

MARINE TURTLE CONSERVATION PROGRAM AT PUERTO PRINCESA SUBTERRANEAN RIVER NATIONAL PARK: CHALLENGES AND OPPORTUNITIES DURING COVID-19 PANDEMIC

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ABSTRACT

Marine Turtle Conservation Program (MTCP) at the Puerto Princesa Subterranean River National Park (PPSRNP) is located in the West Coast of Palawan, known as the Coral Triangle of the Philippines. This study described the profile of Marine Turtle Conservation Program (MTCP) at the Puerto Princesa Subterranean River National Park in terms of location, marine turtle species identification, number of hatchlings released per year, management organizational structure, and conservation activities. This study also aimed to determine the perceived management challenges and opportunities encountered by employees during Covid-19 pandemic. Documentary analysis, netnography, virtual focus group discussion, and structured questionnaires were used in data gathering. There were 3 recorded species in the conservation site, i.e., *Chelonia mydas*, *Eretmochelys imbricata*, and *Lepidochelys olivacea*. The average hatchling success from 2015 to 2021 was 82%, while the mean hatchlings per year was 1,659.4 (\pm 699.31). The lowest hatchling success was 697 hatchlings in 2014-2015, while the highest was 2,476 hatchlings in 2019-2020. The MTCP is under the supervision of Protected Area Superintendent (PASu) with management activities: regular monitoring of egg nesting and eggs hatching, implementation of easement zone, community coastal clean-up, hatchlings release, and conservation awareness campaign. Debris left by typhoon Rai (Odette) happened on 17 December 2021 was perceived as a very high challenge, while the absence of noise during nesting season was perceived as a very high opportunity.

Keywords: marine turtles, Philippines, Puerto Princesa Subterranean River National Park

INTRODUCTION

Puerto Princesa Subterranean River National Park (PPSRNP) was formerly declared as a national park on 26 March 1971 with Proclamation Document No. 835, while the official name was declared on 12 November 1999. The name Puerto Princesa Underground River (PPUR) was proclaimed in 2012 as one of the new seven (7) Natural Wonders of Nature (Acero 2020). The inscription of the Park as a UNESCO World Heritage Site was carried out in 1997. Puerto Princesa Subterranean River National Park (PPSRNP) is known as the world's longest navigable underground river. The Park is located in the West Coast of Palawan, 81 km north of the Puerto Princesa

City (Fig. 1). The Park Management of the Puerto Princesa City Government manages the park under the umbrella of programs for environmental conservation and sustainable development (Palawan Council for Sustainable Development).

The Marine Turtle Conservation Program (MTCP) of PPSRNP was first initiated by the United Nation Development Program-Small Grants Program (UNDP-SGP) in sitio Marta Fe in the Cabayugan village. (Notes: A sitio in the Philippines is a territorial enclave that forms part of a barangay. A barangay in the Philippines is a small territorial and administrative district forming the most local level of government).

The PPSRNP took over the management of the Program in 2015 and expanded to all beaches within the park. This study was conducted to determine the management

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Figure 1 Location of PPSNRP

challenges and opportunities during Covid-19 pandemic. Results of this study are expected to serve as a baseline for drafting management plans and policies, with Protected Area Management Board (PAMB) as the responsible party to tackle any negative impacts in the future pandemic, if any.

Based on the management objectives of the Park and Marine Turtle Conservation Management (MTCP), this study aimed to: 1) Describe the profile of Marine Turtle Conservation Program at the Puerto Princesa Subterranean River National Park in terms of location, marine turtle species identification, number of hatchlings released per year, management organizational structure, and conservation activities; 2) Determine the perceived management challenges and problems encountered by the MTCP employees during Covid-19 pandemic; and 3) Determine the perceived management opportunities and advantages met by the MTCP employees during Covid-19 pandemic.

MATERIALS AND METHODS

Relevant documents and related results of previous studies on the Puerto Princesa Subterranean River National Park (PPSNRP) were gathered from the park and MTCP

management to describe the profile of Marine Turtle Conservation Program (MTCP). A structured questionnaire was used to determine the perceived management challenges encountered by MTCP personnel. The questionnaire was written both in English and translated to Filipino dialect (Tagalog).

The questionnaire was pre-tested to PPSNRP staff that are not directly involved in the MTCP management and was revised based on the comments gathered from the staff. The Cronbach alpha value of the questionnaire was also determined after the pre-test. The final questionnaire was then distributed to 20 employees who were directly involved in MTCP management. Total enumeration of respondents who were directly involved in MTCP management was conducted to attest to the analysis of the gathered documents.

The questionnaire comprised three (3) parts. Part I requested information on the demographic profile of the respondents. Part II requested information on the related challenges which were met by the respondents in managing MTCP during Covid-19 pandemic. Part III requested information on related opportunities which were met by the respondents in managing MTCP during Covid-19 pandemic.

A four-point Likert scale was used in Parts II and III of the questionnaires, as what was

suggested in the pre-testing phase of the questionnaire. A four-point Likert scale was used to extract specific responses from the respondents. In Part II, the scales used were: 4 = very problematic; 3 = moderately problematic; 2 = minimal problem; and 1 = not a problem. In Part III, the scales used were: 4 = very high advantage; 3 = moderately advantageous; 2 = minimal advantage; and 1 = not an advantage.

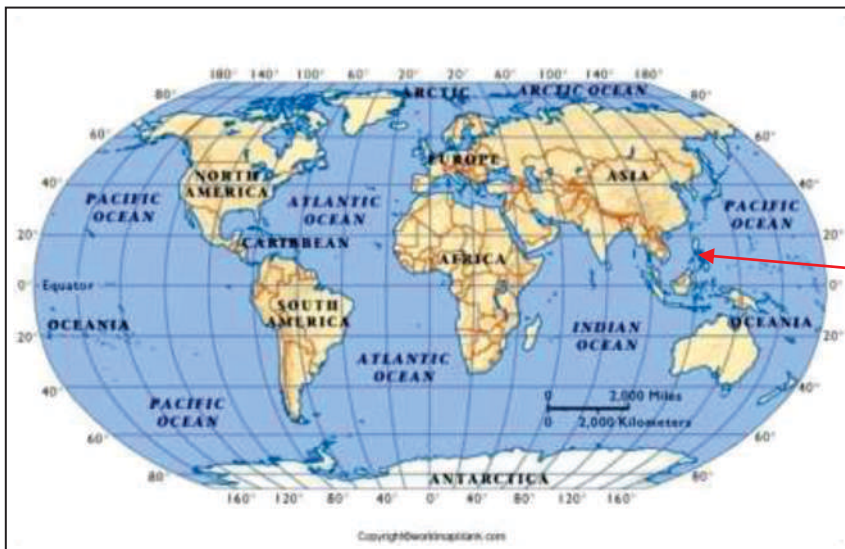
The data was statistically analyzed by using descriptive method. To clarify vague answers provided by the respondents, the netnography was used. The netnography analysis played an important role in the Focus Group Discussion (FGD), with key informants who further supported the claims stated in this study (Kozinets 2015).

RESULTS AND DISCUSSION

Profile of Marine Turtle Conservation Program (MTCP) at the Puerto Princesa Subterranean River National Park (PPSRNP)

The existence of marine turtles in PPSRNP is among indicators of healthy marine ecosystem. Aside from maintaining healthy seagrass and coral reef, marine turtles in PPSRNP boost ecotourism during the pre-pandemic era. (Genilan 2022).

The Marine Turtle Conservation Program (MTCP) is located in the latitude of 10°9'60"N and longitude 118°54'59.99" E of the world map (Fig. 2). The MTCP location is within the coverage of PPSRNP, which is in the crest of Coral Triangle (Fig. 3).



Location of the MTCP-PPSRNP:
10°9'60" N, 118°54'59.99" E

Figure 2 The MTCP-PPSRNP in the world map
Source: worldmapblank.com (2023)



Figure 3 Position of the Philippines in the Coral Triangle
Source: Acero (2020).

The Coral Triangle in Western Pacific region includes waters of Indonesia, Malaysia, the Philippines, Papua New Guinea, Timor Leste, and Solomon Island. Marine biodiversity concentrates in the triangle area as recognized by marine ecologists (Acero 2020). MTCP covers seven (7) beaches in PPSNRP boundaries facing Sulu Sea, which are along the beaches of Martafe, Sabang, Secret, Swimming Area, Camingay, Underground River, and Panablan (Fig. 4).

Recorded Species Nesting in the Conservation Sites

The Coral Triangle nurtures six of the world’s seven marine turtles species (World Wildlife Fund 2023), including the Leatherback, the Green turtle, the Hawksbill, Olive ridley, Loggerhead, and Flatback marine turtles (Coral Triangle Center 2021). Maclang (2017) reported that the sea turtles nesting in the MTCP area are Green turthe (*Chelonia mydas*), Hawksbill turtle (*Eretmochelys imbricate*), and Olive ridley (*Lepidochelys olivacea*) (Fig. 5), which are

commonly seen along the coastlines of the Coral Triangle.

Number of Hatchlings Released Per Year

In the seven MTCP sites located along the beaches of Martafe, Sabang, Secret, Swimming Area, Camingay, Underground River, and Panablan there are park rangers assigned in each site. There are sites that cannot be reached on foot for example the Martafe MTCP site can only be reached by boat.

Park rangers in each MTCP site monitor the mother marine turtle during nesting months, transfer the hatched eggs to the nearby artificial hatcheries, as well as count and record the number of hatchlings. In the period of 2015 - 2021, when PPSRNP took over the conservation program, there were 12,307 hatchlings released to the oceans (Fig. 6). The top 4 years having records of higher hatchlings were 2019 - 2020 (2,476), followed by 2015 - 2016 (2,243), 2019 - 2020 (2,137), and 2020 - 2021 (1,850).



Figure 4 The sites of MTCP-PPSRNP
Source: Genilan (2022)



Figure 5 Marine turtles found in the MTCP-PPSRNP sites (Genilan 2022)

Hatchling success from 2015 to 2021 was at an average of 82%. The lowest hatchling success was 697, while the highest was 2,476. The standard deviation was 699.31 and the mean hatchlings per year was 1,659.4.

To date, there is no available data for 2021-2022. During this period the park management suffered from insufficient manpower due to job retrenchment of contractual workers during Covid-19 pandemic. Another reason is the typhoon Rai/Odette that left debris in the nesting sites causing the shift of the available manpower in the nesting sites to immediately clear up debris instead of monitoring the nesting areas along the coastline.

Management Organizational Structure

The Marine Turtle Conservation Program (MTCP) is directly under the supervision of

Protected Area Superintendent (PASu) under the Conservation Protection and Empowerment (Fig. 7). To date, there are 20 employees assigned to the seven (7) MTCP sites. The City Government of Puerto Princesa manages the entire PPSRNP together with the Protected Area Management Board (PAMB). Protected Area Superintendent (PASu) and staff are under the umbrella of PAMB. PPSRNP as one of the Protected Area in Palawan, Philippines has three functions, i.e., conservation including MTCP, community empowerment and development, as well as tourism and community enterprise development. Despite the condition during Covid-19 pandemic, the PPSRNP and MTCP management continue to manage the tourism sites, including the MTCP, not only for attracting tourists but also to primarily focus on the protection of marine life and monitor biodiversity in PPSRNP.

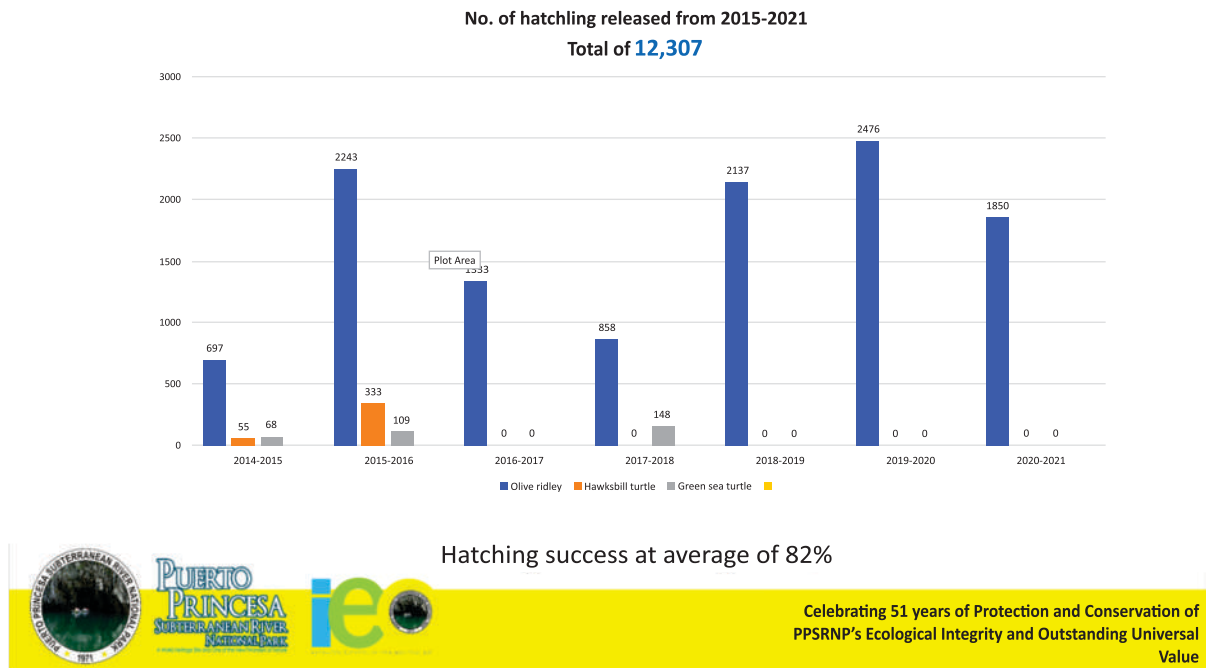


Figure 6 Number of hatchlings released per year (Genilan 2022)

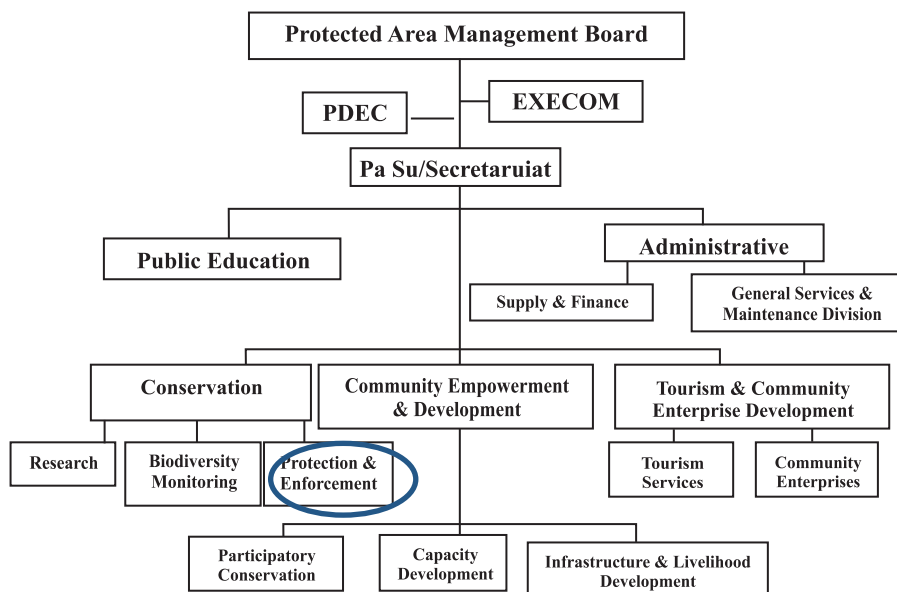


Figure 7 PPSRNP organizational structure
Source: PPSRNP Progress Report (2017)

Conservation Activities

The Protection and Empowerment arm of PPSRNP has been conducting management activities, such as annual regular monitoring of hatching cycle for hatchery preparation in early November), hatching monitoring based on moon phase, beach-walk monitoring at late evening and at dawn (from December to April of the following year), establishment and

implementation of easement zone in all conservation sites, coastal clean-up involving surrounding communities as partner, monitoring of nesting sites, releasing of turtle hatchlings involving surrounding communities and tourists, as well as awareness campaign on turtles and turtles conservation. During Covid-19 pandemic, however, the communities and tourists participation was halted.

Demographic Profile of the Employees Assigned to the Marine Turtle Conservation Program (MTCP) at the Puerto Princesa Subterranean River National Park (PPSRNP)

Demographic profile of the twenty employees assigned to the Marine Turtle Conservation Program (MTCP) at the Puerto Princesa Subterranean River National Park (PPSRNP) is presented in Table 1. In terms of age range, the demographic data indicated that more than the majority of the employees are in the establishment stage of their career (25 - 44 years). Employees within this age range denote that they are already decided on their chosen field of work. These employees are also taking initial steps for advancement of their career (Super *et al.* 1996). With regard to their educational background, sixty percent are college graduates, while only forty percent are high school graduates. Seventy percent are park rangers who are directly involved in the field work and management of MTCP.

The peak field work of park rangers happens during the nesting months. The park rangers are alternately scheduled to monitor the coastlines early in the morning during the nesting months. The mother marine turtles usually lay their eggs from midnight to 5:00 in the morning. Subsequently, park rangers carefully place the newly laid soft eggs to the nearby artificial hatchery. As the focal technician at the MTCP, the management hired three marine biologists to tackle the technical aspects of the MTCP management. The marine biologists took turns in visiting the seven MTCP sites and coordinated with park rangers on their

respective duties. The marine biologists are also responsible establishing progress reports to be presented and reported during the regular meetings of the PAMB.

Challenges and Problems Encountered in the Management of Marine Turtle Conservation Program during Covid-19 Pandemic

The least problems (mean of 2.0 - 2.8) encountered by the respondents were routine activities (statements 1.a to 1.e of Table 2), such as night patrols, collection of the to-be-released hatchlings. In regard to production activities (statements 2.a to 2.e of Table 2), the respondents rated moderate problems on monitoring premature hatchlings and counting of hatchlings, while rated the least problems on record keeping and monitoring the egg-laying activity of mother turtles. Minimal problems (mean of 2.1 - 2.3) in the environmental issues (statements 3.a to 3.c of Table 2) were unpredictable high tides and sudden change in temperature.

The occurrence of Typhoon Rai (Odette) on 17 December 2021 was rated as being very problematic (mean of 3.8). The typhoon left bulk of debris on the nesting sites. Although zero mortality reported, there were 86 tourists-transporting boats destroyed during the event of the typhoon. Typhoon Rai (Odette) caused significant damages not only in the MTCP sites but also in the entire PPSRNP. A century old Dipterocarp trees grown in the PPSRNP were uprooted which may trigger forest fire, if being left until the trees dry out.

Table 1 Demographic profile of employees assigned to the MTCP at the PPSRNP

Category	Frequency	Percentage (%)
1. Age		
• 26 - 30	5	25
• 31 - 35	11	55
• 36 - 40	3	15
• 41 - 50	1	5
2. Educational Background		
• High school	8	40
• College	12	60
3. Job Description		
• Marine Biologist	3	15
• Park Ranger	14	70
• Others	3	15

Table 2 Challenges and problems in MTCP management during Covid-19 pandemic

Statements	Mean	Interpretation
1. Routine activities		
a. Night patrols during egg laying months	2.7	minimal problem
b. Collection of turtle eggs	2.7	minimal problem
c. Handling of turtle eggs from nesting site to hatchery	2.8	moderate problem
d. Monitoring of egg in the hatchery	2.55	minimal problem
e. Releasing of hatchlings	2.55	minimal problem
2. Production activities		
a. Monitoring of premature hatchlings	2.9	moderate problem
b. Monitoring of mother turtles that lay eggs	2.35	minimal problem
c. Counting of hatchlings	2.70	moderate problem
d. Record keeping such as the number of eggs placed in the hatchery and the number of hatchlings produced	2.55	minimal problem
3. Environmental factors affecting egg-laying activity and hatchability of turtle eggs		
a. Unpredictable high tides	2.1	minimal problem
b. Sudden change in temperature	2.3	minimal problem
c. Occurrence of Typhoon Rai (Odette)	3.8	very problematic
4. Physical factors		
a. Debris in the nesting sites	3.75	very problematic
b. Disturbance, such as presence of tourists	1	No Problem
c. Noise pollution during nesting season	1	No Problem

During Covid-19 pandemic, there were lack of manpower in the MTCP to immediately clean the debris from the MTCP sites. The understaffed MTCP found it difficult to clean the debris on the nesting sites since granular lockdowns was imposed and the rise on Covid-19 positivity rate was apparent in Palawan Province from November 2021 to January 2022. Retrenchment of contractual workers due to Covid-19 pandemic was a contributing factor in the understaff condition of the MTCP. Granular lockdowns also deterred the movement of heavy equipment from the Puerto Princesa City engineering office to the MTCP sites. Supposedly, heavy equipment would help a lot in the removal of uprooted logs from century old Dipterocarp trees that were run-off during the typhoon.

Debris in the nesting sites was rated as very problematic (mean of 3.75) for physical factors (statements 4.a to 4.c of Table 2). Cumbersome debris were scattered along the beaches as an aftermath of Typhoon Rai (Odette). These debris caused major disturbance on the nesting sites for marine turtles. Nesting sites with lots of debris is a major disturbance for the mother turtles in reaching the nesting sites for laying eggs.

Aguillera *et al.* (2018) reported that significant effect was found among nesting sites with high, medium, and low debris density, compared with the control group. The denser the debris in the nesting sites, the lower crawl times was reported. The study of Fujisaki & Lamont (2016) revealed that removal of large debris had increased the nesting activities of sea turtles. Large debris posed adverse impact on the nesting behavior of sea turtles. Furthermore, Fujisaki and Lamont (2016) concluded that removal of large debris is an effective means to enhance nesting of sea turtles.

Respondents rated no problem (1) on statements 4.b (disturbance, such as presence of tourists) and 4.c (noise pollution during nesting season). The MTCP was closed for tourism during Covid-19 pandemic.

Responses obtained from the questionnaire indicated that Covid-19 pandemic indirectly affected MTCP management. The main challenge was the occurrence of natural phenomena, such as the Typhoon Rai (Odette). Job retrenchment and granular lockdowns that deterred the movement of heavy equipment from Puerto Princesa City engineering office to MTCP sites were the indirect challenges brought about by Covid-19 pandemic.

Opportunities and Advantages in the Management of Marine Turtle Conservation Program during Covid-19 Pandemic

Respondents perceived a very high advantage (mean of 3.9) on MTCP management in terms of night patrols during egg-laying months (statement 1.a) (Table 3). On the other hand, respondents rated moderately advantageous (mean of 2.75 - 3.45) in regard to almost all routine and production activities (statements 2.a to 2.d of Table 3), such as night patrols during egg-laying months, collection of turtle eggs, handling of turtle eggs from nesting site to nearby artificial hatchery, monitoring of eggs in the nearby artificial hatchery, and the release of hatchlings. The moderately advantageous (mean of 2.75 - 2.95) was obtained in production activities (statements 2.a to 2.d of Table 3), including monitoring of premature hatchlings, monitoring of egg-laying activity of mother

turtles, counting of hatchlings, and record keeping.

The respondents also rated environmental factors affecting the egg-laying and hatchability of the turtle eggs (statements 3.3.a to 3.3.b of Table 3) as moderately advantageous (mean of 2.8), including monitoring high tides and low tides schedules and monitoring temperature.

The physical factors (statements 4.a to 4.c of Table 3) was rated as not advantageous (mean of 1.15) which affected the cleaning of debris in the nesting sites. Statement 4.b about less trashes as pollutants brought by the presence of tourists compared with pre-pandemic era was rated moderately advantageous (mean of 2.9). Statement 4.c pertains to no noise pollution during nesting season compared with pre-pandemic era was rated very high advantage (mean of 3.9) by the respondents. The MTCP and all tourist destinations were tourist-free during Covid-19 pandemic.

Table 3 Opportunities and advantages in MTCP management during Covid-19 pandemic

Statements	Mean	Interpretation
1. Routine activities		
a. Ease in night patrols during egg-laying months compared with that in pre-pandemic era	2.7	Low advantage
b. Ease in collection of turtle eggs compared with that in pre-pandemic era	3.45	Moderately advantageous
c. Ease in handling of turtle eggs from nesting site to hatchery compared with that in pre-pandemic era	2.75	Moderately advantageous
d. Ease in monitoring of egg in the hatchery compared with that in pre-pandemic era	3.05	Moderately advantageous
e. Ease in releasing of hatchlings compared with that in pre-pandemic era	3.05	Moderately advantageous
2. Production activities		
a. Ease in monitoring of premature hatchlings compared with that in pre-pandemic era	2.9	Moderately advantageous
b. Ease in monitoring of egg-laying activity of mother turtles compared with that in pre-pandemic era	2.75	Moderately advantageous
c. Ease in counting of hatchlings compared with that in pre-pandemic era	2.95	Moderately advantageous
d. Ease in record keeping, such as the number of eggs placed in the hatchery and the number of hatchlings produced, compared with that in pre-pandemic	2.8	Moderately advantageous
3. Environmental factors affecting egg-laying activity and hatchability of the turtle eggs		
a. Ease in monitoring the schedule of high tides and low tides compared with that in pre-pandemic era	2.8	Moderately advantageous
b. Ease in monitoring temperature compared with that in pre-pandemic era	2.8	Moderately advantageous
4. Physical factors		
a. Ease in cleaning the debris in the nesting sites	1.15	Not advantageous
b. Less trashes as pollutants brought by the presence of tourists compared with that in pre-pandemic era	2.9	Moderately advantageous
c. No noise pollution during nesting season compared with that in pre-pandemic era	3.9	Very highly advantageous

CONCLUSION

Determining the challenges, problems, and opportunities in managing biodiversity during a pandemic pose a research topic for environmentalist, specifically in the management of Marine Turtle Conservation Program (MTCP). Results of this study are expected to provide guidelines for the protected area management and environmental planners to plan for possible management solutions on the problems encountered by MTCP employees who are directly involved in MTCP management. This study revealed that the very high problem/challenge encountered by the employees was the debris left by Typhoon Rai (Odette) in the nesting sites. It is, therefore, recommended that the MTCP-PPSRNP management should establish strategies for removing the debris brought about by the typhoon on the nesting sites before the next nesting period, in case of the occurrences of any other typhoons and pandemics. Tapping the assistance of the local government unit to provide manpower and equipment for removing debris in the nesting sites can be possibly done. The very high opportunity/advantage in MTCP management during Covid-19 pandemic was the absence of noise disturbance from tourists during nesting season. It is recommended that the influx of tourists to MTCP during the nesting season should be limited and if possible be avoided.

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