



Republic of the Philippines
Department of Environment and Natural Resources
MIMAROPA Region
PROVINCIAL ENVIRONMENT AND NATURAL RESOURCES OFFICE

MAR 29 2023

MEMORANDUM

FOR : The Regional Executive Director
DENR MIMAROPA Region
1515 DENR By the Bay Building, Roxas Boulevard
Barangay 668, Ermita, Manila

THRU : The ARD for Technical Services

FROM : The OIC, PENR Officer

SUBJECT : **SUBMISSION OF MILESTONE ACCOMPLISHMENT REPORT FOR THE MANGROVE FOREST ASSESSMENT IN APO REEF NATURAL PARK FOR CY 2023**

DENR MIMAROPA RECORDS SECTION RECEIVED APR 14 2023	
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BY: _____	DATE NO. _____
TIME: _____	

Forwarded is the memorandum dated March 22, 2023 of CENRO Sablayan which was received on March 27, 2023 regarding submission of Milestone Accomplishment Report for the Mangrove Forest Assessment in Apo Reef Natural Park for CY 2023. The Apo Reef Natural Park Protected Area Management Office (ARNP-PAMO) has already monitored twelve 100 m² monitoring plots distributed across Apo Island, ARNP. These sampling plots are representative of the 9.64 hectare mangrove forest within the MPA. A total of nine mangrove species were recorded including one species that was observed outside the twelve monitoring plots. The diameter-at-breast height and tree height of large trees and the canopy cover within the monitoring plots were also acquired during the survey. The final assessment report is scheduled to be submitted in April.

Attached herewith is detailed mangrove forest assessment report with geotagged pictures.

For information and record.


ERNESTO E. TAÑADA

TSD-CDS3/29/2023
Copy Furnished:
1. Planning Section
2. File

So. Pag-asa, Brgy. Payompon, Mamburao, Occidental Mindoro
Email: penroccmin@denr.gov.ph



Republic of the Philippines
Department of Environment and Natural Resources
MIMAROPA Region
COMMUNITY ENVIRONMENT AND NATURAL RESOURCES OFFICE

March 22, 2023

MEMORANDUM

FOR : The Regional Executive Director
DENR MIMAROPA Region
1515 DENR By the Bay Building, Roxas Boulevard,
Barangay 688, Ermita, Manila

THRU : The OIC, PENR Officer
Mamburao, Occidental Mindoro

FROM : The CENR Officer

SUBJECT : SUBMISSION OF MILESTONE ACCOMPLISHMENT
REPORT FOR THE MANGROVE FOREST ASSESSMENT
IN APO REEF NATURAL PARK FOR CY 2023

Respectfully forwarded is the milestone accomplishment report for the mangrove forest assessment in Apo Reef Natural Park (ARNP) for CY 2023. The ARNP-PAMO has already monitored twelve 100 m² monitoring plots distributed across Apo Island, ARNP. The final assessment report is scheduled to be submitted in April.

For information and record.

For the CENR Officer

RECORDS

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DATE: 3/29/23 TIME: 1:00 PM

[Signature]
ISAIAS A. GUIMOD
DMO IV/Deputy CENRO



Department of Environment and Natural Resources
MIMAROPA Region
APO REEF NATURAL PARK
Protected Area Management Office



March 22, 2023

MEMORANDUM

FOR : The Regional Executive Director
DENR MIMAROPA Region
1515 DENR By the Bay Building, Roxas Boulevard,
Barangay 688, Ermita, Manila

THRU : The OIC, PENR Officer
Mamburao, Occidental Mindoro

The CENR Officer

FROM : The Protected Area Superintendent

SUBJECT : SUBMISSION OF MILESTONE ACCOMPLISHMENT
REPORT FOR THE MANGROVE FOREST ASSESSMENT
IN APO REEF NATURAL PARK FOR CY 2023

Respectfully submitted is the milestone accomplishment report for the mangrove forest assessment in Apo Reef Natural Park (ARNP) for CY 2023. Twelve 100 m² plots in Apo Island, ARNP were surveyed from February 21 to 23, 2023. These sampling plots are representative of the 9.64-hectare mangrove forest within the MPA. During the three-day survey, nine mangrove species were recorded including one species that was observed outside the twelve monitoring plots. The diameter-at-breast height and tree height of large trees and the canopy cover within the monitoring plots were also acquired during the survey. All data collected will be analyzed and the final assessment report will be submitted in April.

Attached herewith is the milestone accomplishment report.

For information and record.


KRYSTAL DAYNE T. VILLANADA



Mangrove Forest Assessment

Milestone Accomplishment Report

CY 2023

[Signature]

I. Introduction

Apo Reef Natural Park (ARNP) is a 15,799.23-hectare Marine Protected Area (MPA) that covers an irregularly shaped atoll, a fringing reef, and three islets. The Natural Park hosts a number of ecosystems and among which are mangrove forests. The mangrove forests in ARNP, particularly in Apo Island and Binanggaan, are estimated to span 9.64 hectares. To date, at least 11 species of mangroves have been recorded within the MPA (Tabaranza et al., 2014; REECS, 2017).

Mangrove forests provide a number of ecosystem services. They prevent coastal erosion and reduce damages from waves, storm surges, and tsunamis (Sandilyan & Kathiresan, 2015; Spalding et al., 2014). Mangroves also serve as nursery grounds for a diverse range of reef fishes (Mumby et al., 2003; Abu El-Regal & Ibrahim, 2014) and terrestrial fauna (Nagelkerken et al., 2008). Moreover, mangrove forests are valued for their cultural services like ecotourism and recreation (Friess, 2016; Mukherjee et al., 2014). Thus, monitoring the health of this ecosystem is important.

The monitoring of mangrove forests in ARNP is an activity under *MPA Management, Strengthening, and Networking*, a subcomponent of the Coastal and Marine Ecosystems Management Program or CMEMP. Since 2021, this has conducted annually by the Protected Area Management Office of ARNP (ARNP-PAMO) with the aim of a) assessing mangrove species diversity and abundance and trends in the condition of the mangrove forests and b) developing necessary management interventions to further their protection.

II. Accomplishments

Twelve monitoring stations in Apo Island, ARNP were surveyed from February 21 to 23, 2023 (Figure 1). These stations were similar with those monitored last year. The monitoring team included personnel from the ARNP-PAMO and the Municipal Environment and Natural Resources Office (MENRO) of Sablayan (Table 1).



Figure 1. Twelve monitoring plots within the mangrove forest in Apo Island, ARNP.

Table 1. Members of the mangrove forest monitoring team for CY 2023.

Name	Office	Task
Hugo G. Salvador	ARNP-PAMO	Species identification, Tree height measurement
Roberto P. Beringuela	ARNP-PAMO	Densiometer measurements
Kelvin John U. Zubiri	ARNP-PAMO	Recorder
Ludygario M. Matira	ARNP-PAMO	Dbh measurement
Federico A. de Jesus	ARNP-PAMO	Dbh measurement
Jaysrael D. Urieta	ARNP-PAMO	Plot demarcation
Mark Dennis M. Barretto	ARNP-PAMO	Plot demarcation
Melvin Cariño	MENRO Sablayan	Dbh measurement

100 m² plots were demarcated in each monitoring station using a nylon wire. The four corners of these plots were permanently marked with green waterproof paint. Large trees (>5 cm diameter-at-breast height [dbh]) were counted and identified up to species level using Primavera et al. (2004) and Primavera (2009). The tree height and dbh of the large trees were measured using a laser rangefinder (TruPulse Laser Rangefinder 200, USA) and diameter tape (Yamayo Million Diameter Tape, Japan). Canopy cover was measured using a convex spherical densiometer (Forestry Suppliers Inc., USA) (Figure 2). Densiometer measurements were taken four times at different directions (north, south, east, and west) within each plot, and these were averaged to minimize observer errors (Lemmon 1956, Baudry et al. 2014). One 4 m² subplot was established in each 100 m² plot and surveyed for regenerants. Saplings and seedlings were counted and identified using the previously mentioned field identification guides for mangroves.

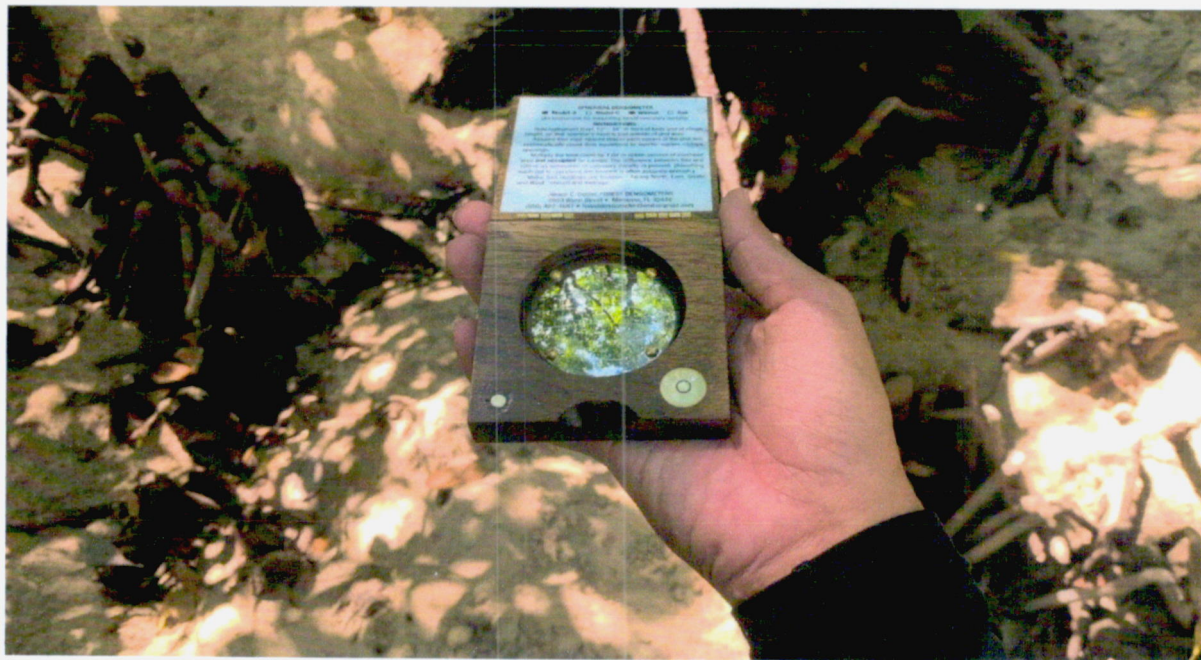


Figure 2. Convex spherical densiometer used in measuring canopy cover in the mangrove forest monitoring plots.

During the three-day survey, eight species from three families were recorded within the twelve monitoring stations (Table 2, Figure 3). The lone threatened species of true mangrove recorded was *Pemphis acidula* (locally known as Bantigi). This species is listed as Endangered under DENR Administrative Order 2017-11 or the *Updated National List of Threatened Philippine Plants and their Categories*. Notably, the survey team has also recorded individuals of a *Rhizophora* hybrid (either *Rhizophora lamarckii* or *Rhizophora annamalayana*) in two of the monitoring plots (Plot 7 and 4) (Figure 4). The trees featured relatively large obovate-elliptical leaves and branching inflorescence with two flowers.

Table 2. Species of true mangroves sampled across twelve monitoring stations in Apo Island, ARNP.

Species	Common Name	Family	Conservation Status	
			IUCN Red List	Nat'l Red List
<i>Bruguiera cylindrica</i>	Pototan	Rhizophoraceae	LC	
<i>Rhizophora apiculata</i>	Bakauan-lalaki	Rhizophoraceae	LC	
<i>Rhizophora mucronata</i>	Bakauan-babae	Rhizophoraceae	LC	
<i>Rhizophora stylosa</i>	Bakauan-bato	Rhizophoraceae	LC	
<i>Rhizophora</i> sp.	-	Rhizophoraceae	-	
<i>Pemphis acidula</i>	Bantigi	Lythraceae	LC	EN
<i>Sonneratia alba</i>	Pagatpat	Lythraceae	LC	
<i>Xylocarpus rumphii</i>	Malapiagau	Meliaceae	NE	

LC – Least Concern, EN – Endangered, NE – Not Evaluated

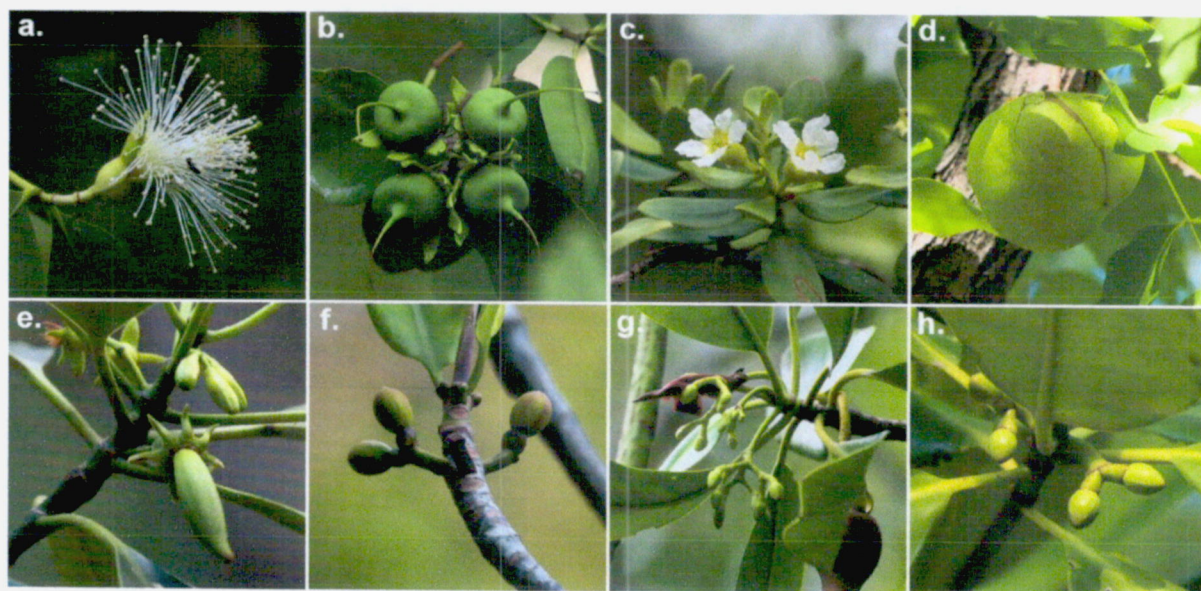


Figure 3. Flowers and fruits of selected mangrove species recorded within the monitoring plots. A-B) *Sonneratia alba*, C) *Pemphis acidula*, D) *Xylocarpus rumphii*, E) *Bruguiera cylindrica*, F) *Rhizophora apiculata*, G) *Rhizophora mucronata*, and H) *Rhizophora lamarckii* or *Rhizophora annamalayana*.



Figure 4. Leaves (a) and flowers (b) from the *Rhizophora* hybrid recorded within Plot 7.

Mangrove species which were only observed outside of the 100 m² plots were also noted. Two large *Avicennia marina* (locally known as *Api-Api* or *Bungalon*) trees were observed near Plot 7. This species was not reported in Tabaranza et al. (2014) and REECS (2017). The trees featured light brown and smooth barks, elliptical leaves that mostly exhibited leaf curling, and clusters of small orange to dark orange flowers (Figure 5).

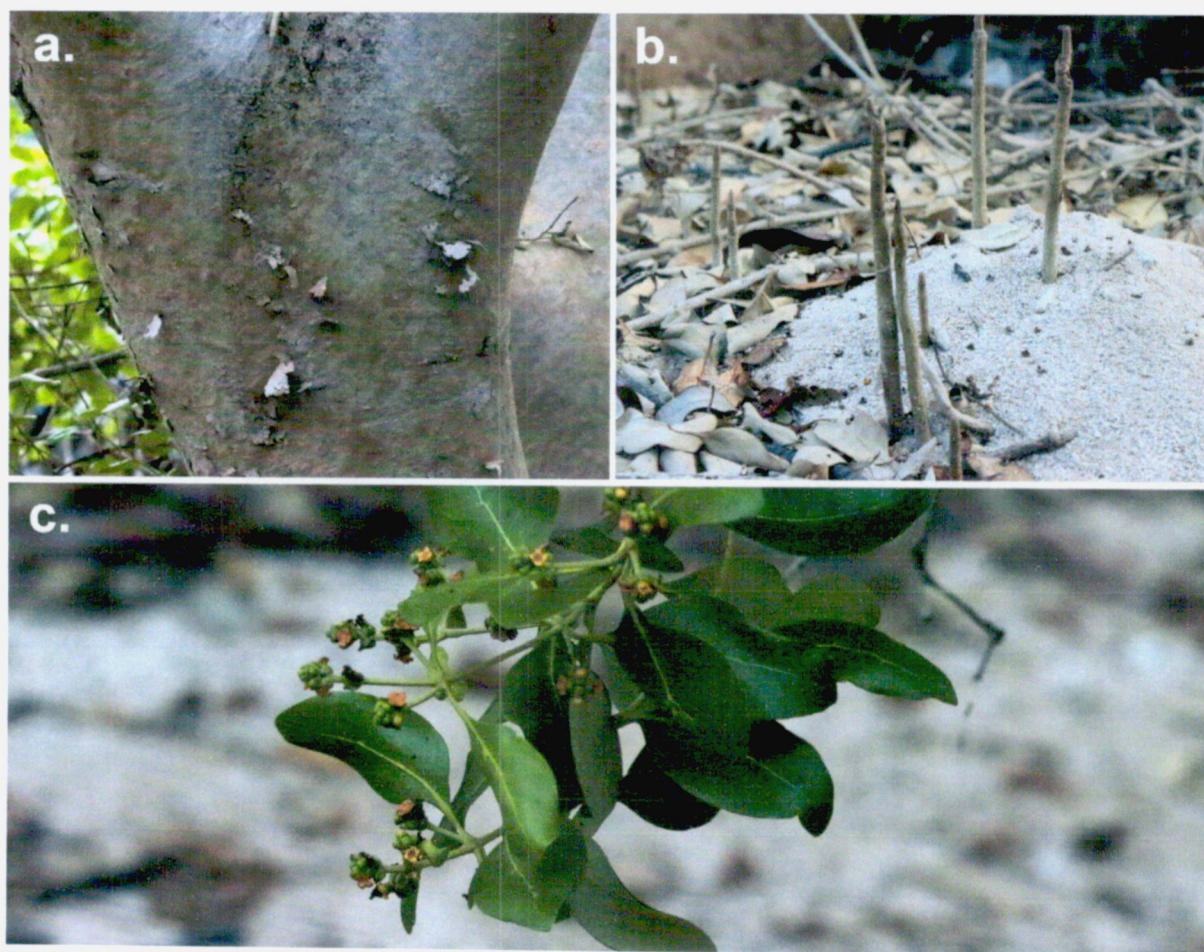


Figure 5. Light brown flaky bark (a), pencil roots (b), curling elliptical leaves, and orange to red orange flower clusters (c) of the *A. marina* tree recorded outside of Plot 7.

In the following quarter, a reconnaissance activity will be conducted in Binanggaan to look into the feasibility of establishing additional mangrove forest monitoring stations in the islet. The reconnaissance activity and survey proper (if deemed necessary) should be conducted in April and prior to the start of the breeding season of Black-naped Terns (*Sterna sumatrana*) and Bridled Tern (*Onychoprion anaethetus*). The analysis of data and report-writing shall immediately follow after all the data has been collected. The Shannon-Weiner diversity index, relative density, relative frequency, relative dominance, and importance value of the adult mangroves will be computed. Furthermore, the condition of the mangrove forests of ARNP will be assessed using the criteria in DENR BMB Technical Bulletin No. 2017-05 (Table 3). The final report will be submitted before the end of April.

Table 3. Criteria for determining the condition of mangrove forest based on DENR BMB Technical Bulletin No. 2017-05.

Condition	Criteria
Excellent	76% and above in % Crown Cover 0.1 Regenerants per m ² Above 5m in average tree height Undisturbed to negligible disturbance
Good	51% - 75% Crown Cover 0.76 - <1 Regenerants per m ² 3m - <5m in average tree height Slight disturbance and few cuttings
Fair	26% - 50% Crown Cover 0.50 - 0.75 Regenerants per m ² 2m - <3m in average tree height Moderate disturbance to noticeable cuttings
Poor	0% - 25% Crown Cover <0.50 Regenerants per m ² <2m in average tree height Heavy disturbance

Prepared by:


HUGO IGNACIO G. SALVADOR
 CMEMP Extension Officer

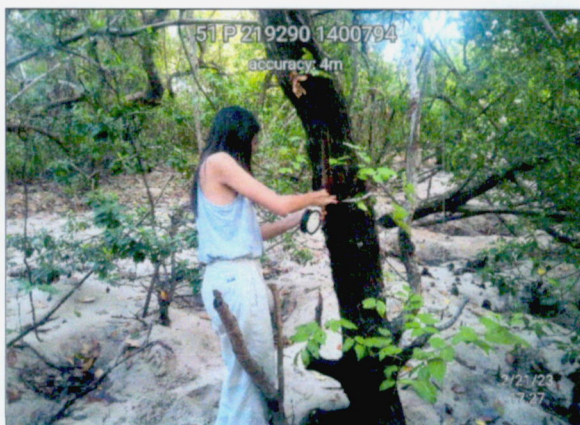
Reviewed and submitted by:


KRYSTAL DAYNE T. VILLANADA
 Protected Area Superintendent

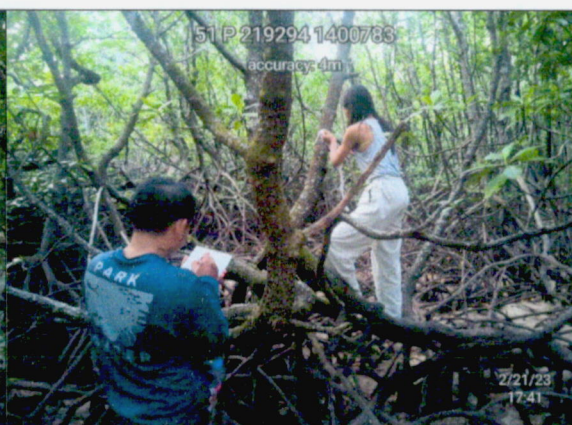
III. References

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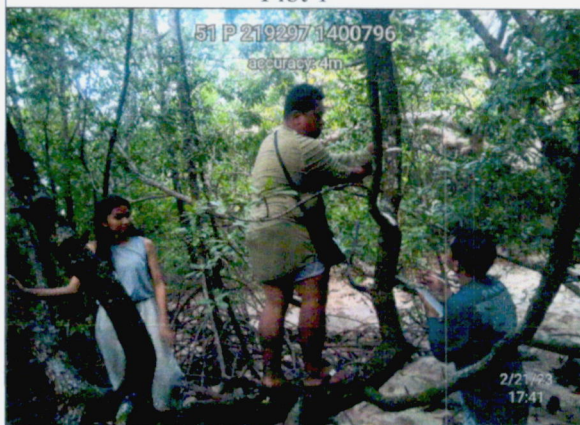
IV. Photodocumentation



CMEMP Extension Officer Hugo Salvador measuring the dbh of the *X. rumphii* tree within Plot 1



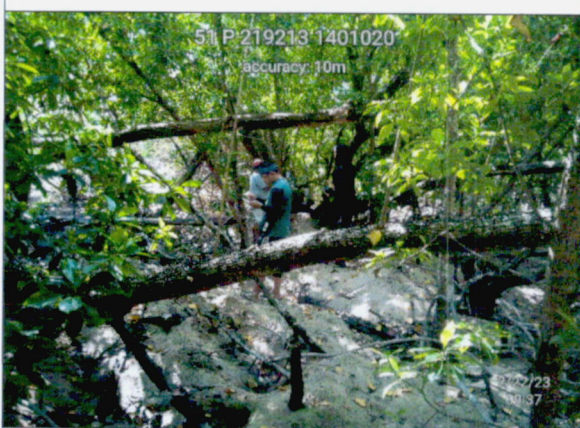
Park Ranger Kelvin John Zubiri writing down the dbh of an adult tree within Plot 1



MENRO personnel Melvin Cariño assisting in the measurement of dbh in Plot 1



Boat Crew Jaysrael Urieta marking one of the four corners of Plot 4



Park Ranger Kelvin Zubiri (middle) recording the data gathered onto a waterproof slate



Members of the survey team en route to Plots 5 & 6



Park Ranger Ludygario Matira (left) measuring the dbh of an *R. mucronata* tree within Plot 5.



Park Ranger Ludygario Matira measuring the dbh of an *R. mucronata* tree within Plot 6.



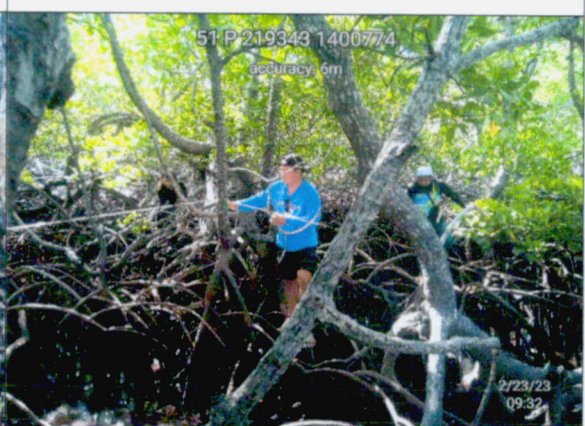
CMEMP Extension Officer Hugo Salvador measuring tree height of large trees within Plot 6 using a laser rangefinder



Park Ranger Ludygario Matira measuring the dbh of the largest *S. alba* tree in ARNP



CMEMP Extension Officer Hugo Salvador measuring tree height of the *S. alba* tree in Plot 7



Boat Crew Jaysrael Urieta (middle) marking the four corners of Plot 2 after it has been demarcated with a nylon wire



CMEMP Extension Officer Hugo Salvador (right) measuring tree height of large trees within Plot 2



Park Ranger Ludygario Matira (middle) climbing a mangrove tree within Plot 3 to measure its dbh



Photograph of the convex spherical densiometer that was used by Park Maintenance Foreman Roberto Beringuela in measuring canopy cover



Park Ranger Ludygario Matira (middle) tying the nylon wire on a stilt root of a *Rhizophora* tree within Plot 8



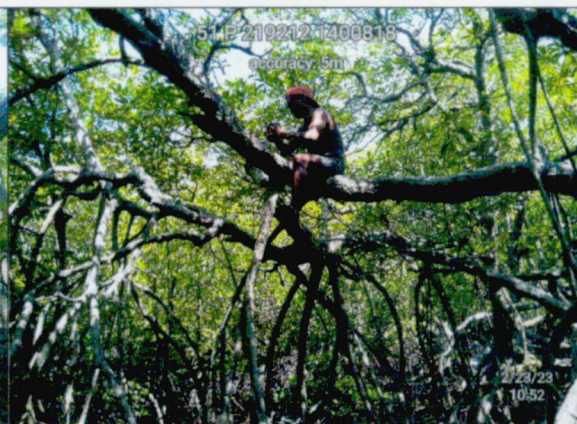
Boat Crew Jaysrael Urieta marking the corners of Plot 8



Boat Crew Jaysrael Urieta marking the corners of Plot 9



CMEMP Extension Officer Hugo Salvador (right) measuring tree height of large trees within Plot 2



Park Ranger Ludygario Matira (middle) climbing a mangrove tree within Plot 3 to measure its dbh



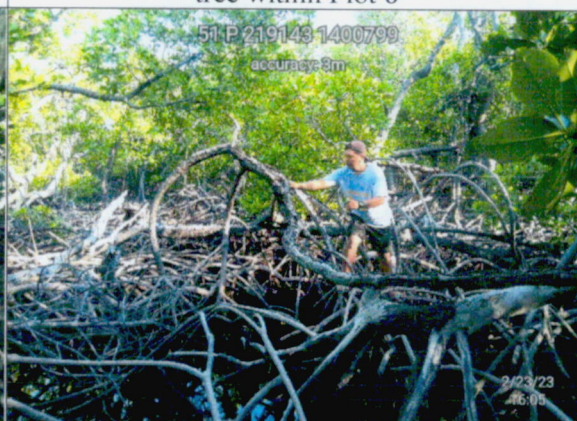
Photograph of the convex spherical densiometer that was used by Park Maintenance Foreman Roberto Beringuela in measuring canopy cover



Park Ranger Ludygario Matira (middle) tying the nylon wire on a stilt root of a *Rhizophora* tree within Plot 8



Boat Crew Jaysrael Urieta marking the corners of Plot 8



Boat Crew Jaysrael Urieta marking the corners of Plot 9