



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



OCT 03 2022

MEMORANDUM

FOR : The Regional Executive Director
DENR MIMAROPA Region
1515 L&S Bldg, Roxas, Blvd.,
Ermita, Manila

THRU : The ARD for Technical Services

FROM : The OIC, PENR Officer

SUBJECT : **SUBMISSION OF 3RD QUARTER C.Y 2022
ACCOMPLISHMENT FOR THE FASPO FUNDED
SPECIAL PROJECT “ RESEARCH ON META-
POPULATION OF TAMARAW IN MINDORO”**

Forwarded is memorandum dated September 22, 2022 of TCP Coordinator regarding Submission of 3rd Quarter Accomplishment Report on the FASPO Funded Special Project “**Research on Meta Population of Tamaraw in Mindoro Island.**” The goal of this study revolve on the establishment of information on the island-wide habitats, distribution and estimate populations of tamaraw in Mindoro, and develop alternative counting methodologies to estimate tamaraw population suitable to range of habitat types.

Attached is the detailed accomplishment report of the Community Consultation conducted as part of the Key Informant Interview (KII) in five (5) municipalities in Oriental Mindoro.

For information and record.


ERNESTO E. TAÑADA

TSD-CDS10/032022

Copy furnished:

1. Planning Section
2. file

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

September 22, 2022

MEMORANDUM

FOR : The OIC, PENR Officer
Mamburao, Occidental Mindoro

FROM : The TCP Coordinator
San Jose, Occidental Mindoro

SUBJECT : SUBMISSION OF 3rd QUARTER C.Y. 2022
ACCOMPLISHMEMNT FOR THE FASPO FUNDED
SPECIAL PROJECT "RESEARCH ON META-
POPULATION OF TAMARAW IN MINDORO"

The **DENR-Tamaraw Conservation Program** is currently conducting a Foreign Assisted and Special Projects Office (FASPO) funded **Research on Meta-population of the tamaraw in Mindoro Island**. The goals of this study revolve on the establishment of information on the island-wide habitats, distribution, and estimate populations of tamaraws in Mindoro, and develop alternative counting methodologies to estimate tamaraw population suitable to a range of habitat types.

Target activities for the 3rd quarter of said research project is the conduct of Community Consultation Thru Key Informant Interview (KII) in five (5) municipalities in Oriental Mindoro; Develop alternative counting methodologies that suitable in range of possible habitat of Tamaraw.

Forwarded and submitted herewith is the report on the KII conducted in six (6) out of five (5) target municipalities in Oriental Mindoro, Report on conducted pilot testing of dung-transect method, and highlights on conducted workshop on the implementation of Tamaraw Project in Presentation of possible population monitoring methodologies.

For your information, and record.

NEIL ANTHONY DEL MUNDO





3rd Quarter Accomplishment Report in Implementation of Tamaraw Meta-population Research of Tamaraw in Mindoro

Introduction

The Tamaraw (*Bubalus mindorensis*) is a dwarf buffalo endemic to Mindoro Island. The species is known for its short “V” shaped horns, slightly hairier skin, and standing only four feet tall at the shoulders. Historically, Tamaraw are thought to have been present across the entire island, from sea level up to 2000 meters asl in a range of habitats including secondary forest and grassland. However, the population of the species start to decline due to many factors; an outbreak of rinderpest, a highly contagious viral disease of domestic cattle that cause sharp decline from 1900 to 1949; the continuous disturbances in its habitat due to human activities such as unregulated slash and burn farming that contributing to the decrease of the available grazing area; and wildlife poaching.

The Tamaraw is categorized as Critically Endangered based on the DENR-Department Administrative Order No. 2019-09 or the “Updated List of Threatened Philippine fauna and their Categories”. Today, there are four known population of tamaraw in Mindoro, namely: Mts. Iglit-Baco Natural Park (MIBNP), where the bulk of the population resides and the most extensively surveyed and monitored thru the Annual Population count of species conducted by the DENR – Tamaraw Conservation Program, where 403 individuals accounted for this year; Upper-Inner Amnay Watershed Region with 10-60 individuals; Aruyan-Malati Tamaraw Reservation of 3-15 based on regular patrolling data and camera trapping; and Mt. Calavite Wildlife Sanctuary with 4-6.

The Department of Environment and Natural Resources thru its Tamaraw Conservation Program conducted a Population and Habitat Viability Assessment workshop (PHVA) on December 2018 and resulted in the creation of the Tamaraw Conservation and Management Action Plan (TCMAP), funded by the UNDP-Biodiversity Finance Initiative (BIOFIN) and facilitated by International Union for Conservation of Nature and Asian Wild Cattle Specialist Group (IUCN-AWCSG). During the PHVA workshop, stakeholders identified many issues and concerns that lead in crafting the 10-year TCMAP. Per TCMAP, there are gaps on the knowledge about the Tamaraw. This issue is caused by information gaps on the possible locations and habitat range of the species. As a result, estimation of the island-wide population is difficult and current limitations include population estimates within the core habitat inside Mts. Iglit-Baco Natural Park (MIBNP).

Hence, to further fill the missing gap on the knowledge of species’ population across Mindoro, the research on meta-population aims to answer some primary issues and concerns on meta-population component on the gaps identified. Bridging this gap can provide substantial information on population dynamics, locations, and habitat range of tamaraws within the Island of Mindoro and the project also aims to identify alternative counting methodology/ies for the tamaraw in a range of habitat type.

Research on the Meta-Population of Tamaraw in Mindoro Island is being funded by the DENR-Foreign Assisted Special Project Office (FASPO) and is an activity identified in TCMAP Activity Goals 1 and 2.

Goals of the activity are to

- Establish information on the island-wide habitats, distribution, and estimated populations of Tamaraws in Mindoro
- Develop alternative counting methodology/ies to estimate Tamaraw population suitable to a range of habitat types.

This will be done by conducting community consultations and gathering data from key informants in areas where there were reports of tamaraws. It also aims to document and assess other tamaraw habitats aside from four known and established tamaraw habitats. To date, there are only four known and established tamaraw habitats, these are:

- Mt. Calavite Wildlife Sanctuary in Paluan, Occ. Mindoro
- Mts. Iglit-Baco Natural Park in mid southern municipalities of Oriental and Occidental Mindoro
- Aruyan-Malati Tamaraw Reservation in Sablayan, Occ. Mindoro
- Upper Mindoro Range in Upper Amnay, Sablayan Occ. Mindoro and Naujan, Oriental Mindoro

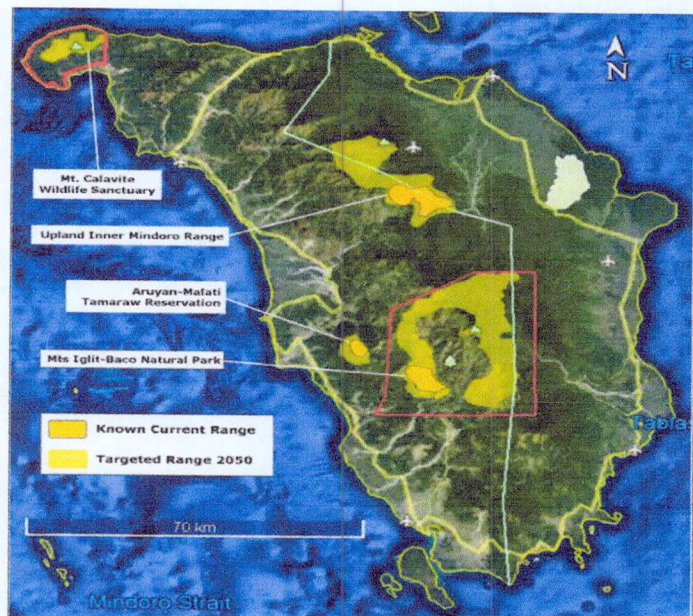


Figure 1. Known Tamaraw Habitats

Below is the summary of population estimates in known tamaraw habitats in Mindoro. It can be noted that the bulk of the population of said animals are in MIBNP but a significant number can also be found in Upper Amnay- Inner Upper Mindoro Range. This research also aims to conduct population census in Upper Amnay area.

Table 1: Summary of Tamaraw population estimates from 1987, 1996 to 2018. Modified from Long *et al.* 2018) (lifted from TCMAP)

Site	Year of population estimate		
	1987 ¹	1996 ²	2018 ³
Mounts Iglit-Baco Natural Park	145	175	400-500
Upper Amnay Watershed Region including Eagle Pass	65	65	5-70+
Aruyan-Malati Tamaraw Reservation	41	14-30	3-15
Mount Calavite Wildlife Sanctuary	45	>1	0-5
Santa Cruz – Pinagturilan	20	0	0

Oriental Mindoro (Municipalities of Victoria, Bansud, Bongabong and Mansalay)	40	0	0
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¹Petocz (1989); ²de Leon (1996); ³Long *et al.* (2018)

Here under is the list of activity per component of the project implementation.

Component 1	
A. Island-wide identification and mapping of Tamaraw locations and habitats	1. Initial map of Tamaraw likely habitats
	2. Identification and location of Tamaraw sightings thru Community Consultation (Key Informant Interview)
	3. Rapid habitat assessment of likely habitat based on the result if community consultation and island-wide suitability mapping.
	4. Process documentation report/technical report
	5. Final map of Tamaraw distribution and habitats
Component 2	
B. Meta-Population monitoring thru identification of appropriate count methods suitable to a range of habitat	1. Workshop/ with experts
	2. Consultations with stakeholders
	3. Consultation with stakeholders for the testing of population monitoring abd census methodologies.
	4. Field trial of method

**Report for the conduct of Component 1 of the Project; the
establishment of information on the island-wide habitats, distribution,
and estimated populations of Tamaraws in Mindoro subcomponent 1.1;
Key Informant Interview (KII)/ Community consultations**

For the whole duration of the project, there are 22 target municipalities to be conducted the Community Consultations thru Key Informant Interview (KII). For 3rd quarter 2022, KII was conducted in six (6) municipalities out of five (5) target municipalities.

For the 3rd quarter of CY 2022, Community Consultations were conducted in Bansud, Gloria, Pinamalayan, Naujan, Victoria, and Socorro, Oriental Mindoro. IPs in Bansud and Gloria have knowledge of possible habitation of tamaraw in “Barangay 35” and “Ilog ng Bansud” near the boundary of Occidental Mindoro, which, subject for verification survey. Meanwhile, IPs in Naujan and Victoria have knowledge of Tamaraw presence in Bucayao Monte, Bucayao Grande, Mt. Halcon; localities of “Bikratan” and “Sukdulan”. Lastly, interviewed IPs in Pinamalayan and Socorro have no knowledge of possible Tamaraw presence in their locality.

Prior to data gathering, communication letter to office of the Municipal Mayors of respective municipalities and to the concerned Barangay Officials was prepared and sent. After securing permission of the officials, the Meta – Population Survey Team conducted the data collection using key informant interview from August 17 – 19, 2022 in Bansud, Gloria, and Pinamalayan; September 01 - 03 in Victoria, Naujan, and Gloria, Oriental Mindoro.

A questionnaire was prepared for gathering and capture of data and aimed in creating demographic and socio-economic profile, assess respondent’s knowledge on Tamaraw and ecology and general understanding of Tamaraw and its habitat, and assess awareness on pressing issues and or problems in conservation of tamaraws. Survey team filled up the prepared questionnaire (attached, Annex A) based on the responses of the respondents. Data gathered were organized, classified, and analyzed. Further data analysis will be concluded to assess respondents’ profile and its importance in tamaraw conservation management.

COMMUNITY CONSULTATION RESPONDENTS’ PROFILE

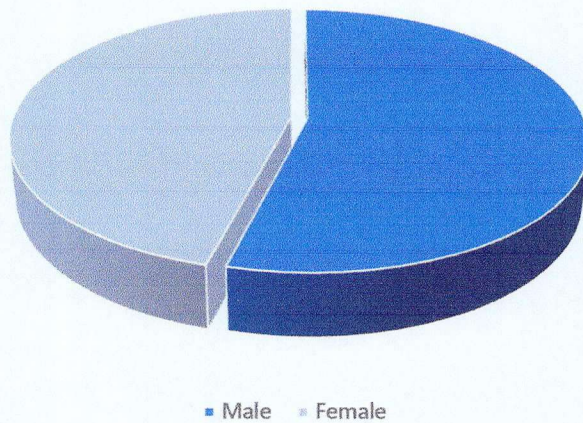
DEMOGRAPHICS

Age Group	Bansud	Gloria	Pinamalayan	Naujan	Victorla	Socorro
20 - 24	4	2	2	8	1	2
25 -29	4	5	4	4	4	3
30 -34	5	3	6	6	4	5
35 - 39	8	4	4	2	2	7
40 - 44	3	1	2	0	1	2
45 - 49	10	3	1	0	0	2
50 -54	1	3	1	1	1	2

55 -59	4	1	2	1	0	2
60 - 64	2	2	1	1	1	2
65 - 69	1	2	1	1	0	1
70 - Above	2	1	1	1	2	0
Total	44	27	25	25	16	28

Most of the respondents are relatively young, 60% were belong to ages 21-39 of the total respondents.

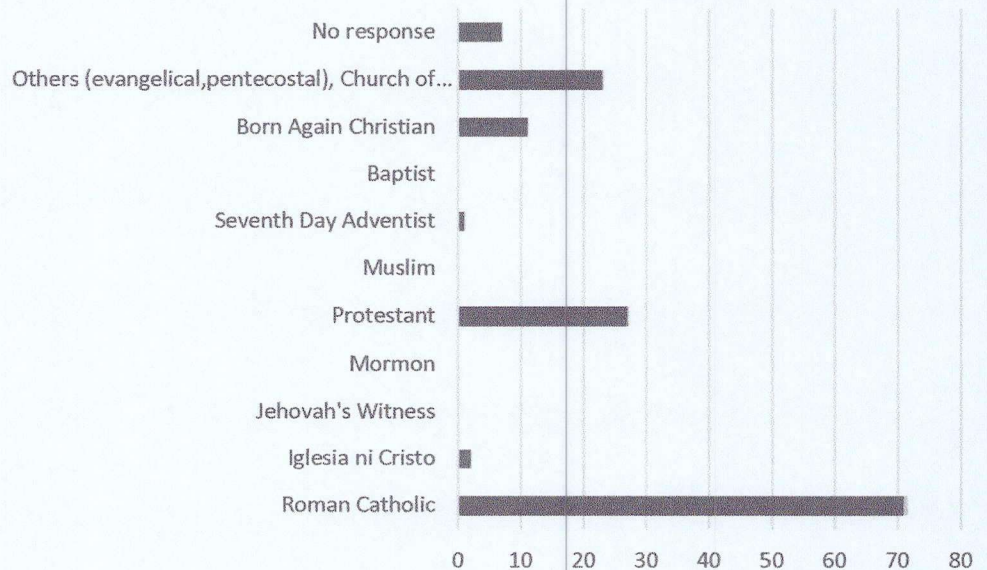
Sex of the Respondents



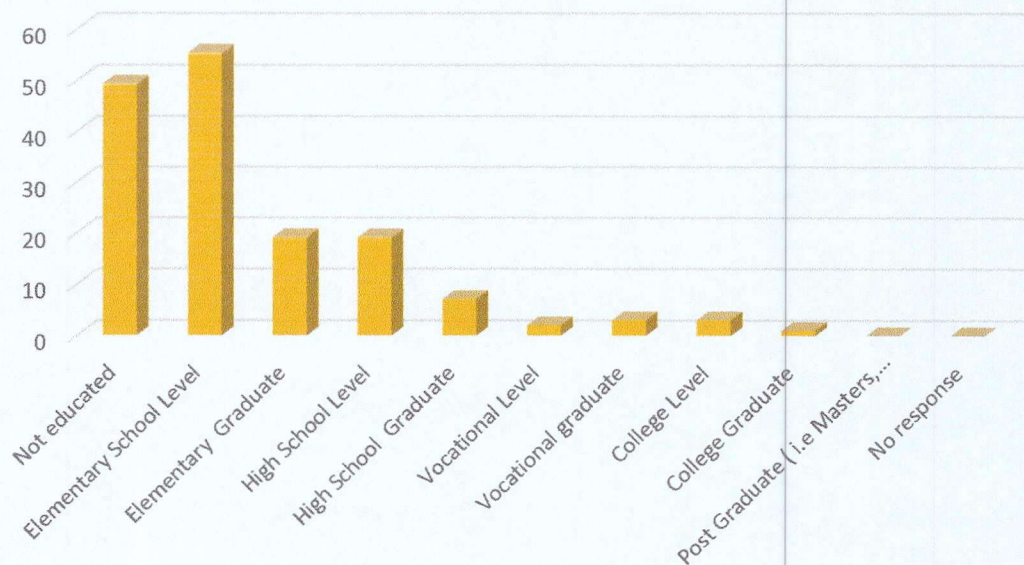
Majority of the respondent are male compromising of 54% of the 172 respondents.

All the respondents are in Christian religious sector, mostly are Roman Catholic with 50%; Protestant encompassing 19 %; and Evangelical of 16 %.

Religious Affiliation

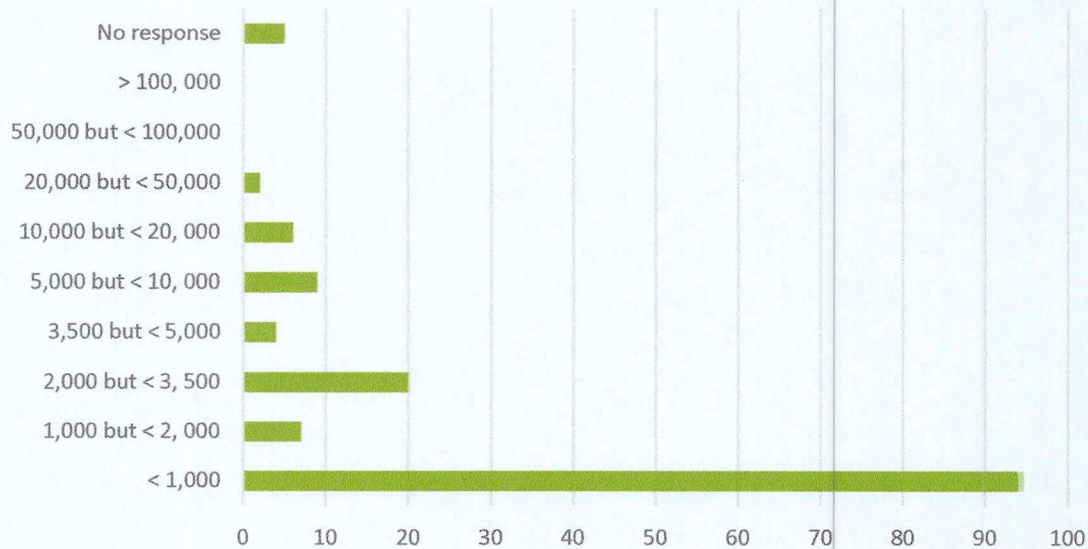


Educational Attainment



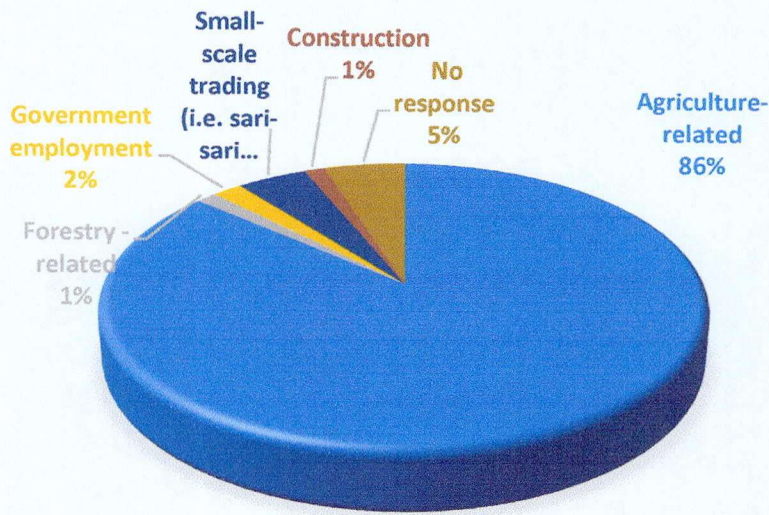
Most of the respondents have some level of education, 35% were in elementary school as highest level of educational attainment, and 31% has not attended school at all.

Monthly Income



92% of the respondent has 1,000 to not more than 10,000 of monthly income mostly IP's relying in agriculture; 64 % of the respondents were in the poverty line, in which, they only have 1000 pesos monthly income.

INCOME SOURCES

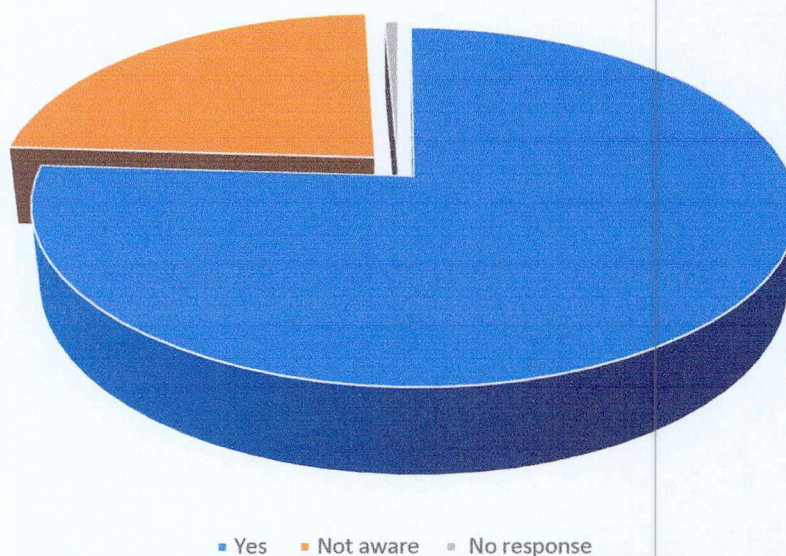


Most of the income source of the respondents are heavily dependent in agriculture-related, which are mainly producing crops such as palay, root crops, and *kopra*, etc, plantation of fruit-bearing trees and forestry-related products.

Gauge of level of Awareness of Respondents about Tamaraws and its Conservation

Respondents from six (6) barangays in Oriental Mindoro that conducted Key Informant Interview, 55% said that the tamaraw resemble carabao.

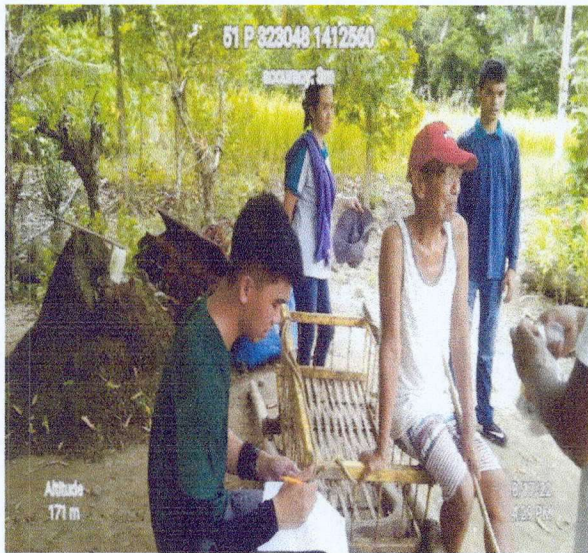
Tamaraw Awareness



59% of the respondent were aware of the tamaraw, and the possible habitation of the species.

Result of Community Consultation

Municipality (Oriental Mindoro)	Key Informants (Mangyan Group/Respondents)	Result
Bansud	Tau Buid group of IP	"Barangay 35", near the boundary of Occidental Mindoro
Gloria	Tau Buid and Tadyawan groups of IP	"Ilog ng bansud", near the boundary of Occidental Mindoro
Pinamalayan	Buid and Tadyawan groups of IP	Negative presence
Naujan	Alangan group of IP	Aware of tamaraw presence in Bucayao Monte, Bucayao Grande, Bikratan, and Sukdulan
Victoria	Alangan group of IP	Aware presence of Tamaraw in Bucayao Monte, Bucayao grande, and Mt. Halcon.
Socorro	Tadyawan group of IP	Negative presence



Report for the component two (2) of the project; Meta-population monitoring thru identification of appropriate count method suitable to a range of habitat type subcomponent 2.1; Report on the workshop conducted

Highlights of conducted workshop on the implementation of Research of Meta-population of the Tamaraw in Mindoro Island in Presentation of possible population monitoring methodologies and survey protocol

The workshop on the research of Meta-Population of Tamaraw was held on June 03, 2022 at Siburan River Park, Sablayan Prison and Penal Farm, Sablayan, Occidental Mindoro.

Present

DENR Office

PENRO Occidental Mindoro - Ellie Nunez

CENRO Sablayan - Alvin Saneco
- Ferdinand Magno

Local Government Unit

MENRO Sablayan - Charlou Ormega
- Erwin Cacabelos
- Norie Gallinera
- Raiza Joy Cusi
- Alfredo Sarona JR.

TCP Partner

D' Aboville Foundation. - Fernando Garcia

IP Representatives
- Jun Tibayan
- Danseco Tibayan
- Valentin Mayag
- Timothy Gregorio

DENR- TCP - Staff and Survey team

Agenda

1. Together with Stakeholders, to come up with of possible methodology/ies for monitoring tamaraw population in Upper Amnay Region
2. To keep stakeholders informed about the project's schedule of activities.

The meeting began with TCP Coordinator, Neil Anthony del Mundo's opening remarks, in which he offered his greetings and introduced the agenda.

Transcript of the Consultation and Agreements Reached

TCP Technical Staff, Alvin Tabuga, began the discussion with Project's Profile including the basis and history. He also highlighted the project's objectives:

1. Established information on the island-wide habitat, distribution, and estimated population of tamaraw in Mindoro;
2. Develop alternative counting methodologies to estimate tamaraw population that is suitable to range of habitat types.

He also outlined the project's target activities, and expected outputs.

Component 1 of the project includes:

1. Initial map of likely habitat;
2. Community Consultation/ Key Informant Interview covering 22 municipalities of Occidental and Oriental Mindoro;
3. Rapid habitat assessment/ verification survey including 22 municipalities in two provinces of Mindoro;
4. Documentation report/Technical report;
5. Final map of tamaraw distribution of habitat

Component 2 includes:

1. Workshop/meeting with experts;
2. Consultation with stakeholders;
3. Consultation with stakeholders for the testing of population monitoring and census methodologies;
4. Field trial of population monitoring and census methodologies.

TCP Coordinator, Neil Anthony del Mundo, discussed the Project's status as of second quarter of 2022. Physical accomplishments includes:

1. Initial map of likely habitats;
2. 16 of 22 or 73% of target municipalities have conducted community Consultations/Key Informant Interviews;
3. Seven municipalities have already conducted of rapid habitat assessment/verification survey;
4. 50% were accomplished processing documentation report;
5. Final map of tamaraw distribution and habitat to be accomplished after the verification surveys.

Mr. del Mundo explain the project's methodology, Key Informant Interview, which is a form of community consultation using standard set of questions capturing demographic socioeconomic, tamaraw, and biodiversity consciousness data in communities near the Inner Mindoro Range communities with documented Tamaraw in the past but not included in the current list, as well as select agency and non-government organizations. On the basis of the data acquired in KII, a verification survey will be conducted.

TCP Wildlife Veterinarian, Mikko Angelo Reyes, presented population census and monitoring methodologies for large mammals being used worldwide. These methodologies are as follows;

1. Ecological Assessment,
 - a. Risk Assessment;
 - b. Biodiversity survey and monitoring,
 - c. impact assessment;
2. Population assessment,
 - a. total count,

- b. line transect,
- c. aerial survey,
- d. indirect method including counting,
- e. camera traps,
- f. electro-telemetry.

TCP partner, D' Aboville Foundation representative, Fernando Garcia presented biological concepts of exploring and testing of monitoring methodologies and enumerated methodologies under direct and indirect method of observation:

1. direct observation
 - a. Use of drone - can cover large area of monitoring;
 - b. Tagging - monitoring can be done anytime;
2. indirect observation:
 - a. Camera traps -can collect data over long period with no human presence needed;
 - b. Genetic analysis- can be conducted in any type of habitat;
 - c. transect method and patrolling- can be conducted in any type of habitat, and no technology involved, and no expensive operation.

Workshop Proper:

Based on the initial discussion, these are the possible methodologies that be applied in the census and monitoring of tamaraw population in Inner Upper Mindoro Range (upper Amnay Tamaraw Habitat)

1. Intensive Count Method (ICM) - this is the traditional count method being applied in the tamaraw core habitat in Mts. Iglit-Baco Natural Park. This methodology was developed and tested from 1997-2000 and was used starting 2000 up to this year as means of determining the number of tamaraw individuals in MIBNP core habitat. This method involves observation of the species in vantage point of eight (8) times within the duration of the count, specifically at early hours in the morning (i.e 5:30 AM to 7:00 AM) and at nightfall (5:30 PM to 8:00 PM). These window periods determined the most active grazing of herds. Also, counting periods determines the four (4) age classes: 1) adult; 2) juvenile; 3) yearling; 4) calf, and relative location of the herds. The count also differentiates by sex to determine population profile and succession dynamics.
2. Double Observer Intensive Count Method – This census methodology was developed in partnership with DAF and was tested from 2018-2022 to verify the result of ICM. This method involves groups walking the same transect 20 minutes apart. Record Tamaraw, Philippine deer and Oliver's warty pig with the help of GPS, and data sheets. It involved two different approaches: Independent and dependent double observer. The independent double observer design consists in two different observers, with no contact during the fieldwork. The dependent allows for the non-independent observations, with both observers aware of the sightings.
3. Dung Transect Method – This census methodology was developed together with DAF and was tested from 2018-2022 as an alternative methodology from ICM since burning of observation areas will be eliminated based on Burning Phase out plan of 2020-2025. . This Method involves walking transects of 500 m that are semi-randomly plotted avoiding rough terrain, cliffs and areas prohibited by the IPs. Each team composed of trail opener, dung spotter, data recorder measuring the

perpendicular distance of the dung to the transect line, taking GPS coordinates and encoding the data. Dung-Transect Method can utilize indirect observation of the studied species to record occurrence or estimate density of the animals through observing in transects.

Based on the discussion on the presented possible methodologies to be applied in Upper Amnay, it was agreed that the Dung Transect Method is the most appropriate given the following conditions and scenarios:

- a. ICM cannot be adopted in Upper Amnay since it is a different habitat from that of the MIBNP core habitat. In MIBNP, the habitat is composed mainly of grassland, havana, thus the ease of observation of tamaraws. In Upper Amnay, on the other hand, in a forest covered habitat.
- b. Lack of vantage points and the unfamiliar terrain makes it difficult to conduct ICM and Double observer.
- c. Tamaraw habitat in Upper Amnay covers a larger area compared to MIBNP core habitat, about 5x in size.
- d. **Dung Transect Method seems to be the best fit to test given the scenarios listed above.**

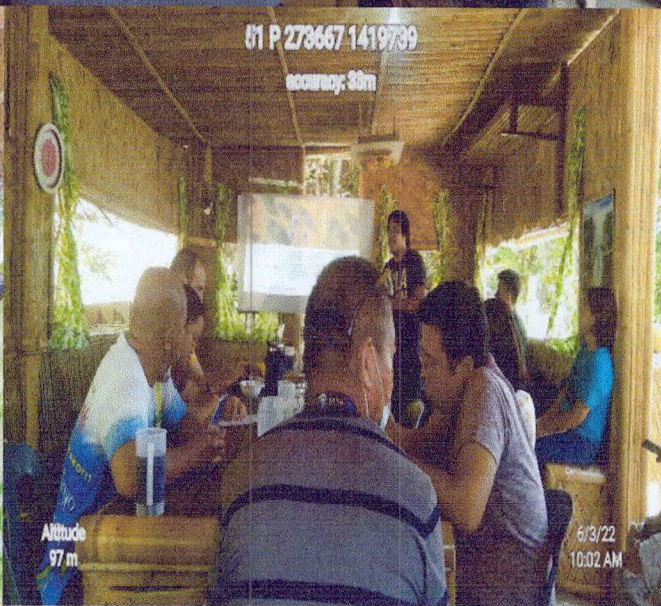
The protocol and design for the execution of the agreed methodology was also discussed for population monitoring in Upper Inner Mindoro:

- Define total extension of population and possible connection to other sub-populations;
- Create maps including habitat types, topography, landmarks, and indigenous communities;
- Define team involved in the research with proper skills;
- Field trial and training;
- At least 3 pilot testing for each season, 2 testing per year for 3 years
- Refine methodology based on the results and experiences on pilot testing;
- Final implementation of methodology.

Also discussed are the following Issues and concern during the workshop.

	Issues/Suggestions	Action taken/ to be taken
Charluo Ormega	Delineation of points in Upper Amnay for declaration as Critical habitat for tamaraw	TCP will be conducting additional assessment and survey in the region.

Charluo Ormega	Timeline of establishing Upper Amnay as Critical habitat to officially introduce the resolution to Sangguniang Bayan.	Based on WFP of TCP for 2022, and a priority activity of TCP, it will introduce the proposal to LGU-Sablayan by October this year.
Charluo Ormega	<p>Asked if the purpose of this meeting is to declare Amnay as critical habitat.</p> <ul style="list-style-type: none"> As per LGU, if there is no legal basis such as critical habitat, there will be no funding to hire tamaraw rangers for Amnay Suggest to include areas of at least 1-2 years of tamaraw presence 	The main purpose of the meeting is to inform stakeholders of possible methodologies of estimating tamaraw population in Amnay, which is the Dung transect method.
Ellie Nunez	Asked extent of elevation of possible habitation of tamaraw	1400+ meters asl based on indirect sign of species found by NGP in Blue Mountain, Rizal. However, based on observation, species is very adaptive in habitat type and elevation.
Fernando Garcia	<p>Reiterate the importance of declaring Amnay as Critical Habitat for Tamaraw and establishing population monitoring methodologies for the region.</p> <ul style="list-style-type: none"> Suggest the Dung transect as effective methodology/ies for monitoring tamaraw population in Upper Amnay Region 	
Neil Anthony del Mundo	Hiring of tamaraw ranger and warden	Will prioritize hiring of IP as additional Tamaraw ranger and warden when Upper Amnay is declared as Critical habitat and funds were available.





Report on the conduct of component two (2) meta-population monitoring thru identification of appropriate count methods suitable to a range of habitat type sub-component 2.0; Appropriate count method identified:

Initial Result of the Conducted Tamaraw Dung-Transect Method as a Population Monitoring in Upper-Inner Amnay

Introduction

The Tamaraw (*Bubalus mindorensis*) is a small, hoofed mammal endemic in Mindoro Island and is only endemic bovine species in Philippines. It is known to be widespread across the Island, however in 1930s, an outbreak of infectious viral disease of cattle known as the rinderpest affected the population of species. By the year 1969, number were estimated to have dropped under 100, prompting the international community for conservation. In the 20th century, the main threat to the species was habitat loss due to increased human activity such as hunting and farming by resettled and local people (Manuel, 1957; Harrison, 1969). In addition, according to Schutz (2015) the main threats nowadays are the lack of options for the remaining population to disperse and increase their range due to human pressure and undisturbed natural corridors, anthropogenic practices such as slash and burn agriculture (*kaingin*) structuring their natural environment.

In Philippine culture, the Tamaraw is considered a national symbol and flagship species of Mindoro provinces. The species share natural habitat over the ancestral land of the Mangyan communities who preserved traditional lifestyle, which, the Tamaraw and Mangyan depend on the preservation of their natural habitat for survival. For them the survival of the species is important as worth the survival of their tribes and culture. Proclamation No. 692 was enacted in 2004 to make October 1 as a special working holiday in province of Occidental Mindoro, and October as the Tamaraw Conservation Month reminding the public of importance, conservation of the species and its habitat. In addition, Toyota Motors Philippines released Toyota Kijang popularly known as the “*Tamaraw FX*”, which widely patronized by taxi operator and become popular mode of transportation much like of the taxi and jeepney. Far Eastern University’s varsity team was name after the species.

Annual population count of the species in Mts. Iglit-Baco Natural Park (MIBNP) of DENR-Tamaraw Conservation Program showed an increasing population since the start of counting in 2000. The highest recorded number were 523 in 2018. However, the species currently classified as Critically Endangered (CR) in the IUCN list of threatened species and based on DENR Administrative Order No. 2019-09 or “Updated List of Threatened Philippine Fauna and their Categories”.

Today, there are four known population of tamaraw in Mindoro, the largest known population of species is within the Mts. Iglit-Baco Natural Park (MIBNP) tamaraw can be found in grassland dominated landscape; meanwhile, Aruyan-Malati Tamaraw Reservation, unlike MIBNP, the locality remains mostly forested (Garcia-Gil, 2021). Residing Mangyan group of Tau-Buid in this locality is practicing slash and burn agriculture creating mosaic of open areas of bush/shrub land with forest regeneration, traditional hunting using snare traps and spear traps observed; then, Mt. Calavite Wildlife Sanctuary located in Paluan, Occidental Mindoro mostly covered by a mosaic of patches of open grasslands and secondary forests. Lowland forest (<1000 masl), lower montane (>1000 masl), and grassland (>600 masl) (MBCFI, 2019); Lastly, the Upper Amnay Watershed Region located in demarcation of two provinces. Experiences two types of climates, type 1 climate were observed in 700 m elevation, with two pronounced wet and dry seasons, which is climatic

type of Occidental Mindoro. On the North- east side, evenly distributed wet season with rainfall throughout the year, these climate types reflect the vegetation. One of the important localities is the Bucayao Grande Watershed in Oriental Mindoro coupled with an estimated elevation of up to 1200 masl, the resulting ecotones produce alpine habitats. These include mossy forest, creeping bamboo thickets, subtropical alpine forest, and scrubland habitats. In elevations of around 700 masl, extensive open areas, interspersed with secondary forests, are present (Schutz 2019).

Among the four known established population of tamaraw in Mindoro, MIBNP is the most extensively surveyed and only monitored thru the Intensive Concentration Count (ICC) or Simultaneous Multi-Vantage Point Count (SMVPC) since year 2000 within approximately 2,000 hectares Tamaraw core habit in the Park and it needs refinement, which, method includes “controlled burning” as a preparatory activity to improve visibility of tamaraw during counts as new sprouts of cogon (*Imperata cylindrica*) and talahib (*Saccharum spontaneum*) attract the species. However, the method has major disadvantages, which, includes burning of other species, reduction of soil fertility, limited diversity in grassland ecosystem, and deterrence of forest succession. The need of monitoring methodology in other three known population were important in bridging the gaps on knowledge providing reliable population estimate and the extent of the species’ distribution.

The Department of Environment and Natural Resources-Tamaraw Conservation Program conducted a Habitat and Viability Assessment Workshop (PHVA) on December 2018 and resulted in the creation of the Tamaraw Conservation and Management Action Plan (TCMAP), funded by the UNDP-Biodiversity Finance Initiative (BIOFIN) and facilitated by International Union for Conservation of Nature and Asian Wild Cattle Specialist Group (IUCN-AWCSG). During the PHVA workshop, stakeholders identified many issues and concerns that lead in crafting the 10-year TCMAP.

The research on meta-population aims to answer some primary issues and concerns on meta-population component such as gaps on knowledge of the population dynamics, location, and habitat of the tamaraw. Bridging this gap can provide substantial information on population dynamics, locations, and habitat range of tamaraws within the Island of Mindoro. As a result, estimation of the island-wide population is difficult and current limitations include population estimates within the core habitat inside Mts. Iglit-Baco Natural Park (MIBNP).

Tamaraw habitats, latest population estimates per site

Table 1: Summary of Tamaraw population estimates from 1987, 1996 to 2018. Modified from Long *et al.* 2018) (lifted from TCMAP)

Site	Year of population estimate		
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Upper Amnay Watershed Region including Eagle Pass	65	65	5-70+
Aruyan-Malati Tamaraw Reservation	41	14-30	3-15
Mount Calavite Wildlife Sanctuary	45	>1	0-5
Santa Cruz – Pinagturilan	20	0	0
Oriental Mindoro (Municipalities of Victoria, Bansud, Bongabong and Mansalay)	40	0	0

¹Petocz (1989) ²de Leon (1996); ³Long *et al.* (2018)

Mts Iglit-Baco Natural Park stretches in forestland of Rizal, Calintaan, Sablayan, and San Jose in Occidental Mindoro; Gloria, Bansud, Bongabong, Mansalay in Oriental Mindoro. The Park is the largest well-known and well-monitored population of the species of tamaraw in the province. However, the bulk population of species is found mostly in Sablayan and Calintaan. Meanwhile, series of surveys in 2017 and 2018 in Upper Amnay Watershed confirmed the presence of species in the region, seven different animals were observed directly, while through indirect signs there are possibly more than 65. Yet, according to local inhabitants there are approximate of 100 individuals (Long et al. 2018; Schutz 2019); Moreover, the Aruyan-Malati Tamaraw Reservation adjacent to Sablayan Penal and Prison Farm, Sablayan, Occidental Mindoro has estimated of individual 10-12 tamaraw in 2015, however, conducted survey in 2017 revealed of possible 15-20 individuals (Long et al. 2018). In addition, recent rangers' patrolling and monitoring observed two to three family groups and few solitary males; Next, Mt. Calavite Wildlife Sanctuary has 0-5 individuals (Long *et al.* 2018). However, expedition of MBCFi in 2019 reported that there were possible 4-6 individual thru indirect sightings (Hoof marks, fecal deposits, and grazed leaves); Moreover, study of Petocz (1989) in Pinagturilan, Santa Cruz discovered approximately 20 tamaraw individuals, but succeeding study revealed there were no longer tamaraw habitation in this locality. However, study of DENR-TCP in 2021 'rediscovered' the species in aforementioned locality thru indirect presence, signs suggest possible 4-6 individuals; Lastly, In Oriental Mindoro, there were documented population of species in municipalities of Victoria, Bansud, Bongabong, and Mansalay estimated population of 40 individuals (Petocz 1989).

Methodology

Description of Study Site

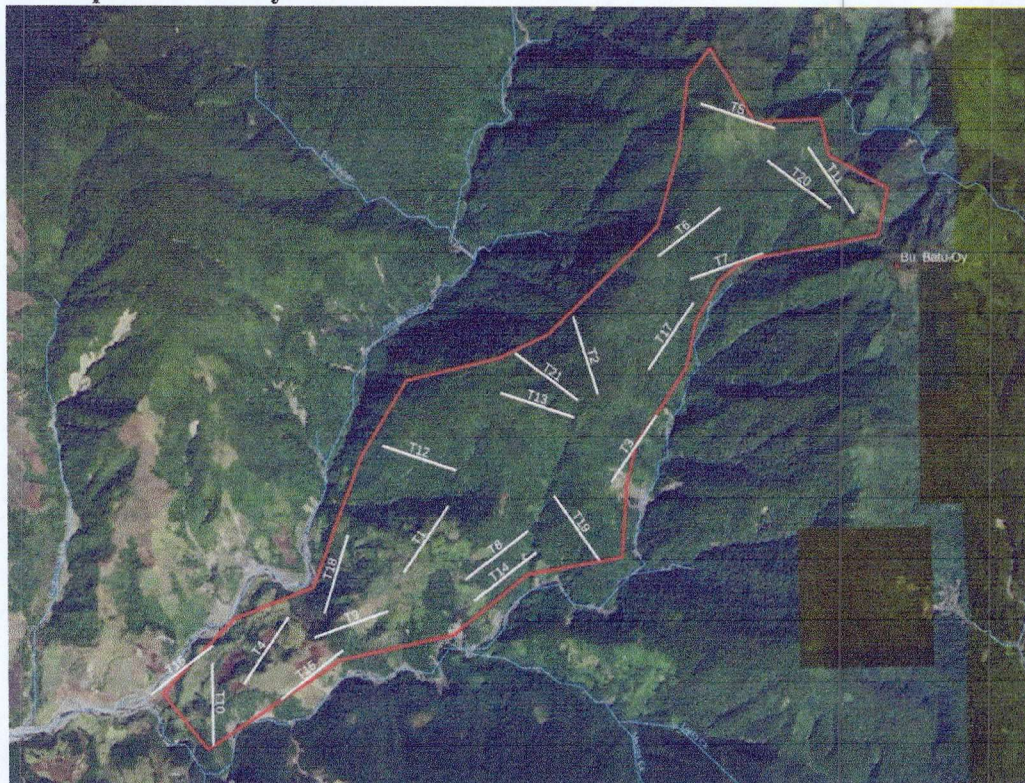


Figure 1. Map of study site and randomly selected transect-lines

The Upper-Inner Amnay Region is located in demarcation border of two Mindoro Provinces, it is politically bordered by Sablayan in Occidental Mindoro; Victoria and Naujan in Oriental Mindoro. Important localities are the Amnay river in East, Bu. Batu-Oy and Bucayao Monte in South, Ogos in West, and Aglabungan junction in North. Selection of the study area is based on the reports of tamaraw rangers of species' distribution, and compiled data of conducted surveys. Twenty-one (21) transect-line measuring 250 meters were randomly plotted in approximately 527.5 ha. During the study, type I and III climatic type were observed, where most of area ranging up to 700 m in elevation in the side of Occidental Mindoro experiences type 1 climate with two pronounced wet and dry seasons during the year. On the other hand, area on the North-east side experiences evenly distributed wet season with rainfall all over the year, these climatic types reflect the vegetation in this region. Study area is composed of Grassland and Scrubland (<600 meters asl), Upper montane forest (<1000 meters asl), and Sub-alpine forest (>1500 meters asl).

Transect 1, 4, 8, 9, 10, 12, 14, 15, 16, 18 (~300 – ~800 meters asl) this site is generally an open-canopy mostly grassland and secondary forest dominated by Cogon (*Imperata cylindrica*), Agoho del Monte (*Casuarina equisetifolia* Linn.), and Malatungaw (*Melastoma malabathricum* L.). Villages of residing Alangan group of IPs were observed in this area live in communal huts called “Bahay-lakoy”, conducting *kaingin* as form of agriculture; cassava, taro, corn and rice were the major crops; native pigs, and chicken for community consumptions. Rattan is relatively few as it harvested for multiple use including for handicrafts products (basket, hammock) which they sell to Villa Cerveza, Victoria, Oriental Mindoro twice to thrice a month.

Transect 2, 3, 6, 7, 13, 17, 19, 21 (~ 900 – ~1200 meters asl) this site is composed of scrubland and secondary forest and is surrounded by lowland and montane forest. Tamaraw hoof marks, dungs were detected in trails. Abandoned IP's huts and *kaingins* were observed. The abandoned *kaingin* were colonized mostly by Malatungaw (*Melastoma malabathricum* L.), Cogon (*Imperata cylindrica*).

Transect 5, 11, 20 (~1500 - ~1600 meters asl) sub-alpine forest were observed in this site. Trees observed in this area appeared to have stunted growth, creeping bamboo locally known as *usiw* were also dense in the area, reaching to 1.5 to 2 meters in height. Forest floor is mostly covered with moss, and moist leaf litter.

Dung-Transect

This method involves observers walk along transect-lines and measure the perpendicular distance from the transect to the center of each dung they observed. Dung - Transect can be either line or point transect, then surveyed by having an observer moving along the line. Surveyor of this technique can utilize indirect observations of the Tamaraw, which is the species' dung to record the occurrence or estimate density. Also, the observer will take note the number of dungs, distance of dung parallel to the transect line, and habitat type where it is observed, and estimation of the age of dung. The Study team composed of staff and tamaraw rangers, wardens, and volunteer.

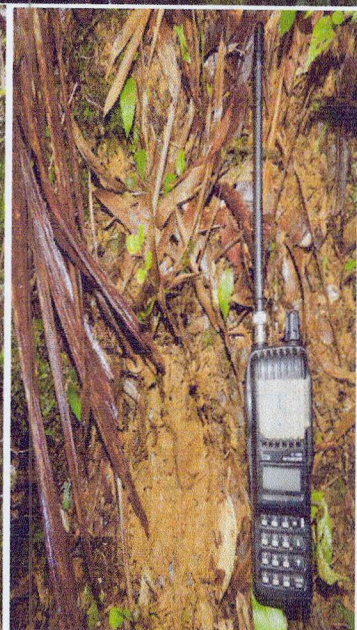
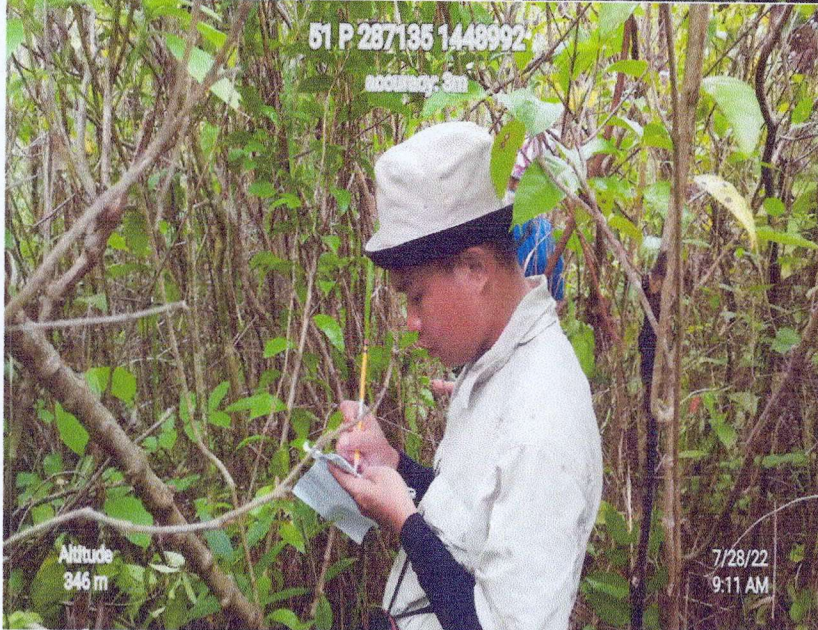
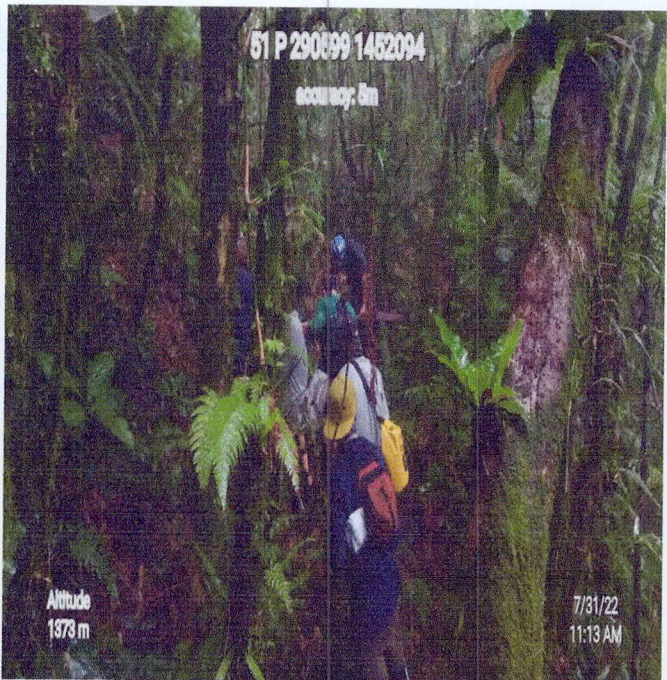
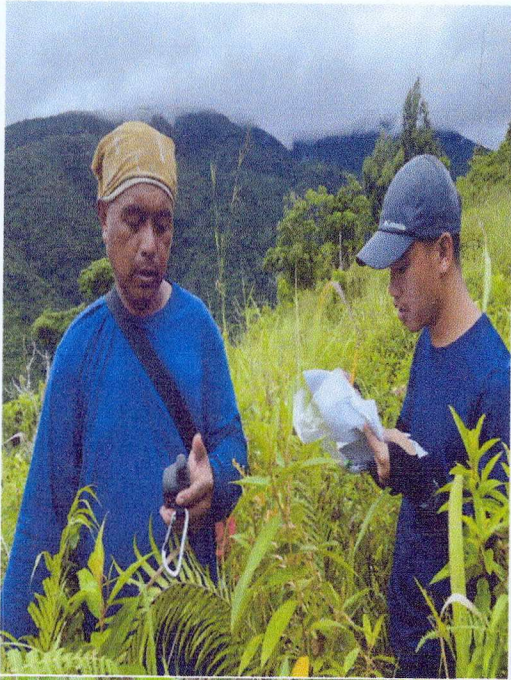
Results

Transect group	Transect number	No. of dungs observed
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~300 – ~800 meters asl	Transect 1	0
	Transect 4	0
	Transect 8	0
	Transect 9	Abandoned*
	Transect 10	0
	Transect 12	0
	Transect 14	1
	Transect 15	0
	Transect 16	0
	Transect 18	Abandoned*
~ 900 – ~1200 meters asl	Transect 3	2
	Transect 6	1
	Transect 7	0
	Transect 13	0
	Transect 17	1
	Transect 19	Abandoned*
	Transect 21	2
	Transect T2	2
~1500 - ~1600 meters asl	Transect 20	10
	Transect 11	8
	Transect T5	8
Total no. of dungs observed		35

* Abandoned transect were because of the topography and may impose risk to study team.

The results will be subjected to statistical and other data analysis tools to determine the population of tamaraws in the study area - a portion of tamaraw habitat in Upper Inner Amnay





Report on the Financial and Physical Accomplishment of the “Tamaraw project” for the 3rd quarter of 2022

Financial Accomplishment

(2022)

Financial				
Allotment	Obligation	% Obligation	Disbursement	% Disbursement
1, 110, 000	761, 125.89	69	249, 499.58	22

For the conduct of “Research on meta-population of tamaraw in Mindoro”, as of 3rd quarter of 2022, the obligated and awarded were ₱ 761, 125.89 or 69 % of ₱ 1, 110, 000, the remaining fund is ₱ 348, 874.11.

Physical Accomplishment

Major components (Component 1)

Expected Outputs	Overall Target	Cumulative Target (2021+2022+2023)	Cumulative Accomplishment		Status
			No.	%	
Initial Map of Likely Habitats	1	1+0+0	1	100	Completed
Community Consultations/Key Informant Interviews (no. of Municipalities)	22	9+13+0	21=9+12+0	95%	Remaining (2) municipalities were scheduled in 4 th quarter.

Rapid habitat assessment/verification survey (no. of Municipalities)	22	3+11+6	10=3+7+0	45%	On-going
Process documentation report	2	1+0+1	1	50%	On-schedule (2021) report is already prepared, however, capturing only the activities so far conducted.
Final map of Tamaraw distribution and habitats	1	0+0+1	0	0%	2023 Final output

Physical Accomplishment
Major components (Component 2)

Expected Outputs	Overall Target	Cumulative target 2021+2022+2023	Cumulative accomplishment		Status
			No.	%	
Workshop/meeting with experts	1	1+0+0	1	100%	Completed
Consultation with stakeholders	1	1+0+0	1	100%	Completed

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