, indicating that the conservation status of the species at the national level can vary quite widely from District to District, or Chiefdom to Chiefdom, depending on what anthropogenic and climatic impacts, individually, or combined, are observed. The present study is based on sampling areas where distribution, DBH, regeneration data were collected and validated in a later field visit and through more detailed analyses and GIS and statistical modelling carried out during Steps 5 and 6. However, a more detailed and nuanced assessment of the status of the species by District and Chiefdom should be made by using the NDF and inventory and traceability technology for conducting a National Inventory and establishing a National Monitoring Plan for all CITES listed and Non-CITES species of commercial importance, the results of which can be used for the development of management plans and the establishment of management measures tailored to each national forest, community, or forest concession level.

However, because there is not yet enough quantifiable data related to impacts and risks at District and Chiefdom level, and not enough inventory data and especially not a National Inventory of the species, we can consider that at national level the severity of conservation concern is considered **MEDIUM**.

Step 5. Evaluation of the Potential Biological Risks of *Pterocarpus erinaceus*

Based on the assessments of West Africa regional geographic distribution of *Pterocarpus erincaeus* the risk severity was assessed as being **MEDIUM.**

By verifying the status at national and sub-national population size and distribution, using data compilation, supervised random forest algorithm, pixel-based analysis, predictive modeling, regression analysis and insights, the risk severity resulted to be **MEDIUM** as well.

Assessing the size structure of national and sub-national populations based on data collected in the field plots, it shows that the overall health of the population, based on the occurrence of many small, young trees, which are most likely to reproduce, the risk severity could be considered as **LOW**.

The evaluation of habitat specificity and vulnerability, since habitat types are declining in size and/or deteriorating in quality, due to various factors, such as land cover changes through extension of agricultural land, climate change or unsustainable past exploitations gives a **MEDIUM** risk severity.

Step 6 – Evaluate impacts of harvest for *Pterocarpus erinaceus*

Based on the analysis of current harvest practices and the historical impact on the species population, but also on running various analyses to determine the Minimum Diameter of Exploitation (MDE) and the rotation cycles for *Pterocarpus erinaceus* at regional (District levels), it resulted that there is an **UNKNOWN** harvest impact severity on harvest and national populations, as well as on the ecosystem.

Step 7 – Evaluate Impacts of Trade

Based on the volumes identified in the exploitation and export licences, correlated with the lack of accurate inventory data from the exploitation areas from 2018 to 2021, and the lack of an NDF for these areas, we consider the impact of legal trade to be **HIGH.** In addition, the lack of a clear system to monitor the impact of exploitation, or a traceability system to help meet the LAF, supply chain transparency, or identification of illegal exploitation, we consider the impact of illegal trade to be **UNKNOWN**.

Factors to Consider Regarding the Evaluation of Existing Management Measures

The factors and indicators defined in this table rank management procedures relevant for conservation concerns, intrinsic biological risk factors, harvest impacts, and trade impacts according to rigour (complexity, accuracy, precision). These should be considered as examples of the types of management measures appropriate for "Low", "Medium" and "High" levels of conservation concern, intrinsic biological risk, harvest impact, and trade impact. It is not expected or necessary that management measures in place will have all of the characteristics outlined in this table. Scientific Authorities can evaluate the existing management procedures for the target species and populations as "Uncertain", "Minimal", "Moderate" or "Intense" using this table in combination with Worksheet for Step 8 Part 3, and then evaluate whether the existing management measures are appropriate in Worksheet for Step 8, Part 4.

Level of existing management rigour	**Management of conservation concerns (Step 4)**	**Management of intrinsic biological risks (Step 5)**	**Management of wild harvest impacts (Step 6)**	**Management of trade impacts (Step 7)**
Uncertain				
Minimal	Part of the species natural range is included in protected areas, especially in the Northern and Eastern part of the country where there are a series of National Park and Forest Reserves on the border with Guinea and within the natural range of the species. However, these protected areas cover less than 5% of the natural distribution of the species. In the Sierra Leonean legislation, the community forests are also considered protected forests and are under the jurisdictions of Chiefdoms and some of them have informal protection measures for *Pterocarpus erinaceus*, but they are of minimal rigour.	No clear harvest guidelines provided through legislation/regulations. The harvest methodology is usually described by the entities to which the concessions were granted and submitted for approval to the Director of Forestry through the local management plans. Inadequate management measures, defined in appropriate forest management plans, as well as the absence of standardized harvest guidelines and of a monitoring/traceability system in place to track	As in the case of the intrinsic biological risk, the inadequate management measures and standardized harvest guidelines also qualifies the existing management as of minimal rigour. This absence of precise guidelines for harvesting raises concerns about the sustainability of current practices. The absence of established management measures is evident. This lack of clarity could potentially lead to unregulated harvesting practices and pose a threat to the species' long-term survival.	

Level of existing management rigour	Management of conservation concerns (Step 4)	Management of intrinsic biological risks (Step 5)	Management of wild harvest impacts (Step 6)	Management of trade impacts (Step 7)
	There is also a reforestation programme in place at the country level, which includes *Pterocarpus erinaceus* among the key-species, but this should be included into a proper National Reforestation Plan which will have to be part of a National Forest Management Plan in order to be very effective – to know which are the most affected areas, to understand distribution, where the connectivity is missing, where inbreeding or low levels or no regeneration is an issue, so that the reforestation should happen in a targeted way.	exploitation practices and impacts, represent a cumulative risk to the species and might cause an overharvesting of the resource. From the analysis carried out in the Step 6 on MDE – Minimum Diameter of Exploitation , it results that the minimum diameter established by the Director of Forestry at national level of > 30 cm is not entirely accurate and should not apply at national level. According to the analysis, the MDEs should vary from one district to another from >30 cm in some districts to >35 - 40 cm in other, which proves the need for very adaptive management measures depending on the data collected on the ground.	Without defined management measures, the risk of overharvesting or harvesting immature trees increases. This could result in population decline and hamper the species' ability to regenerate and sustain its population. As in the case of Step 5 there is a need of an adaptive determination of MDEs at District, or even of Chiefdom or concession level, to provide sustainability to the harvesting practices and allow the species to recover. The lack of monitoring /traceability systems is also reducing the rigour of the management measures for *Pterocarpus erinaceus* as there are no clear records on inventoried trees – lack of coordinates of inventoried trees, detailed maps of the trees – no clear monitoring records on harvested trees and gaps in the correlation between the harvested trees and resulting logs.	

Level of existing management rigour	Management of conservation concerns (Step 4)	Management of intrinsic biological risks (Step 5)	Management of wild harvest impacts (Step 6)	Management of trade impacts (Step 7)
			Moreover there is no clear demarcation and control of access to the harvesting areas which could cause a high risk of illegal harvesting. Monitoring and impact assessment of cumulative harvesting – timber, charcoal, slash and burn for agricultural land conversion, or grazing is not very effective.	
Moderate				For each area of exploitation there is a file covering part of the supply chain information. There are management plans with minimal information, rather presented as operational plans, with maps showing basic details of harvested sections (boundary shapefiles), points with harvesting areas (shapefiles), lists of harvested trees (without coordinates and detailed maps) and lists of logs resulting from harvesting,

Level of existing management rigour	Management of conservation concerns (Step 4)	Management of intrinsic biological risks (Step 5)	Management of wild harvest impacts (Step 6)	Management of trade impacts (Step 7)
				in Excel format. The files also include exploitation, transport and export licences, phytosanitary certificates, Bills of lading. Although these legal measures on harvesting and trade exist and provide a minimum of traceability, the problem is more one of the difficulties related to tracking and linking information of origin, correlate exploited and extracted volumes of timber to those transported, stocked, processed, and exported at each level of the supply chain. There is a lack of centralization of this data, which needs a digitization.
Intense				

Future developments in improving the management measures of *Pterocarpus erinaceus* in Sierra Leone

A. Standardize management measures by redefining and implementing detailed forest management planning nationwide

In order to achieve robust management measures for *Pterocarpus erinaceus* species that meet the needs of conservation, biological risk reduction and exploitation and trade impacts, that can also meet the social and economic needs of sustainable exploitation, strict requirements for the development of management plans need to be defined that follow all the important steps of sustainable management, based on real data collection and adapted to different local conditions.

In order to have efficient and effective management plans, the methodology for their implementation needs to be correctly and clearly defined and reflected in legislation so that it can be standardised at national level for all stakeholders, be they from public administration, local and indigenous communities or the private sector.

Thus, the elements, or the main steps to be taken in the forest planning process, which will be defined and introduced in Sierra Leone's forest legislation are:

- Redefinition of all types of national, community, protected and unclassified/private forests so that all of them can be included in a digital database with boundaries and related data related to ownership, owners, concessionaires, etc.
- Each delimited area of exploitable forest is defined as a logging concession.
- The timescale for a management plan for a concession where *Pterocarpus erinaceus* is present should be 20 years, to reflect the rotation cycle of the species, not 5 years as at present.
- Each area of forest designated as a concession should be further divided into well-defined and demarcated sections, or compartments, that form part of a national database.
- The sections, or logging compartments, should be the basis for dividing a management plan implementation period (the 20 years mentioned above) into logging cycles of between 1 and 3 years, the logging details of which should be included in Annual Operational Plans.
- Management plans at forest concession level must be based on an exploration inventory, taking into account trees at different stages of development, from old trees, to mature trees contributing to reproduction, to young trees with diameters below the minimum logging diameter, to saplings and coppices. During the development of this exploration inventory, dendrometric data are collected, which will then be analysed in terms of distribution patterns. These data are crucial for analysing the condition of the species on the selected plots and for making management decisions, such as determining minimum logging diameter, setting logging quotas, making decisions on reforestation, or other possible silvicultural works that would improve the condition of the species in the longer term at concession level.
- A 20-year management plan should also take into account management zoning of the concession, with logging areas, protection areas (streams, wetlands, reserves), wildlife sanctuaries, creation or maintenance of access roads, alternative use areas for local communities, for collection of non-timber products, or for grazing and possible expansion of agricultural land, etc.

- Following the establishment of minimum logging dimensions and diameters, as well as the areas where timber extraction can be carried out, for each section or compartment, annual operational plans will be drawn up.
- The annual operational plans are made for the purpose of approving the annual possibility of harvesting and are made on the basis of logging inventories, which record only those trees that meet the minimum logging diameter requirement.
- The annual operational plans shall determine the methods of harvesting, marking of felled trees and stumps, tree extraction routes, avoiding wetlands, agricultural or inhabited areas, and protection and quiet areas. Log yards are also established, with geographical coordinates, where logs will be created after tree removal.

In addition to redefining and legislating management plans, there is an urgent need for a National Forest Inventory to be undertaken in the short term by the Government of Sierra Leone. This National Forest Inventory should form the basis for the National Management Plan, which is provided for in the Forestry Act of 1988.

B. Develop and deploy a National Forest Traceability System

In order to facilitate the implementation of management plans as well as annual operational plans and to establish a monitoring system for forestry operations and practices, the Government of Sierra Leone is committed to developing and implementing a National Digital Forest Traceability System to be defined and enforced through dedicated legislation for all stakeholders operating forests in Sierra Leone.

The main elements of this National Digital Forest Traceability System are:

- The creation of a national digital database of all forest areas (concessions) as currently demarcated, regardless of their nature, to which attributes such as ownership status, owners, managers, concessionaires, logging companies, etc. are added.
- Create a digital index of concession and/or logging, transport and timber processing companies.
- Creation of an index of users, with access permissions to various levels of data, from public administration, to owners and concession, logging, transport and processing companies.
- Development of a web application and geoportal incorporating the above as well as data to be collected in the field by authorised users using mobile applications.
- Development of a mobile application incorporating the modules necessary to go through all the important steps in the supply chain related to logging, such as:
    - A module for conducting exploratory inventories, which has plot creation capabilities for collecting sample data and dendrometric data and georeferencing inventoried trees i.e. Arboreal Forest, which uses LIDAR technology.
    - A logging inventory module, which records all trees that meet the minimum logging diameter requirements, together with their geographic coordinates, as well as their 3D model made by scanning using a LIDAR sensor and processing through a custom Virtsilv algorithm. This module also estimates the volume per foot of the inventoried tree.

    - A felling registration module, using the same LIDAR technology and Virtsilv processing algorithm as the inventory module, which records the location of the felling and measures the felled tree.
    - A log recording and matching module, to be used when creating logs, which scans 3D, measures volume and creates the unique log model, using the same LIDAR and Virtsilv technologies.
- All this data recorded through the mobile app is synchronized via internet connection into a database in the web app and geoportal, and can be viewed and managed in near real time by authorized users at Ministry, local community/chiefdom, or company level.

C. Run a pilot for forest management planning and for the deployment of a traceability system in a pilot site

For piloting and adapting a digital traceability system for *Pterocarpus erinaceus* species, an area of woodland in Karene District, Tambaha Simibuyie Chiefdom, where the species occurs and where previous logging has been carried out, was chosen.

This pilot aims to take the next steps and verify the viability of the proposed technological solutions:

- Carry out an exploratory inventory by collecting data in plots, using the Arboreal Forest mobile application, which allows the creation of plots and the inventory and measurement of DBH, height and standing volume of all trees in the selected plot, regardless of age, or diameter. The pilot is done using iPhone Pro 12, 13 and 14 phones, which are equipped with the LIDAR sensor that the app requires. The data thus collected will be used to estimate standing volumes and to estimate tree distribution and pattern within the selected area, contributing to the estimation of DME and a potential harvesting quota at Chiefdom level.

- Conduct a harvest inventory in the second phase, whereby all trees that will meet the DME requirement that will result from the previous analysis will be recorded. These trees will be 3D scanned using the available iOS 3D Scanner App, which will use the same LIDAR sensor available on the iPhone Pro 12, 13 and 14 phones and whose 3D point cloud images will be processed by the Virtsilv algorithm which will create a unique tree identity per standing tree and estimate its volume. All these trees will have their coordinates recorded and will be synchronised in a database and geoportal specifically created for this pilot.

- Retroactive recording of sample exploited trees, by geo-referencing and scanning the stumps, to achieve a reverse traceability for already exploited trees and estimating the extracted volumes and recording them in a database.

- Initiate the recording by scanning, georeferencing and 3D modelling using LIDAR and Virtsilv technology of logs stored in log yards and correlate their volumes with the retrospective recording of previous stage logging. Creation of a dedicated database for existing log stocks exploited during 2018-2021 in Tambaka Simibuyie Chiefdom.

- Assess the impact of logging in this Chiefdom based on retrospectively collected data.

D. Other actions and committments

The following actions will also contribute to improving and increasing the sustainability of forest management in Sierra Leone in general and *Pterocarpus erinaceus* in particular:

- Update the application process for accepting harvest plans from private sector companies based on modernizing and updating the regulations to reflect detailed processes and requirements.
- Investment in policy level change
- **I**nitial Monitoring Efforts: While regular monitoring of *Pterocarpus erinaceus* was lacking historically, the current situation reflects a shift towards a more proactive approach. The initiation of monitoring samples across the habitat signifies a commitment to assessing the species' dynamics.
- Harvest Records and Locations: Although the harvested timber volumes are documented, the locations specified are often vague and lack precision. However, the fact that records now include locations is a positive development. Aligning the recorded locations with the actual sites of harvested trees is a crucial step for accurate impact assessment.
- Impact Assessment Emphasis: There is a notable emphasis on evaluating the impact of harvesting activities on the species and its surroundings. While historical monitoring gaps exist, the current focus on impact assessment indicates an intention to address ecological consequences more comprehensively
- Collaborative Research: Initiate collaborative research efforts involving scientific experts, local communities, and relevant stakeholders to determine appropriate management measures. Consider input from traditional knowledge holders to complement scientific findings.
- Scientific Data Collection: Conduct further studies and data collection to understand the species' growth patterns and age structure. This information is essential for formulating accurate MDE recommendations that align with the species' reproductive capacity
- Stakeholder Engagement: Involve local communities, indigenous groups, universities, timber associations and relevant authorities in discussions about management measures. Their input can provide valuable insights into traditional harvesting practices and contribute to the success of the proposed measures.
- Identification Materials: Create and share identification materials that aid field workers, forestry officials, and other stakeholders in accurately identifying *Pterocarpus erinaceus* trees. This contributes to accurate data collection and monitoring efforts.
- Regular Review and Adaptation: Establish a mechanism for regular review and adaptation of management measures. As new scientific insights emerge and environmental conditions change, these measures should be updated to reflect the latest information.

CURRENT LEGAL PROVISIONS IN SIERRA LEONE REGARDING MANAGEMENT MEASURES, OBSERVATIONS AND PROPOSED CHANGES

Forestry Act of 1988		
Legal provision	**Observations**	**Changes that will improve legislation and management measures in Sierra Leone**
Part III, Section 6 of the 1988 Forestry Act states that the Director of Forestry is responsible for the preparation of a National Forest Inventory	There hasn't been any National Forest Inventory carried out since the enactment of the Act.	A National Forest Traceability and Monitoring System will be implemented over the longer term and defined in this Act and the Forestry Regulations. In this way this legal provision can eventually be implemented and will be the basis for increasing the sustainability of forest management, with a database from which decisions can be made and forest policies defined that are appropriate to the requirements of modern forestry and adapted to the social, economic and environmental needs of Sierra Leone.
Part III, section 7 of the 1989 Forestry Act states that the Director of Forestry is responsible for the development of a National Forest Management Plan	The National Forest Management Plan has not yet been developed since the enactment of this Act.	Sierra Leone's National Forest Management Plan will also be carried out through a National Forest Traceability System, by integrating technological solutions that could help in the development of exploratory inventories, underpinning this National Plan and requiring a standardized methodology for developing similar plans at the forest concession level, using the same tools for inventorying and measuring DBH, basal areas, monitoring growth rates at the species level and estimating standing volumes for the entire forest resource. This traceability and monitoring system will have to be reflected in a new version of the legislation, thus defining its use for the elaboration of the National Forest Inventory and the National Forest Management Plan.

Section 8 of Part III of the Forestry Act specifies that the management plans underlying the granting of a concession must be made by, or authorized and approved by, the Director of Forestry.	If the approval shall remain under the responsibility of the Director of Forestry it is not clearly specified who is actually responsible for making these plans, as it shouldn't be the Director of Forestry, nor the District Forest Offices.	The forest and management, as well as reforestation plans will be made by the person, or the entity granted the concession, and formulated as such in the legal provisions and authorized and approved by the Director of Forestry, in order to transfer the responsibility and the costs of preparation to those who wish to benefit from the exploitation of the forest, without unduly hindering the work of those responsible in the Ministry.
Section 14 of the Forestry Act, specifies that the forest management and reforestation plans shall be developed by the Director of Forestry for the approval of a forest concession.	According to this provision the person, or concession entity, is solely responsible for developing an annual work plan. However, the approval of such plans shall remain under the responsibility of the Director of Forestry but shall be elaborated by the person, or concession entity/company.	
In Part V of the Forestry Act regulating the establishment and management of Community Forests, it is noted that the Chiefdom Council, or any other form of management authority for these forests, is responsible for determining the conditions of exploitation, setting fees and royalties for the use of the forests and their produce.	Without a clear set of exploitation conditions in the Forestry Regulations for each forest type, including Community Forests, that is aligned with the principles of modern and sustainable forestry, these conditions could be interpreted in a variety of ways from Chiefdom to Chiefdom, creating unsustainable and unintegrated forest management. Moreover, there is no categorisation of the values of the forests and their produce according to the composition of the species and volumes present. Such a provision, coupled with the lack of field data on forest	The exploitation conditions will be clearly formulated in the Forestry Regulations, with a reference to this part of the Forestry Act. The conditions formulated will have to comply with the principles of sustainable forestry and all Chiefdom Councils will have to align to such a nationally integrated management practice. An index of all species of trees and types of forest produce, for which fees and royalties are set according to actual value in the markets, per cubic meter, or type of produce, will be estsblished and annexed to the Forestry Regulations and referenced in this section of the Forestry Act.

	resources, may cause a number of unsustainable impacts and social inequalities, through lack of knowledge of the status and value of the resource, and the setting of logging quotas, fees and royalties that do not correspond to market values.	
Forestry Regulations of 1990		
Legal provision	**Observations**	**Commitment of the Government of Sierra Leone to improve legislation and management measures**
Part II Forest Administration and Management Section 3, provides the following sub-sections related to forest management plans: - (1) stipulates that any unclassified forest in private ownership may be put into operation only if a management plan has been drawn up by the owners or custodians of the forest and approved by the Director of Forestry of the Ministry of the Environment and Climate Change. - (2) All such management plans prepared as a result of the provisions of this regulation must meet the	The requirements for the development of forest management plans need to be reformulated into new legislation that meets the current needs of the State and Sierra Leoneans, but also the specific requirements of international agreements and external markets, which are putting increasing pressure on countries to manage their natural resources more sustainably, requiring major traceability and transparency systems.	The management plans will be regulated in such a way as to allow the design of sustainable forest management from a social, economic, environmental and cultural point of view. The sustainability of management plans will be ensured by requiring the following steps: • elaboration in a traceable and transparent way of exploratory forest inventories on a well-defined forest management unit • the establishment of harvesting quotas based on dendrometric data, tree densities of each marketable species and estimated standing volumes and rotation periods. • the carrying out of harvesting inventories for each operational unit, where annual operational plans will be established and approved • carry out inventorying and georeferencing of trees that meet the minimum DBH requirements, which should be formulated from one concession to another based on dendometric data • elaborate harvesting plans that are valid within a legally defined period of time • create annual operational plans which will frame the annual quota allowed for exploitation for each species,

requirements of section 8 of the Forestry Act		will provide for the mapping of access and evacuation routes for felled trees, water courses, bird and wildlife protection areas, protected flora areas, protected trees, and monuments, as well as the exploitation methodology, such as marking, • georeferenced recording of stumps and the actual evacuation of felled trees and their transport to log yards • log recording and measurement. All these key requirements for the elaboration of management and operational plans will be covered by the development of a National Digital Forest Traceability System and a database and geoportal for the transparent management of the forest resource, which will have integrated state of the art technological solutions using LIDAR sensors for inventorying, through the Arboreal Forest application, both at the exploratory and harvesting level, and for the elaboration of a National Forest Inventory. In addition, using a 3D scanning application and a dedicated Virtsilv algorithm, it will be possible to create unique models of standing trees, stumps, felled trees and logs based on the images scanned in the field.
Section 4 addresses the requirements for the preparation of Inventories. - (1) Any person, or entity to whom the right to exploit an unclassified, or private forest has been granted, should do so on the basis of the achievement of a	It is noticed that, as in the case of the management plans in Section 3, no reference is made at any time to maps, either with the boundaries of the management units or for all the trees, or all the forest resources inventoried and required under this section of the Regulations.	In order to validate and make sustainable the management of forest resources, the deployment of state-of-the-art technological solutions, through a National Digital Traceabilty System will allow the georeferencing of each inventoried tree, either by means of the Arboreal Forest application or by 3D scanning it with Virtsilv. By synchronizing these field data, they will be translated into a geoportal, with the help of which inventory maps can be generated, which can then be used for the development of forest management plans, for setting up adapted

complete inventory of the forest resource. - (2) Inventories shall be submitted to the Director of Forestry for verification and approval as required.		management measures, for creating operational plans and for monitoring harvest levels and impacts.
Sections 6 and 7 make reference to the information required annually, regarding the areas exploited, i.e. blocks and their demarcation. - Any person, or entity to whom the right to harvest an unclassified, or private, forest has been granted, should provide to the Director of Forestry annual information on the entire area harvested in the previous year, together with a map showing the area and progress of activities. - Holders of concession contracts, or timber harvesting licences, are required to demarcate the concession area into harvesting blocks and compartments.	There are no very specific requirements as to the nature of this information, i.e. whether in addition to the areas demarcated for logging (blocks), logged trees need to be included as georeferenced points. From what it is observed, operators only provided generic maps with blocks and compartments and individual points for each logging site, or log yard, without including points of exploited trees. All these data should be correlated with those provided in the management plans, but also correspond to an annual operational plan. Apparently the two plans are confused in the practices observed.	The National Forest Traceability System and technologies which will be implemented in the near future by the Government of Sierra Leone will provide quantitative and qualitative information on these operational plans and their status in real time, in that every action in the supply chain will be recorded, geolocated and dated in the system and synchronized, so that the status of logging works and their legality can be observed by any authorized user within the Ministry in near real time.

Section 8 refers to annual logging plans in unclassified forests. Thus: - (1) Holders of contracts and concession licences in unclassified forests operating outside the Forestry Department's areas of jurisdiction must submit a prescribed annual harvest plan for approval by the Director of Forestry in the Department prior to the commencement of operations in the new year, no later than February 1 of each year. Such annual operating plans shall specify the following: (a) The block, or blocks, proposed to be logged that year; b) The choice of the mode of exploitation in the felling compartment and the minimum diameter determining the selection of trees to be felled; c) The sequence in which the compartments will be worked.	This section defines in fact an annual operational plan, and in addition to the required information, it should also provide information specifying the species and minimum DBHs to be harvested (by species), the estimated standing volume to be harvested (by species) and the list of inventoried trees that are selected for harvesting.	All this information will be easily presented and generated using a National Digital Forest Traceability System which will be deployed by the Government of Sierra Leone in the near future. The generation of an annual operational plan will be done from the use of data already collected in the field during the inventory and the generation of maps through the geoportal.

Section 9 refers to minimum operating diameters in situations where these have not been provided for in the concession contract, management plan, or operating licence.	The following limit diameters will be considered in classified and unclassified forests: - *Heritiera utilis* - 5 ft (1.52 m) - All other species - 6 ft (1.83 m). Both in selective logging areas - All species - 4 ft (1.22 m) in clearcut logging areas. This shows a lack of categorization of these limit diameters, which should be defined per each species, individually in an annexed index to the Forestry Regulations.	The traceability system, based on the inventory and collection of field data, which also refers to dendrometric data, will create a favorable framework for collecting these data in a national database, which will allow in the longer term the correct nuancing of these diameter limits according to tree species. The traceability and data collection system will also be useful for the National Forest Inventory and the creation of a monitoring system for forests and their component species through exploratory inventories.
Part V Timber Licence Section 13 sets out the conditions under which an timber licence may be approved: - (1) Only tree species and sizes specified in the licence may be harvested. Only trees marked by a forestry officer can be harvested and extracted.	As the trees inventoried for logging are not required to be georeferenced and their selection is not based on a forest management plan that estimates the standing volume per ha, it is difficult to assess and monitor the sustainability of harvesting.	The deployment of a future National Forest Traceability System by the Government of Sierra Leone will allow, based on the exploratory inventories carried out for preparing the management plans, to select trees that meet requirements of minimum diameter for exploitation, sustainable densities of trees per ha, a favorable distribution of diameter classes which could prove appropriate regeneration, etc. All the harvestable trees will be then inventoried for exploitation and will be included into annual operational plans and annual allowable cuts to be approved by the Director of Forestry. All trees that will be felled will be marked and registered accordingly into a database. The felling itself will also be registered, georeferenced and the trees scanned before skidding and transformation into logs. This way all important steps in the supply chain is being recorded, uploaded into a database and trackable.

STEP 9.1 - NON-DETRIMENT FINDINGS AND RELATED ADVICE

Steps	Compliance	Related Advice
Step 1 - Review Specimen Identification	Target species has been identified.	NDF Positive
Step 2 - Review Compliance with Requirements for Artificial Propagation	Target speices is in compliance with requirements for Artificial Propagation.	NDF Positive for Wild specimens. There is currently no artificial propagation.
Step 3 - Review of Relevant Exclusions and Previously Made NDFs	Target species has been evaluated and there were no previous exclusions.	NDF Positive
Step 4 - Evaluate Conservation Concerns	Target species has been evaluated for conservation concerns.	NDF Positive Step 4 of NDF provides actions for mitigating and monitoring conservation concerns Traceability system for inventory management is critical.
Step 5 - Evaluate Potential Biological Risks of *Pterocarpus erinaceus*	Target species has been evaluated for potential biological risks.	NDF Positive Step 5 of NDF provides actions and methodologies for evaluating and mitigating potential biological risks. Traceability system for inventory management is critical.

Step 6 - Evaluate impacts of harvest for *Pterocarpus erinaceus*	Target species has been evaluated for impacts of harvest.	NDF Positive Step 6 of NDF provides actions and methodologies for evaluating and mitigating impacts of harvest. Traceability system for inventory management is critical.
Step 7 - Evaluate impacts of trade for *Pterocarpus erinaceus*	Target species has been evaluated for impacts of tade.	NDF Positive Step 7 of NDF provides actions and methodologies for evaluating and mitigating impacts of trade. Analysis must be completed on levels and impacts of domestic trade. International trade is predominant and must be monitored. Traceability system for inventory management is critical.
Step 8 - Evaluate Appropriate Rigour of Existing Management Measures	Target species has been evaluated for appropriate rigor of existing management measures.	Step 8 of NDF provides actions and methodologies for evaluating and mitigating risk through management measures. Management Authority and Scientific Authority have been advised on the steps and actions for updating systems. With these actions the NDF will be positive. Traceability system for inventory management is critical.

9.2 Conclusions and Export Quota Allocation for NDF

Since the submission of the August 2023 NDF update, Sierra Leone has made significant investments in establishing the digital traceability and inventory management system referred to in this report. The process included two field missions to pilot and verify data plots to complete the methodology for establishing the annual export quota to be submitted to CITES Secretariat for intersessional review.

The pilot integrated the Sierra Leone Scientific Authority sample plots and verification plots using the Forest-Source digital traceability system. The system is based on using iPhone for scanning trees and geo locating sample plots for verification. All data was uploaded to a custom geo-portal that analyzes the data and distributes across data fields such as DBH, Height, Volume and Location in the forest area.

All data can be sorted based on these parameters and is the basis for establishing the Minimum Diameter of Exploitation (MDE) which was also matched against Sierra Leone National Laws for setting the MDE for *Pterocarpus erinaceus*. The following conclusions are therefore put forward based on the field work below and in Figure 9.1.

Establishment of Minimum Diameter of Exploitation (MDE):

When setting up a transition period of 40 years – optimal MDE is 30 cm in most of the Districts, therefore the rotation cycle of 20 years and a MDE of 30 ensures an average national restoration percentage over 50%.

	MDE 25		MDE 30		MDE 35	
	P%	T	P%	T	P%	T
BOMBALI	30.7	22.8	90.8	32.8	221	42.8
FALABA	10	30	24	40	46.2	50
KAMBIA	26	30	57.2	40	108	50
KARENE	25.1	20	59.9	30	158	40
KOINADUGU	0.371	30	0.848	40	1.18	50
KONO	12.4	38	28.2	48	58.5	58
PORTLOKO	92.5	20	141	30	385	40

$$P = \frac{[(G_0\ (1-\Delta)](1-\propto)^T}{G_p} \times 100 \quad T = \frac{MDE - D_{bi}}{AAM}$$

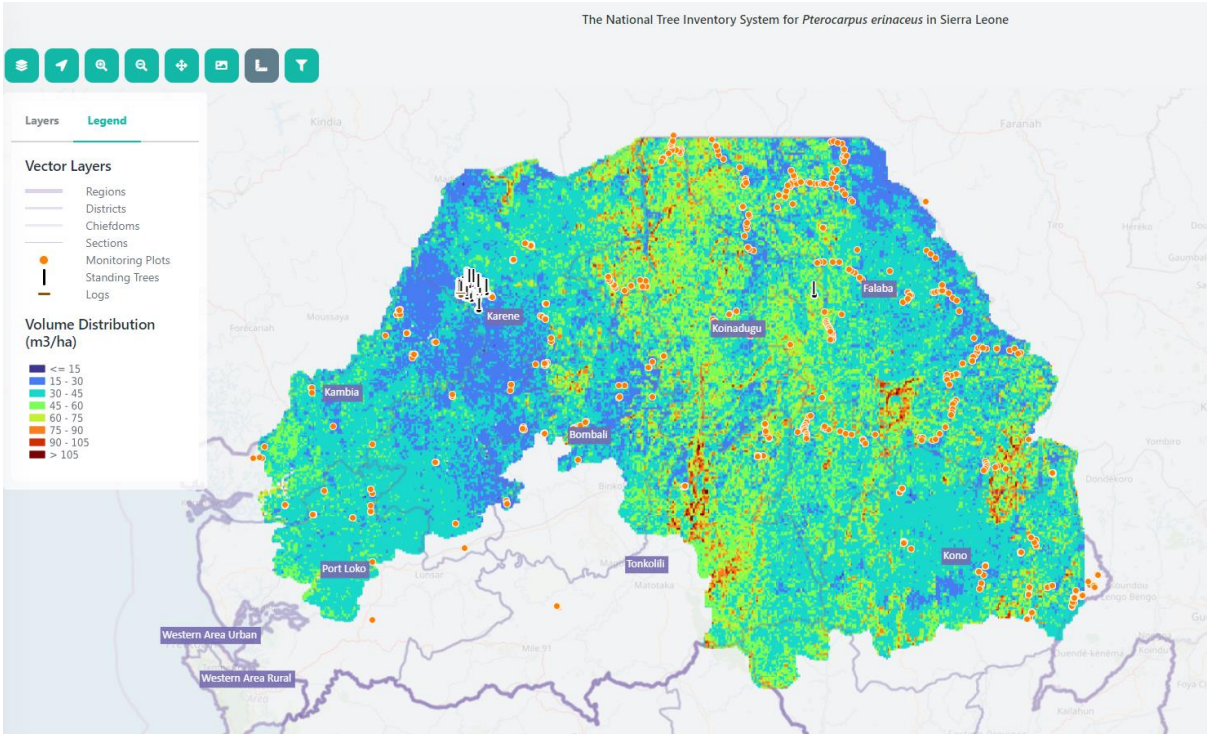
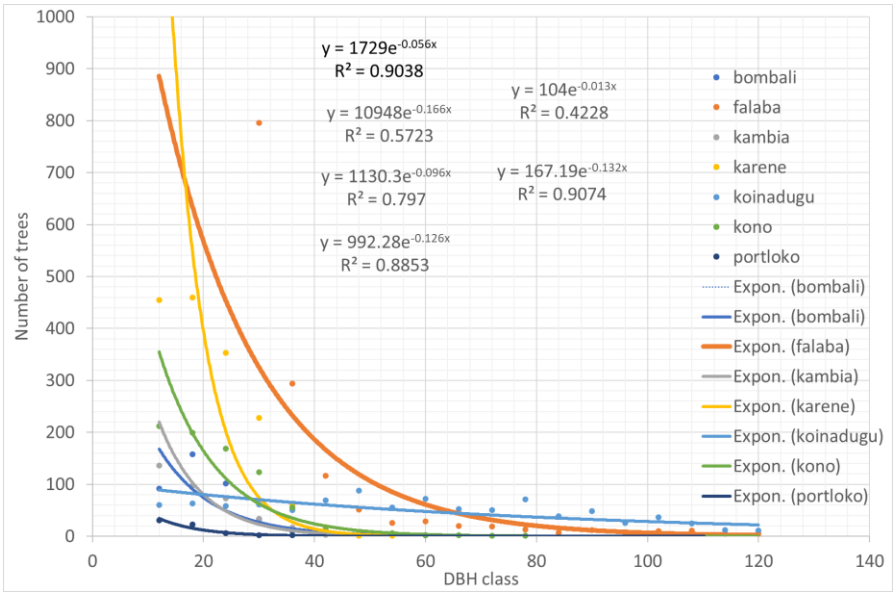
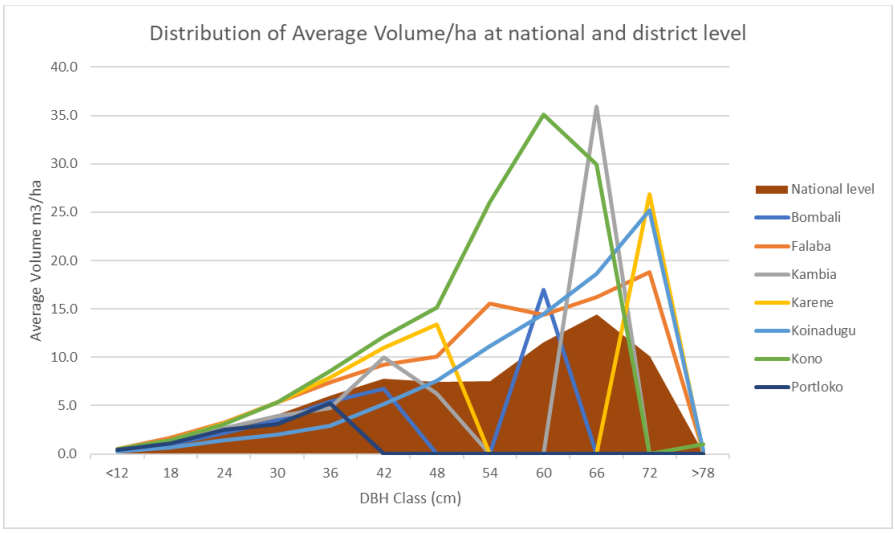


Figure 9.1. Map of Monitoring Plots and the Volume Distribution estimated through the Pilot for implementing The National Tree Inventory System. This is a part of the geoportal output.

Procedure to establish sustainable harvesting:

Based on the average volume distribution from the national level plots, average number of trees, distribution of trees over MDE measured (by LiDAR scanning each tree) in the pilot from Tambakha Simibuyie – Karene District, we established the sustainable harvesting volumes as illustrated below





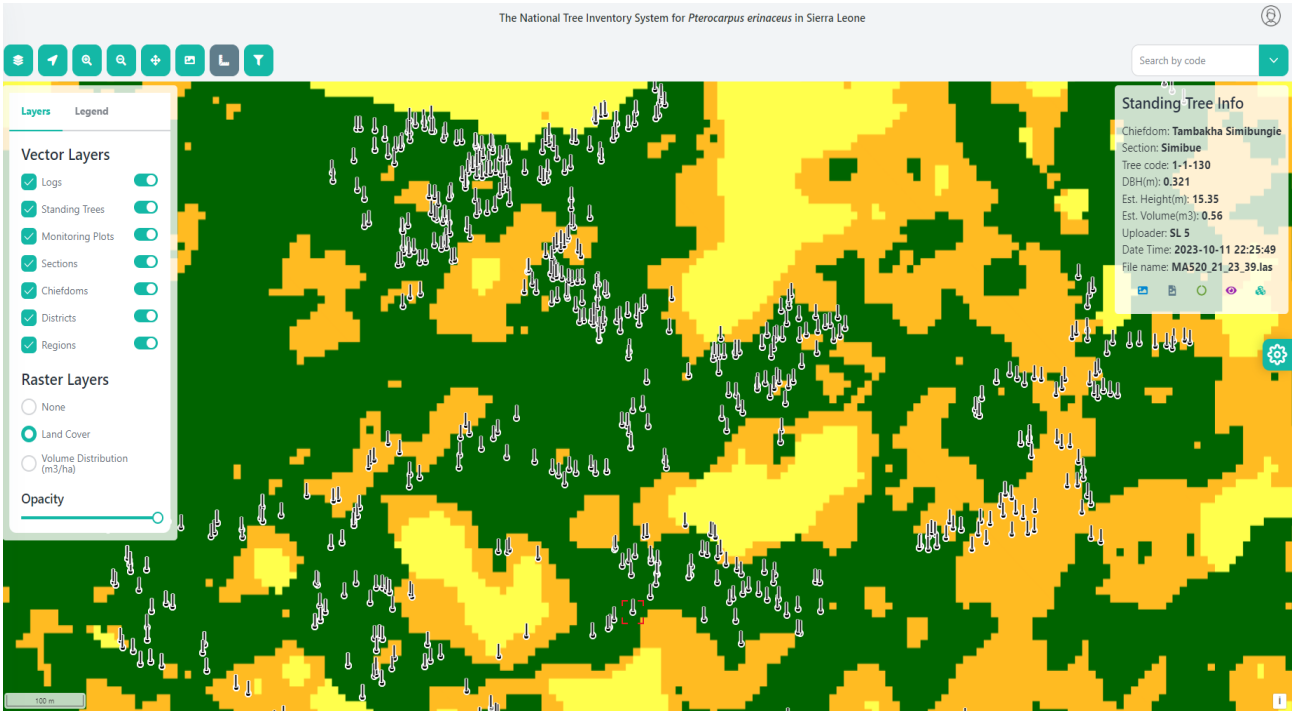
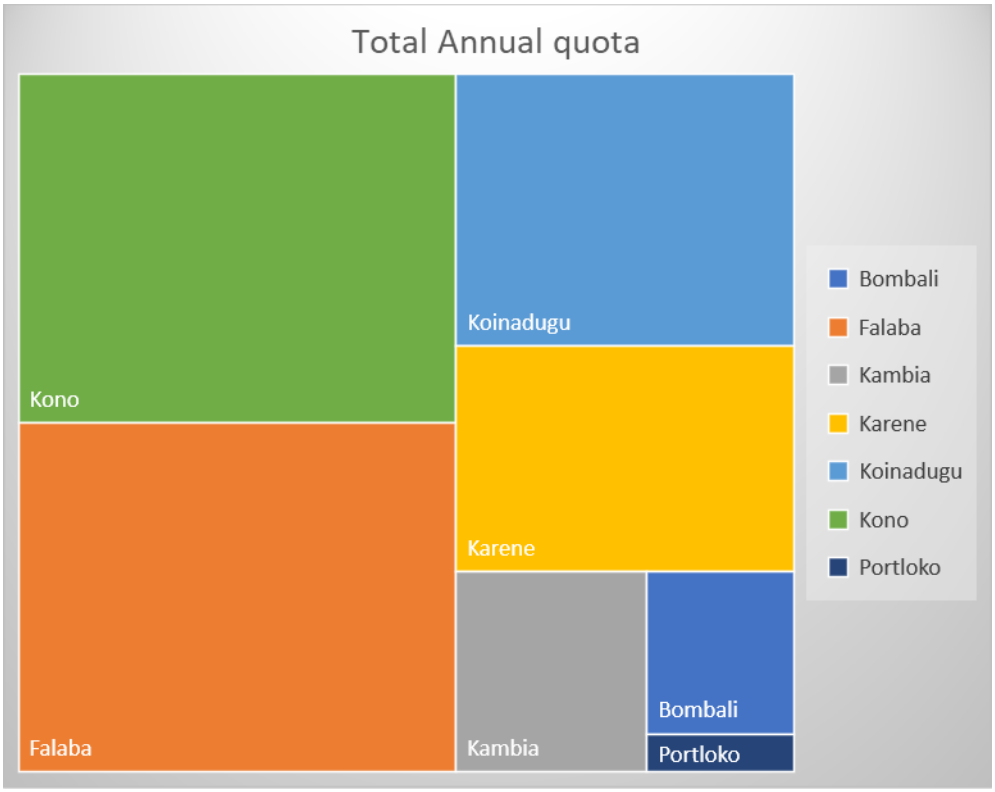


Figure 9.2.Scanned trees over MDE in Tambaka Simibuyie pilot. Output from custom geoportal.

9.3 Export Quota by District for National Level



District	Total quota m^3/year	Precautionary Export quota for standing volume m^3/ year
Bombali	6,753	3,376.5
Falaba	43,021	21,510.5
Kambia	10,753	5,376.5
Karene	21,552	10,776
Koinadugu	25,950	12,975
Kono	43,072	21,536

Portloko	1,547	773.5
Total	**152,649**	**76,324.5**

9.4 Sierra Leone Annual Quota Submission

Sierra Leone has determined an annual harvestable quota of standing volume of 152,649 cubic meters per year.

Because this is the first NDF completed, Sierra Leone is taking a precautionary position and submitting to the CITES Secretariat an annual harvestable export quota of standing volume of 76,324.5 cubic meters per year.

Sierra Leone is making the precautionary volume submission to continue to monitor the species and its distribution at the defined District levels and implement the traceability programs described throughout the NDF report.

Sierra Leone is requesting the Plants Committee to review this report in the intersessional consultation process for the lifting of the Zero-Export Quota, which was self-imposed by Sierra Leone in 2022, to ensure effective compliance with international standards.

Step 10 - Legal Acquisition Findings Procedures

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. This includes establishing the digital traceability system customized for managing and tracking all management plans and allocation of CITES permits for Legal Acquisition Findings.

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 and Climate Change 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 Licence**. 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 and Climate Change 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.

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 Findings (NDF) and Legal Acquisition Findings (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.

The quota system will be developed by the Ministry of the Environment and Climate Change depending on the type of species and NDFs to control the export of timber.

Sierra Leone - CITES Management Authority

Legal Acquisition Findings Procedures

The Management Authority of Sierra Leone has instituted comprehensive procedures for completing Legal Acquisition Findings for all CITES timber export permit applications.

The Legal Acquisition Findings procedures are mandated by the Ministry of the Environment and Climate Change for evaluating compliance to all regulations concerning the legal chain of custody for CITES listed species.

The following is a stepwise framework for documenting and evaluating applications for export for any CITES Appendix II timber species from Sierra Leone. The procedures were developed to demonstrate the systems the Management Authority has instituted to complete a LAF of the chain of custody and traceability of the log or forms of wood back to the forest concession where the trees were harvested.

Below are the mandated steps for completing the Legal Acquisition Findings.

Procedure	Actions
Check and Confirm Ownership	Create a file for each company that has timber harvest licence. Check the map of concessions and region where they have a licence to harvest.
Data Collection and Documentation Review	Gather all available documentation related to the area and logging activities, including contracts, permits, and any existing records from the NDF from the Scientific Authority and Forestry Department. Refer to LAF Document Checklist.
Check Geoportal for Forest Management Data	Use the database of concessions and geoportal for traceability to check information about the log origin through checking the concession area, Geo located trees, volume, and log ID in the database. All harvestable trees and corresponding logs are issued a unique ID in the geoportal and are georeferenced to the exact area of harvest.
Transport Permits	Check all official transport documentation for owner, dates, volumes, species, origin, and destination. Check checkpoint stamps.
Document Depots and Locations of Logs	Create a list of all locations where harvested logs are currently stored. This includes all village level logs.

	Create a Geo reference for each location using the Forest-Source traceability system with the designated iPhone GPS applications. Photos are very useful for providing evidence.
Require a total count and marking on all logs at each location	Establish a total number of logs that are owned by each company. Mark logs with a paint or marker that indicates that they have been tallied. Photos are very useful for providing evidence.
Check a sample volume of each owner's log stocks	Use Forest-Source 3D scanning and traceability system to scan logs and check sample of logs for volume. If logs need to be measured manually, use standard measurements of length and diameter of a sample of logs from each bundle or area to confirm the applicant's volume for each location. 1. Take the average diameter of the log by measuring the largest end and smallest end (excluding bark if present) and divide by 2. 2. Divide the average diameter by 2 to calculate the average radius (r). 3. Use the formula for the volume of a cylinder and insert the average radius of the log (i.e., $3.14 \times r^2 \times$ length).
Evaluate Security and Depot Locations	Document and establish a monitoring and site inspection schedule for all depots where private companies store logs at District and export level.
Consult with Scientific Authority and Forestry Department on Field Verification	Use inventories from Scientific Authority and review of concession where logs were harvested to collect data for CITES permit application and inventory analysis. After harvest, Forest Officer and Scientific Authority representatives should conduct on-site visits to the concession area to assess the harvest of *Pterocarpus erinaceus* against the management plan and timber licence.
NDF and LAF Checklist Report	Compile the collected data from LAF evaluation into LAF Checklist to confirm LAF.

Sierra Leone - CITES Management Authority
Legal Acquisition Findings Procedures
Pre-Zero Export Quota Harvested Stocks
Log and Depot Documentation

Legal Acquisition Findings Analysis Relating to Pre-zero Export Quota Harvested Stocks.

This document outlines the procedures for documenting the logs and declaring a volume of the pre-zero export harvested stocks.

It is necessary to establish a baseline for implementing a methodology for completing a chain of custody and traceability of the logs back to the forest concession where the trees were harvested.

Below are the mandated procedures for completing the process of documenting the logs.

Procedure	Actions
Check and Confirm Ownership	Create a file for each company and the region where their logs were harvested.
Data Collection and Documentation Review	Gather all available documentation related to the area and logging activities, including contracts, permits, and any existing records from current NDF from the Scientific Authority and Forestry Department. Refer to LAF Document Checklist.
Document Depots and Locations of Logs	Create a list of all locations where harvested logs are currently stored. This includes all village level logs. Create a Geo reference for each location using the Forest-Source Traceability platform. Photos are very useful for providing evidence.
Count and mark all logs at each location	Establish a total number of logs that are owned by each company. Scan a sample of 50 logs using Forest-Source 3D scanning applications. Upload scans to dedicated geoportal for pre-zero export quota for volume trends and analysis. Mark logs with a new paint or marker that indicates that they have been tallied. Photos are very useful for providing evidence.

Calculate a volume of each owner's log stocks	Once samples have been analyzed and method approved, use Forest-Source 3D scanning and traceability system to scan all logs to establish a total volume for each company. If logs need to be measured manually, use standard measurements of length and diameter of a sample of logs from each bundle or area to confirm the applicant's volume for each location. 1 Take the average diameter of the log by measuring the largest end and smallest end (excluding bark if present) and divide by 2. 2 Divide the average diameter by 2 to calculate the average radius (r). 3 Use the formula for the volume of a cylinder and insert the average radius of the log (i.e., 3.14 x r^2 x length).
Secure Locations	Document and establish a monitoring and site inspection schedule. Photos are very useful for providing evidence.
Generate Report	Input data of locations, log count and volume into a report for completing the retroactive analysis of NDF.

Retroactive NDF Analysis for Pre-Zero Export Quota Harvested Logs

Procedure	Actions
Trace Documented Logs to Concessions in regions of Harvest.	Based on company documentation generated from the LAF procedures and volumes, trace documented logs to concessions based on a range of data: dates of harvest, volumes, harvest areas.
Use Dedicated Geoportal for Data Management	Use Forest-Source geoportal to generate transparent information about the concession area, harvested trees, and log origins. Same as traceability system for NDF but needs to be specific to the task of LAF for harvested logs.

Field Verification and Dendrometric Measurements	Use inventories from Scientific Authority and review of concession where logs were harvested to collect data for retroactive inventory. Conduct on-site visits to the concession area to assess the status of *Pterocarpus erinaceus* populations. Utilize Arboreal Application or similar tools for dendrometric measurements of remaining trees.
Sustainable Harvest Analysis: NDF	Calculate whether declared volume could have originated from the concession under review. Yes or No. The potential for the area to produce a volume will be a deciding factor of analysis.
Assessment of Population Impact	Analyze the data collected to determine the impact of the past logging activities on *Pterocarpus erinaceus* populations. Calculate mortality rates, growth rates, and population density changes.
Restoration Potential Analysis	Evaluate the potential for restoring *Pterocarpus erinaceus* populations in the concession area based on available data. Estimate restoration percentages and assess the feasibility of recovery.
Compilation of NDF and LAF Report	Compile the collected data, restoration potential analysis, proposed management measures, and traceability system details into a comprehensive report.

ANNEX I A

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%		✓	✓	

ANNEX I B

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%		✓	✓	

ANNEX I C

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%		✓	✓	

ANNEX I D

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%		✓	✓	

ANNEX I E

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%		✓	✓	

ANNEX I F

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%		✓	✓	

ANNEX I G

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%		✓	✓	

ANNEX I H

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%		✓	✓	

ANNEX II A

REVIEW OF BIOLOGICAL CHARACTERISTICS, HARVEST AND EXPORTATION REGIMES

In conducting this Non-Detriment Findings, 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 in the near future.

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.

Biological and Management Characteristics (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

Plot of responses to questions in the Table above: Scores of various parameters that determine Non-Detriment Findings

Factors Affecting Management of the Harvesting Regime

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 describe abundance and trend in the national population?	Quantitative data, recent	✓
	Good local knowledge	
	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	None	
	Small	
	Medium	✓

illegal or unmanaged off-take or trade?	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 co-ordinated 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 harvest, occurs in State-controlled Protected Areas?	High	
	Medium	
	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	None	
	Low	

national harvest occurs in areas where there is no strong local control, giving *de facto* or actual open access?	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'	> 15%	
	5-15%	✓
	< 5%	

natural range or population is legally excluded from harvest?	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	

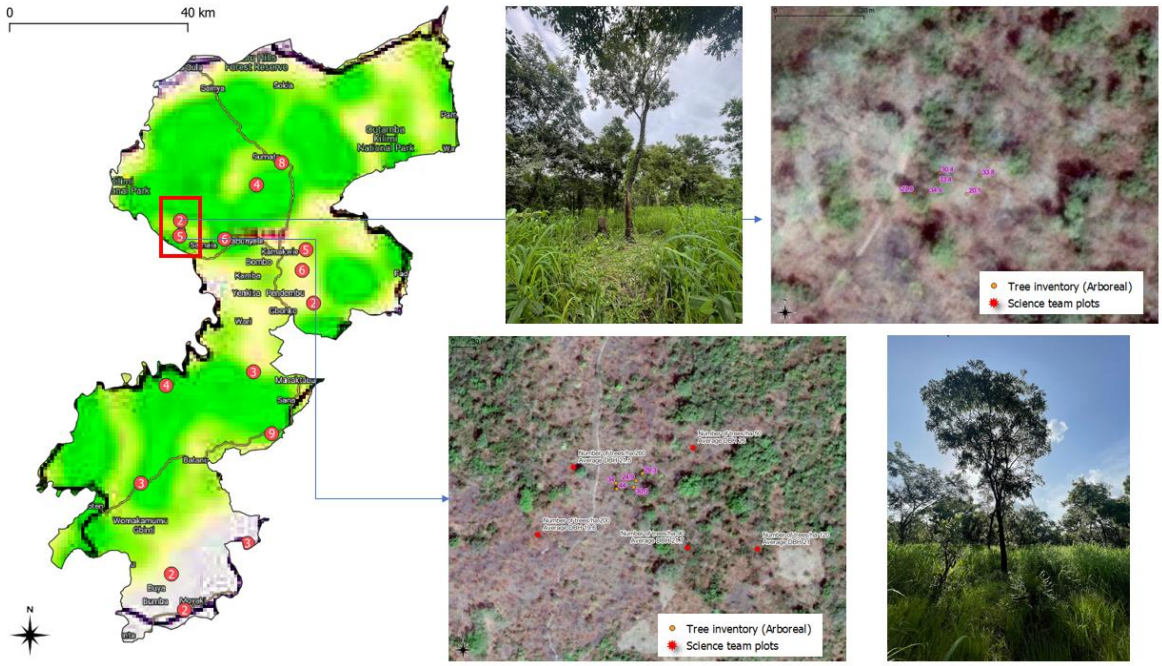
ANNEX II B

Conclusion on the Status of The Non-Detriment Findings 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
	Portloko District	Bureh	NEGATIVE
		Kasseh	NEGATIVE

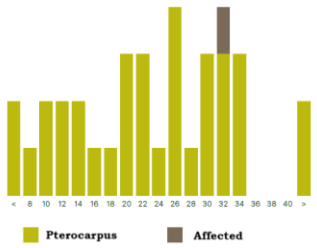
Annex III - Field check in Karene District



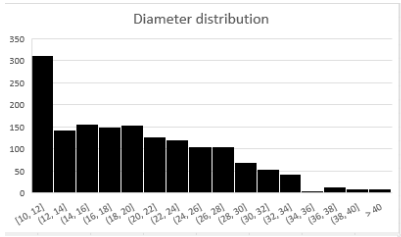
Statistics from field team

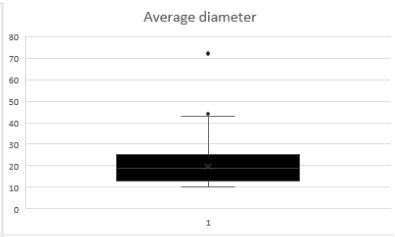
Total plot area: 3800 m2
Total number of trees: 35

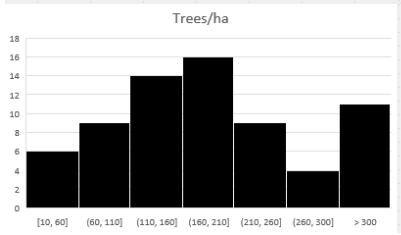
	BA (Basal Area)	QMD (Diameter)	Trees (Trees / ha)	Height (Lorey's H.)
Pterocarpus	5.1 96 %	34.4	89	10.1
Affected	0.2 4 %	33.4	3	12.0

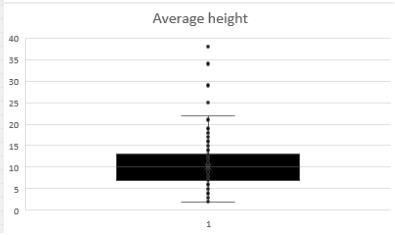


Statistics from science team

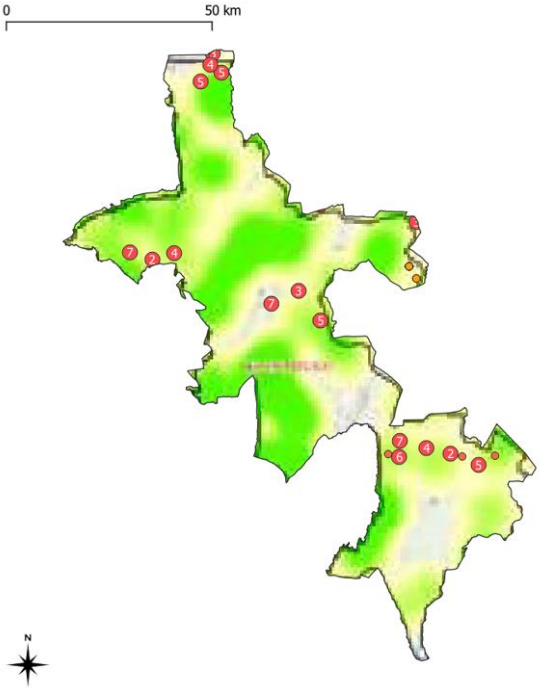








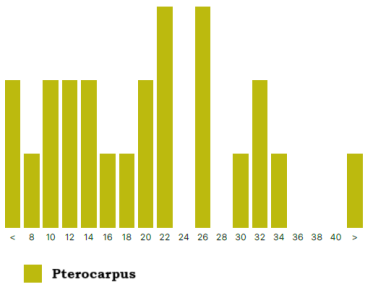
Annex IV - Field check in Koinadugu District



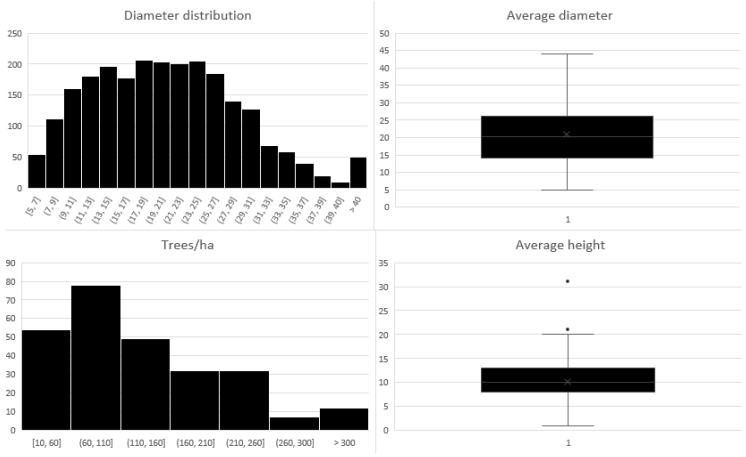
Statistics from field team

Total plot area: 1940 m2
Total number of trees: 24

	B A Basal Area	Q M D Diameter	Trees Trees / ha	Height Lorey´s H.
Pterocarpus	6.0 100 %	35.0	123	10.2



Statistics from science team

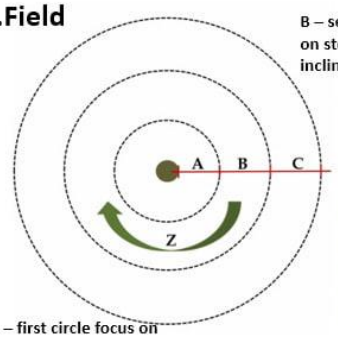


Annex V: Photos and workflow of Field Level Traceability System Training in Karene and Koinadugu Districts

Karene Training with local DFO and team: 3D scanning and pilot tests

Scanning a standing tree using iPhone LiDAR

1.Field

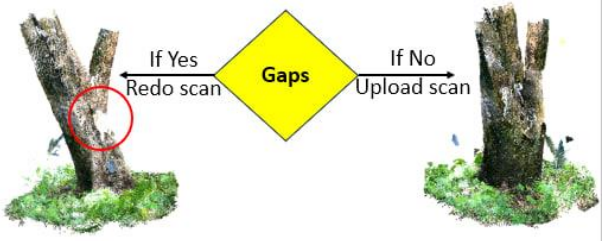


B – second circle focus on stem, phone inclined to the ground

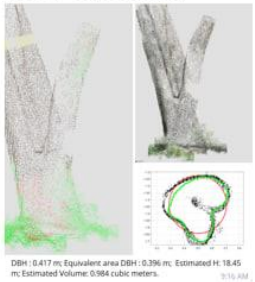
A – first circle focus on ground and stump

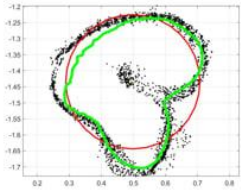
C – third circle (optional), focus on stem phone inclined to approximately 4 m on the stem

2.Result check for gaps



3.Automatic measurement and digital twinning

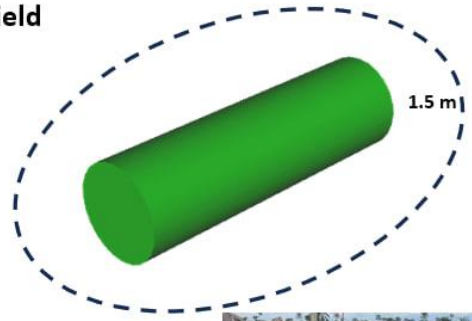




1.3 unique section and GPS located DBH and height

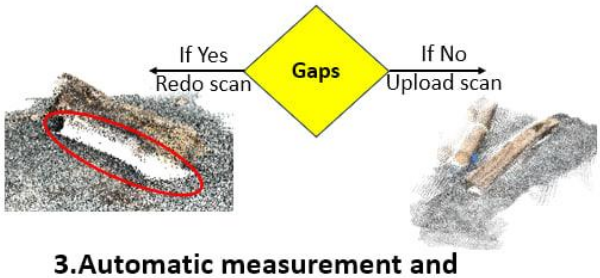
Scanning a log using iPhone LiDAR

1.Field

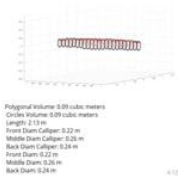


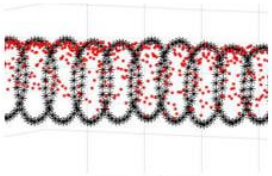
Scan around the log to be scan
Face the phone to the ground, to an angle to assure visibility of the contact area between log and ground

2.Result check for gaps



3.Automatic measurement and digital twinning





Unique shape measurement and GPS located volume, length and diameters

Annex VI. Legal Acquisition Checklist Template

LAF Checklist Template	
Regulations	**Company:**
Region of Harvest	Area of harvest / District
Timber Licence Application (Schedule 1)	Designates company and region
Chain Saw Permit	Receipt for payment
Timber Sales Agreement	Contract with Chiefdom and District: Yes or No
Forest Management Plan	Outlines basic operations.
Maps of designated harvest areas or compartments	Check areas of harvest on maps in management plan.
Inventory of Standing Trees to be Harvested	Outlines total of harvestable standing volume and average cubic meter per tree. Yes or No Gives tree number: Yes or No GIS coordinates: Yes or No
Official Timber Licence (Schedule 6) Forestry Regulation 1990	Permit numbers: Species Minimum diameter of 30cm> Volume in cubic meters
Inventory of logs from harvested trees at forest level and section level	Lists of logs harvested. Check volumes
Official Transport Permit (Schedule 13) Forestry Regulations 1990	Permit Numbers: Designates company, type of product transported, volume, location of origination and dates of validity.
Processing	Location: Form: Logs, Sawn wood, Veneer etc…
Royalties and licence fees Finance Act 2023	Paid upon export based on volume per 20ft container. Total:

The LAF checklist is for Management Authority CITES permit application evaluation and is reflective of the regulations directly related to the legal harvest, transport, processing, and inventory management of the species.