A CATALOGUE OF LOCALLY THREATENED PLANTS FOR PRIORITY CONSERVATION

at Guiuan Marine Resource Protected Landscape and Seascape

Inocencio E. Buot Jr.
Anne Frances V. Buhay
Marne G. Origenes

2024

A CATALOGUE OF LOCALLY THREATENED PLANTS FOR PRIORITY CONSERVATION AT GUIUAN MARINE RESOURCE PROTECTED LANDSCAPE AND SEASCAPE

Journal of Nature Studies
Supplement No. 6

Inocencio E. Buot Jr.
Anne Frances V. Buhay
Marne G. Origenes

Philippine Society for the Study of Nature (PSSN), Inc.
2024

Recommended Citation
Buot IE Jr, Buhay AFV, & Origenes MG. 2024. A Catalogue of Locally Threatened Plants for Priority Conservation at Guiuan Marine Resource Protected Landscape and Seascape (Journal of Nature Studies Supplement 6). Philippine Society for the Study of Nature (PSSN), Inc. 91p.

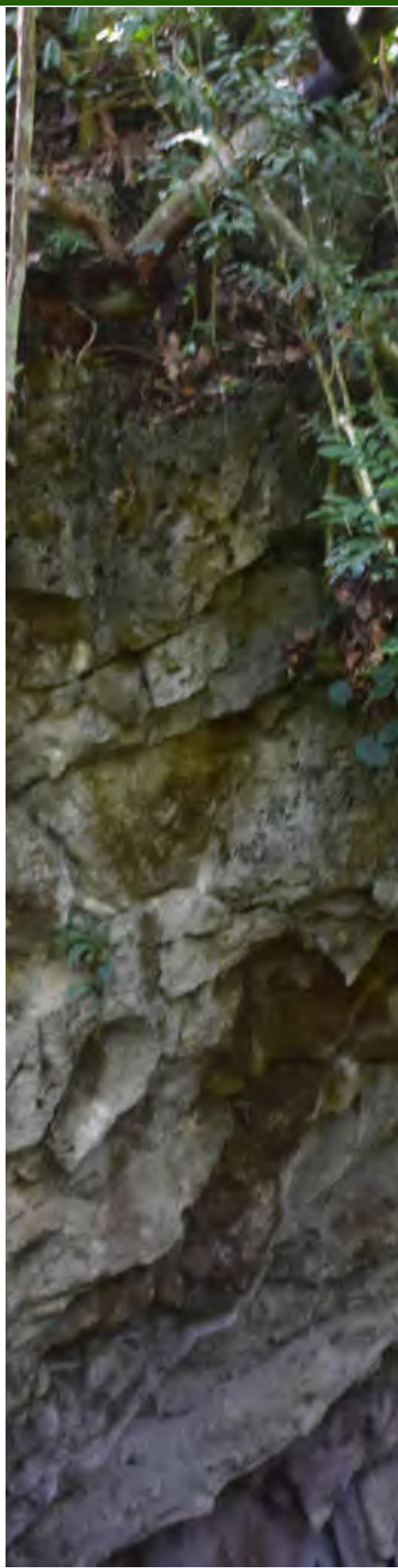
Published by the Philippine Society for the Study of Nature (PSSN), Inc.
Los Baños, Laguna, 4030 Philippines
Website:https://www.journalofnaturestudies.org/

Printed in the Philippines

PDF ISBN 978-621-96871-2-6
Print ISBN 978-621-96871-1-9

TABLE OF CONTENTS

PREFACE

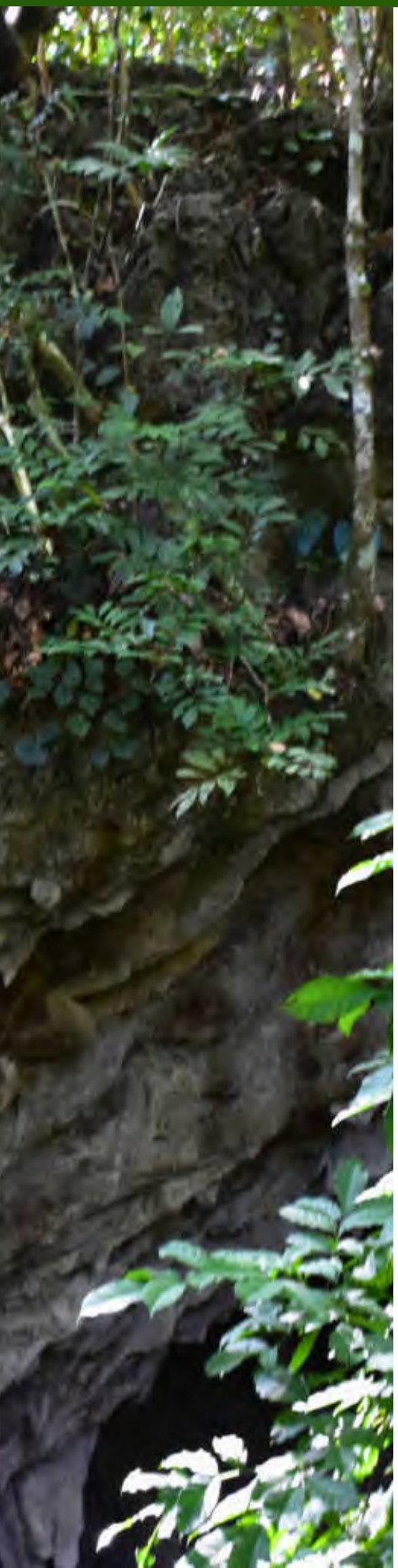


There had been endless discussions about the concept of localized biodiversity conservation. Admittedly, the most appropriate and practical conservation strategy, has been a challenge to many. The CONserve-Kaigangan research program led by the University of the Philippines Los Baños in close partnership with the Eastern Samar State University (ESSU), Samar State University (SSU), the Department of Environment and Natural Resources (DENR) Protected Area Superintendent (PASu) Office in Guiuan, the local government units and Peoples' Organizations, attempts to design a localized conservation prioritization of plant diversity in Guiuan Marine Resource Protected Landscape and Seascape (GMRPLS), in Guiuan, Eastern Samar. Kaigangan is the local dialect (Waray) for forests over limestone in Samar Island which has one of the most extensive forests over limestone in the Philippines and in southeast Asia.

Unfortunately, there are several threats to biodiversity in GMRPLS kaigangan. Hence, the urgent need to start a widespread conservation effort at the community level. With the funding initially coming from the Department of Science and Technology's Grants-In-Aid Program (DOST-GIA) and later from the Department of Science and Technology's Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD), the CONserve-Kaigangan team identified vulnerable plants and prioritize conservation using the Localized Conservation Priority Index (LCPI), developed at the Plant Systematics Laboratory, Institute of Biological Sciences, College of Arts and Sciences, University of the Philippines Los Baños. It is a composite index, comprising ecological and sociocultural indicators which may trigger loss of biota. The book presents photographs of the top 20 priority plants for urgent conservation at the GMRPLS. It contains field spot characters too and reason why they are endangered locally. The book aims to create awareness and thus, calls for concerted effort among stakeholders, namely, local government units, academe, business sectors, People's Organizations and the local communities to help in the conservation effort.

You will notice that the introductory part, the discussion about the LCPI concept, the presentation style of the top 20 priority species and the concluding part, are more or less similar to that of the other book dealing with the top priority species for conservation in Samar Island Natural Park.

PREFACE



The main differences are the unique top 20 species for priority conservation for each protected area.

On behalf of the authors, I thank the DOST-GIA and DOST-PCAARRD, for the funding. The collaborative partnership of UPLB, ESSU and SSU, produces useful outcomes for the community. The Protected Area Superintendent of the GMRPLS, Ms. Vivian Cuadra of the DENR and her hospitable staff, incredibly helped us. We had been working under the Gratuitous Permits number 2019-16, 2020-10, 2021-14, 2022-18 and 2023-21 granted by the DENR Region 8 in Tacloban City.

Inocencio E. Buot Jr
Professor and Project Leader

INTRODUCTION

The Philippines is a megadiversity country because it has an incredibly high number of endemics in a very small piece of land in the westernmost part of the Pacific (Mittermeier et al., 1998). However, it is considered one of the hottest of all the hotspots due to the widespread human activities threatening biodiversity loss in various ecosystem types (Myers et al. 2000). One of these ecosystems is called forests over limestone, which are formations thriving on limestone outcrops. The forests over limestone provide unique landscape and ecosystem services to local communities, including, provisioning (food, medicine, timber), regulating (temperature regulation, carbon sequestration), cultural (traditions), and aesthetic services (recreation) (Hamilton-Smith 2001; Clements et al. 2006; Struebig et al. 2009; BirdLife/FFI/ IUCN/WWF 2014; BMB-DENR 2019; Fernandez et al. 2020; Tolentino et al. 2020; Obeña et al. 2021; Villanueva et al. 2021a, b).

In the Philippines, the forests over limestone ecosystems serve as habitats of unique flora and fauna, including the Philippines' national bird, the huge Philippine monkey-eating eagle (Pithecophaga jefferyi) (Tolentino et al., 2020). Locally known as ***kaigangan***, the forest over limestone landscape of Samar Island is one of the most extensive limestone formations in the country and in southeast Asia as well. The recent assessment conducted by CONserve-KAIGANGAN has shown the unique biodiversity of forests over limestone in Samar Island (Fernandez et al. 2020; Tolentino et al. 2020; Obeña et al., 2021; Villanueva et al., 2021). New species had been discovered in Samar Island Natural Park forests over limestone such as *Decaisnina tomentosa* (Tandang et al., 2022), *Corybas kaiganganianus* (delos Angeles et al., 2022a), *Begonia normaaguilariae* (delos Angeles et al., 2022b), *Schismatoglottis minuta* (delos Angeles et al., 2023), and *Hoya kaiganganiana* (delos Angeles et al., under review). A lot more should be uncovered in the next coming years.

In Guiuan, Eastern Samar (**Figure 1**), the forests over limestone forms a unique formation and has been designated as Guiuan Marine Resource Protected Landscapes and Seascapes (GMRPLS). The coastal regions of Guiuan and nearby islands, including Manicani, Candulo, Suluan, Tubabao, Calicoan, and Homonhon, along with their adjacent reefs, located in Eastern Samar Province, were designated as the "Guiuan Marine Reserve" through the Proclamation No. 469 on September 26, 1994. This area was classified under the Protected Landscapes/Seascapes category in accordance with Republic Act 7586, also known as the National Integrated Protected Area System Act, as amended by RA 11038, or the E-NIPAS Act of 2018.

The municipality of Guiuan, Eastern Samar, is typically made of limestone and rocky substrate, where the presence of limestone rocks indicates the presence of a cave system in the area. The substrate is sandy to sandy-rocky with limestone rubbles (DENR-CENR-GMRPLS n.d.). Incidentally, Guiuan Marine Resource Protected Landscapes and Seascapes is situated in an extremely vulnerable location. It is a typhoon belt and most of the strong winds passing through the Philippines, almost always hit Eastern Samar and the GMRPLS. The inherent stress experienced by the biodiversity in the soil-deficient forests over limestone is aggravated by these strong typhoons frequenting the area.

In GMRPLS, the biodiversity documentation has been considered new records as there had been no publications on this in the past (Fernandez et al., 2020). However, threats, both natural and anthropogenic, are everywhere in GMRPLS. It is a typhoon belt and is prone to sea level rise too as it is near the shore. Harvesting is rampant and many areas have private claimants.

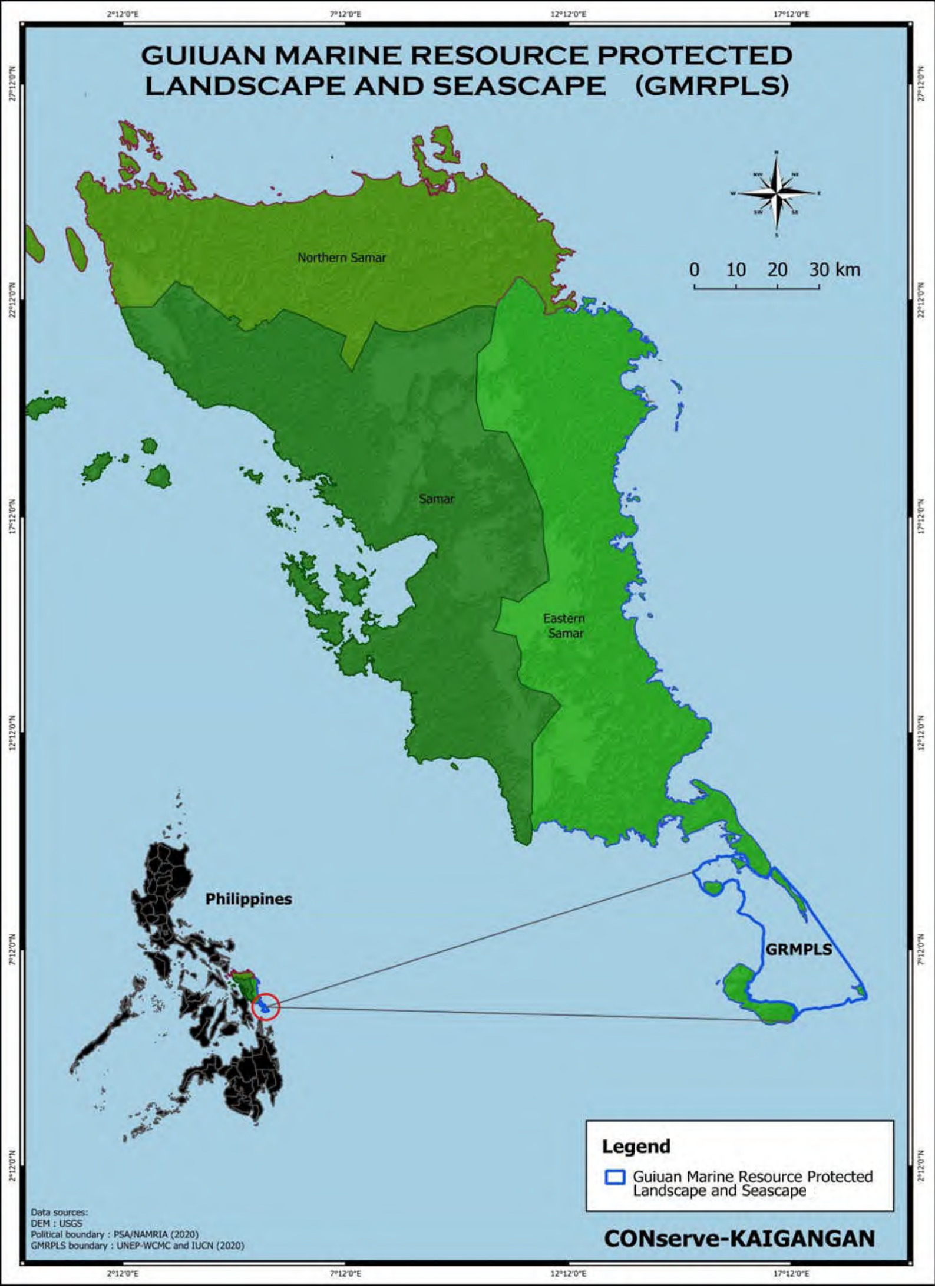


Figure 1. Map of Guiuan Marine Resource Protected Landscape and Seascape (GMRPLS).

Setting conservation priorities with village communities is essential since not all plant species had been assessed by IUCN and the national committee on Red List led by the Department of Environment and Natural Resources (DENR), Philippines. Setting priority species for localized conservation, helps determine the taxa in the order of priority, with local communities taking active part considering gender and age groups. It can give the local planners, resource managers, and local people essential information on local biological diversity of cultural and economic importance (Brehm et al., 2010). Moreover, this approach can also be used in identifying the priority areas for conservation (Chanthavong and Buot, 2019).

A number of species are to be conserved in Guiuan Marine Reserve Protected Landscape and Seascape (GMRPLS) in Guiuan, Eastern Samar, Philippines. There is an urgent need to look into the prioritization of species for immediate conservation. This book documents the top 20 priority plants for conservation at the GMRPLS using localized conservation priority index (LCPI) especially customized for the locality. Field photographs are shown for easy identification by stakeholders across ages and backgrounds.

This undertaking hopes to contribute to SDGs 5 (Gender equality), 6 (Clean water), 11 (Sustainable cities and communities), 12 (Responsible consumption and production), 13 (Climate Action), 15 (Life on land) and 17 (Partnership to achieve goal).

THE LOCALIZED CONSERVATION PRIORITY INDEX

There had been few papers discussing localized conservation priority index (Buot et al., 2024a, Buot et al., 2024b, Villanueva and Buot, 2020). Suffice it to say, that the Localized Conservation Priority Index (LCPI) is a point scoring method used to rank species by the level of priority. It is composed of five criteria: harvesting risk, economic use, cultural use, species distribution, and frequency value, which can be categorized as ecological and socio-cultural indicators **(Table 1)**. We started developing this localized conservation index long ago with graduate students of the Plant Systematics Laboratory of the Institute of Biological Sciences, College of Arts and Sciences, University of the Philippines Los Baños. It started in 2009 (Sopsop and Buot, 2009). Later this was improved by Chanthavong and Buot (2019), Caringal et al (2020) and Villanueva and Buot (2020a and 2020b). Each criterion in the LCPI can have a score ranging from 1 (lowest) to 5 (highest), where a higher score could indicate a higher vulnerability and hence, higher conservation priority. The scores of the criteria can be summed up using the formula:

Localized Conservation Priority Index = Harvesting Risk + Economic Use + Cultural Use + Species Distribution + Frequency Value

Each plant is scored according to these criteria. The scores will be summed up to identify the priority level (**Table 2**). Based on the formula above, the plant can have a maximum of 25 points. A higher score indicates a higher conservation priority. The priority level of each corresponding score is indicated in Table 2 (Villanueva and Buot, 2020a).

LCPI is just the start of our way to operationalize localized prioritization in biodiversity conservation (**Figure 2**). LCPI was devised according to the premise that there is ongoing nature and culture interaction (Buot et al., 2024a, Buot et al., 2024b, Villanueva and Buot, 2020). This is quite common in the discipline of ethnobotany and ethnobiology (Buot 2009, Pretty et al., 2009). By considering the interface of nature and culture, a more objective and holistic approach to preparing localized conservation strategies for plant resources is possible (Buot et al., 2024a, Buot et al., 2024b, Villanueva and Buot, 2020a, 2020b, Caringal et al., 2020, Chanthavong and Buot, 2019, Sopsop and Buot, 2009).

Our initial LCPI also combines the perspectives of local communities and global conservation authorities, which are relevant in conservation management. This current LCPI is in conformity with the concept of the new conservation science, espoused by Karieva (2012, 2014) and Karieva and Marvier (2012), where both humans and nature are of equal importance. Though this was opposed by Soule (2013), we believe that the concept of the new conservation science is the way to go (Buot, 2008a, 2008b). While there is an urgent need to conserve biodiversity, there is also a need to consider the traditions and values of the local people (Villanueva and Buot, 2020a and 2020b). As the direct users of these resources, local communities have a critical role in conservation (Engels et al., 2011; Caringal et al., 2020).

Our LCPI is just in the beginning stage. Perhaps this is still a crude attempt to operationalize localized conservation. Scientific methodologies always start this way (Buot, 2020). However, we have high hopes that this can be enhanced and improved with criticisms and new suggestions from readers and colleagues.

Table 1. Criteria and scores in calculating the conservation priority scores of the plants using a point-scoring procedure. The sources of information that will be considered in scoring are indicated in the rightmost column (modified from Villanueva and Buot, 2020)

CRITERIA	CATEGORIES	SCORE	Sources of Information
Harvesting Risk	Harvesting represents the removal of the whole plant (includes all the basic parts: root, stem, leaf, flower, and fruit).	5	Interview (Key informants)
	Harvesting of four out of the five basic parts	4	
	Harvesting of three out of the five basic parts	3	
	Harvesting of two out of the five basic parts	2	
	Harvesting of at least one of the five basic parts	1	
Economic Use	Five or more economic uses	5	Interview (Key informants); Ethnobotanical survey from CONserve-KAIGANGAN Project 2; Published literature
	Four economic uses	4	
	Three economic uses	3	
	Two economic uses	2	
	One economic use	1	
Cultural Use	Five or more cultural uses	5	Interview (Key informants); Published literature
	Four cultural uses	4	
	Three cultural uses	3	
	Two cultural uses	2	
	One cultural use	1	
Species Distribution	Within SINP/GMRPLS	5	Merrill; Catalogue of Life (2020); IPNI; Pelser et al. (2011-)
	Within Samar Island	4	
	Within Visayas	3	
	Within the Philippines	2	
	Cosmopolitan	1	
Frequency Value (%)	Not recorded (0) - 20	5	Vegetation sampling in three municipalities (CONserve-KAIGANGAN Project 1)
	21-40	4	
	41-60	3	
	61-80	2	
	81-100	1	

Table 2. Conservation priority classification based on CPI scores column (modified from Villanueva and Buot 2020).

Score	Priority Level	Decision
1-8	Low	Suitable for high-impact harvesting
9-16	Medium	Can be harvested with specific quotas
17-25	High	Requires strict regulation in harvesting

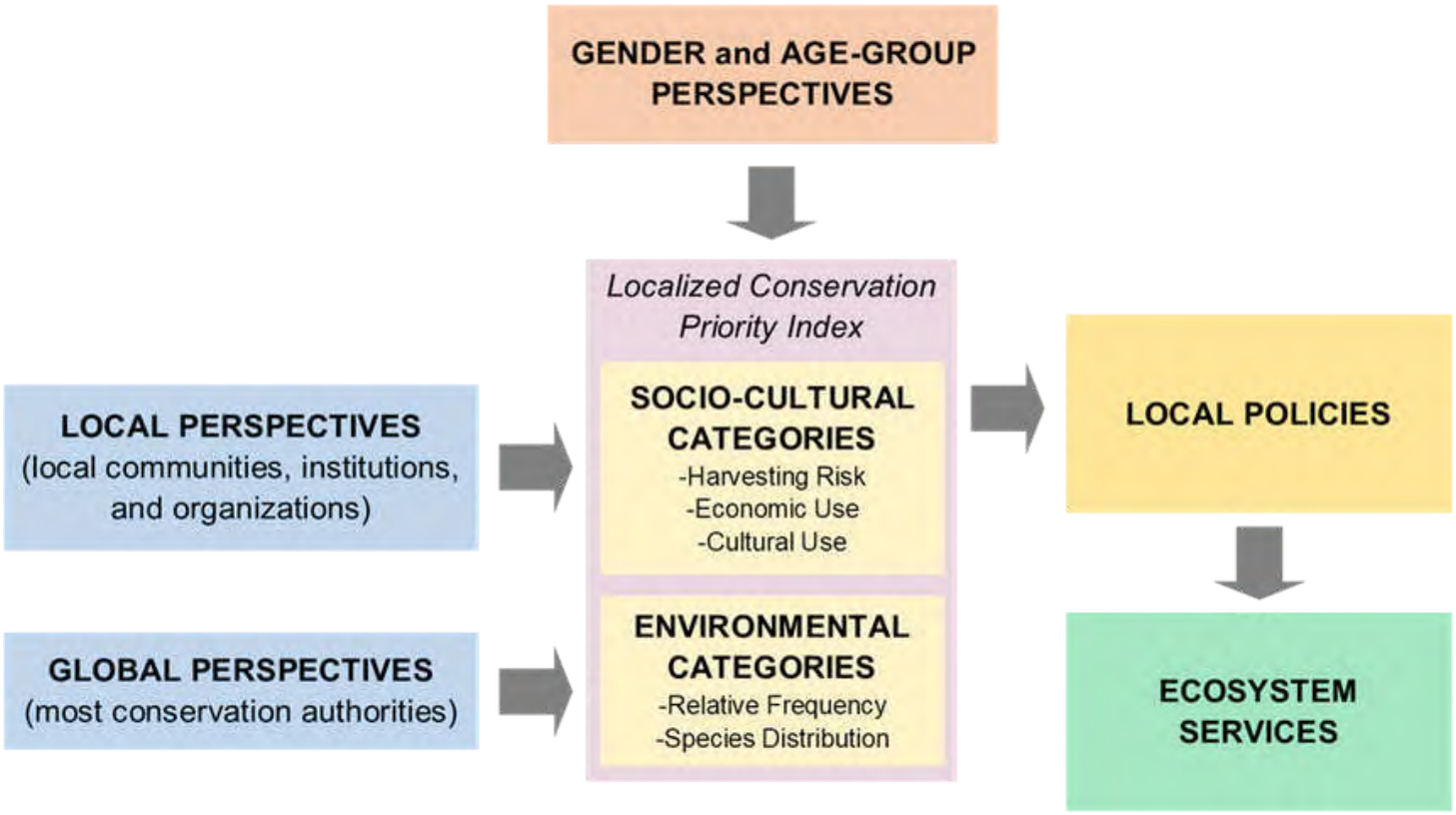


Figure 2. A framework showing how localized conservation priority index (LCPI) combines local and global perspectives with due consideration of the gender and age group perspectives in sustaining ecosystem services in local communities, particularly in forests over limestone.

THE TOP 20 PRIORITY PLANTS FOR CONSERVATION

The following section presents field photographs of the top 20 plants in GMRPLS using the LCPI scoring scheme. The species are arranged from the species occupying the first rank and so on to the species occupying the 20th rank. Field spot characters are identified, occurrences in the Philippines and in other parts of the world, conservation status, the localized conservation priority index (LCPI) score and the reasons for the threat are given. Additionally, the priority level and the recommended action are also highlighted. A map on the species occurrences in Samar Conserve-KAIGANGAN plots and in the Philippines are also included.

01 ***Caryota rumphiana*** **Mart. (Arecaceae)**
Pugahan

Family: Arecaceae
Scientific Name: *Caryota rumphiana* Mart.
Local Name: Pugahan, Tagabunga

Field spot character: Leaves have a distinctive fish-tail shape (Dransfield, 1974). Trunk is solitary with widely spaced nodes forming a ring.

Samar plot occurrences: Plot 2

Other places of occurrences in the Philippines: LUZON: Cagayan, NCR, and Sorsogon, VISAYAS: Negros and Samar, MINDANAO: Agusan del Norte and Davao del Sur (Pelser et al., 2011 onwards).

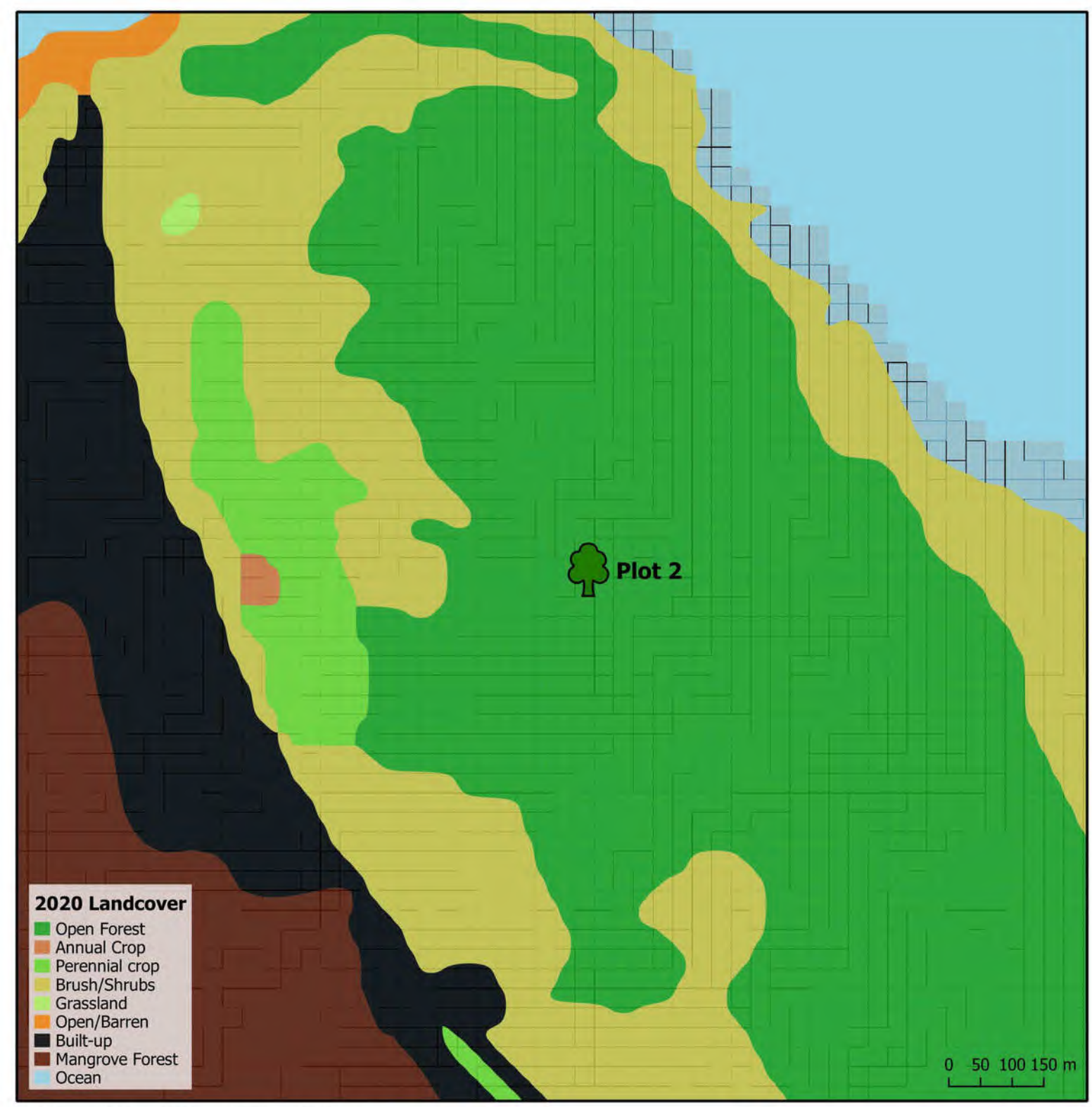
IUCN conservation status: Least Concern

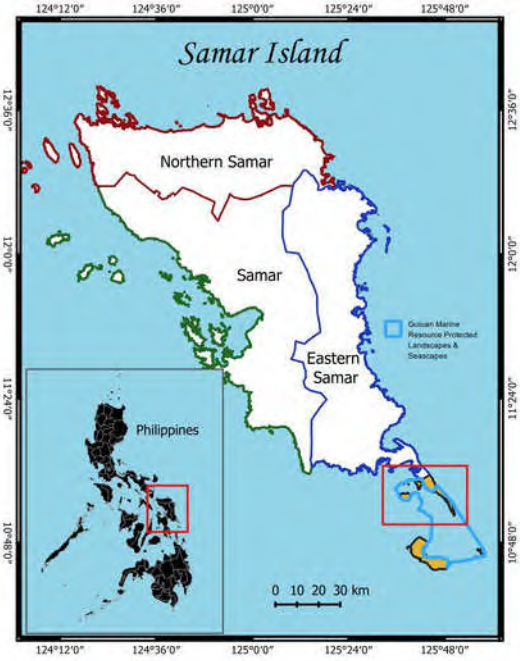
DAO conservation status: Not assessed

LCPI score: 20/25

Reason for the threat: All parts of the plants (root, stem, leaf, flower and fruit) are utilized and harvested as this is used for landscaping, festival decoration, medicine, food, and fiber (Buot et al., 2024b).

Priority level & Recommended Action: High: Requires strict regulation in harvesting.





Data sources:

Political boundary : PSA/NAMRIA (2020)
GMRPLS boundary: UNEP-WCMC & IUCN (2020)
2020 Landcover : NAMRIA (2022)
DEM : USGS

Samar distribution of Caryota rumphiana

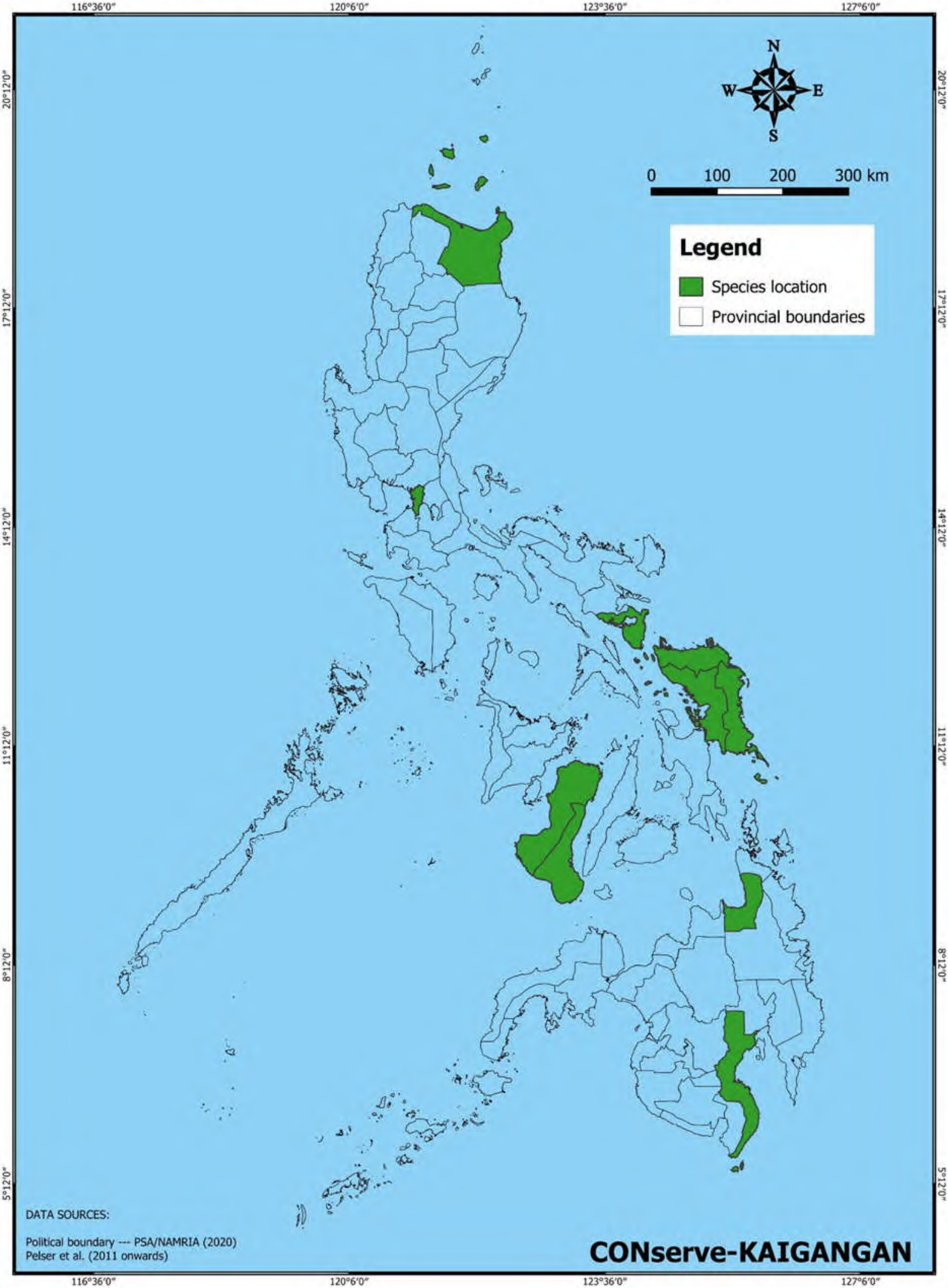
Legend

Caryota rumphiana

Plot 2 (1 individual)

CONserve-KAIGANGAN

Philippine distribution map of Caryota rumphiana



02 ***Saribus rotundifolius*** **(Lam.) Blume (Arecaceae)**

Anahaw

Family: Arecaceae
Scientific Name: *Saribus rotundifolius* (Lam.) Blume
Local Name: Anahaw

Field spot character: Straight solitary-stemmed palm tree, with smooth trunk and shallow rings of leaf scars. Palmately-lobed leaves are fan-shaped. Fruits are fleshy drupe and turning red to black when ripe (Stuart, 2023a).

Samar plot occurrences: Plot 2

Occurrences in the Philippines: LUZON: Albay, Benguet, Cagayan, Camarines, La Union, Laguna, Mindoro, NCR, Palawan, Pampanga, Pangasinan, Polillo, Quezon, Sorsogon, and Zambales, VISAYAS: Negros and Samar, and MINDANAO: Davao and Davao del Sur (Pelser et al., 2011 onwards).

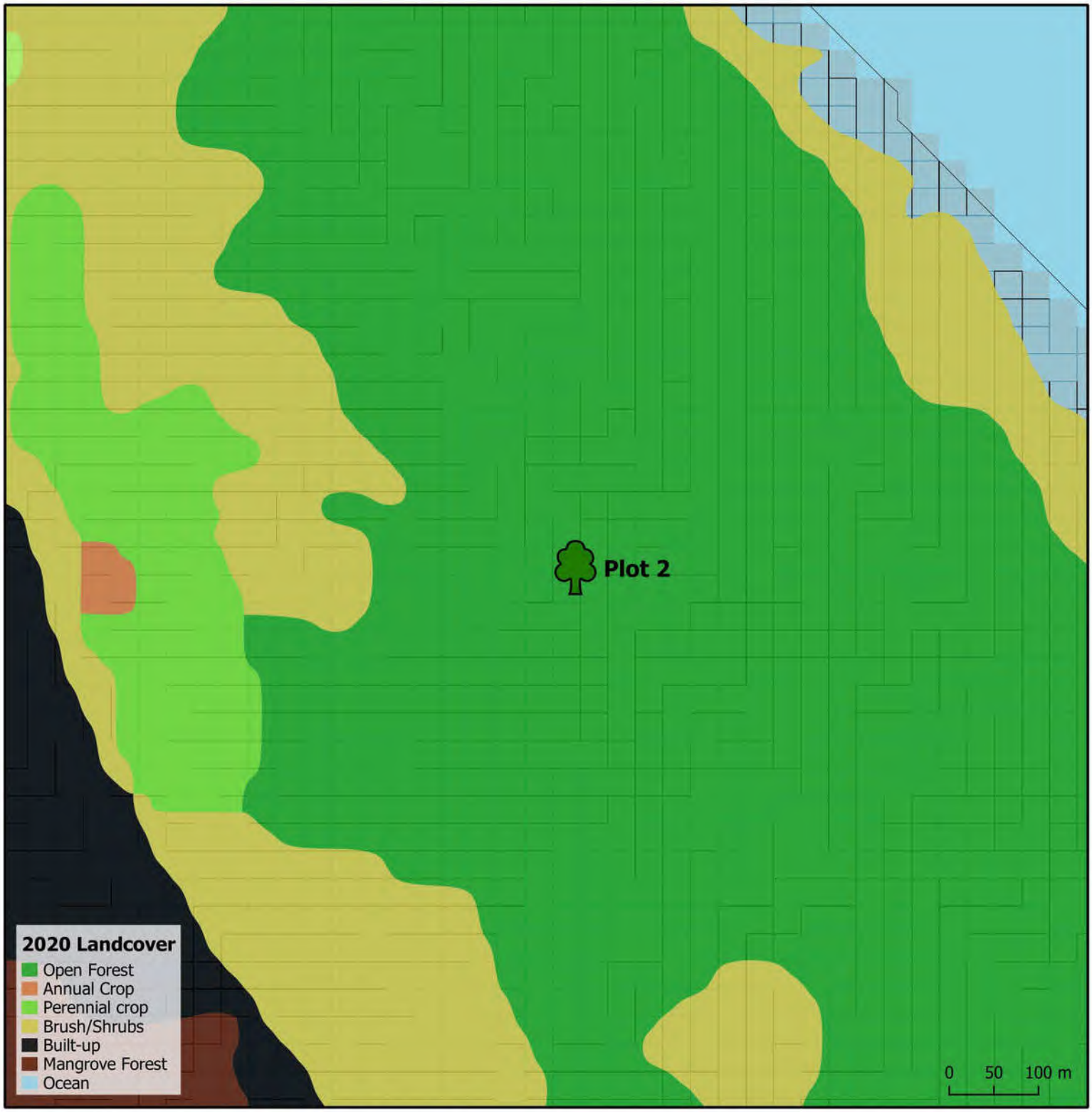
IUCN conservation status: Not assessed

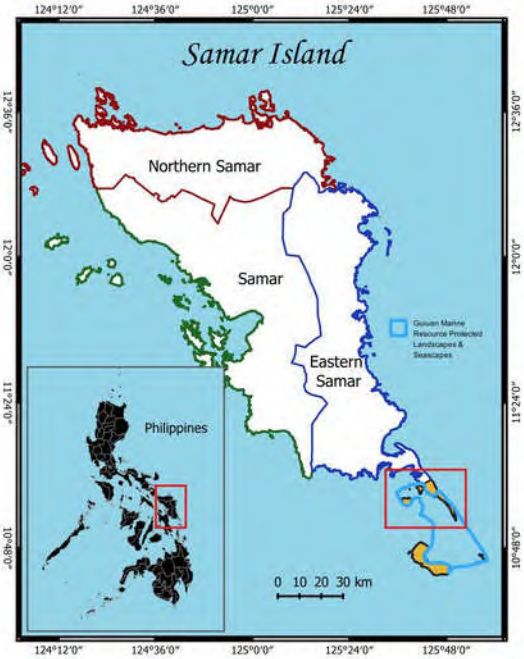
DAO conservation status: Other threatened species

LCPI score: 19/25

Reason for the threat: All parts of the plants (root, stem, leaf, flower and fruit) are harvested and utilized. It is an ornamental, medicine, fan, housing and furniture material. The leaf has been reported to be used as food cover in rural areas (Buot et al., 2024b).

Priority level & Recommended Action: High: Requires strict regulation in harvesting





Data sources:

Political boundary : PSA/NAMRIA (2020)
GMRPLS boundary: UNEP-WCMC & IUCN (2020)
2020 Landcover : NAMRIA (2022)
DEM : USGS

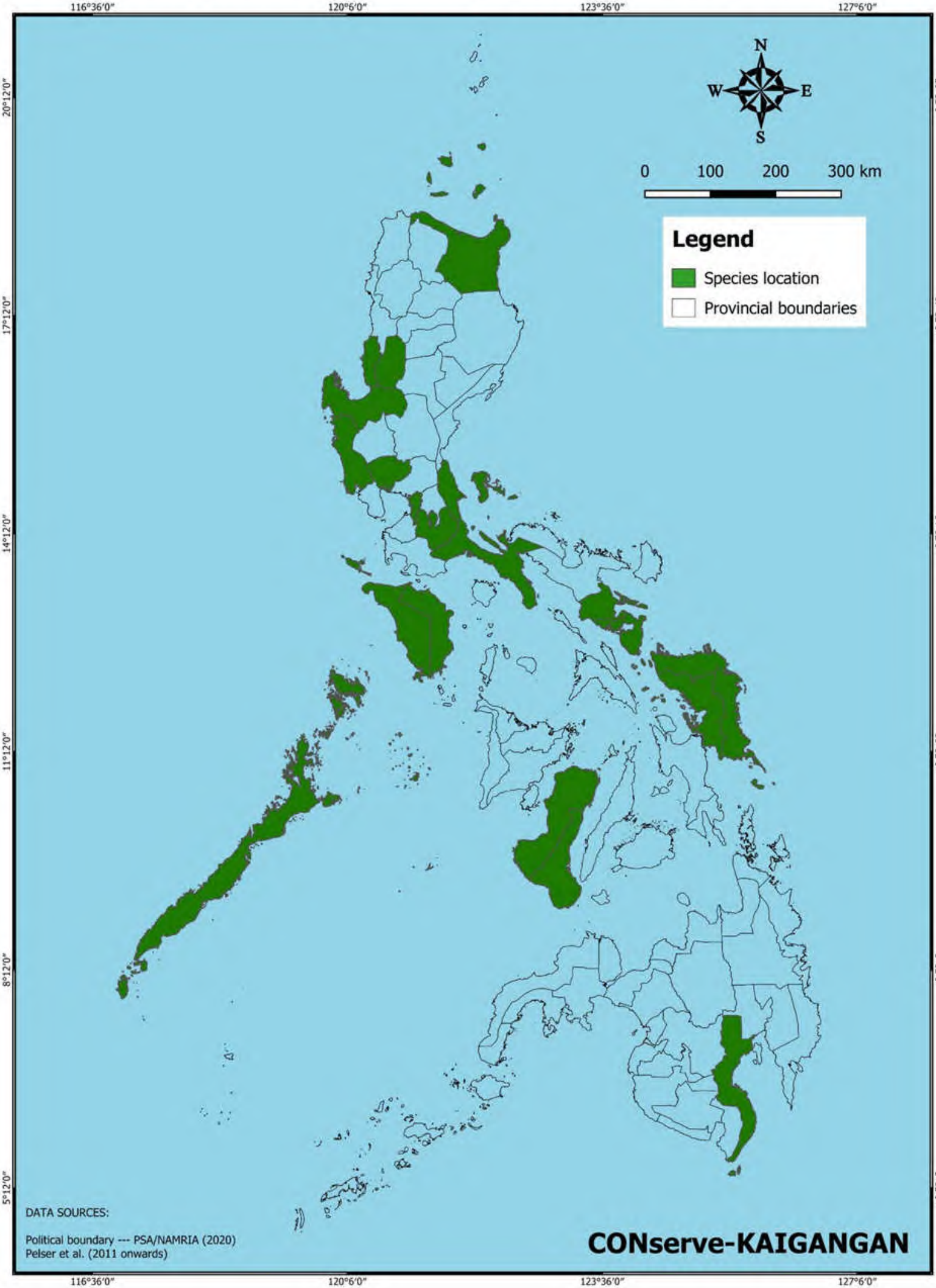
Samar distribution of Saribus rotundifolius

Legend

Saribus rotundifolius
Plot 2 (1 individual)

CONserve-KAIGANGAN

Philippine distribution map of Saribus rotundifolius



03 ***Artocarpus blancoi*** **(Elmer) Merr. (Moraceae)**

Antipolo

Family: Moraceae
Scientific Name: *Artocarpus blancoi* (Elmer) Merr.
Local Name: Antipolo

Field spot character: A large tree, with short and stout buttress. Leaves of one to three pairs of lobes are spirally arranged (Stuart, 2020). Bark is grayish black, exuding white latex (Philstar, 2011). Fruits covered with spine-like structure.

Samar plot occurrences: Plot 4

Occurrences in the Philippines: LUZON: Batan, Bataan, Ilocos Norte, Mindoro, Palawan, and Rizal, VISAYAS: Cebu, Negros, and Samar (Fernandez et al., 2020), and Mindanao (Pelser et al., 2011 onwards).

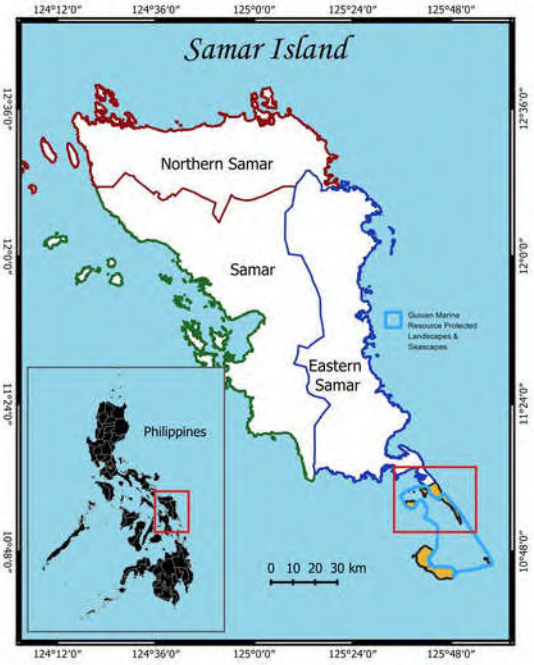
IUCN conservation status: Least Concern

DAO conservation status: Not assessed

LCPI score: 18/25

Reason for the threat: Four (4) parts of the plants (stem, leaf, flower and fruit) are harvested and utilized. It is used for food, construction materials, firewood, hunting, and raw materials for ropes, forage, fiber (Buot et al., 2024b).

Priority level & Recommended Action: High: Requires strict regulation in harvesting



Data sources:

Political boundary : PSA/NAMRIA (2020)
GMRPLS boundary: UNEP-WCMC & IUCN (2020)
2020 Landcover : NAMRIA (2022)
DEM : USGS

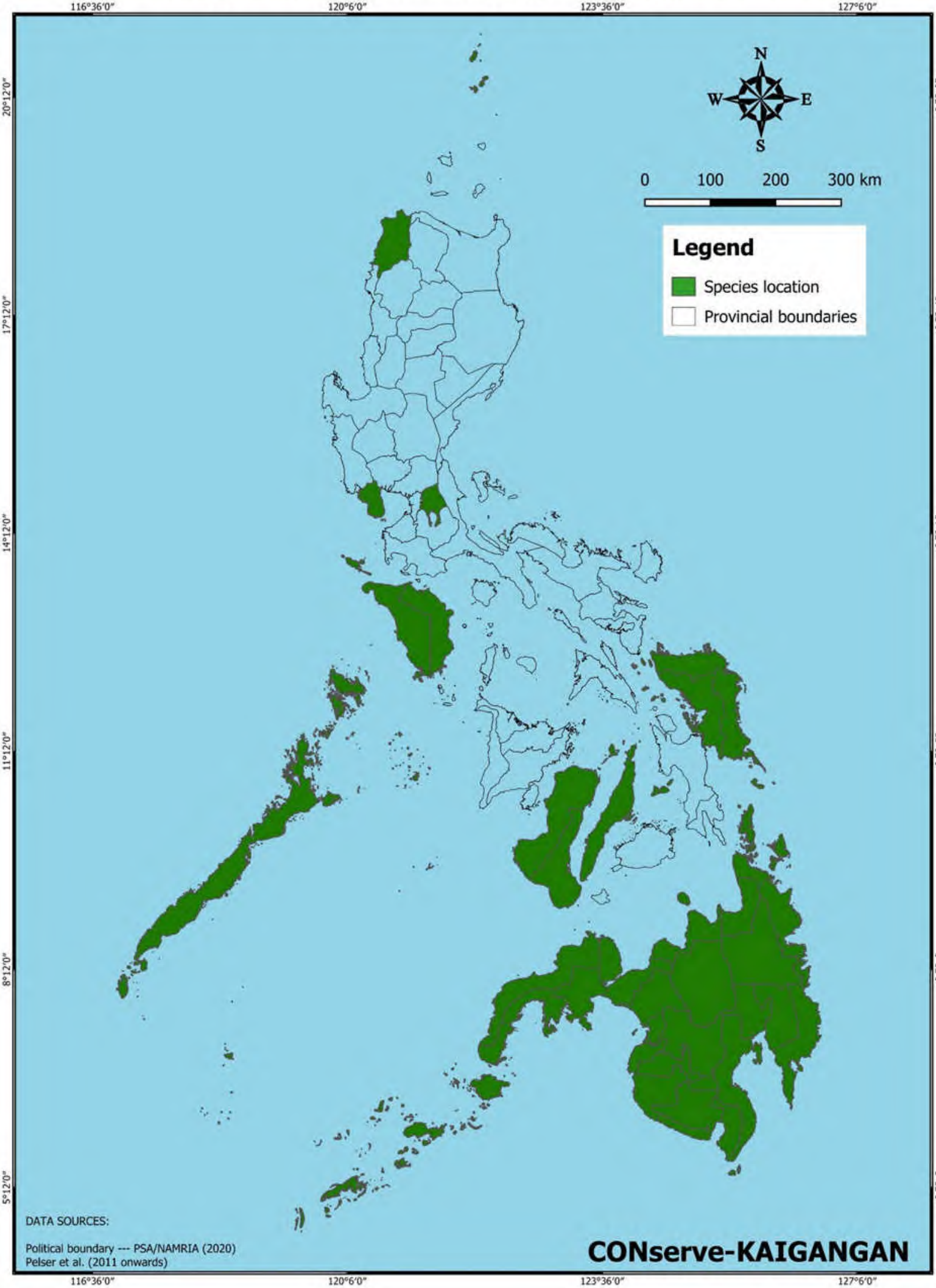
Samar distribution of Artocarpus blancoi

Legend

Artocarpus blancoi
Plot 4 (3 individuals)

CONserve-KAIGANGAN

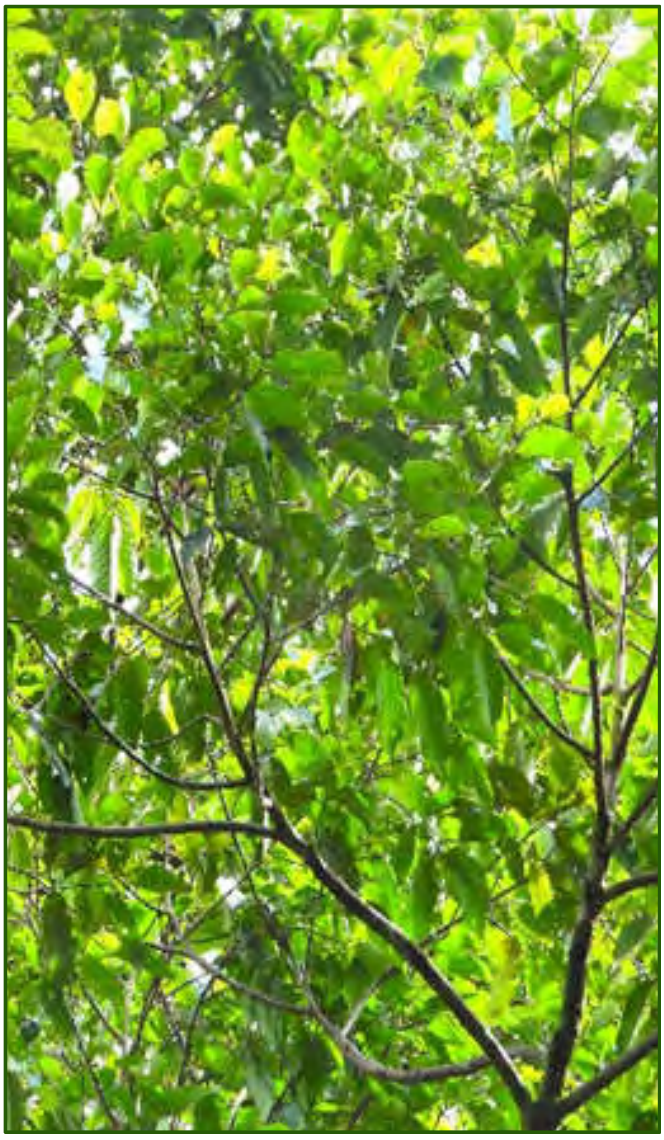
Philippine distribution map of Artocarpus blancoi



04 ***Shorea negrosensis* Foxw. (Dipterocarpaceae)**

Red Lauan

Family: Dipterocaceae
Scientific Name: *Shorea negrosensis* Foxw.
Local Name: Red Lauan,Takuban, Tangilis



Field spot character: Large and straight cylindrical bole, with prominent buttress. Bark is dark brown with a tinge of reddish color (Stuart, 2024). Prominent small corky spots on the stem arranged in vertical lines.

Samar plot occurrences: Plots 1 & 2

Occurrences in the Philippines: LUZON: Albay, Aurora, Cagayan, Camarines, Isabela, Laguna, Mindoro, Nueva Ecija, Polillo, Quezon, and Sorsogon, VISAYAS: Biliran, Cebu, Leyte, Negros, and Samar, MINDANAO: Agusan del Norte, Agusan del Sur, Bukidnon, Basilan, Cotabato, Davao, Lanao, Poneas, Surigao, and Zamboanga (Pelser et al., 2011 onwards).

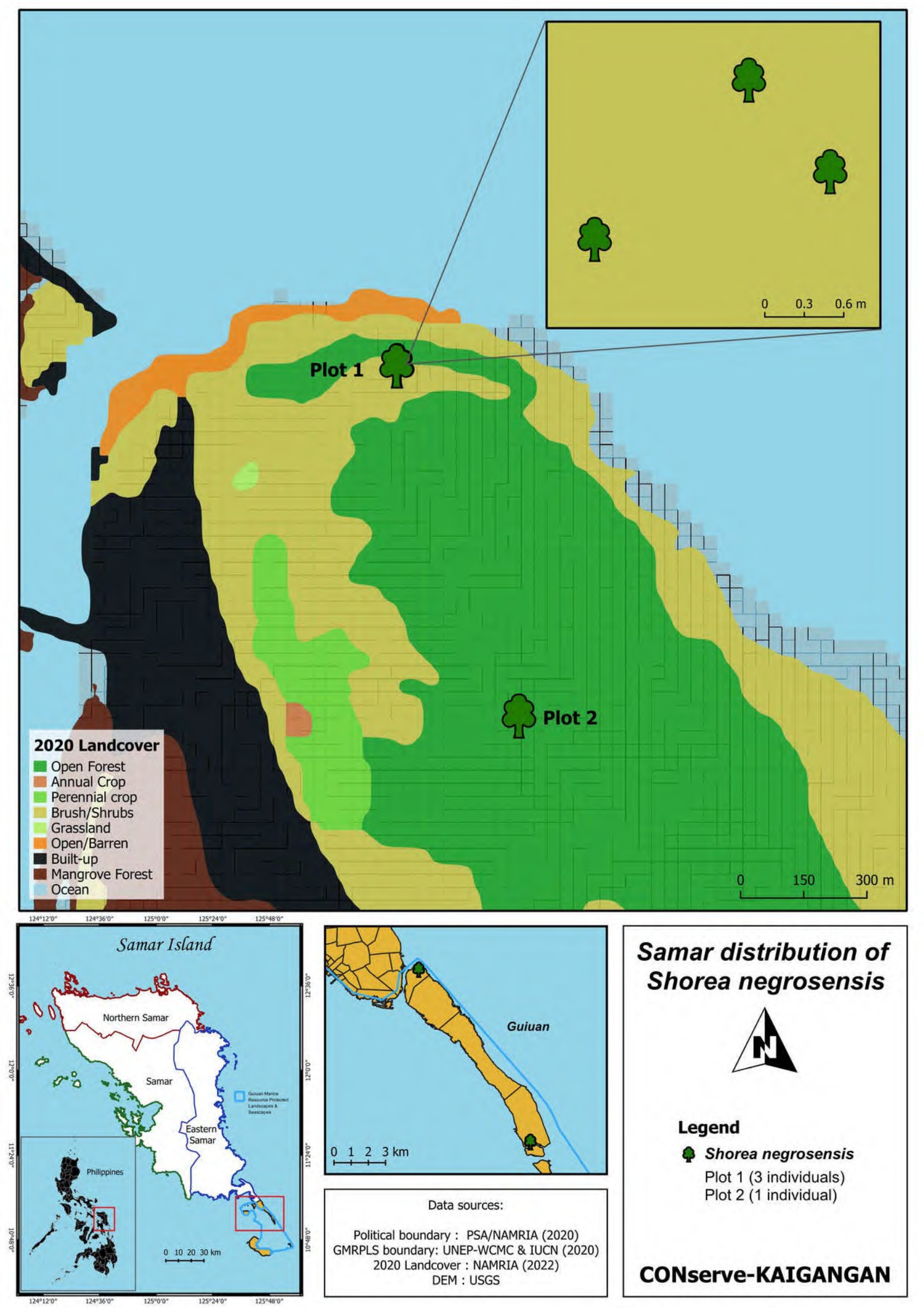
IUCN conservation status: Least Concern

DAO conservation status: Vulnerable

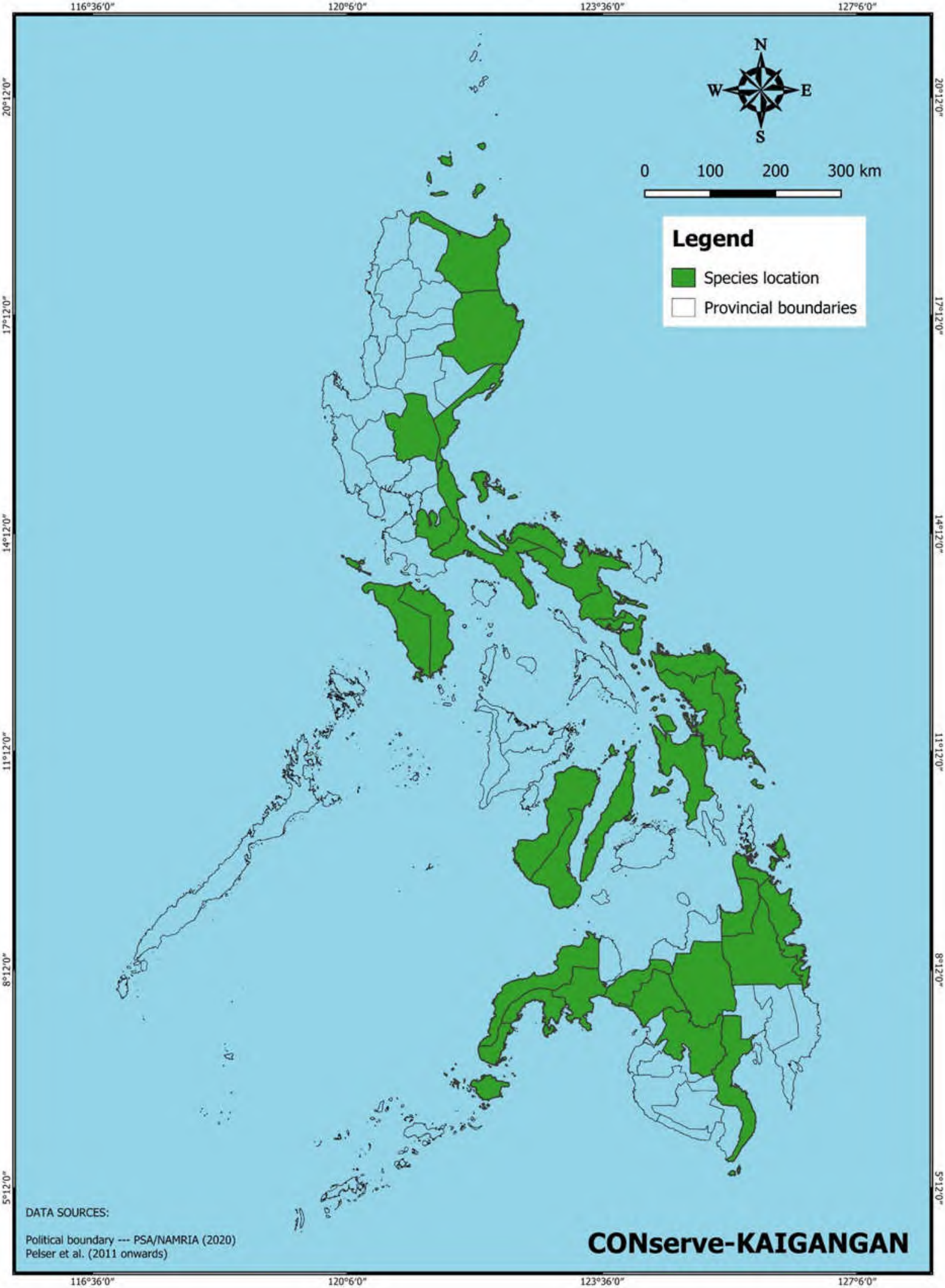
LCPI score: 18/25

Reason for the threat: All parts of the plants (root, stem, leaf, flower and fruit) are utilized. It is for construction materials, furniture, medicine, forage, and firewood (Buot et al., 2024b).

Priority level & Recommended Action: High: Requires strict regulation in harvesting


0 0.3 0.6 m
Plot 1
Plot 2
2020 Landcover
Open Forest
Annual Crop
Perennial crop
Brush/Shrubs
Grassland
Open/Barren
Built-up
Mangrove Forest
Ocean
0 150 300 m
124°12'0"
124°36'0"
125°0'0"
125°24'0"
125°48'0"
Samar Island
Northern Samar
Samar
Eastern Samar
Philippines
0 10 20 30 km
12°36'0"
12°0'0"
11°24'0"
10°48'0"
Guiuan
0 1 2 3 km
Data sources:
Political boundary : PSA/NAMRIA (2020)
GMRPLS boundary: UNEP-WCMC & IUCN (2020)
2020 Landcover : NAMRIA (2022)
DEM : USGS
Samar distribution of Shorea negrosensis
N
Legend
Shorea negrosensis
Plot 1 (3 individuals)
Plot 2 (1 individual)
CONserve-KAIGANGAN

Philippine distribution map of Shorea negrosensis



05 ***Alstonia scholaris*** **(L.) R. Br. (Apocynaceae)**

Anibong

Family: Apocynaceae
Scientific Name: *Alstonia scholaris* (L.) R. Br.
Local Name: Anibong

Field spot character: A large tree with whorled branches arising from the trunk. Leaves are dark green on the upper surface and pale green on the lower surface, arranged in whorls, each with 5-9 leaves (Orwa et al., 2009). It has milky sap.

Samar plot occurrences: Plots 2 & 4

Occurrences in the Philippines: LUZON: Abra, Albay, Balabac, Bataan, Batangas, Cagayan, Catanduanes, Ifugao, Ilocos Norte, La Union, Laguna, Mindoro, Mountain Province, NCR, Palawan, Quezon, and Rizal, VISAYAS: Negros, Panay, and Samar, MINDANAO: Dinagat and Zamboanga (Pelser et al., 2011 onwards).

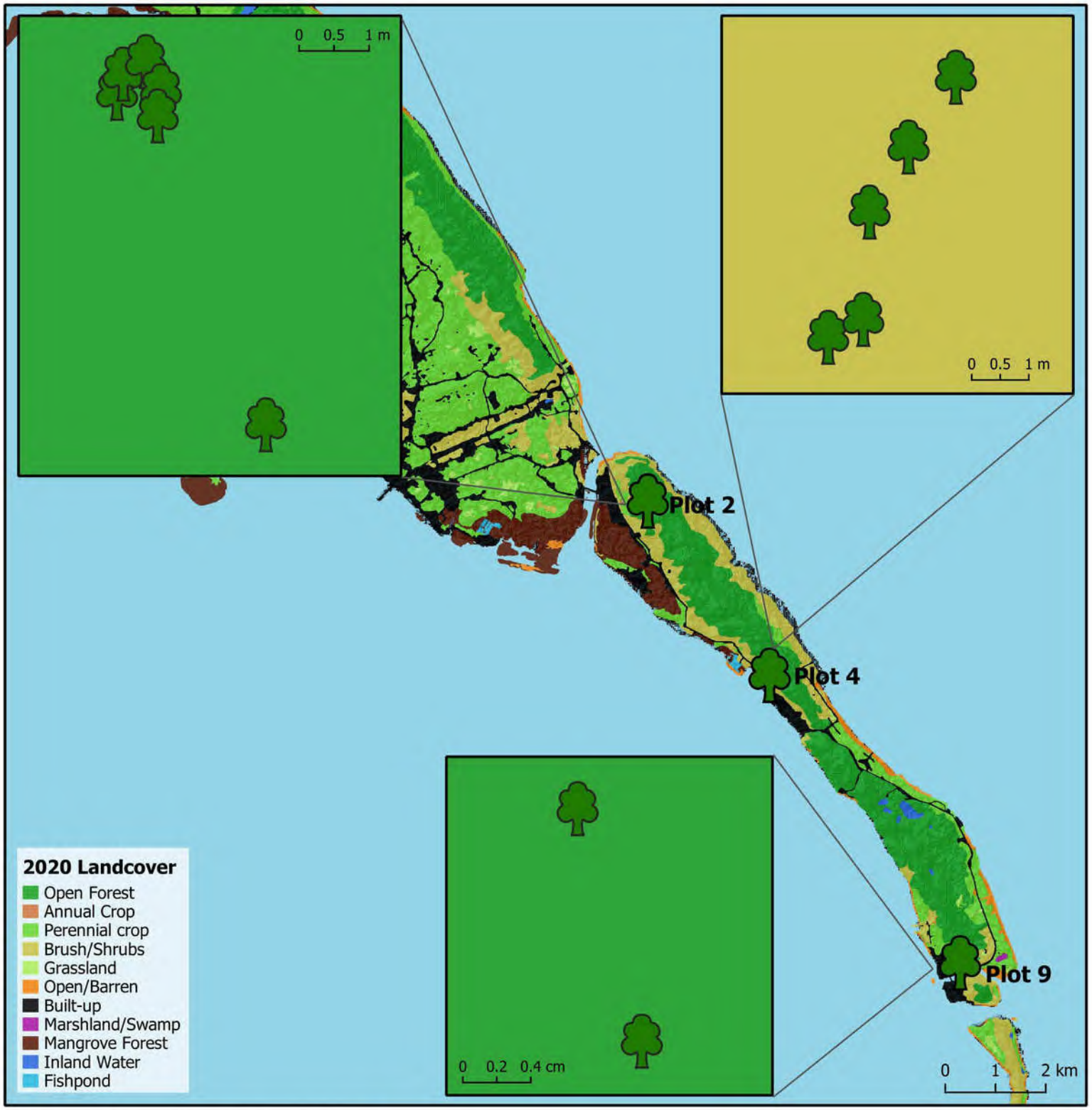
IUCN conservation status: Least Concern

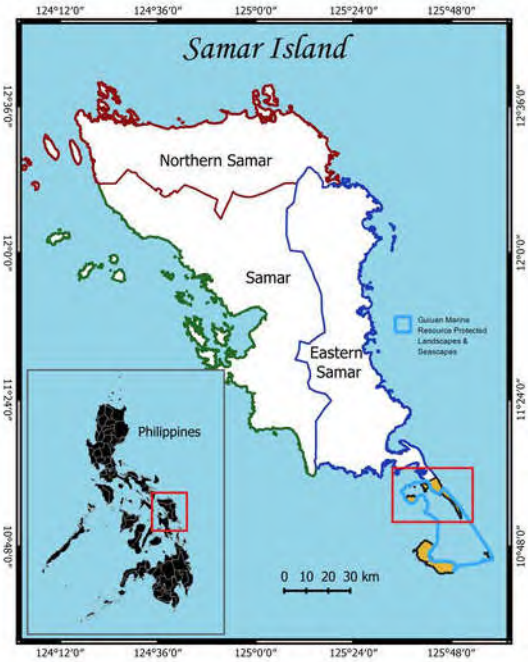
DAO conservation status: Not assessed

LCPI score: 18/25

Reason for the threat: All parts of the plants (root, stem, leaf, flower and fruit) are utilized. It is used as an ornamental plant, construction and industrial materials, and medicine (Buot et al., 2024b).

Priority level & Recommended Action: High: Requires strict regulation in harvesting





Data sources:

Political boundary : PSA/NAMRIA (2020)
GMRPLS boundary: UNEP-WCMC & IUCN (2020)
2020 Landcover : NAMRIA (2022)
DEM : USGS

Samar distribution of Alstonia scholaris

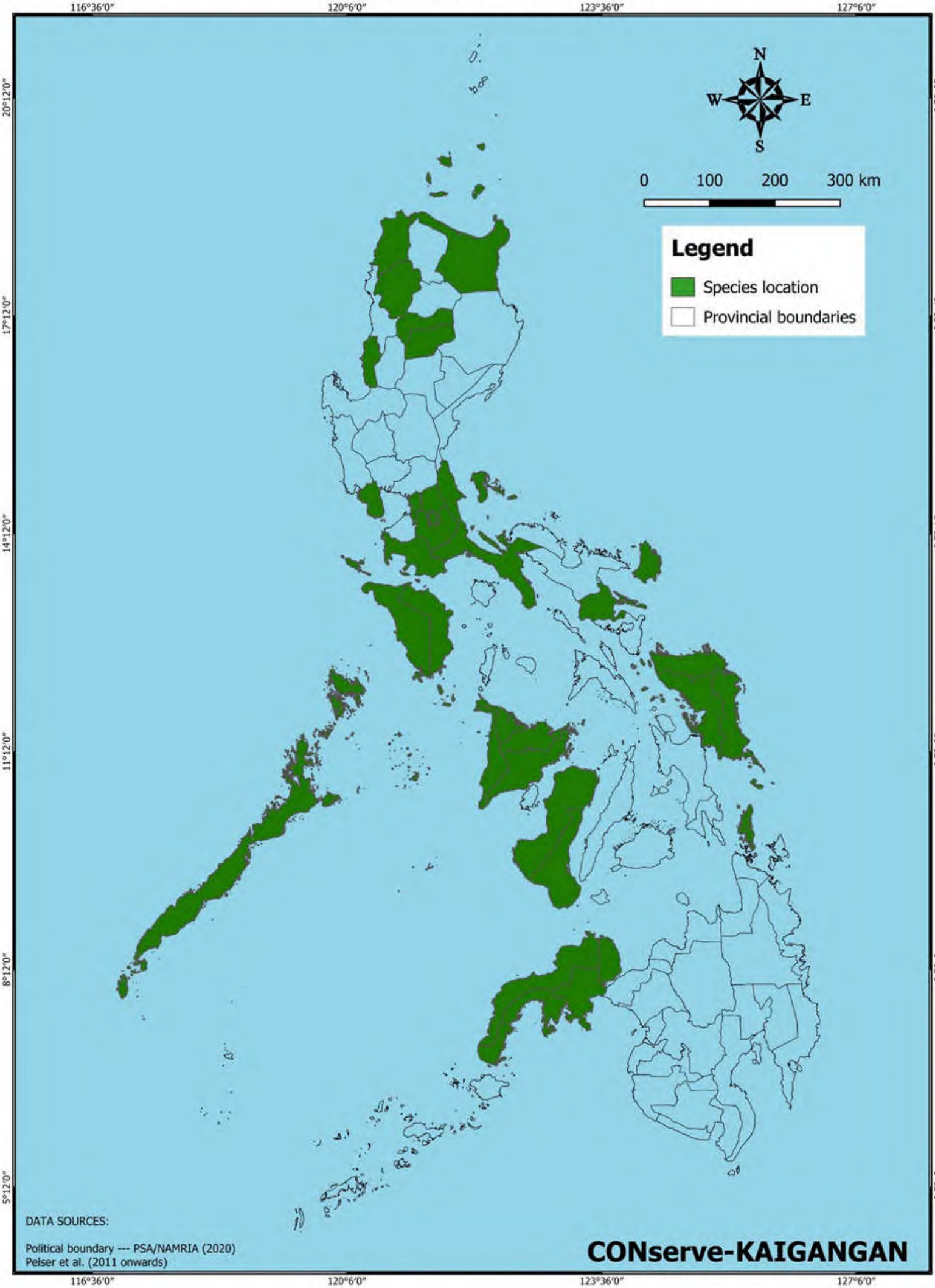
Legend

Alstonia scholaris

Plot 2 (6 individuals)
Plot 4 (5 individuals)
Plot 9 (2 individuals)

CONserve-KAIGANGAN

Philippine distribution map of Alstonia scholaris



06 ***Calophyllum soulattri* Burm.f. (Clusiaceae)**

Pamintaogon

Family: Clusiaceae
Scientific Name: *Calophyllum soulattri* Burm.f.
Local Name: Pamintaogon

Field spot character: Medium-sized tree with dark green elliptical leaf. Bark may have shallow fissures as the tree matures (NParks, 2023).

Samar plot occurrences: Plots 1 & 2

Occurrences in the Philippines: LUZON: Aurora, Balabac, Batan, Bataan, Batanes, Camarines Sur, Culion, Isabela, La Union, Laguna, Mangsee, Marinduque, Minasawa, Mindoro, Palawan, Polillo, Quezon, Rizal, and Zambales, VISAYAS: Bohol, Burias, Leyte, Masbate, Negros, and Samar, MINDANAO: Agusan, Agusan del Norte, Basilan, Cagayan De Sulu, Davao Oriental, Davao del Sur, Jolo, Lanao, Poneas, and Zamboanga del Norte (Pelser et al., 2011 onwards).

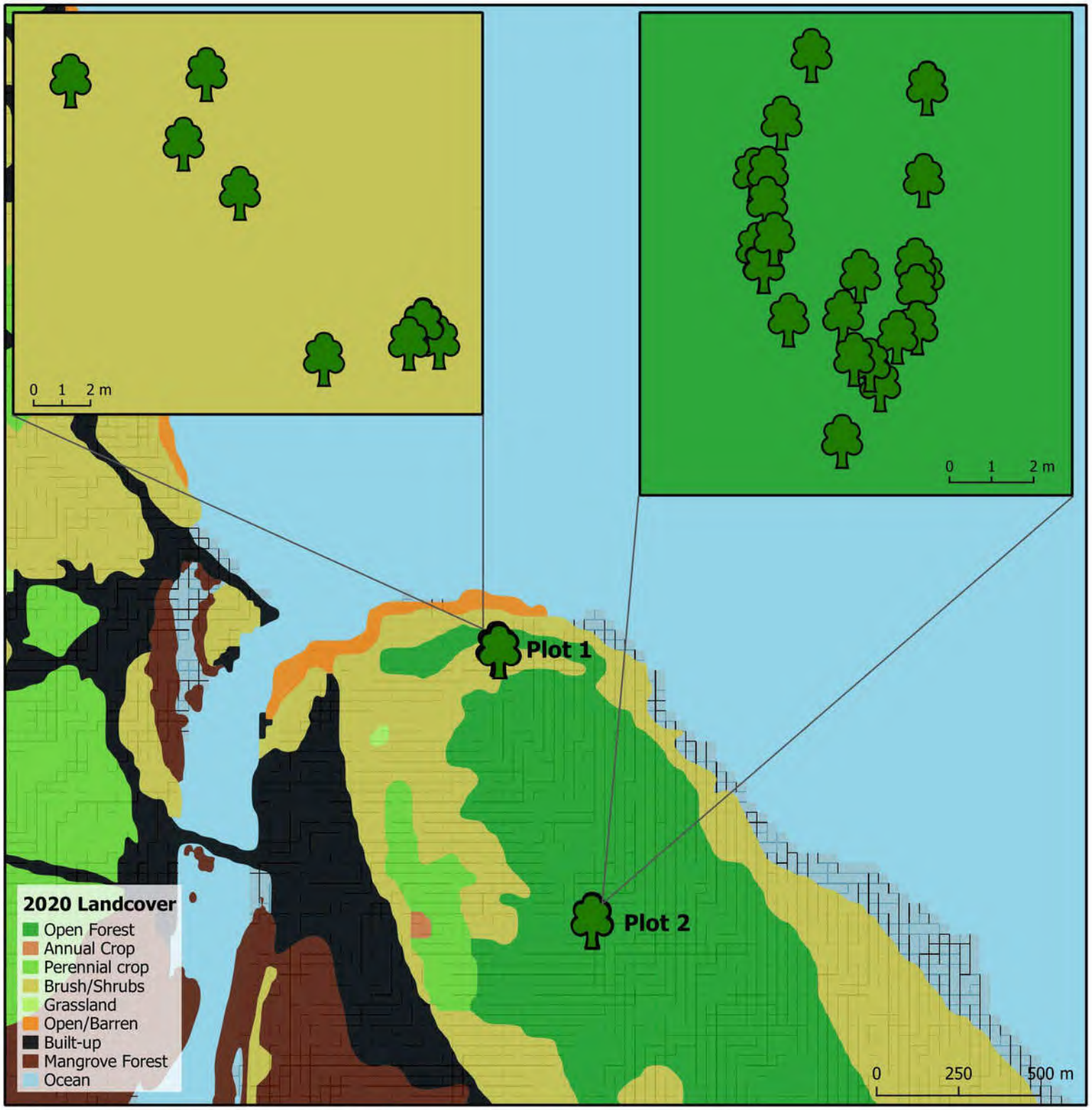
IUCN conservation status: Least Concern

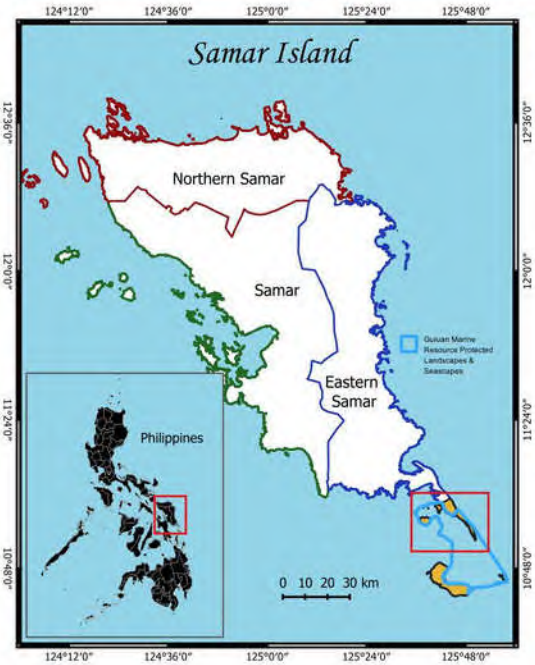
DAO conservation status: Not assessed

LCPI score: 17/25

Reason for the threat: All parts of the plants (root, stem, leaf, flower and fruit) are utilized (Buot et al., 2024b).

Priority level & Recommended Action: High: Requires strict regulation in harvesting





Data sources:

Political boundary : PSA/NAMRIA (2020)
GMRPLS boundary: UNEP-WCMC & IUCN (2020)
2020 Landcover : NAMRIA (2022)
DEM : USGS

Samar distribution of Calophyllum soulattri

N

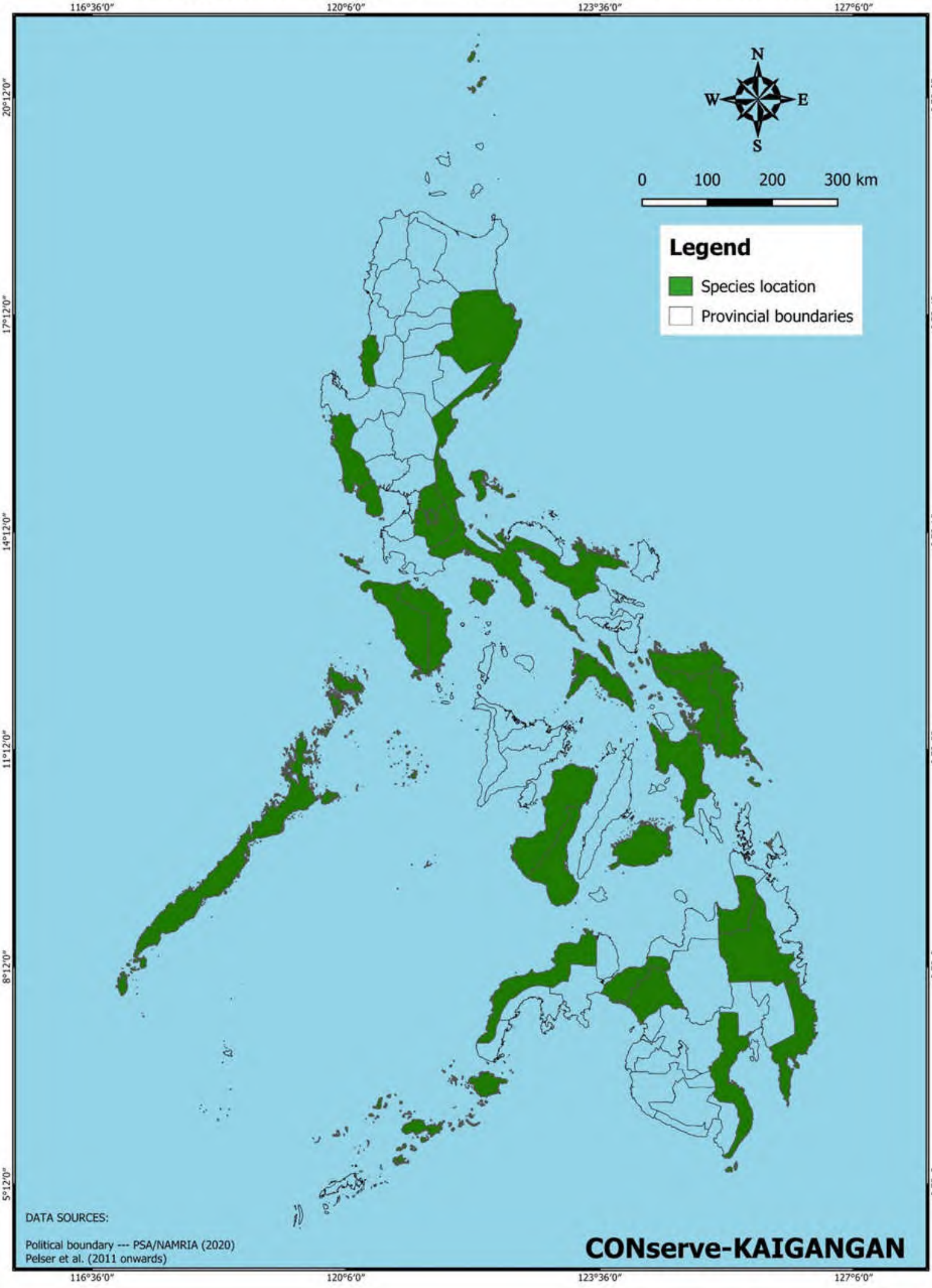
Legend

Calophyllum soulattri

Plot 1 (9 individuals)
Plot 2 (25 individuals)

CONserve-KAIGANGAN

Philippine distribution map of Calophyllum soulattri



07 ***Artocarpus rubrovenius* Warb. (Moraceae)**

Tugop

Family: Moraceae
Scientific Name: *Artocarpus rubrovenius* Warb.
Local Name: Tugop

Field spot character: Large and tall tree with slightly visible buttress. Fruit is fleshy with a hairy and yellowish flexible long spiky texture, containing several light brown seeds (Seibert & Jansen, 1991).

Samar plot occurrences: Plots 5-9

Occurrences in the Philippines: LUZON: Batan, Albay, Aurora, Bataan, Batangas, Camarines, Isabela, Laguna, Pampanga, Quezon, Rizal, Sorsogon, and Mindoro, VISAYAS: Samar (Pelser et al., 2011 onwards).

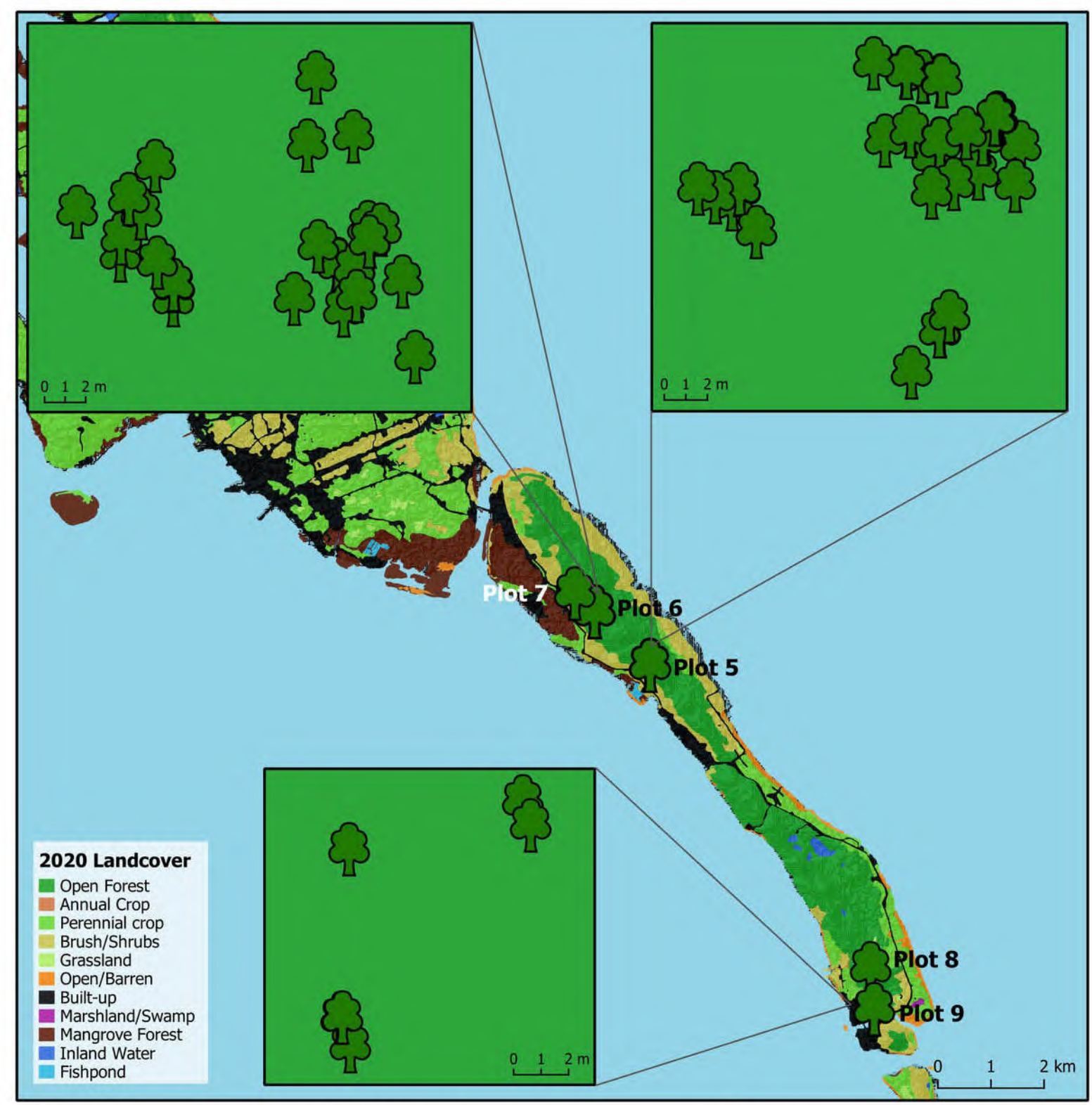
IUCN conservation status: Not assessed

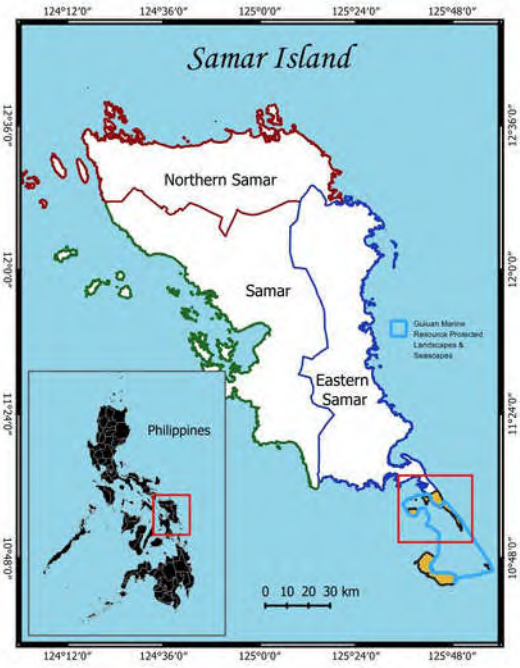
DAO conservation status: Other threatened species

LCPI score: 17/25

Reason for the threat: All parts of the plants (root, stem, leaf, flower and fruit) are utilized as construction materials, medicine, handicrafts, forage, hunting, food, and firewood (Buot et al., 2024b).

Priority level & Recommended Action: High: Requires strict regulation in harvesting





Data sources:

Political boundary : PSA/NAMRIA (2020)
GMRPLS boundary: UNEP-WCMC & IUCN (2020)
2020 Landcover : NAMRIA (2022)
DEM : USGS

Samar distribution of Artocarpus rubrovenius

N

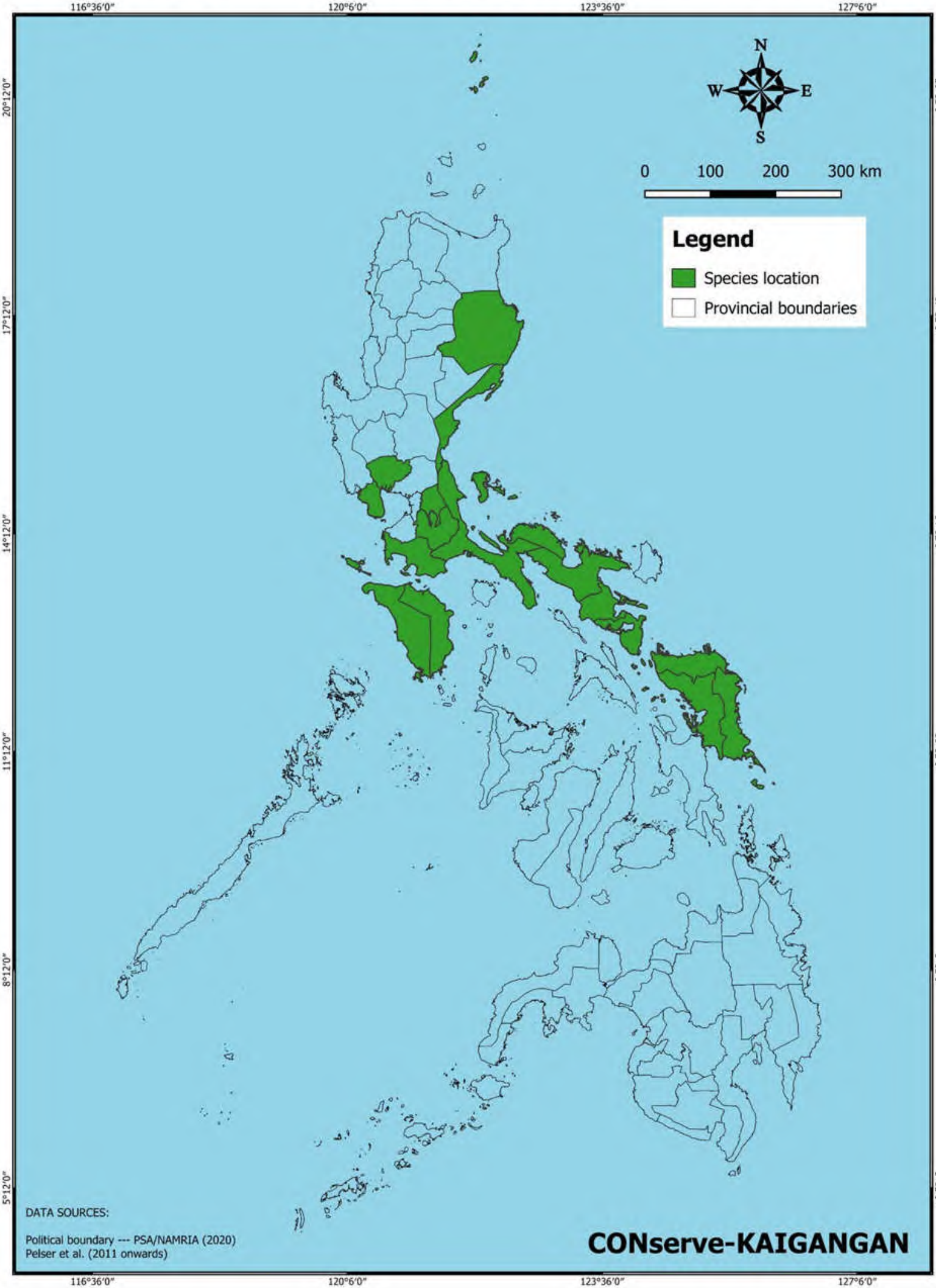
Legend

- ***Artocarpus rubrovenius***

Plot 5 (36 individuals)
Plot 6 (29 individuals)
Plot 7 (1 individual)
Plot 8 (1 individual)
Plot 9 (6 individuals)

CONserve-KAIGANGAN

Philippine distribution map of Artocarpus rubrovenius



08 ***Nothaphoebe leytensis*** **(Elmer) Merr. (Lauraceae)**
Bagobahi

Family: Lauraceae
Scientific Name: *Nothaphoebe leytensis* (Elmer) Merr.
Local Name: Bagobahi

Field spot character: Large tree with leathery green leaves having pointed tips. Bark is smooth and grayish-brown in color.

Samar plot occurrences: Plot 2

Occurrences in the Philippines: LUZON: Camarines, Laguna, Quezon, and Rizal, VISAYAS: Leyte, Panay, and Samar, MINDANAO: Agusan del Norte, Bukidnon, Dinagat, and Surigao (Pelser et al., 2011 onwards).

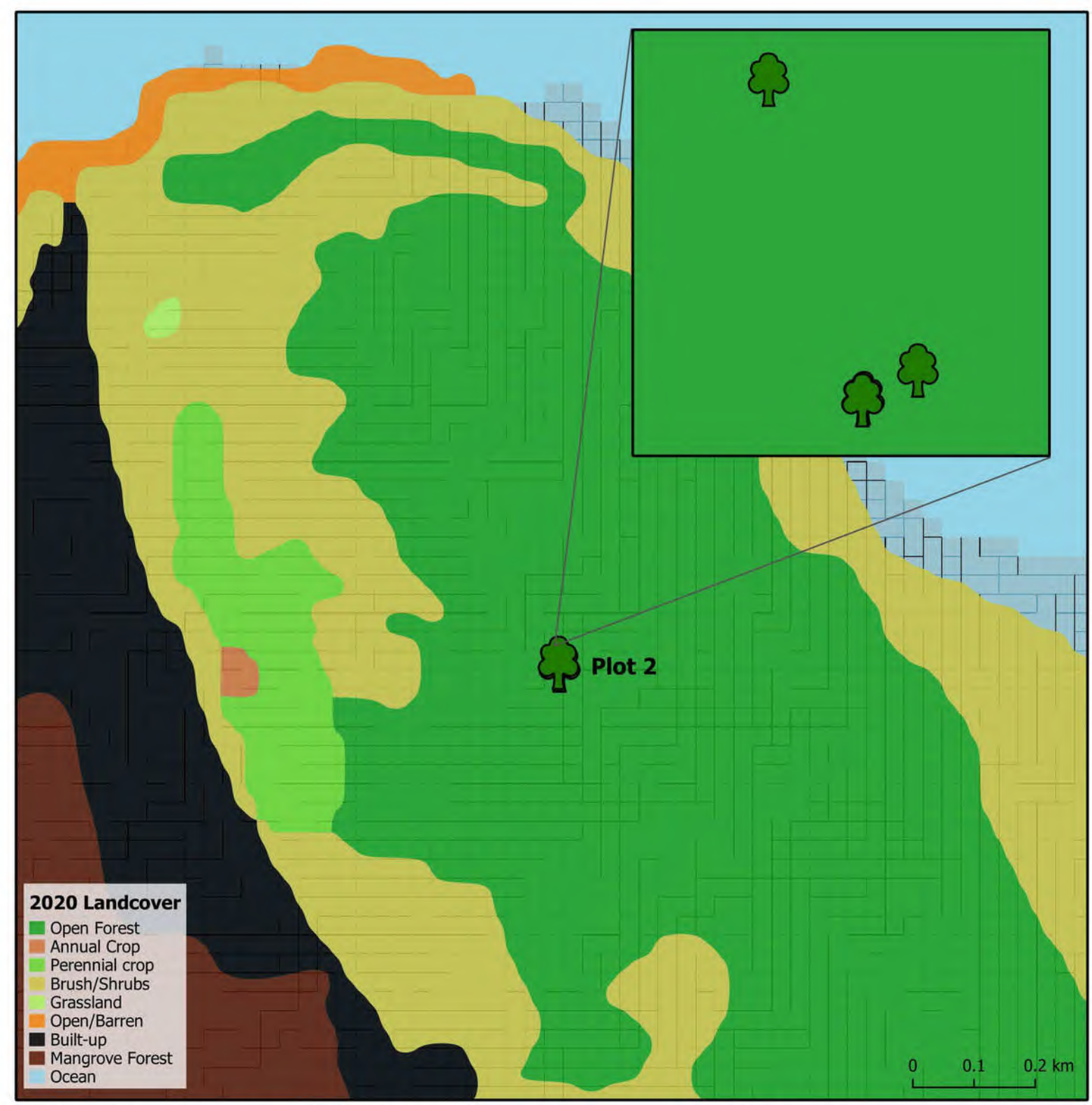
IUCN conservation status: Not assessed

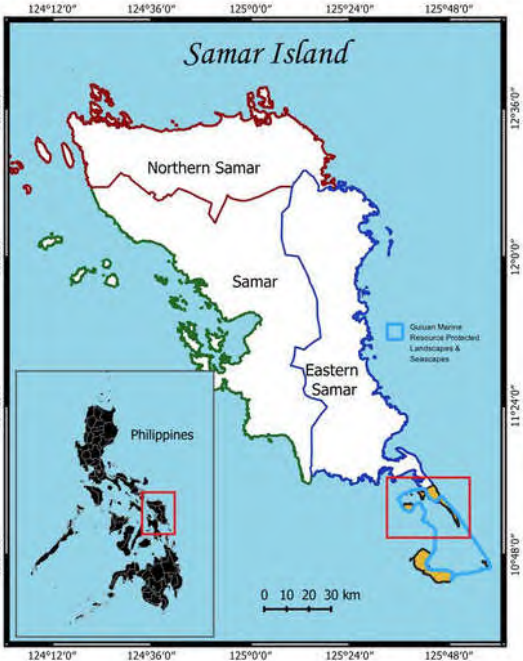
DAO conservation status: Not assessed

LCPI score: 17/25

Reason for the threat: All parts of the plants (root, stem, leaf, flower and fruit) are utilized for construction materials, and medicine (Buot et al., 2024b).

Priority level & Recommended Action: High: Requires strict regulation in harvesting





Data sources:

Political boundary : PSA/NAMRIA (2020)
GMRPLS boundary: UNEP-WCMC & IUCN (2020)
2020 Landcover : NAMRIA (2022)
DEM : USGS

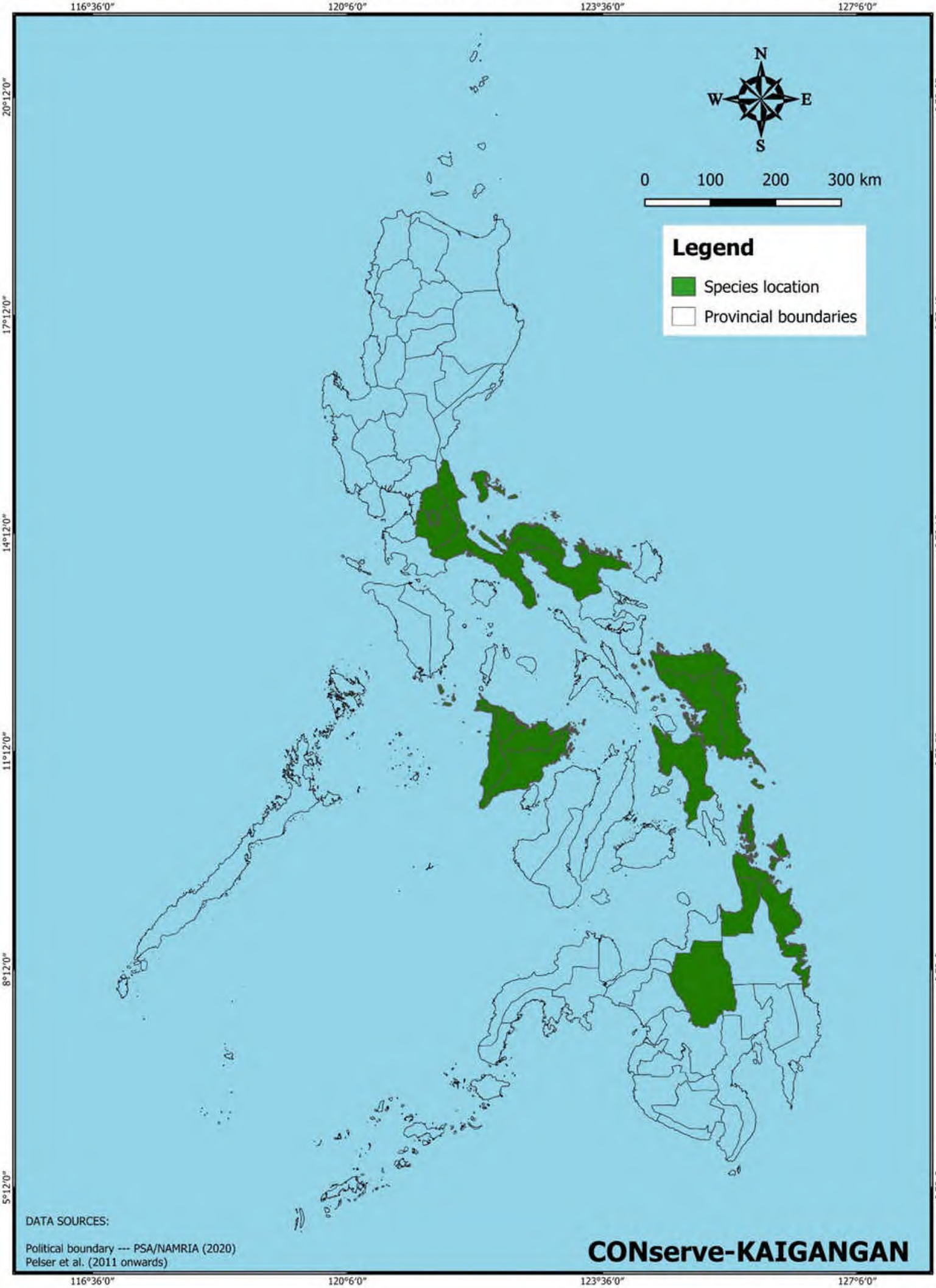
Samar distribution of Nothaphoebe leytensis

Legend

Nothaphoebe leytensis
Plot 2 (5 individuals)

CONserve-KAIGANGAN

Philippine distribution map of Nothaphoebe leytensis



09 ***Shorea astylosa* Foxw. (Dipterocarpaceae)**
Yakal

Family: Dipterocarpaceae
Scientific Name: *Shorea astylosa* Foxw.
Local Name: Yakal

Field spot character: Large tree, with leathery leaves, having pointed tips and smooth margins. Flowers small, pale yellow in clusters. Fruits are round woody capsules that contain winged seeds (Synopsis IAS, 2023). Bark is smooth and grayish-brown in color becoming rough and fissured when mature.

Samar plot occurrences: Plot 5

Occurrences in the Philippines: LUZON: Aurora, Camarines, Ilocos Norte, and Quezon, VISAYAS: Biliran, Negros, and Samar, MINDANAO: Agusan, Bukidnon, Davao, and Zamboanga (Pelser et al., 2011 onwards).

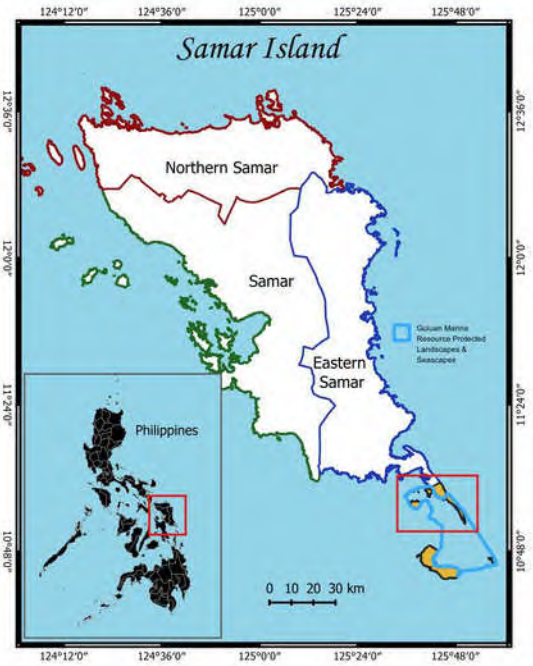
IUCN conservation status: Endangered

DAO conservation status: Critically Endangered

LCPI score: 17/25

Reason for the threat: Four (4) parts of the plants (stem, leaf, flower and fruit) are utilized for construction materials, furniture, medicine, and forage (Buot et al., 2024b).

Priority level & Recommended Action: High: Requires strict regulation in harvesting.



Data sources:

Political boundary : PSA/NAMRIA (2020)
GMRPLS boundary: UNEP-WCMC & IUCN (2020)
2020 Landcover : NAMRIA (2022)
DEM : USGS

Samar distribution of *Shorea astylosa*

N

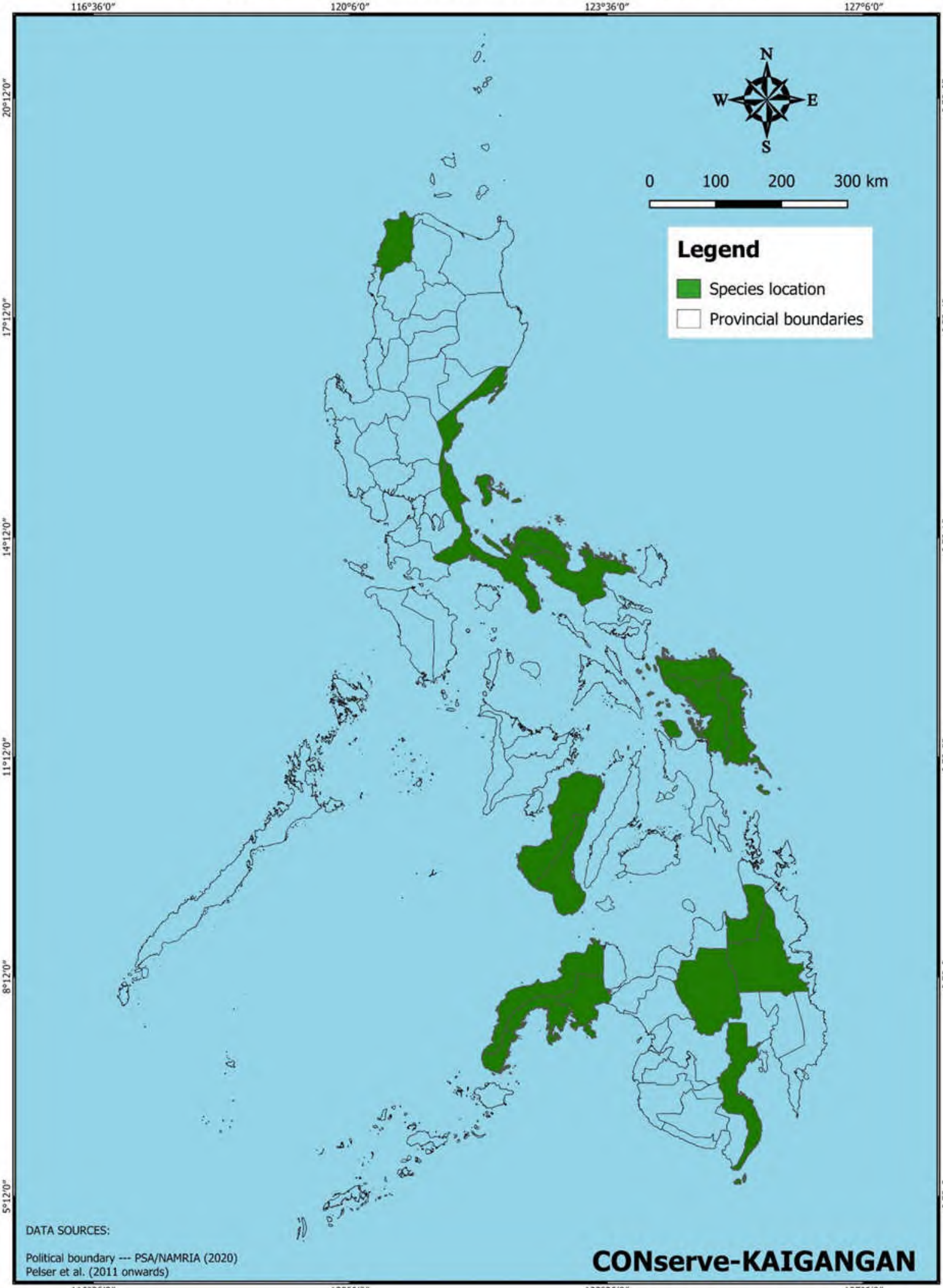
Legend

Shorea astylosa

Plot 5 (1 individual)

CONserve-KAIGANGAN

Philippine distribution map of Shorea astylosa



10 ***Palaquium sp.*** **(Sapotaceae)**

Bagotambis

Family: Sapotaceae
Scientific Name: *Palaquium sp.*
Local Name: Bagotambis

Field spot character: A large tree with rounded boles and somewhat rough stem and branches.

Samar plot occurrences: Plots 1 & 2

Occurrences in the Philippines: Not enough information aside from the current study in Samar.

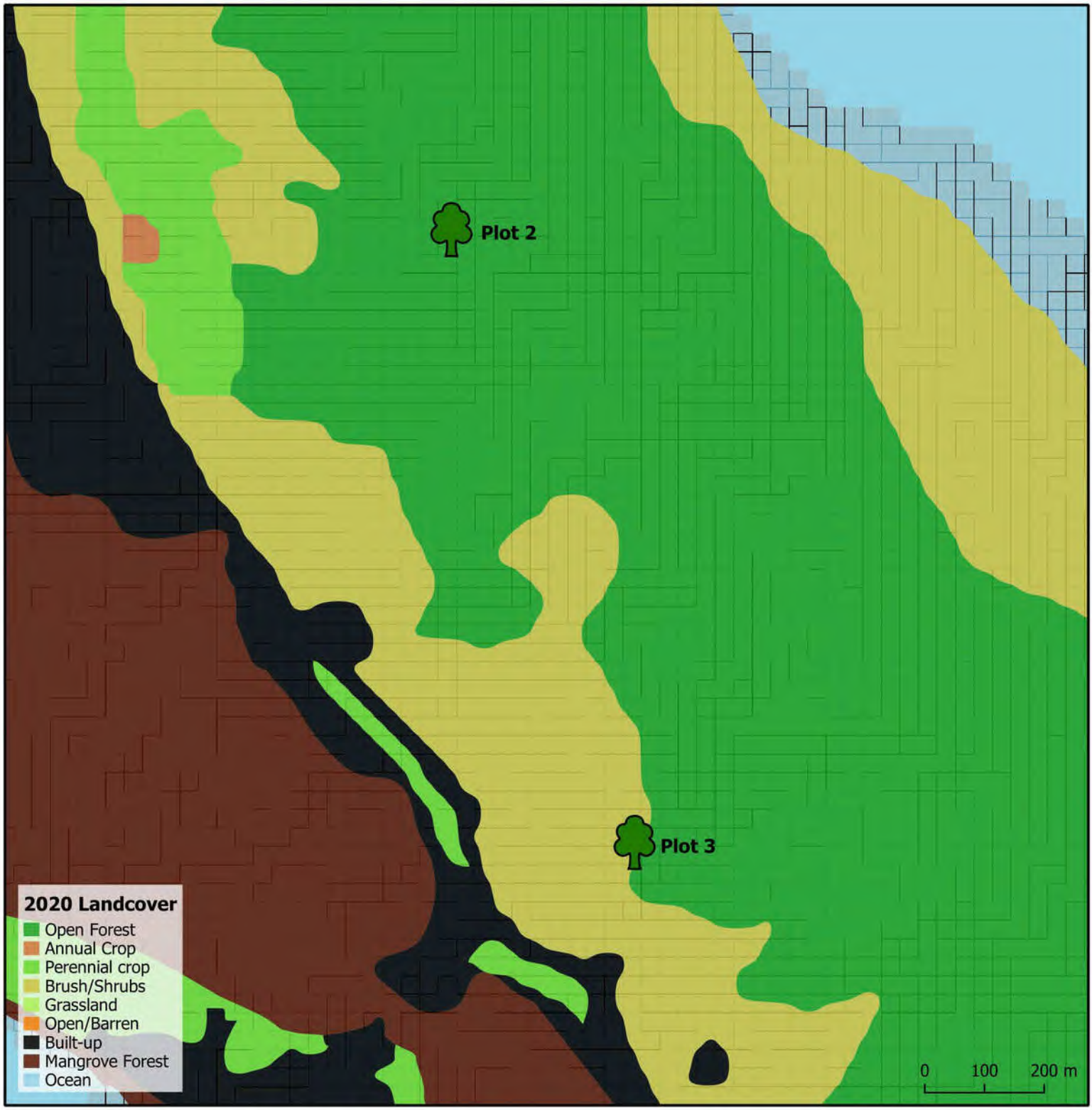
IUCN conservation status: Not assessed

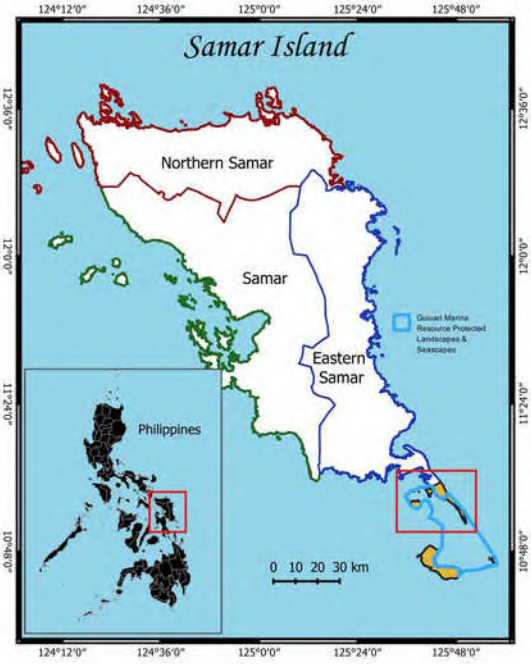
DAO conservation status: Not assessed

LCPI score: 17/25

Reason for the threat: All parts of the plants (root, stem, leaf, flower and fruit) are utilized and harvested for food, forage, ornamental and construction materials (Buot et al., 2024b).

Priority level & Recommended Action: High: Requires strict regulation in harvesting





Data sources:

Political boundary : PSA/NAMRIA (2020)
GMRPLS boundary: UNEP-WCMC & IUCN (2020)
2020 Landcover : NAMRIA (2022)
DEM : USGS

Samar distribution of Palaqium sp.

N

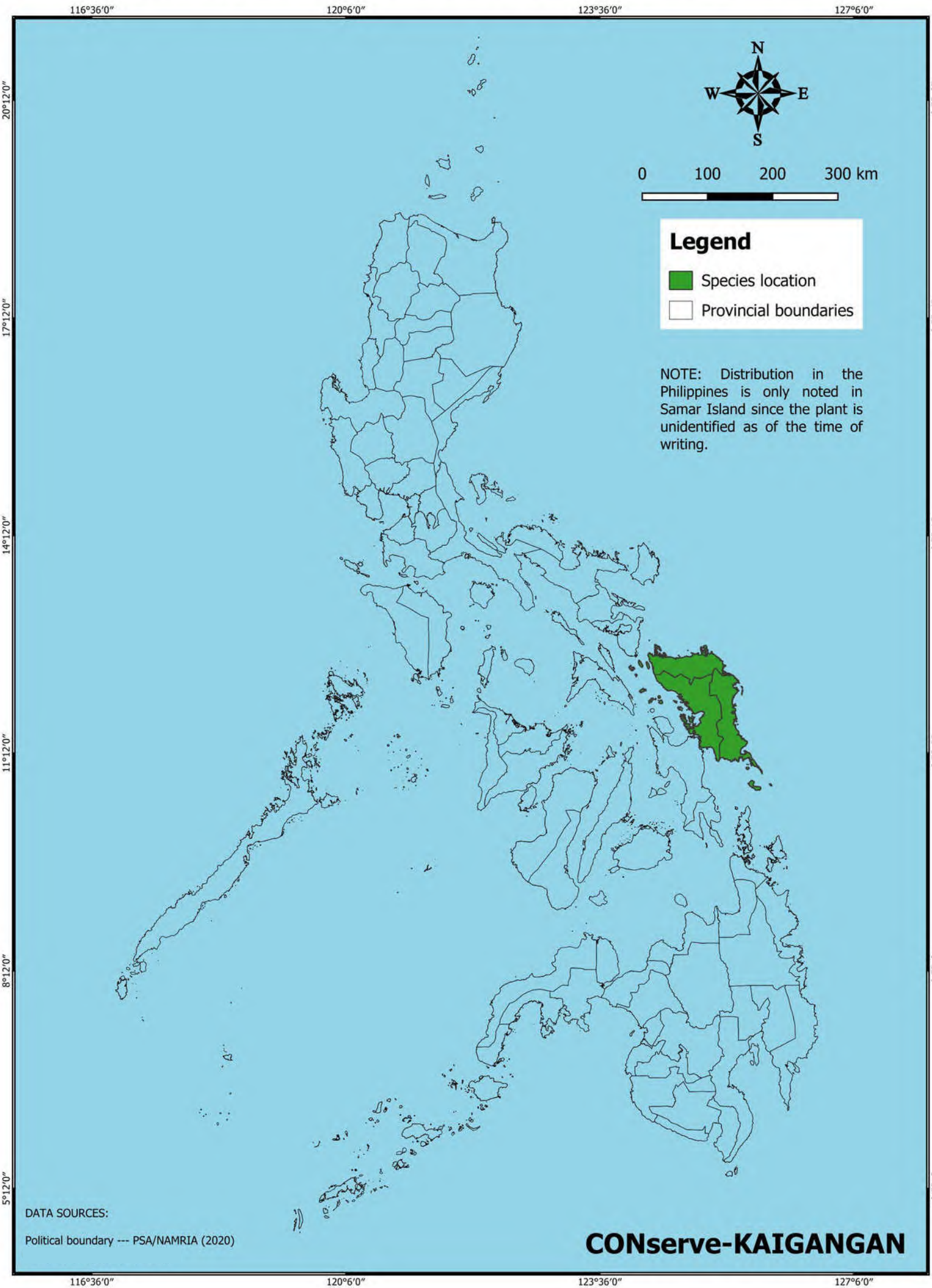
Legend

Palaqium sp.

Plot 2 (1 individual)
Plot 3 (1 individual)

CONserve-KAIGANGAN

Philippine distribution map of Palaquium species



11 ***Heterospathe intermedia* (Becc.) Fernando (Arecaceae)**

Banga

Family: Arecaceae
Scientific Name: *Heterospathe intermedia* (Becc.) Fernando
Local Name: Banga

Field spot character: A single-stemmed mid-sized palm, with a slender, smooth and gray trunk (Palmpedia, 2022). Leaves are pinnate and long just like coconut. Fruits are small, rounded drupes that turn from green to black when ripe.

Samar plot occurrences: Plots 1, 5 & 9

Occurrences in the Philippines: LUZON: Sorsogon, VISAYAS: Biliran, Leyte, and Samar, MINDANAO: Agusan del Norte, Davao Oriental, and Surigao del Norte (Pelser et al., 2011 onwards).

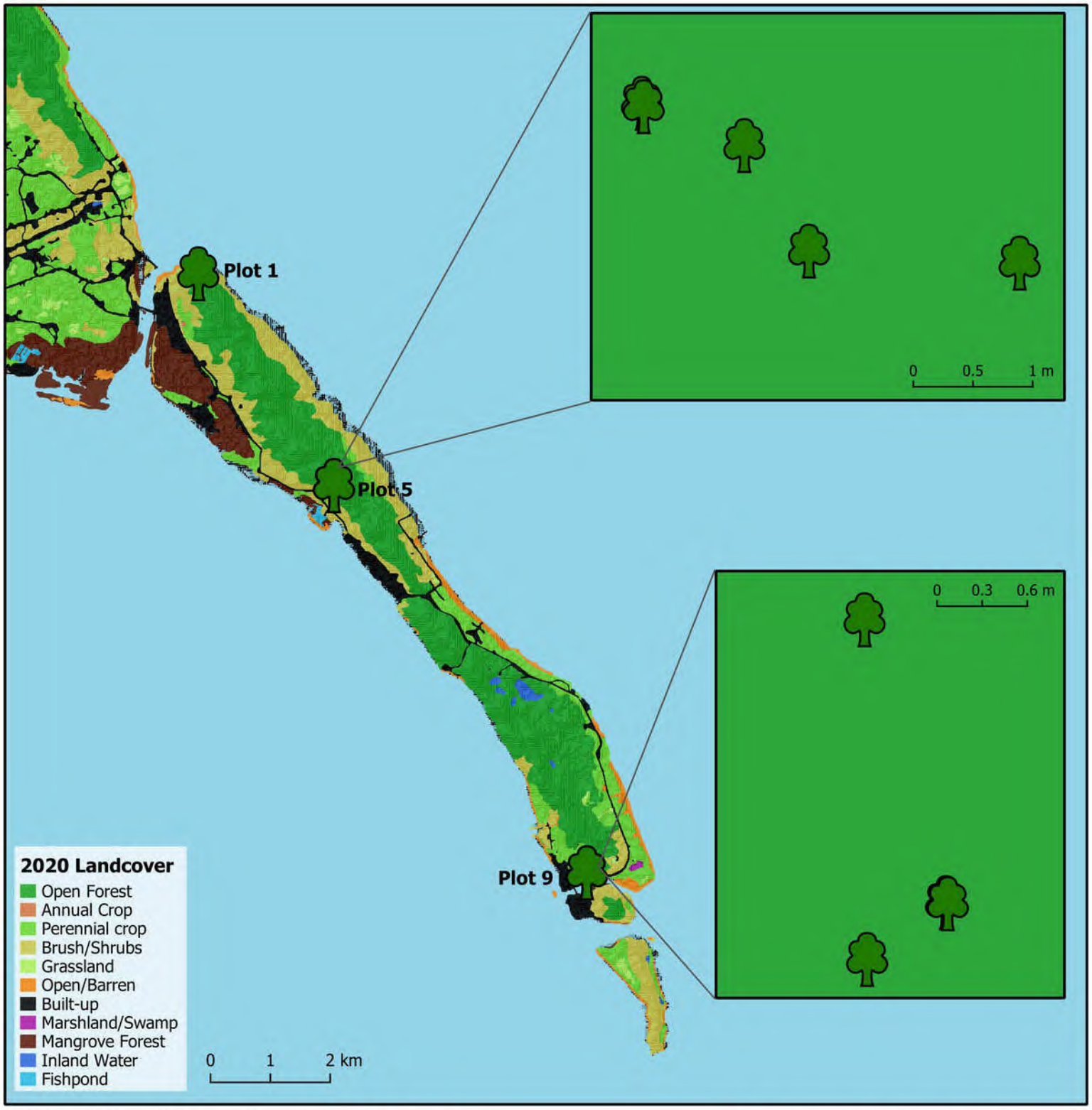
IUCN conservation status: Not assessed

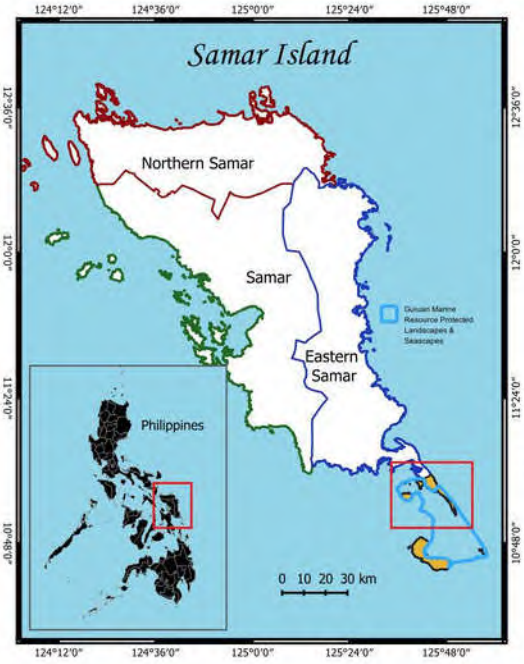
DAO conservation status: Not assessed

LCPI score: 16/25

Reason for the threat: All parts of the plants (root, stem, leaf, flower and fruit) are utilized and harvested for landscaping, ornamental, construction materials, and forage (Buot et al., 2024b).

Priority level & Recommended Action: Medium: Can be harvested with specific quotas





Data sources:

Political boundary : PSA/NAMRIA (2020)
GMRPLS boundary: UNEP-WCMC & IUCN (2020)
2020 Landcover : NAMRIA (2022)
DEM : USGS

Samar distribution of Heterospathe intermedia

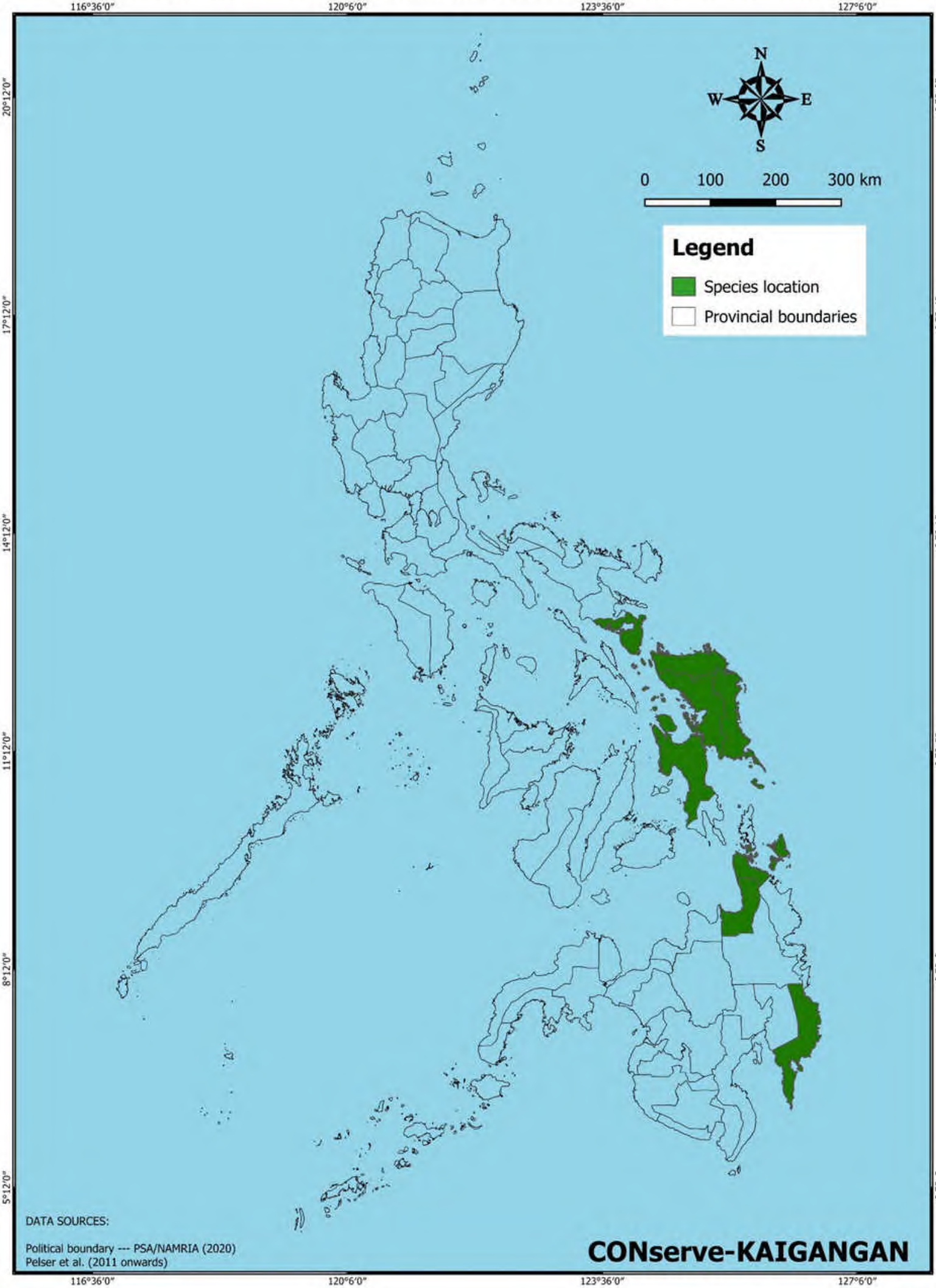
Legend

Heterospathe intermedia

Plot 1 (1 individual)
Plot 5 (5 individuals)
Plot 9 (4 individuals)

CONserve-KAIGANGAN

Philippine distribution map of Heterospathe intermedia



12 ***Hancea wenzeliana*** **(Slik) S.E.C.Sierra, Kulju & Welzen (Euphorbiaceae)**

Apanang

Family: Euphorbiaceae
Scientific Name: *Hancea wenzeliana* (Slik) S.E.C.Sierra, Kulju & Welzen
Local Name: Apanang

Field spot character: A small tree growing up to 10 meters tall, with most parts having short hairs. Stipules of up to 20 mm long are present.

Samar plot occurrences: Plots 1-6, 8, & 9

Occurrences in the Philippines: VISAYAS: Samar (Fernandez et al., 2020; Villanueva et al. 2021), MINDANAO: Surigao and Surigao del Norte (Pelser et al., 2011 onwards).

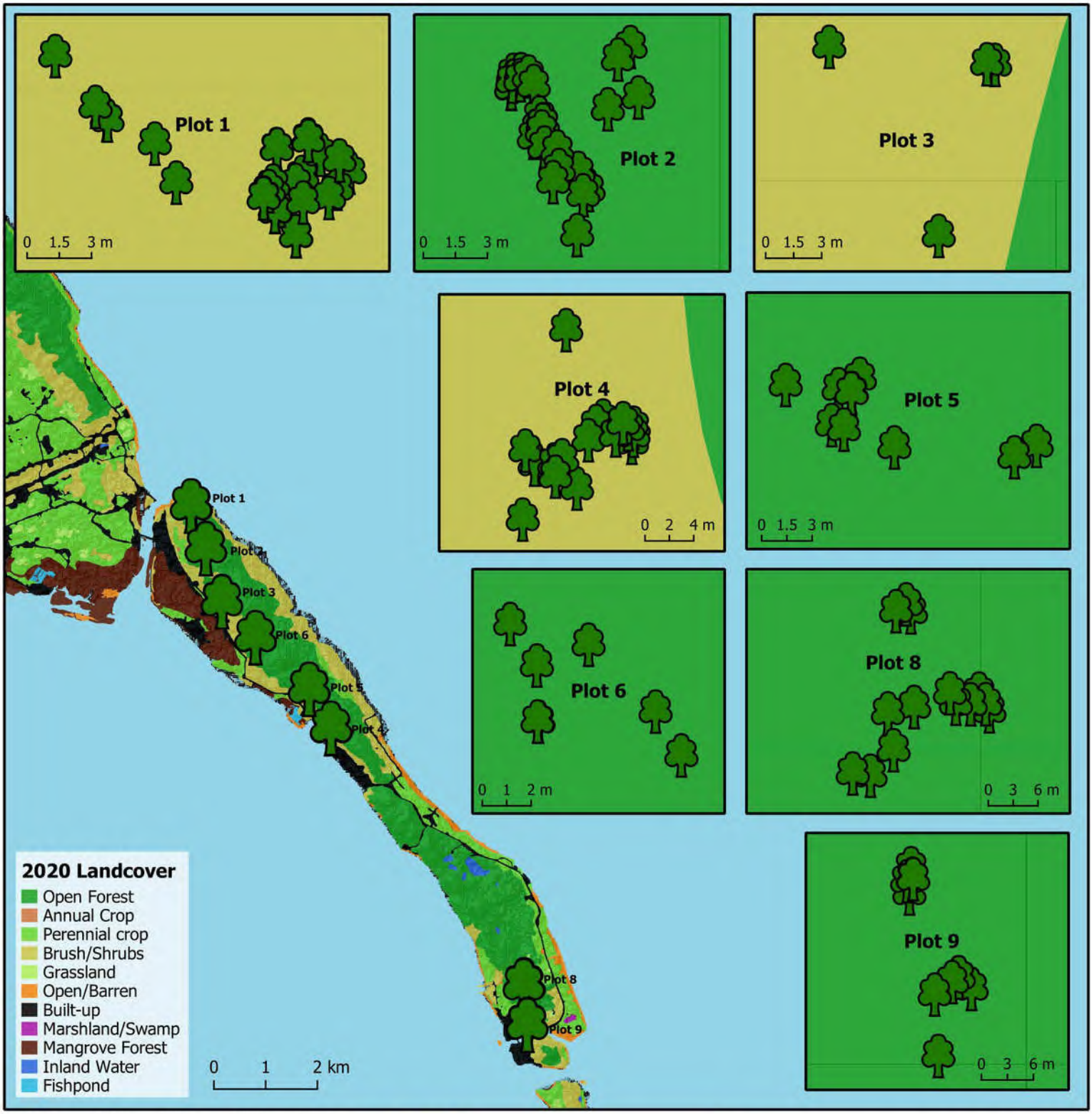
I**UCN conservation status:** Critically endangered

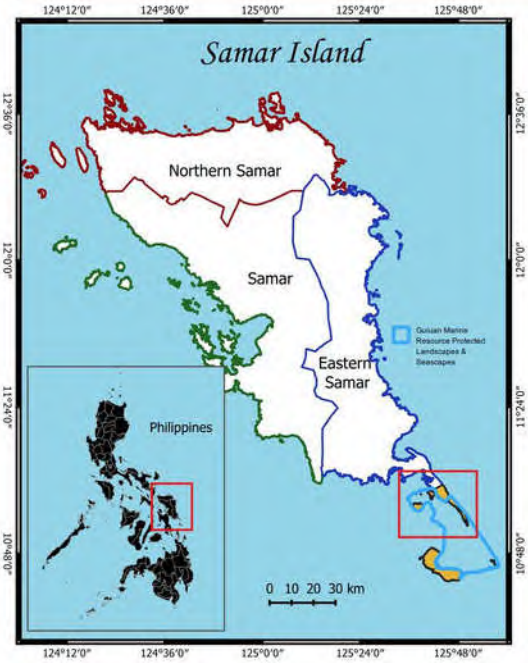
DAO conservation status: Not assessed

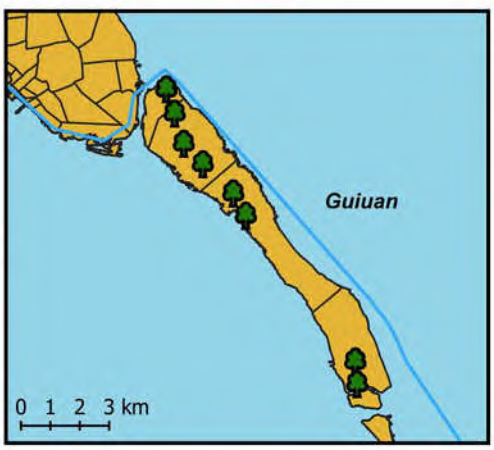
LCPI score: 16/25

Reason for the threat: Four (4) parts of the plants (stem, leaf, flower and fruit) are utilized and harvested for forage, construction materials and firewood (Buot et al., 2024a).

Priority level & Recommended Action: Medium: Can be harvested with specific quotas







Data sources:

Political boundary : PSA/NAMRIA (2020)
GMRPLS boundary: UNEP-WCMC & IUCN (2020)
2020 Landcover : NAMRIA (2022)
DEM : USGS

Samar distribution of Hancea wenzeliana

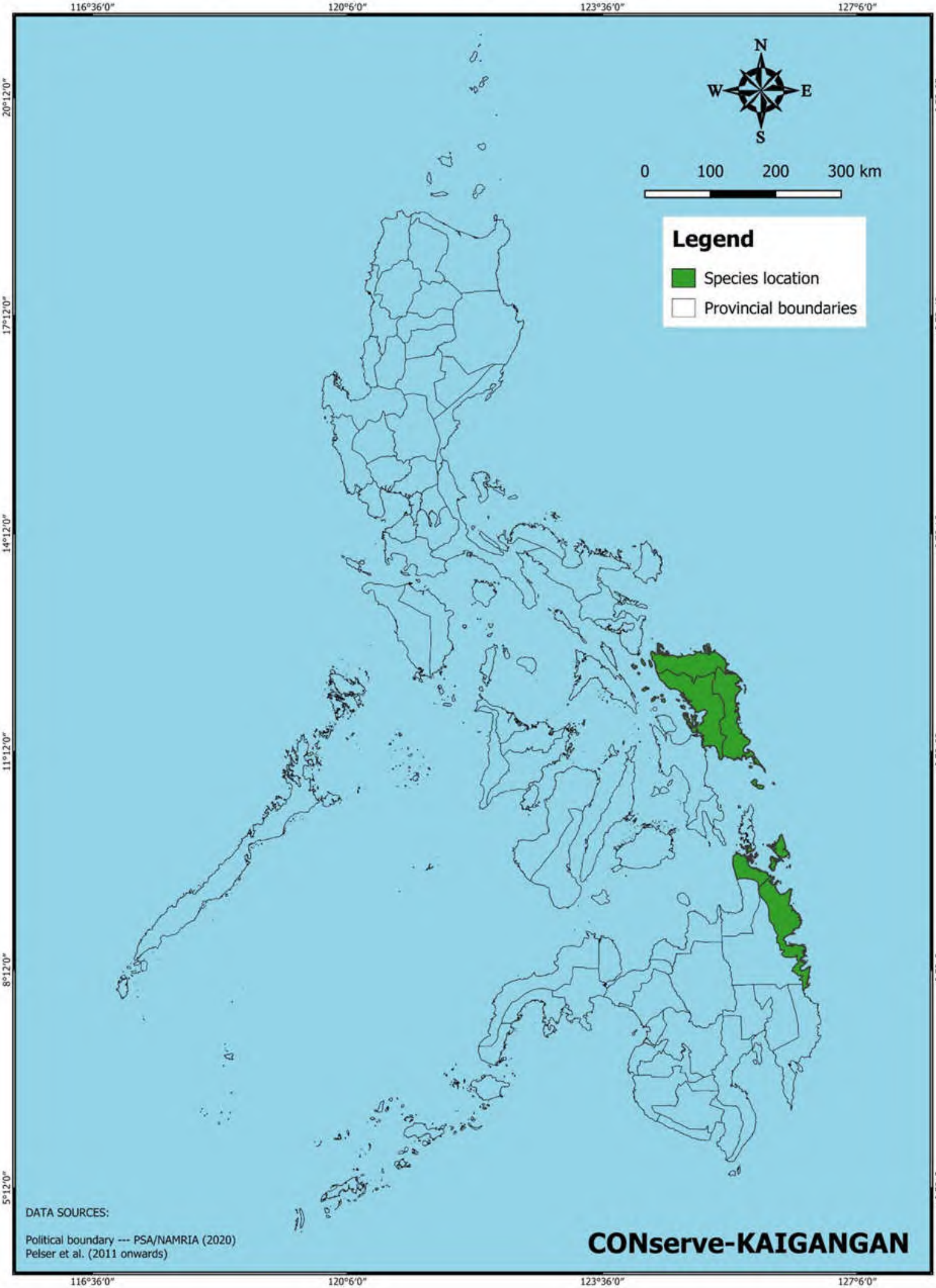
N

Legend

- ***Hancea wenzeliana***
  - Plot 1 (28 individuals)
  - Plot 2 (30 individuals)
  - Plot 3 (4 individuals)
  - Plot 4 (19 individuals)
  - Plot 5 (10 individuals)
  - Plot 6 (7 individuals)
  - Plot 8 (15 individuals)
  - Plot 9 (12 individuals)

CONserve-KAIGANGAN

Philippine distribution map of Hancea wenzeliana



13 ***Aquilaria cumingiana* (Decne.) Ridl. (Thymelaeaceae)**

Agar, Lapnisan

Family: Thymelaeaceae
Scientific Name: *Aquilaria cumingiana* (Decne.) Ridl.
Local Name: Agar, Lapnisan

Field spot character: Bark is ashy gray, mottled and smooth. Leaves alternate, smooth, and elliptically oblong. Fruit is green turning orange-red in color when mature, containing a single seed (Stuart, 2023b). Resinous.

Samar plot occurrences: Plots 1, 2, 4, 6, 7 & 9

Occurrences in the Philippines: LUZON: Alabat, Albay, Aurora, Bulacan, Camarines Norte, Camarines Sur, Catanduanes, Laguna, Nueva Ecija, Quezon, Polillo, and Sorsogon, VISAYAS: Panay, Samar, and Tablas, MINDANAO: Agusan Del Norte, Agusan Del Sur, Bukidnon, Davao Del Sur, Lanao Del Sur, Maguindanao Del Norte, South Cotabato, Tawi-Tawi, Zamboanga Del Norte, and Zamboanga Del Sur (Pelser et al., 2011 onwards).

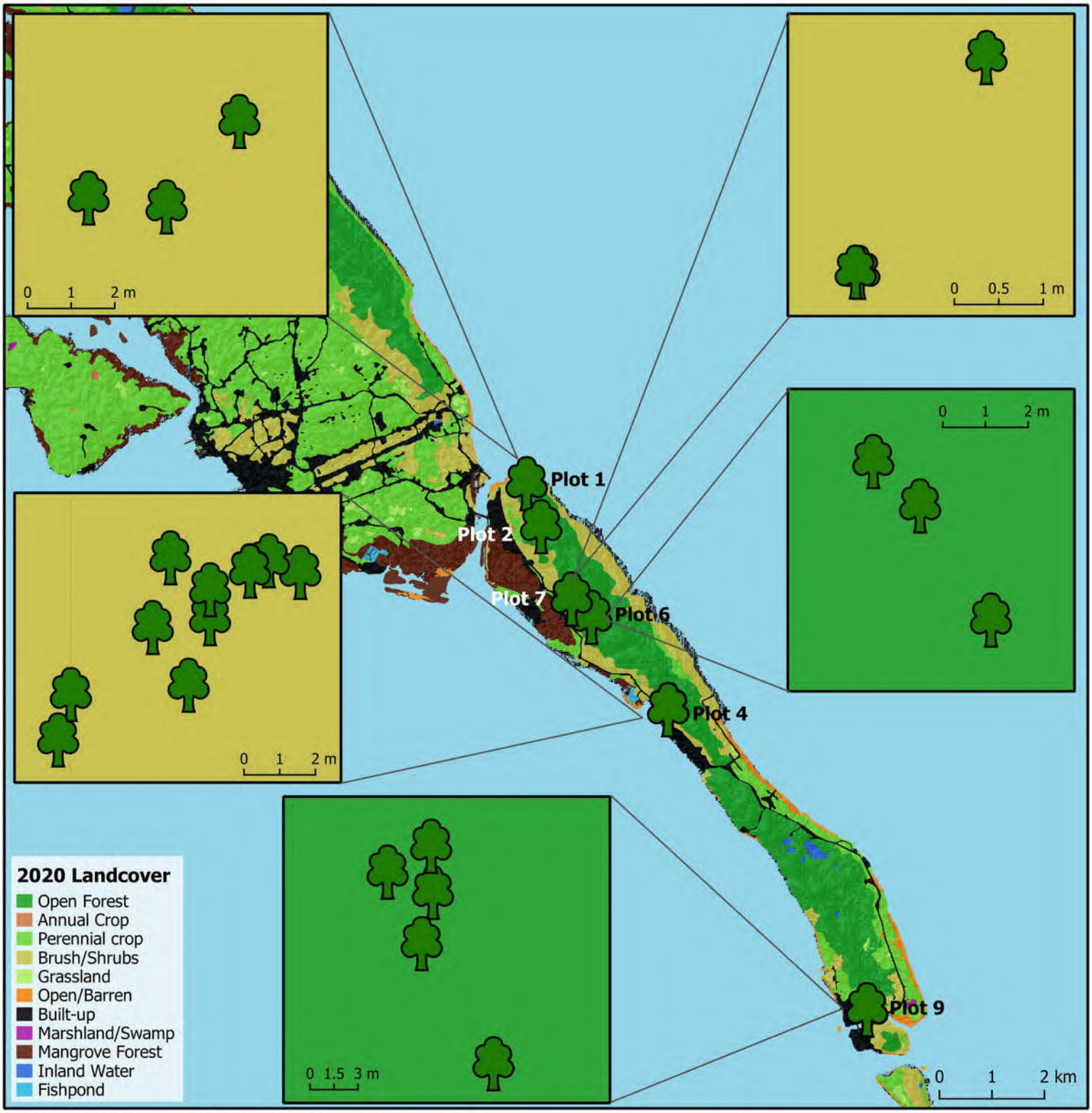
IUCN conservation status: Vulnerable

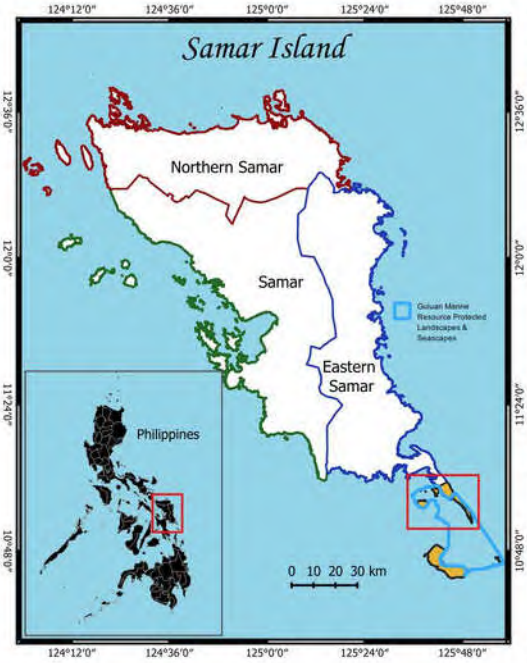
DAO conservation status: Vulnerable

LCPI score: 16/25

Reason for the threat: All parts of the plants (root, stem, leaf, flower and fruit) are utilized and harvested for timber, ornamental, medicine and industrial products (Buot et al., 2024b). Commercially traded for resin.

Priority level & Recommended Action: Medium: Can be harvested with specific quotas.





Data sources:

Political boundary : PSA/NAMRIA (2020)
GMRPLS boundary: UNEP-WCMC & IUCN (2020)
2020 Landcover : NAMRIA (2022)
DEM : USGS

Samar distribution of Aquilaria cumingiana

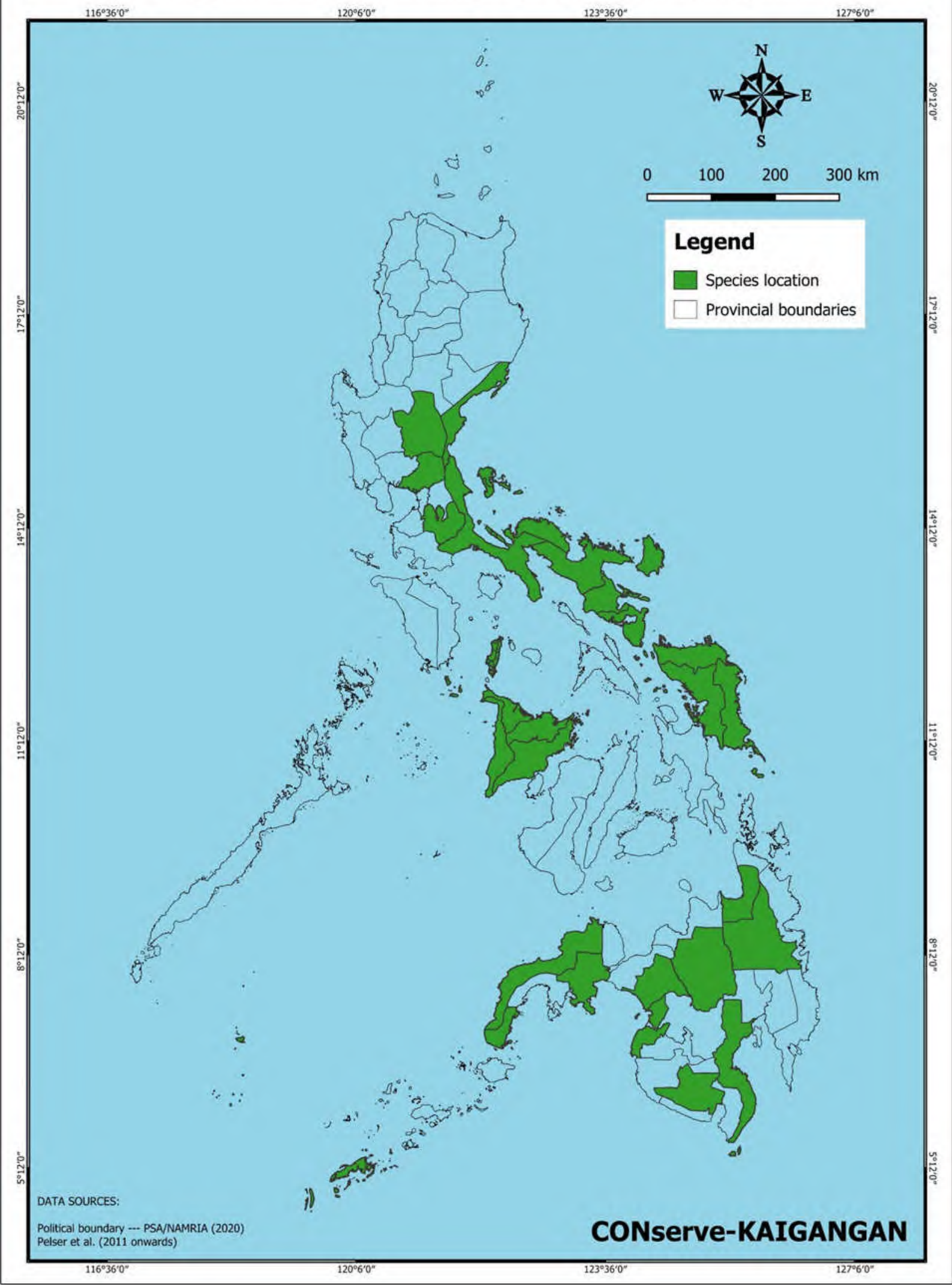
Legend

Aquilaria cumingiana

Plot 1 (3 individuals)
Plot 2 (1 individual)
Plot 4 (11 individuals)
Plot 6 (3 individuals)
Plot 7 (3 individuals)
Plot 9 (5 individuals)

CONserve-KAIGANGAN

Philippine distribution map of Aquilaria cumingiana



14 ***Wallaceodendron celebicum* Koord. (Fabaceae)**

Banuyo

Family: Fabaceae
Scientific Name: *Wallaceodendron celebicum* Koord.
Local Name: Banuyo

Field spot character: A medium-sized tree, with smooth leaflets arranged in an alternate pattern. The upper surface of the leaves is glossy dark green and a lighter green color at the lower surface. Bark is gray-brown, cracked and flaking when mature (IPlantz, 2024).

Samar plot occurrences: Plots 1 & 9

Occurrences in the Philippines: LUZON: Aurora, Benguet, Cagayan, Calayan, Camarines, Camarines Sur, Camiguin De Babuyanes, Isabela, Laguna, Mindoro, NCR, and Quezon, VISAYAS: Burias, Cebu, Masbate, Negros, Samar, and Ticao (Pelser et al., 2011 onwards).

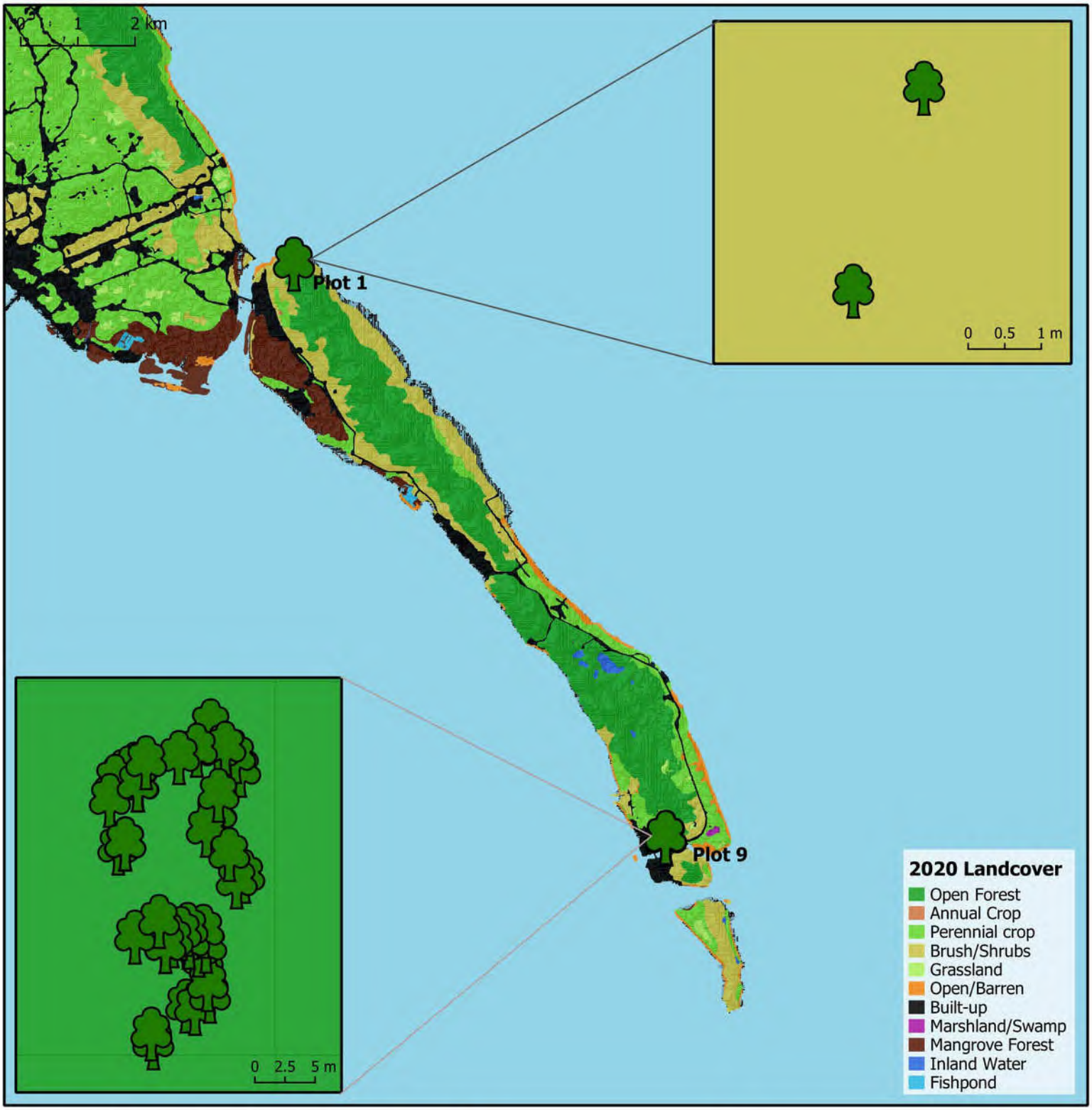
IUCN conservation status: Not assessed

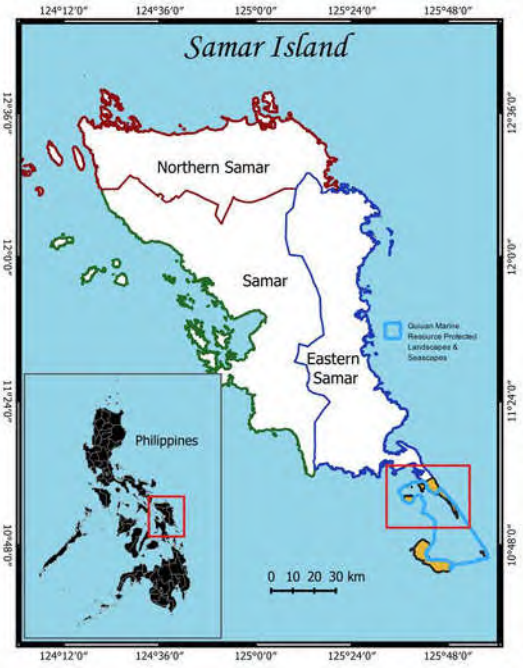
DAO conservation status: Vulnerable

LCPI score: 15/25

Reason for the threat: All parts of the plants (root, stem, leaf, flower and fruit) are utilized and harvested for landscaping, cabinet and furniture making (Buot et al., 2024b).

Priority level & Recommended Action: Medium: Can be harvested with specific quotas





Data sources:

Political boundary : PSA/NAMRIA (2020)
GMRPLS boundary: UNEP-WCMC & IUCN (2020)
2020 Landcover : NAMRIA (2022)
DEM : USGS

Samar distribution of Wallaceodendron celebicum

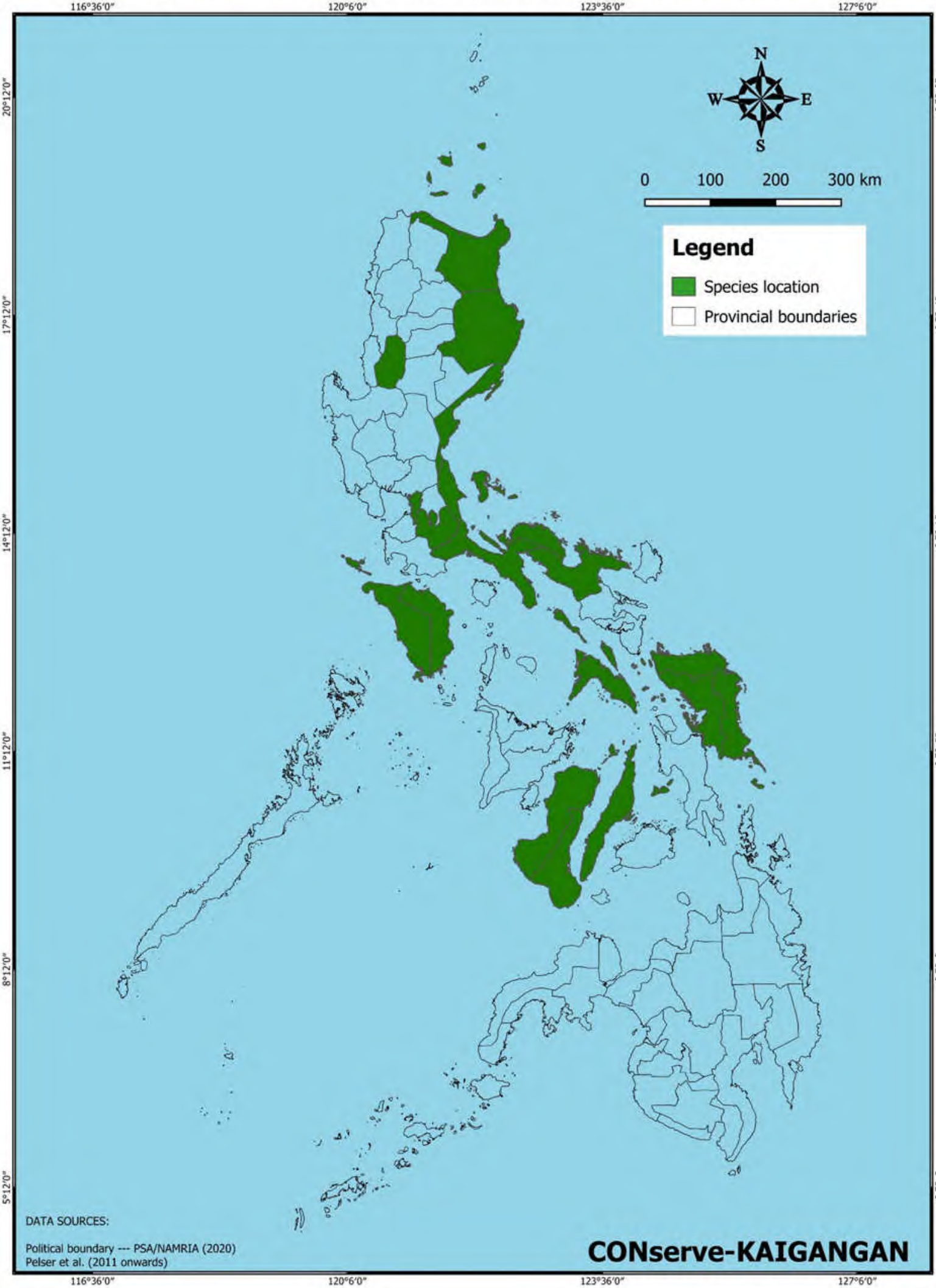
Legend

Wallaceodendron celebicum

Plot 1 (2 individuals)
Plot 9 (47 individuals)

CONserve-KAIGANGAN

Philippine distribution map of Wallaceodendron celebicum



15 ***Palaquium luzoniense* (Fern.-Vill.) Vidal (Sapotaceae)**

Nato

Family: Sapotaceae
Scientific Name: *Palaquium luzoniense* (Fern.-Vill.) Vidal
Local Name: Nato

Field spot character: A tree with straight and cylindrical bole having a buttress (Brown, 1920). Leaves are dark green and glossy.

Samar plot occurrences: Plots 2 & 8

Occurrences in the Philippines: LUZON: Aurora, Bataan, Catanduanes, Ilocos Sur, Isabela, Mindoro, Palawan, Quezon, Rizal, Zambales, VISAYAS: Guimaras, Masbate, Panay, Samar, and Sibuyan, MINDANAO: Agusan, Agusan del Norte, Lanao, Lanao del Sur, Surigao, Surigao del Norte, Zamboanga, and Zamboanga del Sur (Pelser et al., 2011 onwards).

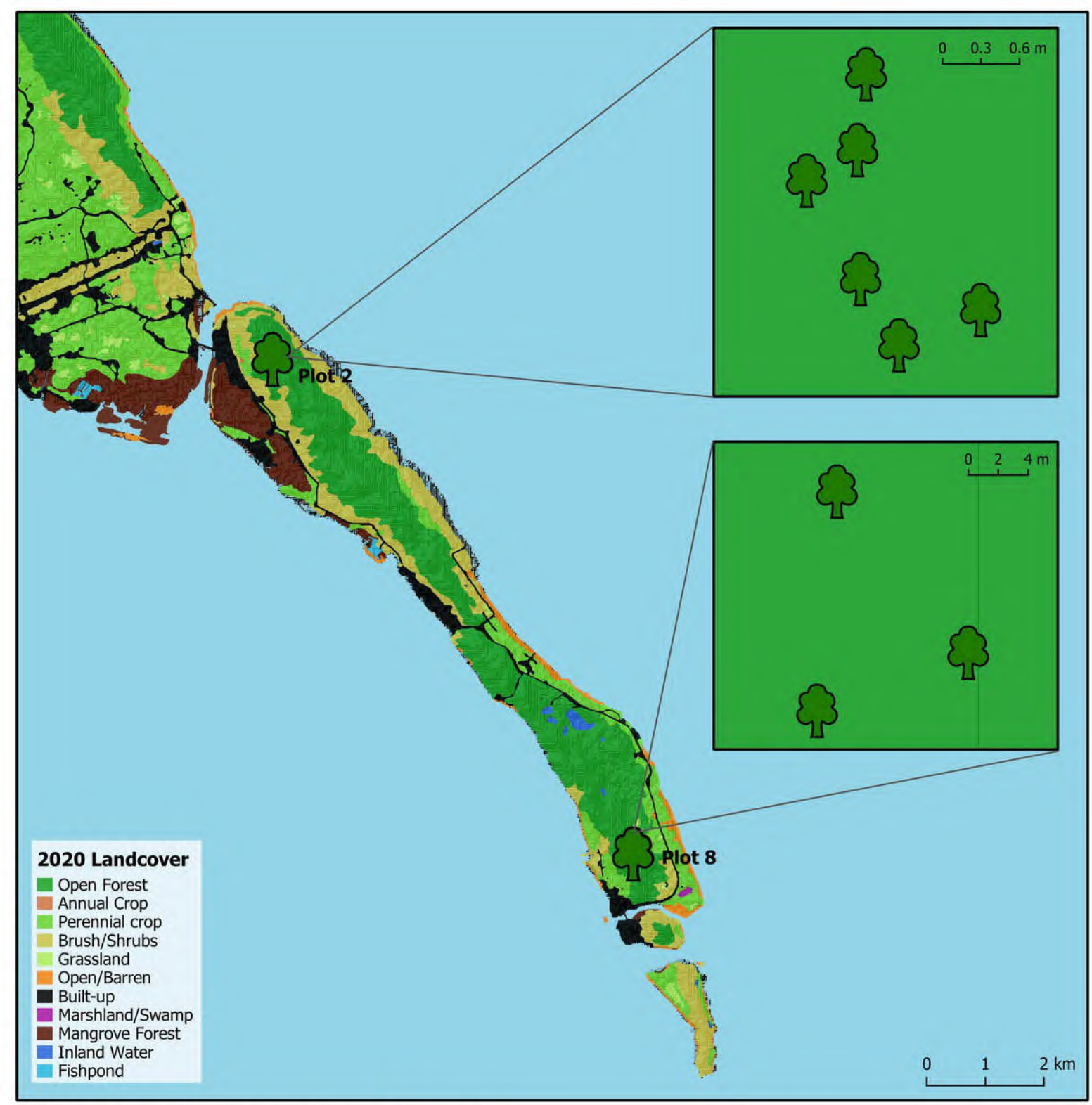
IUCN conservation status: Vulnerable

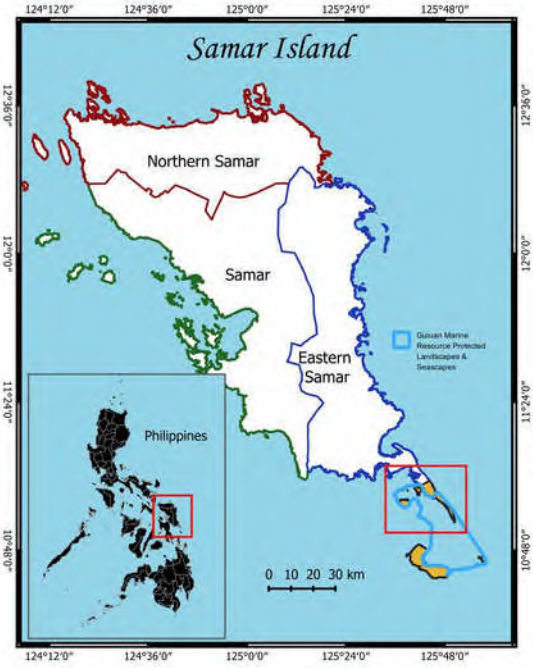
DAO conservation status: Vulnerable

LCPI score: 15/25

Reason for the threat: All parts of the plants (root, stem, leaf, flower and fruit) are utilized and harvested. It is used for construction works, furniture and cabinet making, as veneer and plywood, and other industrial materials (Buot et al., 2024b).

Priority level & Recommended Action: Medium: Can be harvested with specific quotas.





Data sources:

Political boundary : PSA/NAMRIA (2020)
GMRPLS boundary: UNEP-WCMC & IUCN (2020)
2020 Landcover : NAMRIA (2022)
DEM : USGS

Samar distribution of Palaquium luzoniense

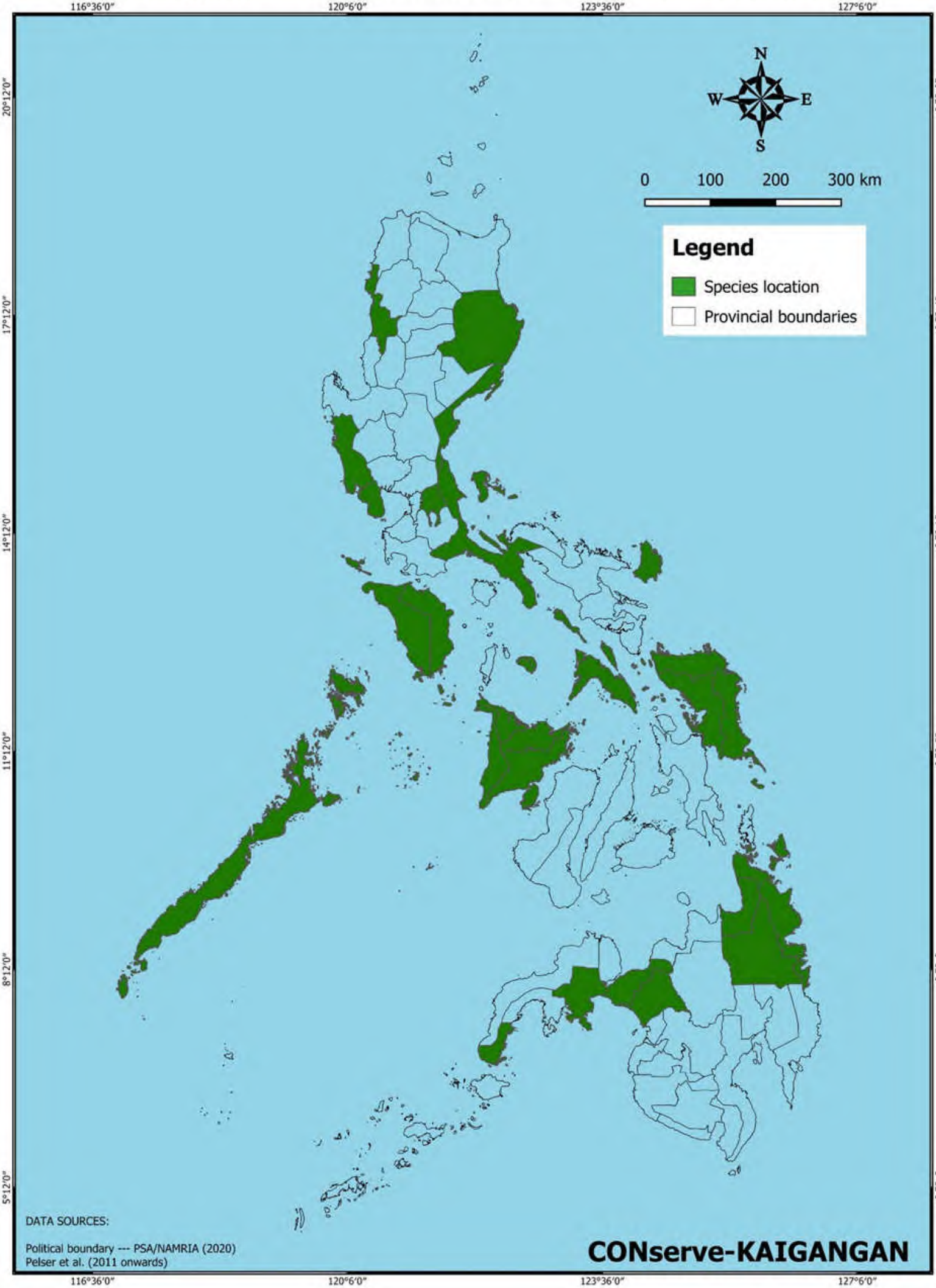
Legend

Palaquium luzoniense

Plot 2 (6 individuals)
Plot 8 (3 individuals)

CONserve-KAIGANGAN

Philippine distribution map of Palaquium luzoniense



16 ***Mastixia sp.*** **(Cornaceae)**

Tul-anan

Family: Cornaceae
Scientific Name: *Mastixia sp.*
Local Name: Tul-anan

Field spot character: A medium-sized tree with large elliptical leaves. Seed coat turning brown when mature and freely opens allowing the seeds to fall off.

Samar plot occurrences: Plots 2

Occurrences in the Philippines: Not enough information aside from the current study in Samar (Fernandez et al., 2020).

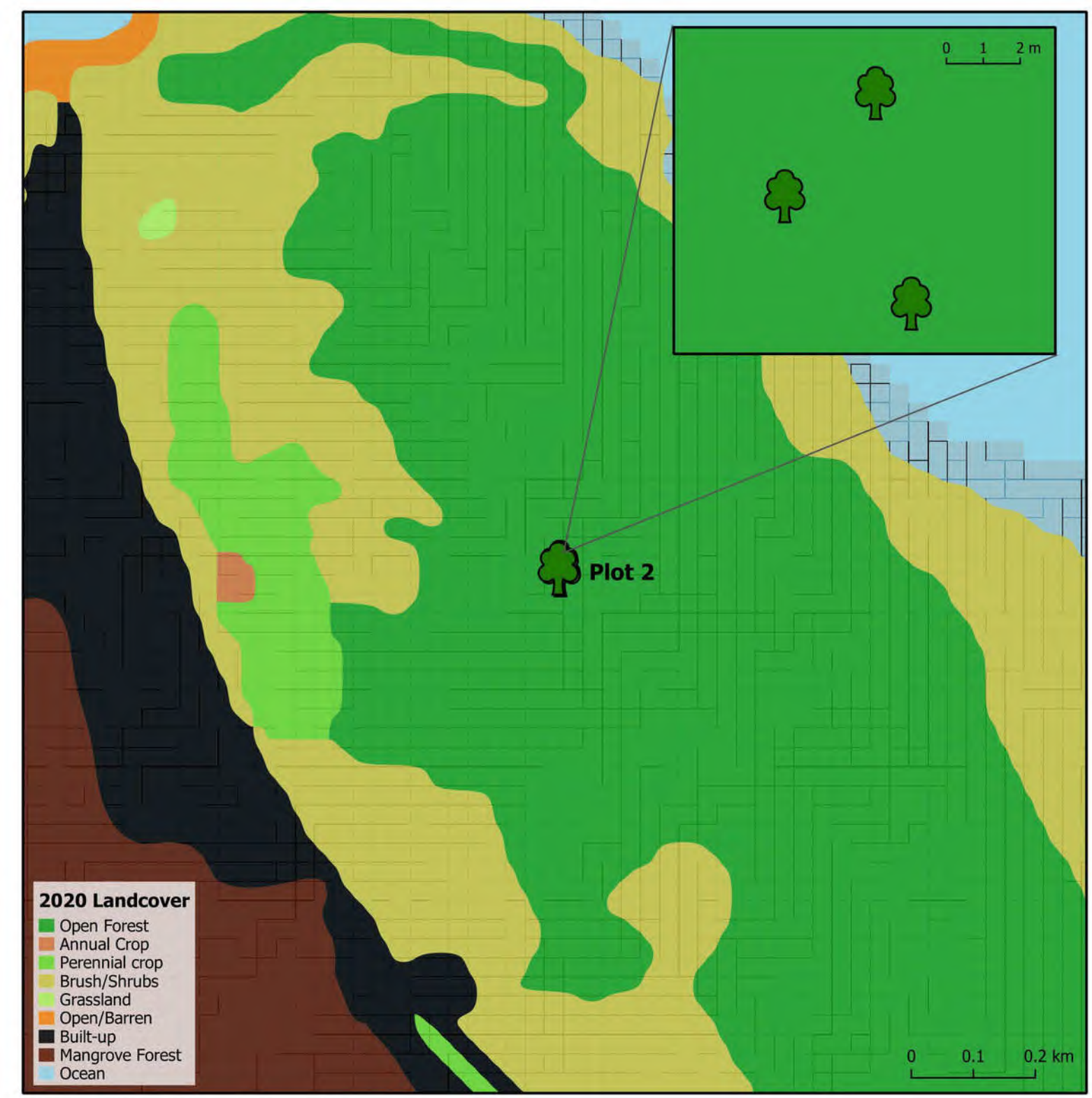
IUCN conservation status: Not assessed

DAO conservation status: Not assessed

LCPI score: 15/25

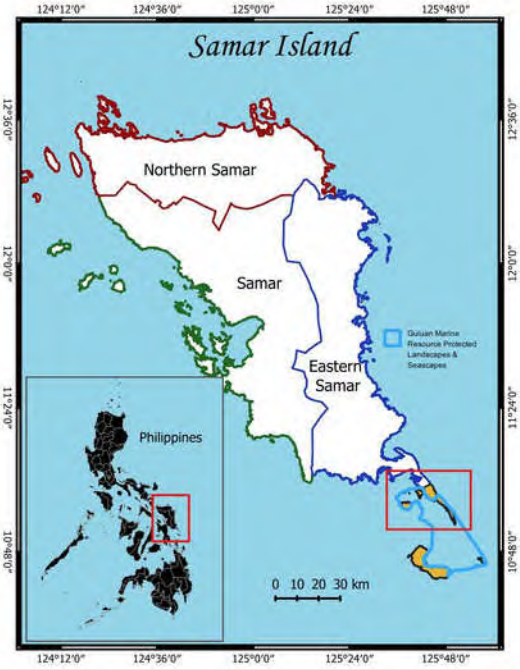
Reason for the threat: Four (4) parts of the plants (stem, leaf, flower and fruit) are utilized and harvested for furniture and house construction materials (Buot et al., 2024b).

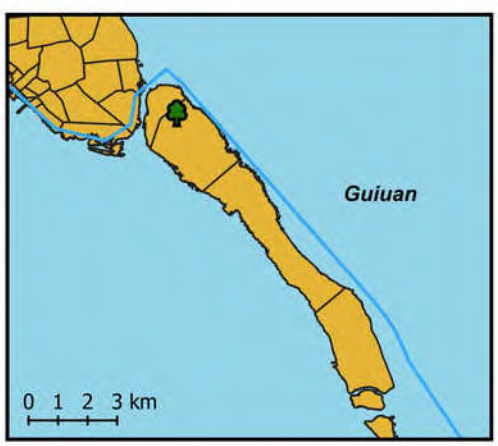
Priority level & Recommended Action: Medium: Can be harvested with specific quotas.



2020 Landcover

- Open Forest
- Annual Crop
- Perennial crop
- Brush/Shrubs
- Grassland
- Open/Barren
- Built-up
- Mangrove Forest
- Ocean





Data sources:

Political boundary : PSA/NAMRIA (2020)
GMRPLS boundary: UNEP-WCMC & IUCN (2020)
2020 Landcover : NAMRIA (2022)
DEM : USGS

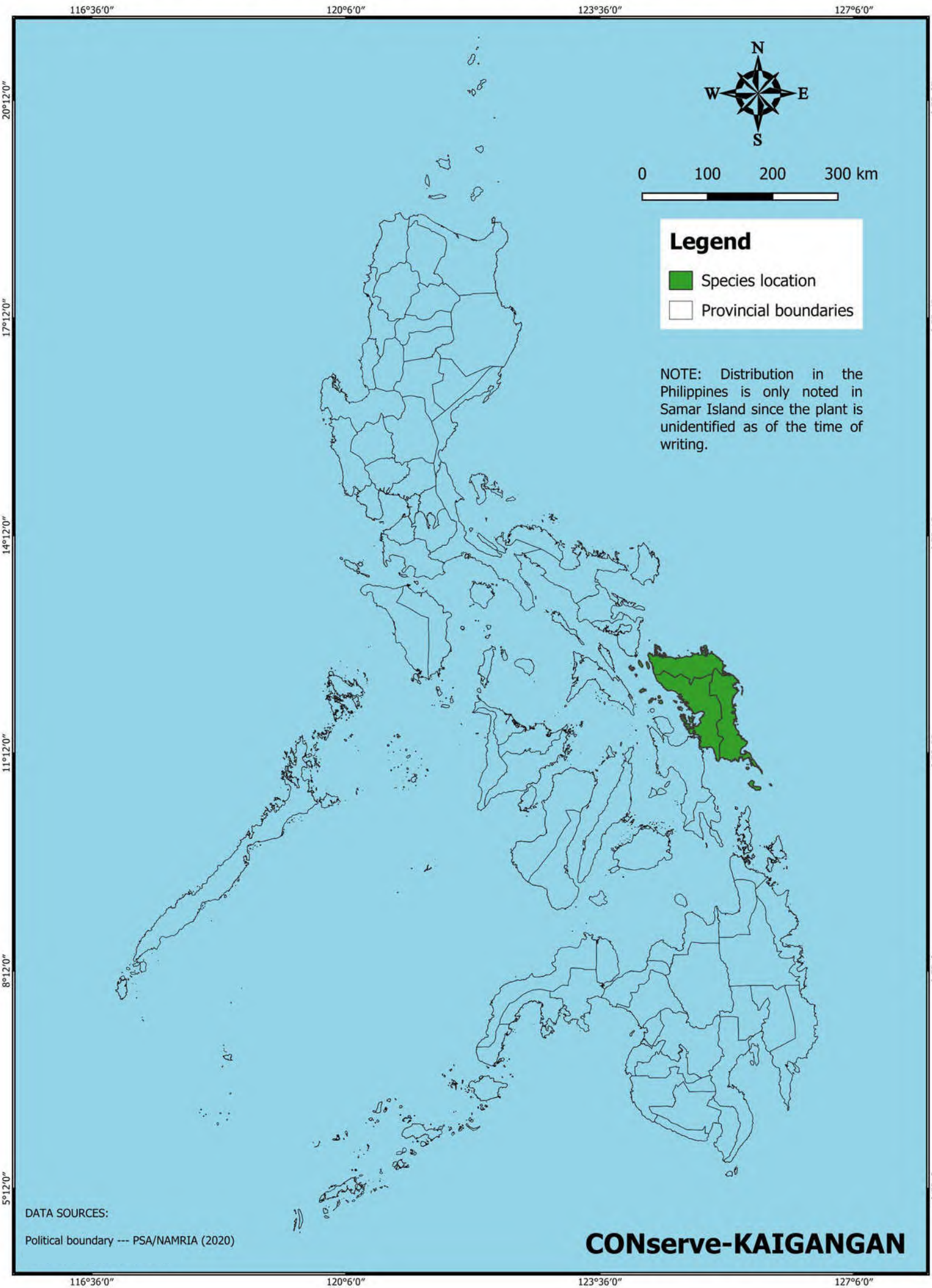
Samar distribution of Mastixia sp.

Legend

- ***Mastixia sp.***
  Plot 2 (3 individuals)

CONserve-KAIGANGAN

Philippine distribution map of Mastixia species



17 ***Wrightia sp.*** **(Apocynaceae)**

Hamor-awon

Family: Apocynaceae
Scientific Name: *Wrightia sp.* (Lam.) Blume
Local Name: Hamor-awon

Field spot character: A shrub or small tree or shrub with glossy, narrowly-elliptic trifoliate leaves.

Samar plot occurrences: Plot 1

Occurrences in the Philippines: Not enough information aside from the current study in Samar (Fernandez et al., 2020).

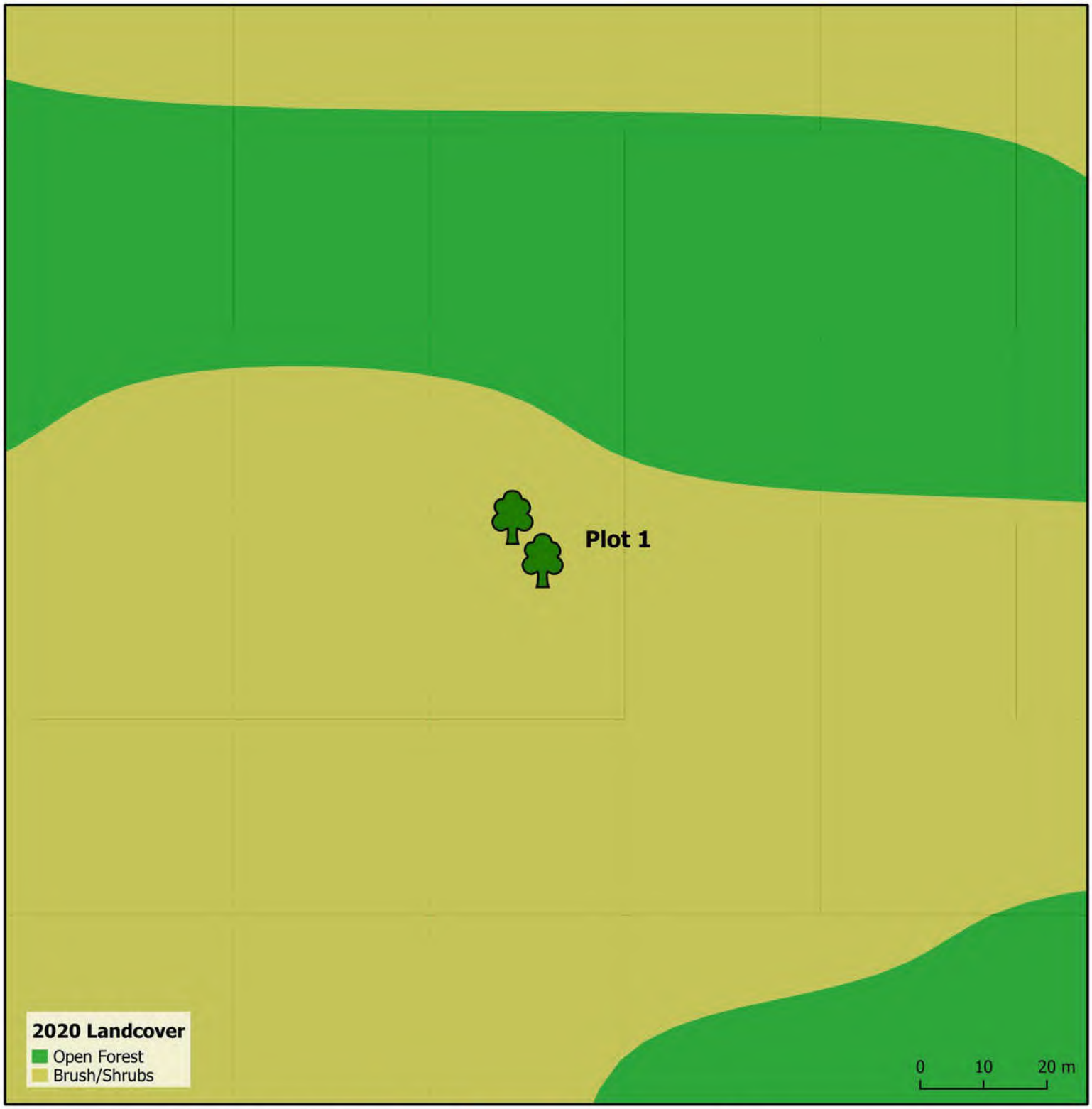
IUCN conservation status: Not assessed

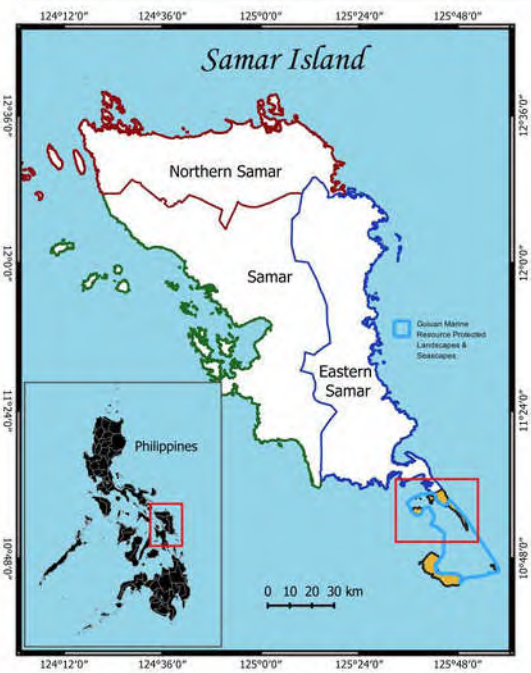
DAO conservation status: Not assessed

LCPI score: 15/25

Reason for the threat: Four (4) parts of the plants (stem, leaf, flower and fruit) are utilized and harvested for construction purposes and forage for animals (Buot et al., 2024b).

Priority level & Recommended Action: Medium: Can be harvested with specific quotas





Data sources:

Political boundary : PSA/NAMRIA (2020)
GMRPLS boundary: UNEP-WCMC & IUCN (2020)
2020 Landcover : NAMRIA (2022)
DEM : USGS

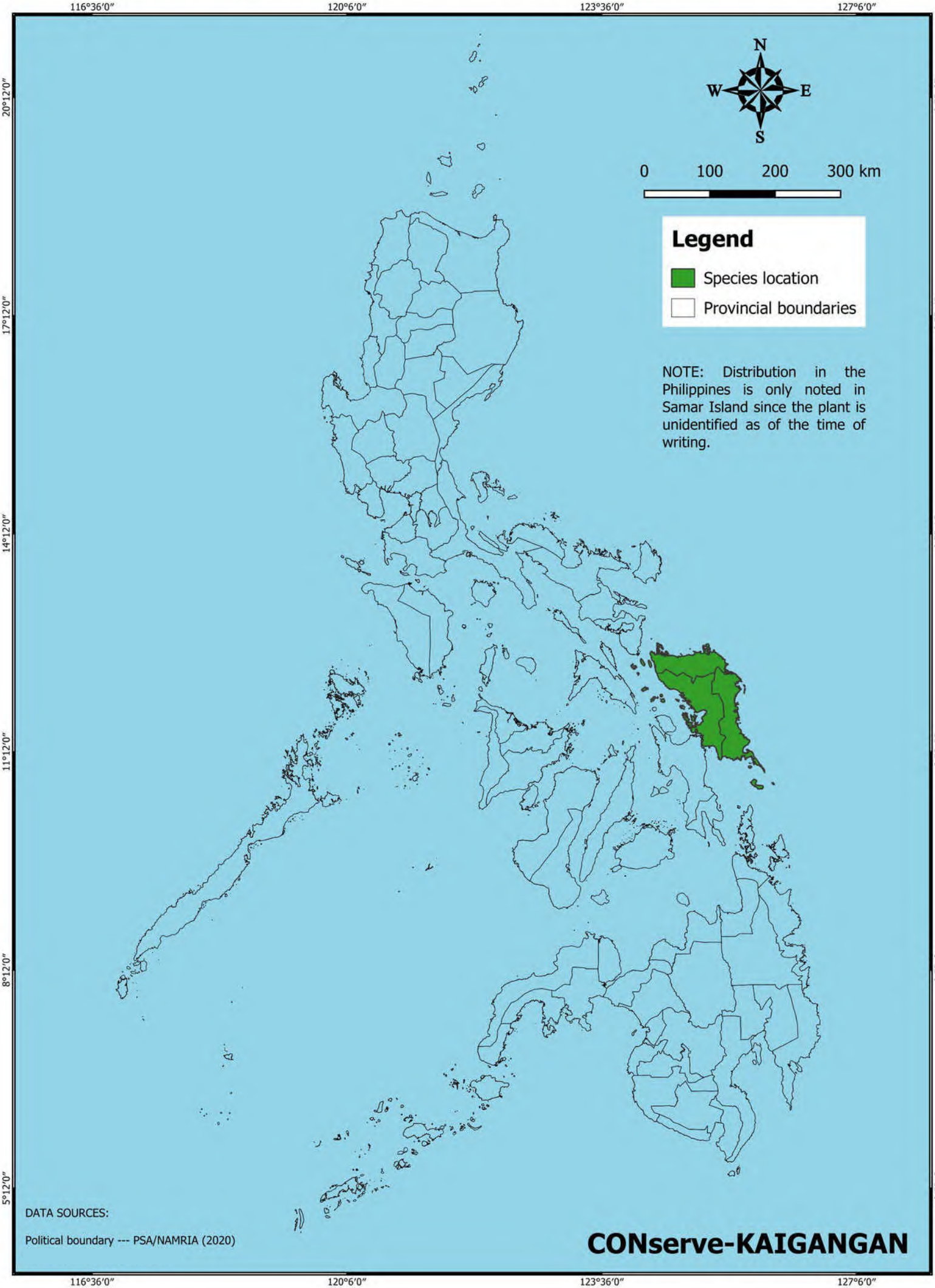
Samar distribution of Wrightia sp.

Legend

Wrightia sp.
Plot 1 (2 individuals)

CONserve-KAIGANGAN

Philippine distribution map of Wrightia species



18 ***unidentified sp.***
Lubi-Lubi

Family: Unidentified
Scientific Name: *Unidentified sp.*
Local Name: Lubi-lubi

Field spot character: A tree of good size, with large leathery elliptic leaves having conspicuous primary and secondary veins. Trunk has prominent nodes and lichen colonies.

Samar plot occurrences: Plot 5

Occurrences in the Philippines: Not enough information aside from the current study in Samar (Fernandez et al., 2020).

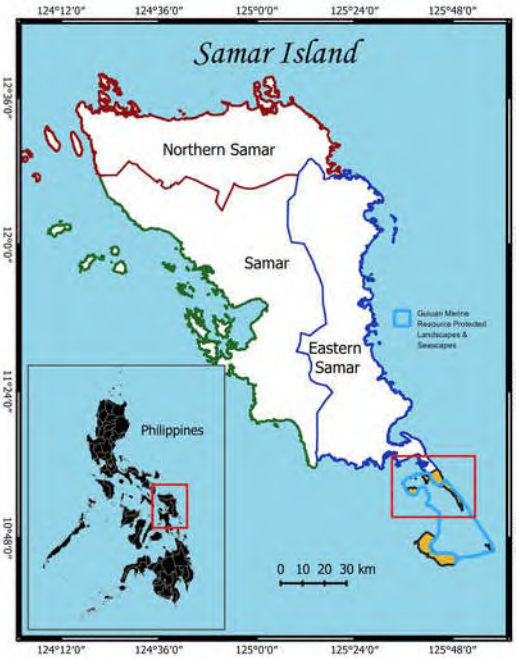
IUCN conservation status: Not assessed

DAO conservation status: Not assessed

LCPI score: 15/25

Reason for the threat: Two (2) parts of the plants (stem and leaf) are utilized as lumber and material for furniture making (Buot et al., 2024b).

Priority level & Recommended Action: Medium: Can be harvested with specific quotas



Data sources:

Political boundary : PSA/NAMRIA (2020)
GMRPLS boundary: UNEP-WCMC & IUCN (2020)
2020 Landcover : NAMRIA (2022)
DEM : USGS

Samar distribution of Lubi-lubi

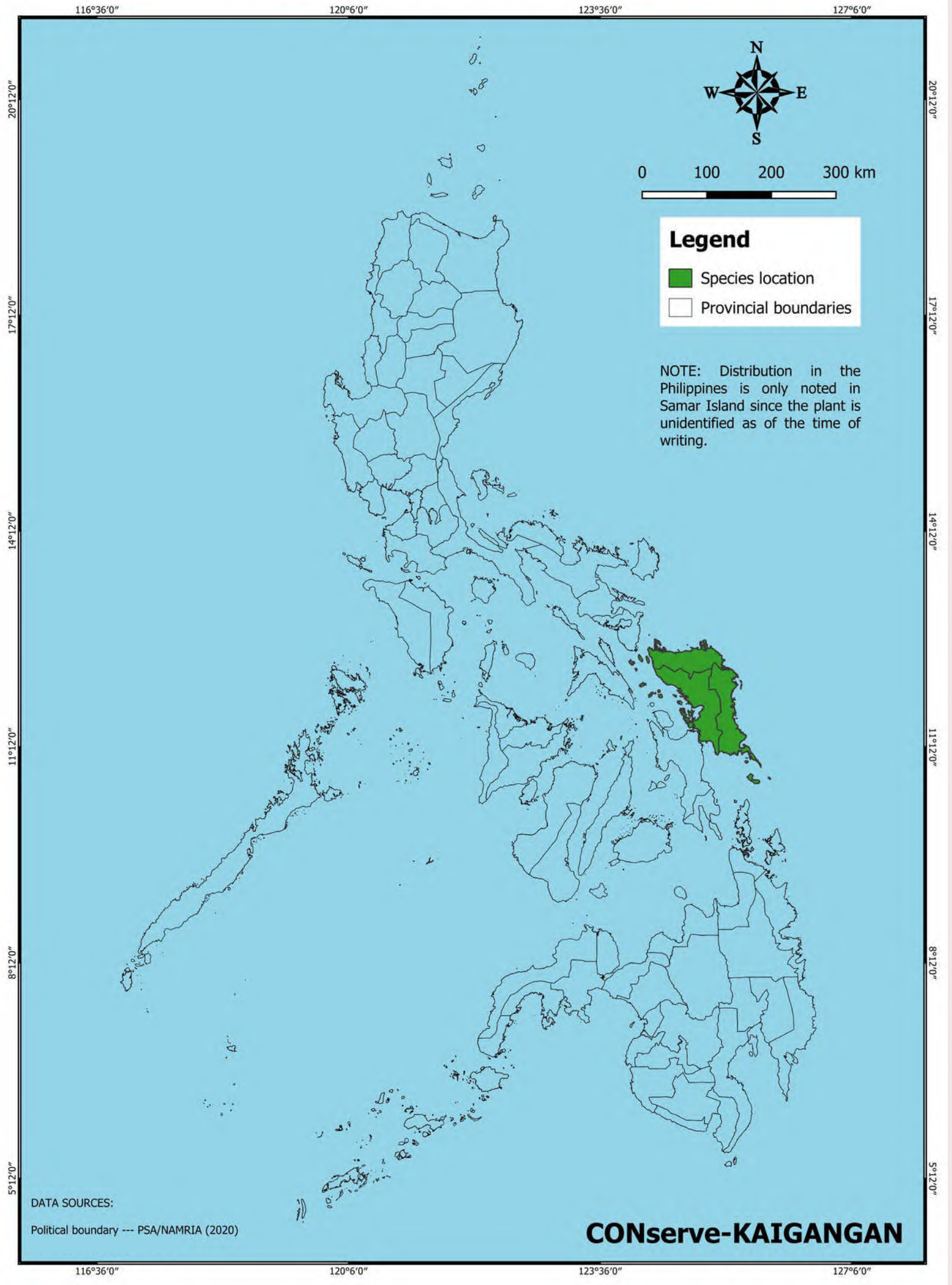
N

Legend

Lubi-lubi
Plot 5 (2 individuals)

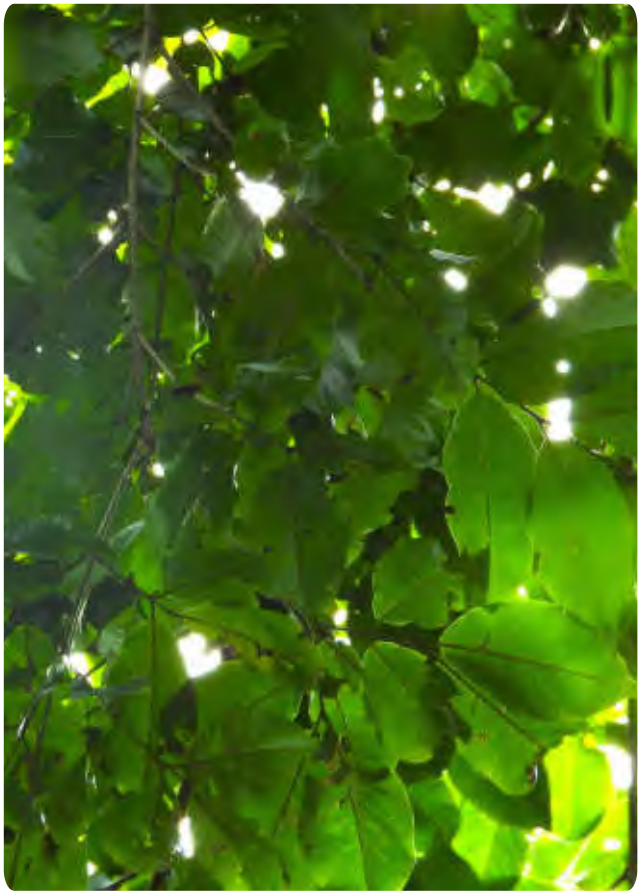
CONserve-KAIGANGAN

Philippine distribution map of Lubi-lubi



19 ***unidentified sp.***
Kuyakya

Family: Unidentified
Scientific Name: *Unidentified sp.*
Local Name: Kuyakya



Field spot character: A medium-sized tree, with visible buttress at the base. Trunk is prominently associated with lichens.

Samar plot occurrences: Plot 2

Occurrences in the Philippines: Not enough information aside from the current study in Samar (Fernandez et al., 2020).

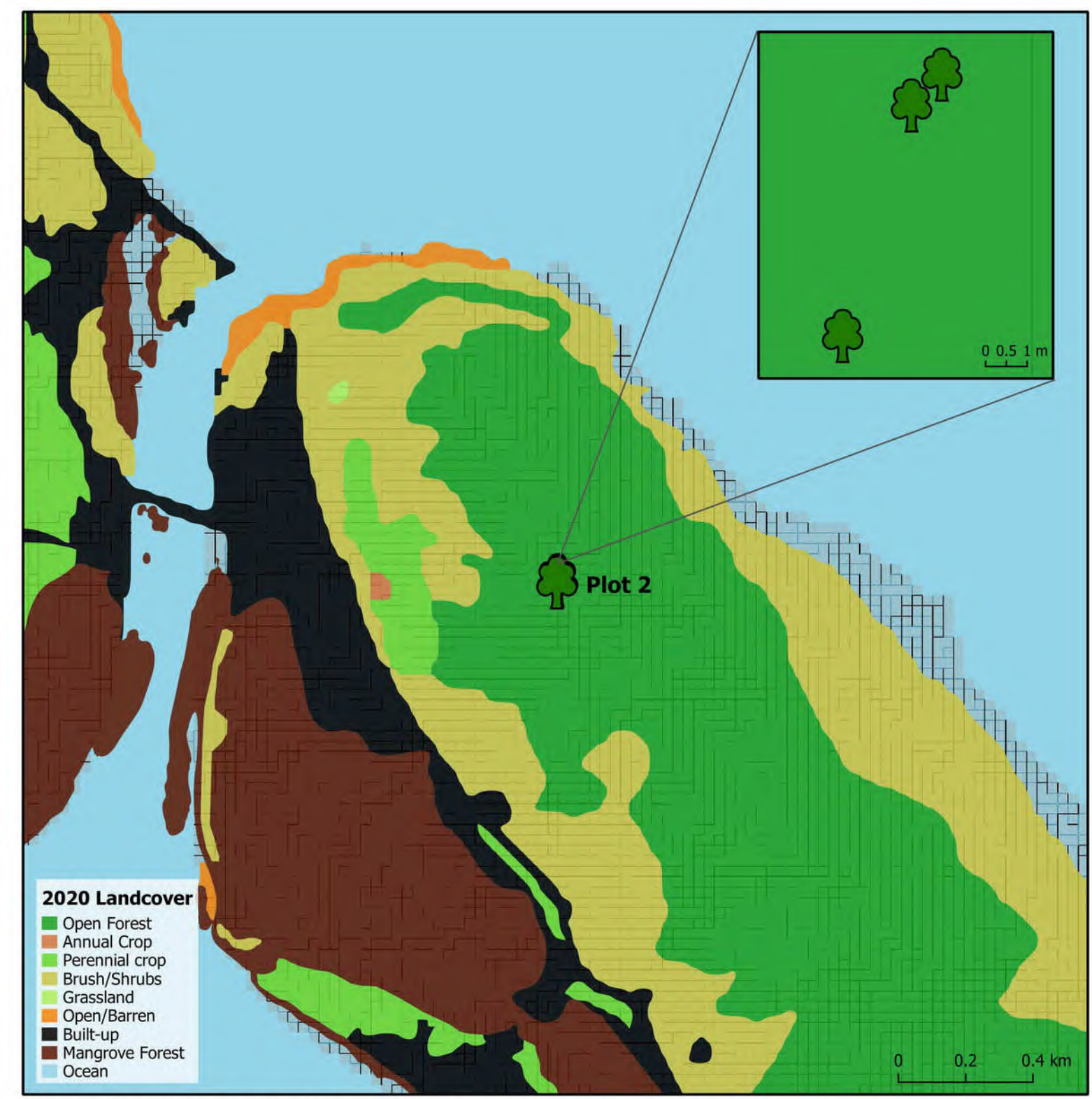
IUCN conservation status: Not assessed

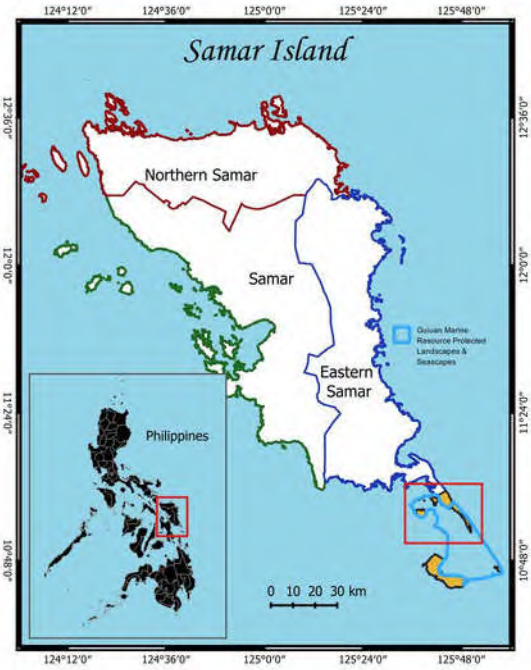
DAO conservation status: Not assessed

LCPI score: 14/25

Reason for the threat: Two (2) parts of the plants (stem and leaf) are utilized for house and construction materials (Buot et al., 2024b).

Priority level & Recommended Action: Medium: Can be harvested with specific quotas





Data sources:

Political boundary : PSA/NAMRIA (2020)
GMRPLS boundary: UNEP-WCMC & IUCN (2020)
2020 Landcover : NAMRIA (2022)
DEM : USGS

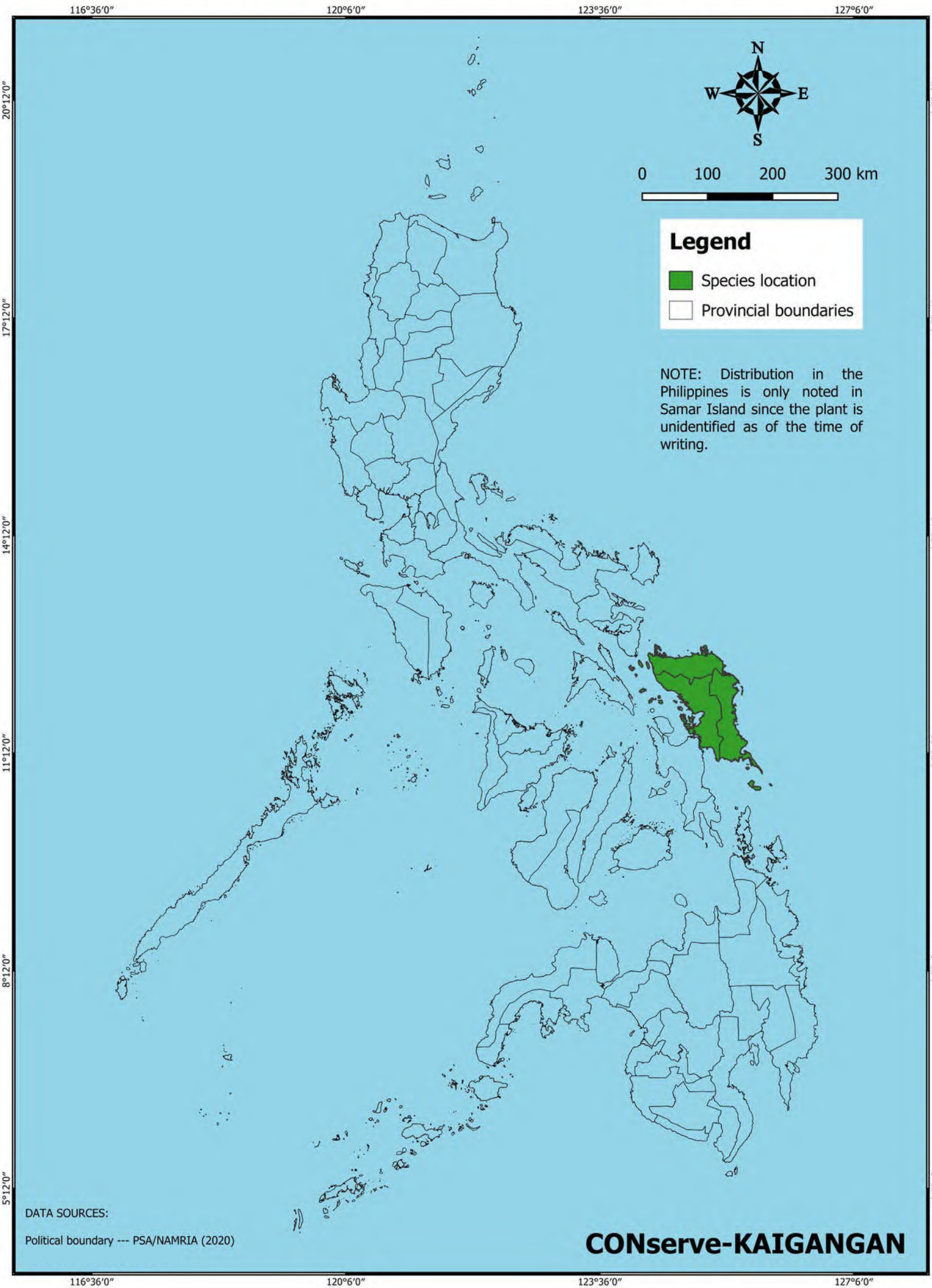
Samar distribution of Kuyakya

Legend

Kuyakya
Plot 2 (3 individuals)

CONserve-KAIGANGAN

Philippine distribution map of Kuyakya



20 ***Neonauclea formicaria*** **(Elmer) Merr. (Rubiaceae)**
Hambabalud

Family: Rubiaceae
Scientific Name: *Neonauclea formicaria* (Elmer) Merr.
Local Name: Hambabalud

Field spot character: A medium-sized tree, with thick, leathery, elliptic to ovate leaf blades having a very conspicuous venation pattern. Fruits are rounded, slightly spongy when mature. Stipules encase terminal buds.

Samar plot occurrences: Plots 1, 3 & 7

Occurrences in the Philippines: LUZON: Camarines Sur and Sorsogon, VISAYAS: Biliran, Bohol, Cebu, Guimaras, Leyte, Negros, Panay, and Samar MINDANAO: Agusan del Norte, Agusan del Sur, Bukidnon, Camiguin, Davao, Davao Oriental, Davao del Sur, Misamis Occidental, Surigao del Norte, Surigao del Sur, Zamboanga Sibugay, Zamboanga del Norte, and Zamboanga del Sur (Pelser et al., 2011 onwards).

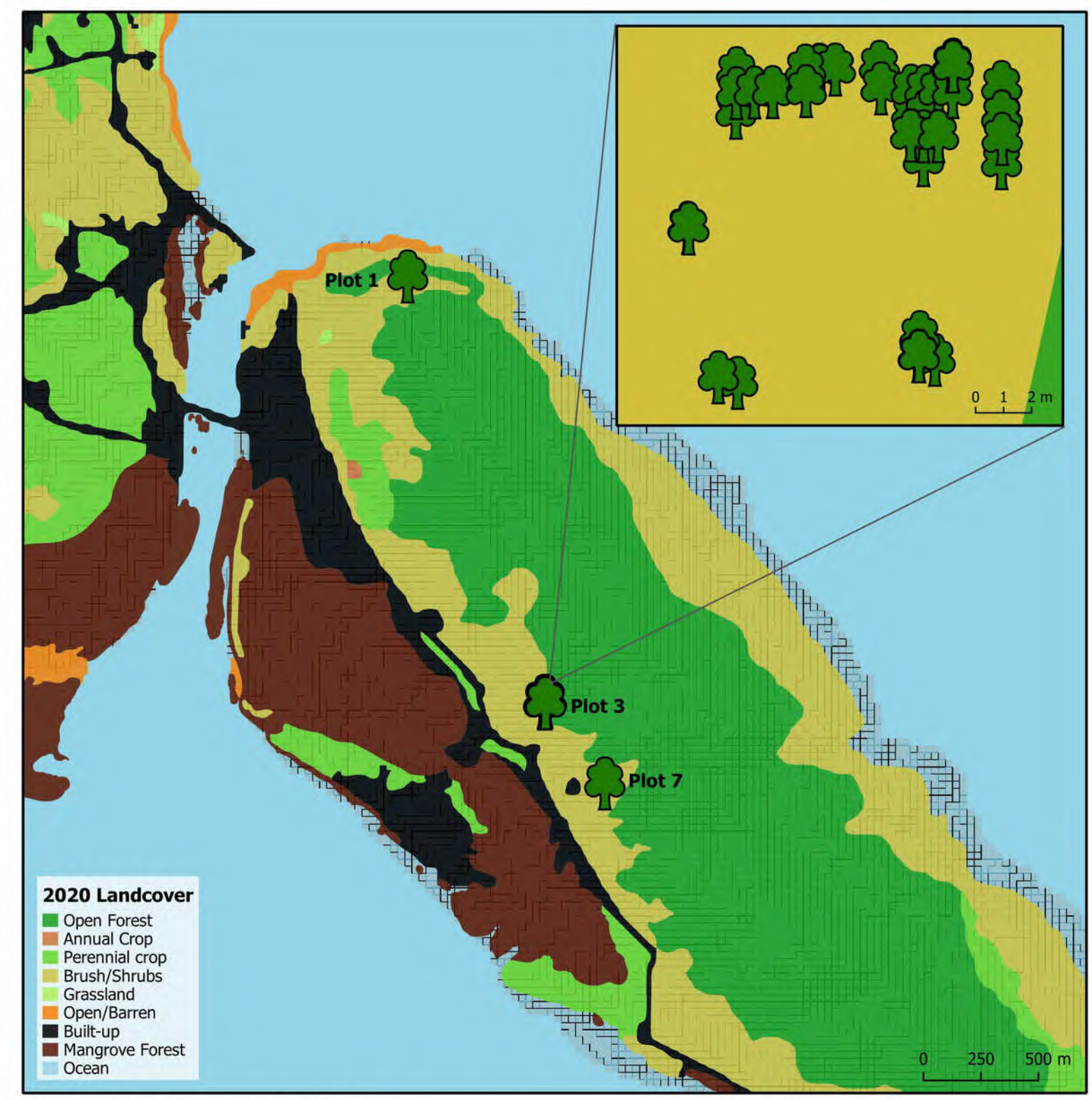
IUCN conservation status: Least Concern

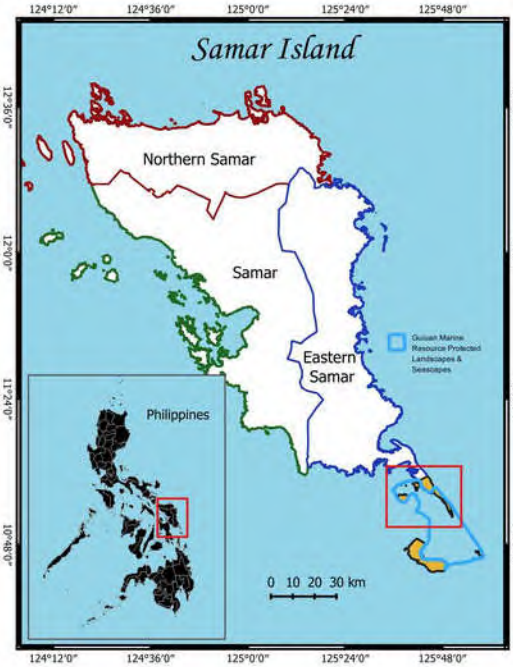
DAO conservation status: Not assessed

LCPI score: 14/25

Reason for the threat: Four (4) parts of the plants (stem, leaf, flower and fruit) are utilized and harvested for medicine and construction materials (Buot et al., 2024b).

Priority level & Recommended Action: Medium: Can be harvested with specific quotas.





Data sources:

Political boundary : PSA/NAMRIA (2020)
GMRPLS boundary: UNEP-WCMC & IUCN (2020)
2020 Landcover : NAMRIA (2022)
DEM : USGS

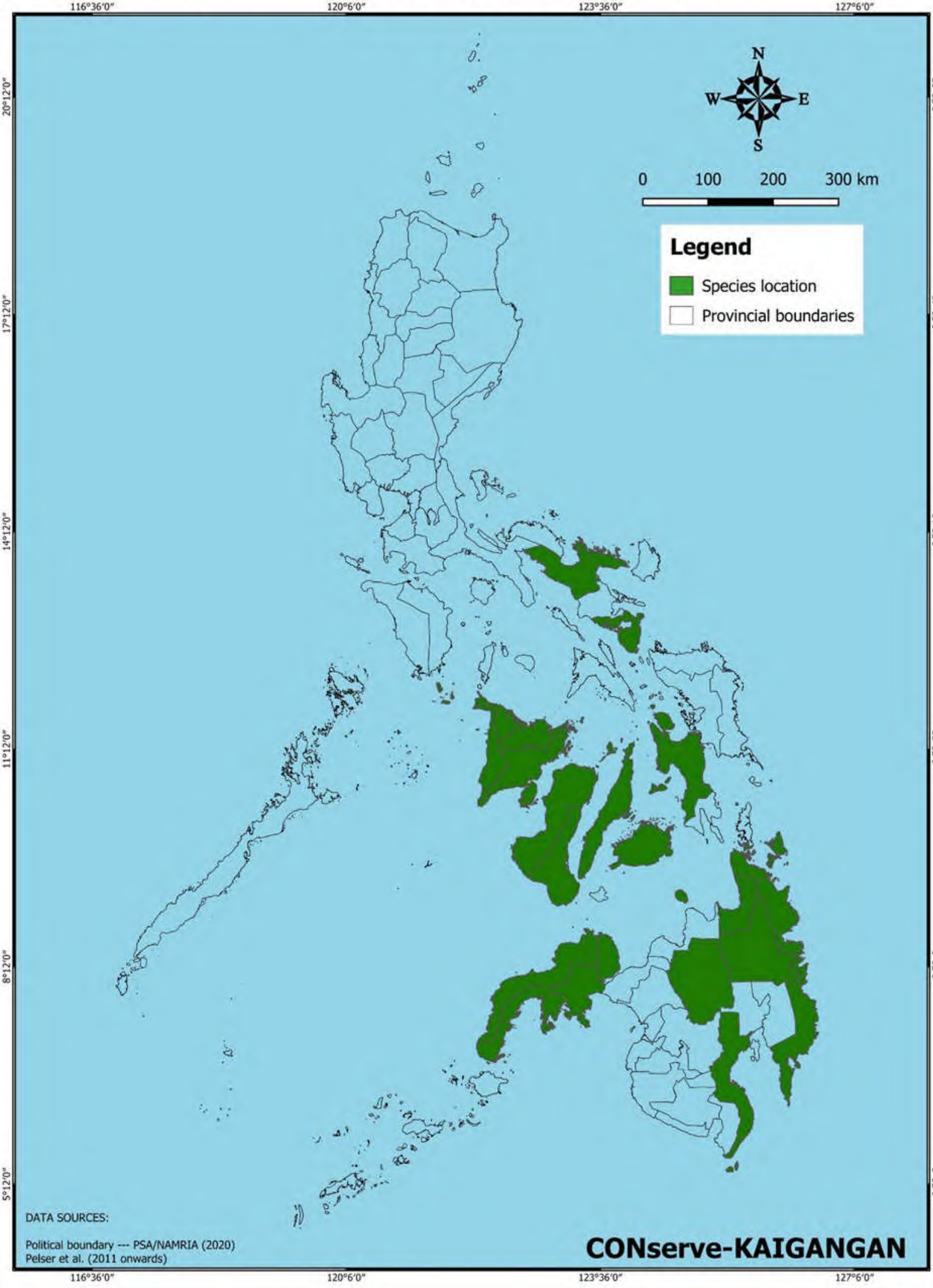
Samar distribution of Neonauclea formicaria

Legend

- ***Neonauclea formicaria***
  - Plot 1 (1 individual)
  - Plot 3 (46 individuals)
  - Plot 7 (1 individual)

CONserve-KAIGANGAN

Philippine distribution map of Neonauclea formicaria



CONSERVATION PLANS

Indeed, there is an urgent need to act now. Both in situ and ex situ conservation approaches should be undertaken. Geotagging of the priority species in GMRPLS enables us to monitor the plants in their habitat more closely. DENR staff can plan out better. Visitors and ecotourists should be more aware of these priority species as these are geotagged already. Ex situ approaches are important too. Excess propagules falling from the mother trees need to be collected for distribution to communities. Training programs on silviculture will be conducted so that locals can domesticate these priority species in their own backyards. Education in the elementary, secondary and tertiary levels should include topics on local natural heritage as the forests over limestone or the kaigangan.

REFERENCES

BirdLife/FFI/IUCN/WWF. (2014). Joint briefing paper on extraction and biodiversity in limestone areas. Cambridge, UK. https://www.birdlife.org/sites/default/files/Extraction-andBiodiversity-in-Limestone-Areas.pdf.

BMB-DENR. (2019). Protection and Conservation Strategy and Action Plan. http://www.bmb.gov.ph/bmb/CAWED/Proposed_Policy/CMPCSAP_ 2019-2028.pdf?cv=1
Brehm, J.M., Maxted N., Martins-Loução, M.A. & Ford-Lloyd, B.V. (2010). New approaches for establishing conservation priorities for socioeconomically important plant species. Biodiversity Conservation, 19: 2715-2740.

Brown, W.H. (1920). Minor Products of Philippine Forests. Bureau of Forestry, Manilla.

Buot, Jr., I.E., Origenes, M.G., Obeña, R.D.R., Hernandez, J.O., Hilvano, N. F., Balindo, D.S.A., & Echapare, E.O. (2024a). Identifying plants for priority conservation in Samar Island Natural Park forests (the Philippines) over limestone using a localized conservation priority index. Journal of Threatened Taxa, 16(3): 24821–24837.

Buot, Jr., I.E., Origenes, M.G., & Obeña, R.D.R. (2024b). Prioritizing plants for conservation in forests over limestone in Guiuan Marine Resource Protected Landscapes and Seascapes using a localized conservation priority index (LCPI). Journal of Marine and Island Cultures. 13 (1): 41-59.

Buot, I.E.Jr. (ed.) (2020). Methodologies Supportive of Sustainable Development in Agriculture and Natural Resources Management. Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) and the University of the Philippines Los Baños (UPLB), Laguna, Philippines.

Buot, I.E. Jr. (2008a). A new way of looking at environmental health: Focused on man and his environment. Asia Life Sciences Supplement 2: 1-5.

Buot, I.E. Jr. (2008b). Sustaining Environmental health in Philippine Satoyama landscapes. Asia Life Sciences Supplement 2: 129-138.

Caringal, A.M., Buot Jr. I.E. & Villanueva, E.L.C. (2020). Analysis of human and Philippine teak forest interaction in the lasang-baybay landscape along Verde Island Passage Marine Corridor, Batangas Province, Philippines. Journal of Marine and Island Cultures, 9(1): 1-9.

Chanthavong, S. & Buot, I.E. (2019). Conservation Status of Plant Diversity at Dong Na Tard Provincial Protected Area, Lao People' Democratic Republic. International Journal of Conservation Science, 10(2): 393-402.

Clements, R., Sodhi, N.S., Schilthuizen, M., & Ng, P.K.L. (2006). Limestone karsts of Southeast Asia: Imperiled arks of biodiversity. BioScience 56 (9): 733-742.

delos Angeles, M.D., Tandang, D.N., Medecilo-Guiang, M.M.P., Buot, I.E.Jr., Schneider, H., & Carballo-Ortiz, M.A. (2023). A new diminutive species of Schismatoglottis (Araceae) from Samar Island, Philippines. Webbia. Journal of Plant Taxonomy and Geography 78(1): 21-28.

delos Angeles, M.D., Rubite, R.R., Chung, K.F., Callado, J.R.C., Buot, I.E.Jr. & Tandang, D.N. (2022). Begonia cucullata (Section Baryandra, Begoniaceae), a new species from the forests over limestone of Samar Island, Philippines. Phytotaxa 541 (1): 049–056.

delos Angeles M.D., Rubite R.R., Chung K-F., Buot I.E.Jr., & Tandang D.N. (2022). Corybas kaiganganianus (Orchidaceae), a new, rare helmet orchid from Samar Island, Philippines. Phytotaxa 543 (2): 127–134.

delos Angeles, M.D., Tandang, D.N. & Buot, I.E.Jr. (under review). Hoya kaiganganiana (Apocynaceae, Asclepedioideae): A New Species from Samar Island Natural Park, Philippines.

DENR-CENR-GMRPLS. (n.d). Guiuan Marine Resource Protected Landscapes and Seascapes Management Plan 2020-2030. DENR-CENR-GMRPLS. Guiuan, Eastern Samar.

Engels, J.M.M., Dempewolf, H. & Henson-Apollonio, V. (2011). Ethical considerations in agro-biodiversity research, collecting, and use. Journal of Agricultural and Environmental Ethics, 24: 107-126.

IPlantz. (2024). Wallaceodendron celebicum / Retrieved June 10, 2024, from https://www.iplantz.com/plant/1597/wallaceodendron-celebicum/

Fernandez, D. A. P., Delos Angeles, M. D., Obeña, R. D. R., Tolentino, P. J., Villanueva, E.L.C., & Buot Jr, I.E. (2020). Fauna and Flora of Forests Over Limestone in Calicoan Island, Guiuan Marine Reserve Protected Landscape and Seascape (GMRPLS), Eastern Samar, Philippines. Journal of Marine and Island Cultures 9(2): 86-104.

Fernando, E.S., Co, L.L., Lagunzad, D.A., Gruezo, W.S.M., Barcelona, J.F., Madulid, D.A., Lapis, A.B., Texon, G.I., Manila, A.C. & Zamora, P.M. (2008). Threatened plants of the Philippines: a preliminary assessment. Asia Life Sciences Supplement, 3:1-52.

Hamilton-Smith, E. (2001). Current initiatives in the protection of karst biodiversity. Nat Croatica 10 (3): 229-242.

Karieva, P. (2012). Failed metaphors and a new environmentalism for the 21st century. Retrieved from http://www.youtube.com/watch?v=4BOEQkvCook (accessed April 2013).

Karieva, P. (2014). New Conservation: Setting the Record Straight and Finding Common Ground Conservation Biology 28: 634-636.

Kareiva, P. & Marvier, M. (2012). What Is Conservation Science? BioScience, Volume 62: 962–969.

Mittermeier, R. A., Myers, N., Thomsen, J. B., Da Fonseca, G. A. B., & Olivieri, S. (1998). Biodiversity hotspots and major tropical wilderness areas: Approaches to setting conservation priorities. Conservation Biology, 12(3): 516–520.

Myers, N., Mittermeier, R.A., Mittermeier, C.G., Fonesca, G.A.B. & Kent, J. (2000). Biodiversity hotspots for conservation priorities. Nature, 403(24): 853-858.

NParks. (2023). Calophyllum Soulattri. Retrieved June 10, 2024, from https://www.nparks.gov.sg/florafaunaweb/flora/2/7/2776

Obeña, R.D.R., Tolentino, P.J.S., Villanueva, E.L.C., Fernandez, D.A.P., Delos Angeles, M.D.D. & Buot, I.E.Jr. (2021). Flora and Fauna Inventory of Limestone Forests in Taft, Eastern Samar, Philippines. The Thailand Natural History Museum Journal, 15(1): 1-20.

Orwa, C., Mutua, A., Kindt, R., Jamnadass, R. & Anthony, S. (2009). Agroforestry Database: a tree reference and selection guide version 4.0. Kleinhovia hospital. World Agroforestry Centre, Kenya. Feedipedia. Available from https://www.feedipedia.org/node/1650

Palmpedia. (2022). Heterospathe intermedia - Palm Grower's Guide. Retrieved June 10, 2024, from https://palmpedia.net/wiki/Heterospathe_intermedia

Pelser, P.B., J.F. Barcelona, & D.L. Nickrent (eds). (2011–onwards). Co's Digital Flora of the Philippines. www.philippineplants.org.

Philstar. (2011). Native Tree of the month (PART 2) Antipolo Artocarpus blancoi (Elm.) Merr. (2011, October 24). Philstar.Com. https://www.philstar.com/cebu-news/2011/10/24/740381/native-tree-month-part-2-antipolo-artocarpus-blancoi-elm-merr

Pretty, J., Adams, B., Berkes, F., Athayde, S.F., Dudley, N., Hunn, E., Maffi, L., Rapport, D., Robbins, P., Sterling, E., Stolton, S., Tsing, A., Vintinner, E. & Pilgrim, S. (2009). The Intersections of biological diversity and cultural diversity: Towards integration. Conservation and Society, 7(2): 100-112.

Seibert, B. & Jansen, P.C.M. (1991). Artocarpus J.R. & G. Forster. In: Verheij, E.W.M. and Coronel, R.E. (Editors): Plant Resources of South-East Asia No 2: Edible fruits and nuts. PROSEA Foundation, Bogor, Indonesia. Database record: prota4u.org/prosea
Sopsop, L.B. & Buot, I.E. Jr. (2009). The endangered plants of Palawan Island, Philippines. Asia Life Sciences 18(2): 251-279.

Soule, M. (2013). The "new conservation". Conservation Biology, 27: 895-897.

Struebig, M.J., Kingston, T., Zubaid, A., Le Comber, S.C., Mohd-Adnan, A., Turner, A., & Rossiter, S.J. (2009). Conservation importance of limestone karst outcrops for Palaeotropical bats in a fragmented landscape. Biol Conserv 142 (10): 2089-2096.

Stuart, G.U. (2020). Antipolo / Artocarpus blancoi/ tipolo: Philippine Medicinal Herbs / Philippine Alternative Medicine at StuartXchange. (n.d.). Retrieved June 10, 2024, from http://www.stuartxchange.org/Antipolo.html

Stuart, G.U. (2023a). Anahaw, Saribus rotundifolius, FAN PALM/ Alternative Medicine. Retrieved June 10, 2024, from http://www.stuartxchange.org/Anahaw

Stuart, G.U. (2023b). Palisan, Aquilaria cumingiana: Philippine Medicinal Herbs / Philippine Alternative Medicine. Retrieved June 7, 2024, from http://www.stuartxchange.org/Palisan

Stuart, G.U. (2024). Lauan-pula, Shorea negrosensis: Philippine Medicinal Herbs / Philippine Alternative Medicine. Retrieved June 7, 2024, from http://stuartxchange.org/LauanPula

Synopsis IAS. (2023). Dipterocarpus spp. Forestry Optional for UPSC IFS. Retrieved June 10, 2024, from https://synopsisias.com/blog/dipterocarpus-spp-forestry-optional-for-upsc-ifs?category_slug=silviculture-of-trees

Tandang, D.N., delos Angeles, M.D., Buot, I.E.Jr. & Devkota, M.P. (2022). Decaisnina tomentosa (Loranthaceae), A New Species from Eastern Samar Island, Philippines. Biodiversity Data Journal 10: e78457: 1-9.

Tolentino, P.J., Navidad, J.R.L., Angeles, M.D., Fernandez, D.A.P., Villanueva, E.L.C., Obeña, R.D.R., & Buot Jr, I.E. (2020). Biodiversity of forests over limestone in Southeast Asia with emphasis on the Philippines. Biodiversitas Journal of Biological Diversity, 21(4):1597-1613.

Villanueva, E.L.C., Fernandez, D.A.P., Delos Angeles, M.D., Tolentino, P.J.S., Obeña, R.D. & Buot, I.E.Jr. (2021). Biodiversity in Forests over Limestone in Paranas, Samar Island Natural Park (SINP), A UNESCO World Natural Heritage Site Nominee. Tropical Natural History 21(1): 119-145.

Villanueva, E.L.C. & Buot, I.E.Jr. (2020a). Setting Localized Conservation Priorities of Plant Species for Sustainable Forest Use. In Buot, I.E.Jr. (Ed): Methodologies Supportive of Sustainable Development in Agriculture and Natural Resources Management. Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) and the University of the Philippines Los Baños (UPLB), Laguna, Philippines. pp.165-179.

List of reviewers:

Dian Ridwan Nurdiana, PhD
Research Center for Ecology and Ethnobiology,
National Research and Innovation Agency (BRIN), Indonesia

Nelson Pampolina, PhD
University of the Philippines Los Baños

Journal of Nature Studies

July 2024

Scientific Peer-Reviewed Journal Published by the
Philippine Society for the Study of Nature (PSSN)

www.journalofnaturestudies.org

The **Journal of Nature Studies** is an online, open access, peer-reviewed journal in English that publishes reports of original research in the natural and applied sciences (agriculture, biology, and its allied fields including studies on social sciences as related to nature and the environment). It also publishes notes and reviews on relevant and timely subjects on nature. The Journal of Nature Studies aims to cater to global or international readership thus the broad composition of its Board of Editors/Reviewers. Two issues a year comprise a volume. The Journal of Nature Studies is indexed by Google Scholar and Open Academic Journal Index. Supplements may be issued amytime as necessary.

kaigangan.uplb.edu.ph

kaigangan.uplb@up.edu.ph

fb.com/conkaigangan

CONserve-KAIGANGAN

CONserve KAIGANGAN

Plant Systematics Laboratory