Final Evaluation Report

We ask all grant recipients to complete a project evaluation that helps us to gauge the success of your project. This must be sent in **MS Word and not PDF format**. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please DO NOT fill in and submit this form until the project has been completed.

Complete the form in English. Note that the information may be edited before posting on our website.

Please email this report to jane@rufford.org.

Your Details	
Full Name	Tuyen Le-Tran
Project Title	Exploring biodiversity and resources of seahorse (*Hippocampus* spp.) in Con Dao archipelago, Vietnam
Application ID	45421-1
Date of this Report	January 27th, 2026

1. Indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
A list of seahorse species composition in Con Dao archipelago				See "**Comment 1**"
Fisheries resource of Seahorse in Con Dao archipelago				See "**Comment 2**"
Threats of seahorse in Con Dao archipelago				See "**Comment 3**"

Comment 1

We measured total 2,621 individual seahorses after conducted field work from March to December 2025 in Con Dao archipelago, with specimens collected from local fishers at Ben Dam Port and their seafood shops. Of these, 25 specimens were collected for morphological and molecular analyses in the laboratory. After analysis, three seahorses distributed in Con Dao archipelago including: *Hippocampus trimaculatus*, *H. spinosissimus* and *H. kelloggi*. Their COI sequence and Cytb sequence were be uploaded to Genbank. These three species were rank as "VU" in IUCN, 2025, also as "VU" in Viet Nam Red List of Threatened Species, 2024.

Comment 2

Information about the fisheries was obtained through interviews with all seafood shops in Con Dao archipelago (n = 7) and with randomly selected fishers at the fishing port (n = 16). Due to their lower catch rates, individuals obtained by diving and crab nets were typically sold at retail prices ranging from 25,000 to 100,000 VND/ind. and from 20,000 to 100,000 VND/ind. respectively. Conversely, trawling, which provided larger catches and longer fishing periods (14 - 60 days), resulted in wholesale prices of 15 - 20 million VND/kg (Table 1). A total of 86.96% of interviewees reported that the seahorse catch in Con Dao had declined over the past 10 years. The wholesale prices at seafood shops (n = 7) ranged from 25 to 30 million VND/kg for dried seahorse. Only three stores sold fresh seahorse due to difficulties in preservation and weight loss over time, with prices of 10 million VND/kg (buyers 1, 3, and 6). The main sources of seahorse were purchased directly from fishermen, with trading activities taking place at Ben Dam Port and Hon Tre Lon Island. Two shops (buyers 1 and 2) also exploited seahorse at Hon Tre Lon and Hon Tre Nho islands. The main trading season for these stores was during holidays and weekends. Export prices to China ranged from 30 to 35 million

VND/kg for dried seahorse (buyers 1–6), while buyer 7 reported a fixed export price of 32 million VND/kg (Table 2).

Table 1 Fishing practices reported by interviewed fishers in the Con Dao archipelago, n: number of interviewees. Information includes: fishing method, time frequency (days per year), trip length (days), position (nearshore or offshore), reported catch (individuals per day ± SD), and sell price (VND per ind. or per kg)

Fishing method	Time frequency (day/year)	Trip length (day)	Position	Reported catch (ind./day)	Sell price
Diving (n = 3)	243.75 ± 41.73	1 - 30	near shore offshore	0.38 ± 0.22	25,000-100,000 VND/ind.
Crab nets (n = 4)	Everyday	Everyday	near shore	0.10 ± 0.03	20,000-100,000 VND/ind.
Bottom trawls (n = 8)	263.75 ± 35.91	14 - 60	offshore	10.50 ± 2.65	15 – 20 million VND/kg

Table 2 Results of interviews with seven seafood shops in the Con Dao archipelago, showing wholesale prices of seahorse (dry and fresh), export prices to China, and sources of fish for trading.

	Wholesale price (Million VND/kg)		Export to China (Million VND/kg dried)	Source of fish for trading
	Dry	Fresh		
Buyer 1	25 - 28	10		Self-caught
Buyer 2	27 - 28	-		From fisherman, Self-caught
Buyer 3	25 - 28	10	30 - 35	From fisherman
Buyer 4	25 - 28	-		From fisherman
Buyer 5	30	-		From fisherman
Buyer 6	27	10		From fisherman
Buyer 7	28	-	32	From fisherman

Comment 3

In Con Dao archipelago, seahorse was caught using diving, crab nets, and trawling methods at Hon Tre Nho (8°44'27.5"N 106°36'05.0"E), Hon Tre Lon (8°42'29.2"N 106°33'36.4"E), Hon Ba (8°41'02.6"N 106°39'19.0"E), and Northeast Bay (8°42'52.8"N 106°39'33.4"E). Bottom trawls recorded the highest catches, with 10.5 ± 2.65 individuals/day and 263.75 ± 35.9 days/year, mainly offshore. In contrast, diving and crab nets yielded smaller catches, with 0.38 ± 0.22 individuals (ind.)/day and 0.1 ± 0.03 individuals/day, respectively. The Con Dao Marine Protected Area was established primarily to conserve large charismatic species, and therefore fisheries management

measures remain relatively weak. During our field survey, we observed that fishing vessels continued to operate even within strictly protected zones

Most of the seahorse specimens had been preserved by fishers in a dried state which had been sun-dried for approximately from eight to ten hours. For *H. trimaculatus* and *H. spinosissimus*, sex ratio were not balance (male:female were 1:1.1 for *H. trimaculatus* and 1:1.38 for *H. spinosissimus*), brooding males accounted more than 20% of the total catch, the capture of immature individuals, and the scarcity of megaspawners. Result of standard length at physical maturity (HM), reproductively active (HR), capture (HC) analysis showed that *H. trimaculatus* and *H. spinosissimus* in the Con Dao were under heavy exploitation, as reflected by the three indicators proposed by Froese (2004) for assessing overfishing. The HM and HR value is bigger than the HC value of two seahorses which confirm that most individuals were harvested prior to maturity. While all of *H. kelloggi* specimens were immature stage. There are the reason why the seahorse catch in Con Dao had declined over the past 10 years. Length–weight relationships of seahorse in Con Dao were differ with seahorse in the other area. It can be influenced by multiple factors, including season, habitat, age at maturity, sex, diet, stomach fullness, health, preservation methods, and the size distribution of caught specimens (Balasubramanian & Murugan, 2017). Therefore, effective fisheries management requires each species and small scale studies.

2. Describe the three most important outcomes of your project.

a) We newly recorded three seahorses in Con Dao arpechilago which are not mentioned before. COI and Cytb sequences were published on Genbank to help the future conservation research such as survey biodiversity and genetic population.

b) The result of the fisheries analysis showed that seahorse has been, and continues to be exploited unsustainably in the Con Dao. The fact that seahorse catches had declined substantially over the past decade. The following management actions are recommended:

1. Prohibit destructive fishing gears.
2. Maintain an approximately 1:1 male-to-female harvest ratio.
3. Prohibit the capture of pregnant males.
4. Enforce size-based harvest limits.
5. Conduct regular monitoring of fishing activities around the archipelago.

Furthermore, population differences among regions and variations in local preservation methods highlight the need for small-scale, site-specific studies to provide accurate biological assessments and inform effective conservation and fishery management strategies.

c) The project report and all relevant materials were submitted to the Con Dao Marine Protected Area authority. These documents support management in gaining a clearer understanding of the local seahorse resources and the current exploitation status, thereby enabling the development of appropriate conservation and fisheries management policies in response to the significant risk of population decline.

Figure 1 Mr. Tuyen Le-Tran is in local seafood shop.

3. Explain any unforeseen difficulties that arose during the project and how these were tackled.

Many seahorses obtained from fishers were dried or partially deformed due to local preservation practices, which made accurate measurements difficult. This required additional time to carefully straighten each specimen, and several individuals had to be excluded because the deformation was too severe to obtain reliable morphological data.

Some fishers were initially hesitant to participate in interviews or share information about catch locations and fishing practices. We addressed this by spending more time building trust, explaining the purpose of the research, and ensuring confidentiality. Once rapport was established, participation improved significantly.

Field surveys were occasionally affected by unfavorable weather conditions, which restricted travel to fishing ports and delayed sample collection. These delays were managed by adjusting the survey schedule and maintaining close communication with local fishers to collect specimens whenever conditions allowed.

4. Describe the involvement of local communities and how they have benefitted from the project.

The local fishers and seafood shop owners were directly involved in the project through interviews and the sharing of their seahorse catches. Many of them had already observed a substantial decline in seahorse abundance over the past decade and often attributed this solely to environmental change. However, the findings of this study provided evidence that unsustainable fishing practices are the primary driver of the decline in Con Dao.

The project has helped raise awareness within the local community about the impacts of current fishing methods and the importance of adopting sustainable practices. It also provides local authorities and resource managers with scientifically grounded recommendations to develop appropriate fisheries regulations. In the long term, these measures will contribute not only to the conservation of seahorses but also to securing the livelihoods of local fishers who rely on these marine resources.

5. Are there any plans to continue this work?

We plan to continue the work through expanded surveys and more detailed biological assessments of seahorse species in Vietnam. Future efforts will focus on:

1. Long-term monitoring of seahorse populations in Con Dao to evaluate changes in abundance, size structure, and reproductive patterns under ongoing fishing pressure.
2. Expanding surveys to other coastal provinces to assess population connectivity, regional differences in exploitation, and local management needs.
3. Genetic population studies to better understand population structure and potential management units across Vietnam.
4. Collaborating with local authorities and communities to develop practical, small-scale fisheries management measures based on the project's findings.
5. Capacity building through training workshops for local fishers and MPA staff on species identification and sustainable practices.

6. How do you plan to share the results of your work with others?

A poster presenting key findings from this project was showcased at the 2025 Joint Conference of the Asian Society of Ichthyologists Annual Meeting and the 12th Indo-Pacific Fish Conference in Taipei, Taiwan, as reported in the Project Update. All research results have been formally submitted to the Con Dao Marine Protected Area Authority to support local management efforts. In addition, two related manuscripts have been prepared and submitted-one to a domestic journal and one to an international journal-to ensure broader scientific dissemination.

7. Looking ahead, what do you feel are the important next steps?

Several important next steps are needed to build on the outcomes of this project. First, long-term monitoring of seahorse populations in Con Dao is essential to track trends in abundance, size structure, and reproductive patterns. Second, further research should be conducted on the effectiveness of local fishing practices and gear restrictions, particularly within and around protected zones. Finally, continued collaboration with the Con Dao MPA authority and local communities will be key to

developing evidence-based management measures that ensure both species conservation and sustainable livelihoods.

Building on the outcomes of this project, we plan to expand the study area to encompass seahorse populations throughout Vietnam. The forthcoming objectives include: (1) identifying seahorse species and mapping their distribution across Vietnam; (2) assessing the intrinsic health and conservation status of seahorse populations in priority areas based on population genetic analyses; and (3) evaluating how fishing activities and practices affect seahorse populations in these regions.

8. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the Foundation receive any publicity during the course of your work?

I used The Rufford Foundation logo in the project poster that was showcased at the 2025 Joint Conference of the Asian Society of Ichthyologists Annual Meeting and the 12th Indo-Pacific Fish Conference in Taipei, Taiwan. The Foundation therefore received international visibility through this event. In addition, I will include an acknowledgment of The Rufford Foundation's support in the two forthcoming manuscripts arising from this project.

9. Provide a full list of all the members of your team and their role in the project.

Tuyen Le-Tran (Project Leader): Responsible for project planning and implementation, obtaining collection permits, coordinating with stakeholders, conducting fieldwork, performing morphological and molecular analyses, and preparing the project report.

Manh Hung Pham: Assisted with fieldwork, provided input on molecular analysis, and contributed to report revision.

Huu Hoang Do: Supported fieldwork activities, provided input on morphological analysis, and assisted in revising the report.

Van Hien Pham (Local Collaborator): Assisted with fieldwork and facilitated connections with the local fishing community.

Huong Trinh, **Tung Vo**, **Minh Tran**, **Thanh Long**, **Thanh Tuyen** (Volunteer, Students at University of Science - VNUHCM): Participated in fieldwork and sample collection support.

Figure 2 Members are surveying in local seafood shop (left) and Ben Dam seaport (right)

10. Any other comments?

I would like to sincerely thank The Rufford Foundation for funding this research. The results of this study are also the core topic of my master's thesis at the University of Science – VNUHCM. Moreover, this grant provided me with a valuable opportunity to conduct conservation research on seahorses, a species I am particularly passionate about. Additionally, I had the chance to share the beauty of seahorses and my personal enthusiasm with other researchers around the world through presenting a poster in Taiwan. I sincerely hope for further opportunities to collaborate with The Rufford Foundation on upcoming projects.

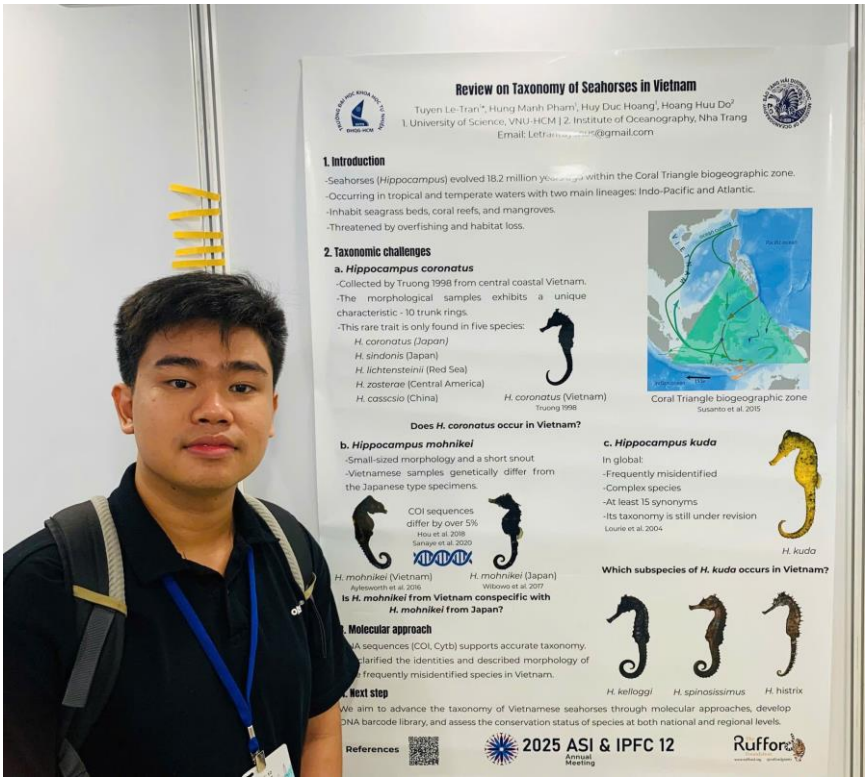

Figure 3 Mr. Tuyen Le-Tran and poster are at the 2025 Joint Conference of the Asian Society of Ichthyologists Annual Meeting and the 12th Indo-Pacific Fish Conference in Taipei, Taiwan

Figure 4 Mr. Tuyen Le-Tran and the examination committee at his master's thesis defense in Ecology at the University of Science, VNU

ANNEX – Financial Report

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