CEPF Final Project Completion Report

Instructions to grantees: please complete all fields, and respond to all questions listed below.

Organization Legal Name	*Wildlife Conservation Society*
Project Title	Restoring the Wild Population of Southern River Terrapin in Cambodia: Nest Protection, 'Head-Starting', Reintroductions, and Sustainable Financing
Grant or GEM Number	64133
Date of Report	November 2017

CEPF Hotspot: Indo-Burma

Strategic Direction: 1 (1.1. 1.2, 1.3, 1.4)

Grant Amount: USD 69,285.00

Project Dates: 2014/06/01 to 2017/05/31

PART I: Overview

1. Implementation Partners for this Project *(list each partner and explain how they were involved in the project)*

WCS has been working with Cambodian Fisheries Administration (FiA) of Ministry of Agriculture, Forestry and Fisheries (MAFF) since 2000. This project had been implemented in cooperation between WCS and FiA. FiA Officer (Mr. Heng Sovannara and later Mr. In Hul) is the Project Manager. He was in charge of overseeing all conservation activities as well as staff management. He was in charge of training local staff to protect annual Southern River Terrapin nests, leading the law enforcement activities patrolling along the rivers, training local people and students on the fisheries law and species conservation, overseeing the construction of new head-starting center, other tasks such as coordination with local people and provincial authorities.

WCS also worked with local people by involving them into the conservation project protecting nest and patrolling the rivers.

2. Summarize the overall results/impact of your project

Since 2014, eight nests consisting of 146 eggs have been protected, resulting in 121 hatchlings (Figure 1), constituting more than 82% hatching success. In the early years all hatchlings were transported to the old head-starting centre in Sre Ambel District, since 2016 they were taken to the newly built Koh Kong Reptile Conservation Center (KKRCC) in Mondul Seima District in Kong Kong Province. The nest protection program has been achieved through collaboration between WCS, FiA and local community members. There are five local staff selected from the local community participating in the program, of which most of them used to be nest collectors and hunters.

Five nesting beaches were restored by removing vegetation, filling in with sand and fencing some of the beaches from local buffalos that were destroying the beach. Vegetation is always growing back every year. Therefore, after the rainy season ended, the team always works to ensure that there are available beaches for nesting females laying eggs.

Figure 1. Nests of *Batagur affinis* (right, below) and *Pelochelys cantorii* (left)

There was only one nest of *Pelochelys cantorii* found during the period of 2014-2017. This one nest with 52 eggs was found in 2017. There were four nests found between 2012 and 2013. All 155 eggs were rotten.

3. SMART: Law Enforcement

Training in gathering data using the SMART (Spatial Monitoring And Reporting Tool: http://smartconservationtools.org/) system was delivered to all Fisheries Administration and community patrol team members. SMART patrols were conducted in every month to follow the protocols that law enforcement staff had learned. The patrol was done twice per month spread across different rivers in the system. The graph and maps below are examples of those produced each month. These were the results taken from the patrols during July and August 2017. They show the coverage of the patrol teams within the river system, highlighting that July had little coverage, during August almost the entire river system was covered by the patrol team. It also shows the maximum days, times, members and efforts of patrol spent by the team (Figure 2 & 3).

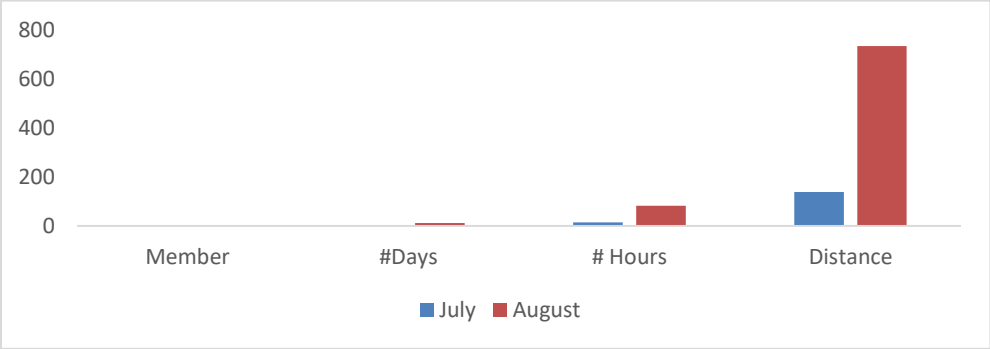

Figure 2. Number of person/hours and person/kilometres patrolled in July and August 2017

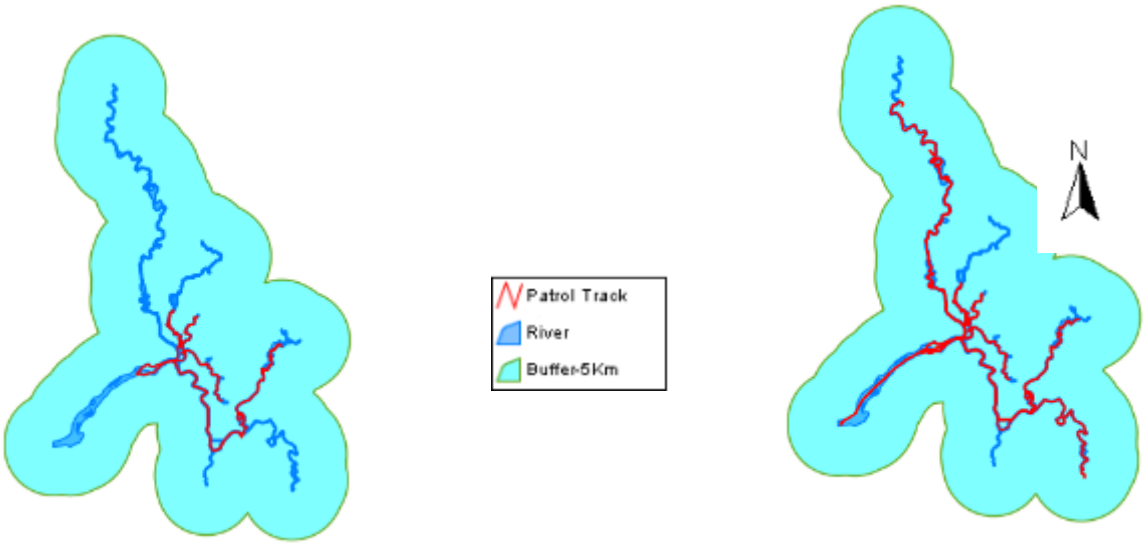

Figure 3. Maps showing coverage of patrol teams in July (left) and August (right) 2017

During the patrol activities the team detected sand dredging (Figure 4), which threatens to alter the hydrology of the river and destroy nesting beaches. In the past, some nesting beaches along the Sre Ambel river were destroyed and there is no longer a beach. The project team reported this to the Ministry of Mines and Energy (MME) and worked with them to develop legislation to ban sand mining throughout the Sre Ambel River system. WCS provided maps (Figure 5), scientific data on turtle movements and data from our recent socio-economic survey in the villages that use the Sre Ambel River, which showed the impact of sand dredging on fisheries resources and its adverse impacts on local livelihoods, to inform this process and advocated strongly for the protection of the river during public and private consultations with MME staff.

In July 2017, MME invited WCS, community members, local authorities and other ministries to participate in the issuance of a circular and declaration (Figure 6) to ban all sand mining activities in all Sre Ambel River system with the exception of small scale dredging in an area near the coastal mangrove forest (Figure 7). This is an important achievement for the project and the Southern River Terrapin.

Figure 4. Dredging vessel on Sre Ambel River in early 2017

Figure 5. WCS, FiA staff and community members at a MME consultation meeting

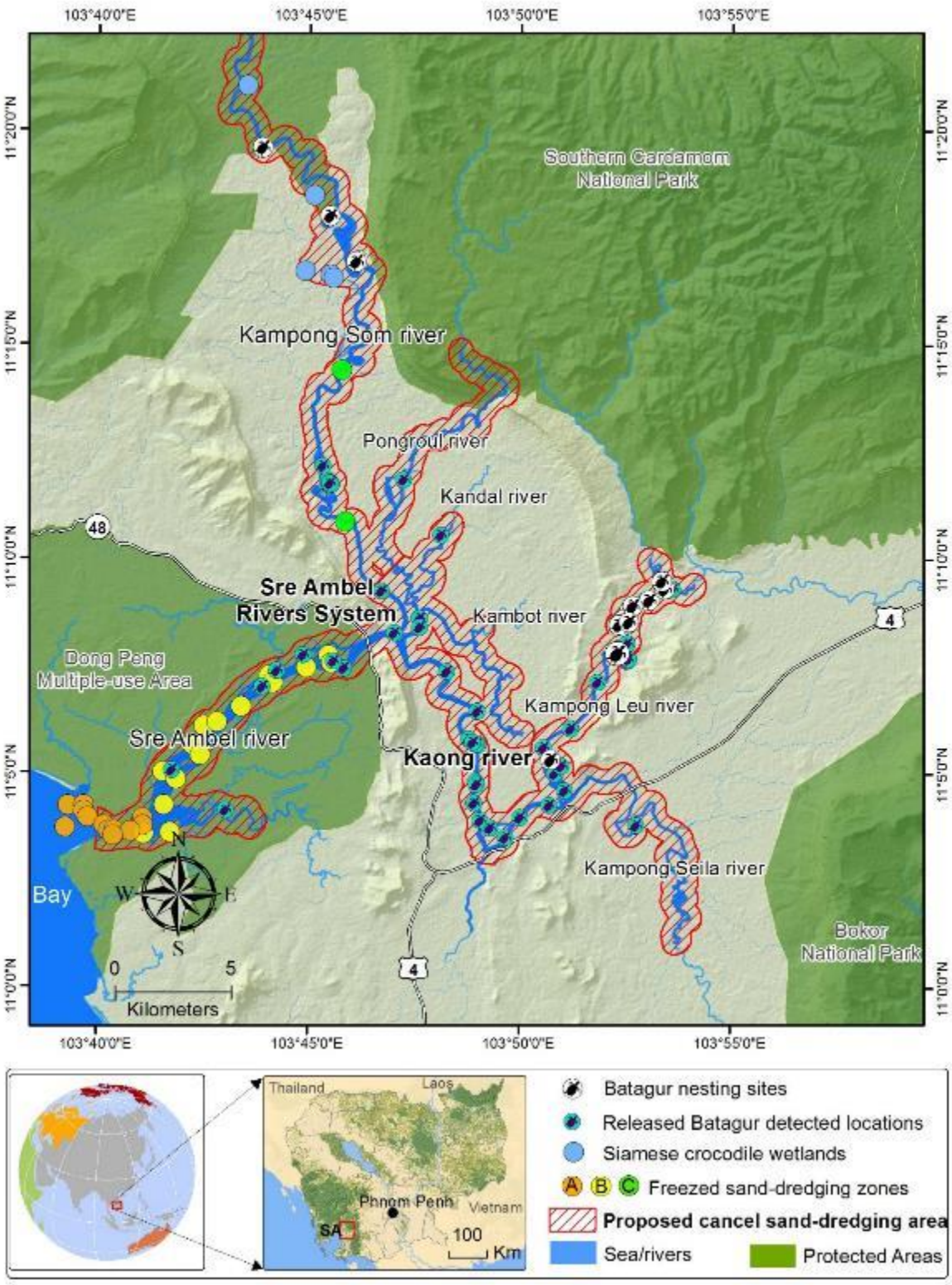

Figure 6. Map of proposed conservation area provided to the Ministry of Mines and Energy

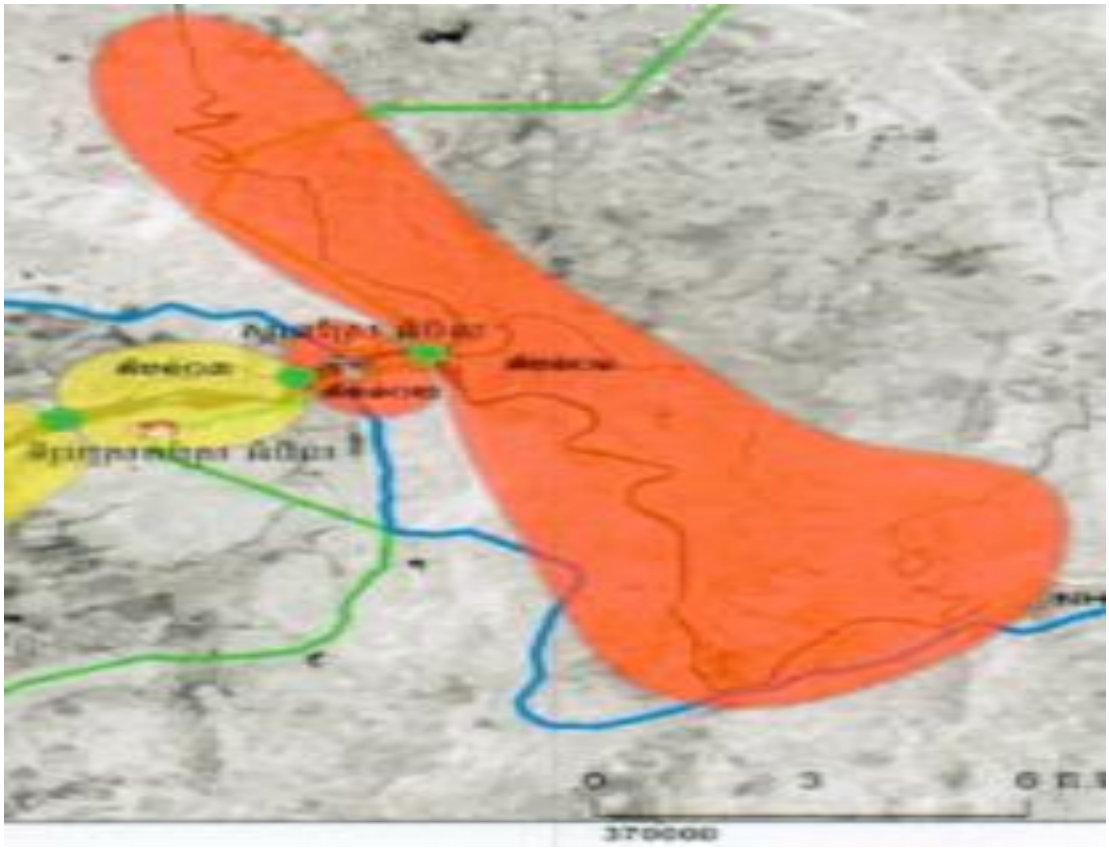

Figure 7. Official government map showing areas where mining is banned (orange) and area where small-scale mining is permitted (yellow)

Other activities found during the patrol included fishing boats, fishing gears with size larger than 4 cm (smaller than 4 cm is illegal), fish traps and crab traps (also legal). The team did not take any action because they are legal - the daily fishing activities by local communities. We did confiscate illegal gears such as spears and fishing hooks (Figure 8).

Figure 8. Fishing hooks and spear confiscated during the patrols

4. Monitoring of individuals released in 2015

Monitoring of the 21 turtles released in 2015 stopped because the acoustic transmitters are no longer working. The last turtle was detected in September 2016, although monitoring continued for six months after this date. Up until this point almost all of the released turtles had been detected at least once, except one individual. Thirteen *B. affinis* were detected by both active (MANTRAK) and passive (SUR-3) receivers. Figure 9 shows tracking using the active receiver.

Figure 9. Som Sitha using the active receiver to search for released terrapins

The most detected turtle by active receiver had 13 detections and the most detected by passive receiver had 22 detections (Figure 10).

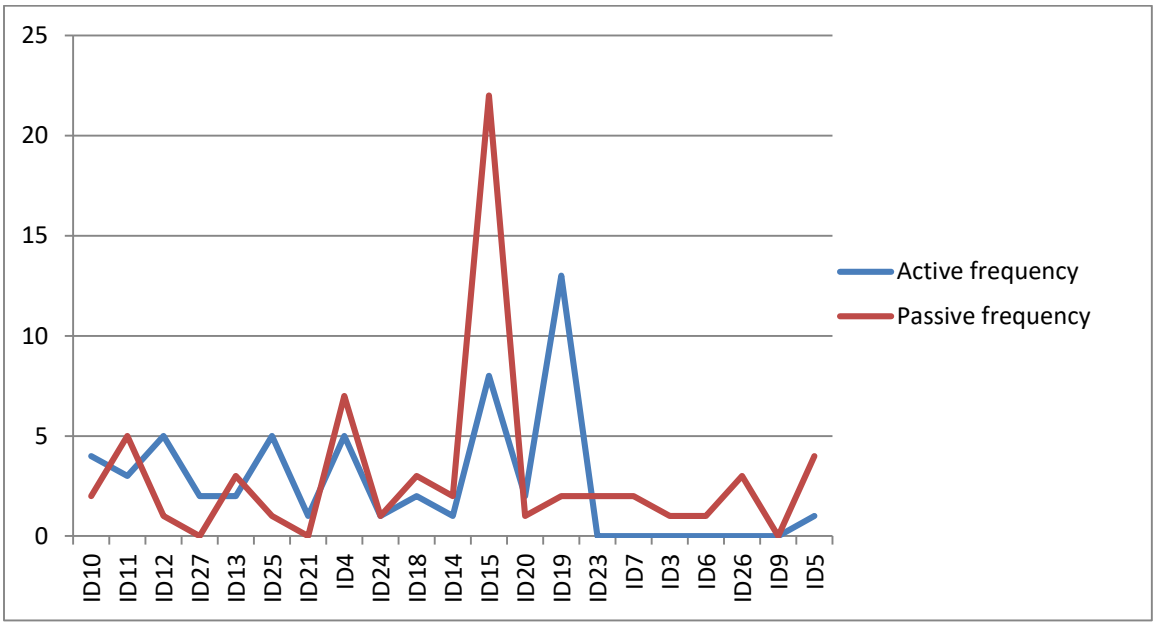

Figure 10. Frequency of detections by both devices (the horizontal axis gives the ID numbers of the released turtles)

Two males and one female terrapin travelled nearly 100 km from the relase site into another river system. This, and the data collected by the receivers, indicates that the turtles use all parts of the river from the headwaters to coastal mangrove (Figure 11). There is clearly potential for turtles released in the Sre Ambel to re-colonise other river systems in Cambodia, if protection is sufficient.

Only one released turtle was found dead during the period, and all other turtles were detected at least once, indicating a high survivorship in the first year following release. Four of the released turtles were captured accidentally by local people who informed the project staff and were willing to hand over the turtles to the project for re-release. This demonstrates an increase understanding of the importance of conservation of the Southern River Terrapin among the local communities.

Figure 11. Locations where released terrapins were detected

5. Release and Monitoring

The reintroduction of an additional 25 headstarted, microchipped, Southern River Terrapins was done on 13 November 2017 - at the end of rainy season. This choice of timing is because we want to know the difference in survivorship of those released in wet season (2015 release) and those released in dry season (November 2017). 25 turtles were inititally released into a pre-release enclosure (in an oxbow lake) where they will stay for at least three months to allow them to adapt to the environment. Health checks were conducted prior to release under the supervision of Dr Paul Calle (WCS Global Health Program Director). The team attached acoustic transmitters from the Sonotronics Company on the individuals that were selected for release (Figure 12).

Figure 12. Transmitter and epoxy glue, and sticking a transmitter on a sub-adult terrapin

The project has employed three stationary Submersible Ultrasonic Receivers (SUR-3) at three detecting stations and one MANTRAK active receiver. This will allow the monitoring team to

track the movements of the turtles. The three stations were placed in different rivers within the river system. The team will monitor them twice per month to study movement, habitat use and survivorship of the released turtles.

More than 40 people joined the release event along the river where the soft-release enclosure was constructed (Figure 13). These included Srun Limsong Deputy Director of the Fisheries Administration (FiA), global and local WCS staff, turtle experts, and Tea Vichet, a local businessman who is influence in Koh Kong Province. He is also a turtle lover and he always releases many wild animals including turtles.

Figure 13. Release of 25 *B. affinis* into the soft release enclosure

6. Education and Awareness

During the community outreach conducted earlier in 2015, we informed the local communities of the plans to release several of the head-started turtles and we asked the communities how they felt about this. Most were very supportive and pledged to inform the project team if any turtles were accidentally captured in fishing gear, which could then be returned to the project. We did some other education and awareness to other villagers and students around the habitat both in the villages and on the rivers to spread out the conservation messages to the people and as well as the fisheries law for protecting the species (Figure 14).

Figure 14. Village awareness MEETINGS and patrol education to local people and fishermen

We also did a socio-economic survey within eight villages located around the proposed conservation area in 2016. This was to study the usage of the rivers, community and the rivers, understanding of *B. affinis* conservation, and their livelihoods depending on the rivers. The result from this survey is in the Annex 1.

7. Establishment of Community Fisheries

The process to designate Community Fisheries on the Sre Ambel River system began with community consultation to find out about the livelihoods of local people, their use of the river and opinons on fishing and protected species such as Southern River Terrapin and Siamese Crocodile. WCS Cambodia is now in the process of recruiting a Royal Turtle Field Coordinator to conduct additional consultations with the community and local authorities in order to develop the zoning and management plan on which the Community Fisheries will be based. One officer from FiA will also counterpart with the project to advise on the establishment of Fisheries Community (Figure 15).

Figure 15. Community consultation with villagers in Sre Ambel October 2017

8. Koh Kong Reptile Conservation Centre

The KKRCC now consists of a hatchling rearing facility, office, staff houses, water storage tanks, electricity connection, water connection, sopar panels, roads, and nine ponds (Figure 16). During early 2017 we lined three breeding ponds and one quarantine pond. One breeding pond is properly fenced and can now accommodate more than 60 sub-adult turtles (Figure 17).

Figure 16. Facilities constructed during the two phases of construction

Figure 17. Recently constructed breeding pond at the KKRCC

Two other ponds will be fenced in 2018. The quarantine pond has been completed incuding lining, concreting, and fencing. This pond will be used to temporarily house two Southern River Terrapins (a large female and a sub-adult male) that a local resident in Koh Kong town donated to the center in November 2017. The project has been negotiating to get the turtles for more than ten years. The female is more than 30 kilograms and the male is more than kilograms. One guard station is almost complete. The center guard will be stationed in the guard station for the security of center and turtles (Figure 18).

Figure 18. Two ponds to be lined (two top), guard post (left) and quarantine pond (right)

WCS and FiA are looking into extending the conservation center from just a head-starting facility to include breeding adults in the three ponds. The KKRCC was officially inaugurated on 14 November 2017. There were more than 130 participants at the ceremony with delagates including Deptuty Director of the Fisheries Administration Srun Limsong, Mr. Sok Sothy, Deputy Governor of Koh Kong Province, senior officers from FiA provincial office, Buddhist monks, local people, teachers, students, WCS staff, trustees, and many other international turtle expert delegates (Figure 19).

Figure 19. Inauguration ceremony of the KKRCC

9. Briefly describe actual progress towards each planned long-term and short-term impact (as stated in the approved proposal)

List each long-term impact from Grant Writer proposal

a. Planned Long-term Impacts - 3+ years (as stated in the approved proposal)

Impact Description	Impact Summary
The capacity for conservation and management of local counterparts strengthened	The Project Manager is the officer from FiA and he has been trained in project management, law enforcement (SMART), and reporting. Local staff are also trained with nest protection program and patrolling.
Host country personnel, including workers from local communities, committed to the project and terrapin conservation for the long-term	There are six local people participating in the project and they are happy with the project. Local residents offered some captured turtles to the project.
Demonstration of a successful model that combines in-situ and ex-situ activities that is applicable to other species of Critically Endangered chelonians	The nest protection program (in-situ) has been a great success resulting in annual hatchlings. All hatchlings are being reared at the facility (ex-situ). Some have been released back into the wild. The first batch of turtles have survived in the wild with a successful survival rate. A second batch of 25 turtles were released this year. This is an example of successful release program. Results were shared in a workshop in November 2017 with chelonian experts from around the world.
Increased recruitment of juveniles into the effective population	With high survival rate, the released turtles are expected to produce offspring within the next few years and that will hopefully have a healthy population in the future.

b. Planned Short-term Impacts - 1 to 3 years (as stated in the approved proposal)

Impact Description	Impact Summary
The Cambodian staff are effectively managing and monitoring patrol effort using the SMART system, with support from WCS.	The patrol team is well-equipped with training and equipment. They are patrolling twice per month using SMART. The report is produced every month consisting of illegal gears, human activities, illegal fishing, wildlife encountered, etc.
Increased awareness within the local communities about the Southern River Terrapin and its conservation.	The project has done a lot of training and education at the villages and on the rivers on the species conservation, fisheries law and illegal activities that can harm the turtles. As an example of their awareness, three fishermen offered the project three captured turtles that were released in

	2015. A local resident offered one turtle to the project that he raised at his house for more than four years. One large female and one sub-adult male were also given to the project recently.
21 head-started terrapins released into the Sre Ambel River	21 head-started turtles were released in 2015 and 25 turtles released in 2017.
Cambodian Fisheries Administration personnel able to undertake aspects of the project independently with limited technical support from WCS	The project is largely managed by FiA with technical support from WCS.
An acoustic monitoring system in place to track the movements and survival of released terrapins	The monitoring is ongoing to monitor the 25 turtles released in 2017. The transmitters on turtles in 2015 stopped working after they had been monitored for more than one year.
Construction of the infrastructure for a captive bred facility for terrapins (partially complete)	There was many infrastructure constructed including two houses for local staff, an office, rearing structure, water storage tanks, road into the center, water tower to supply water to the center, three breeding ponds, two quarantine ponds, and water retention pond. Solar panels were also installed with electricity connection.
25 Southern River Terrapins in assurance population in Singapore Zoo	Unfortunately, the project could not transfer these 25 animals to Singapore Zoo because the Cambodian government did not issue a permit. However, the project managed to transfer 25 head-started turtles to Angkor Center for Conservation of Biodiversity in Siem Reap Province, Cambodia to create an assurance population.

10. Describe the success or challenges of the project toward achieving its short-term and long-term impacts

The success of this project is the result of cooperation and collaboration between WCS, FiA, and local communities. The project has a very dedicated team to perform their tasks in the field. The team has spread out the conservation messages to a great number of local community members. For example, people reported many cases of turtle captures to the project and protected nests every year.

One particularly notable success was the cancellation of all sand mining activities along the Sre Ambel river system. This was achieved through having a close relationship with government and communities. We were able to bring the concerns of local communities about the impact of sand mining on the livelihoods to the Ministry of Mines and Energy to advocate on their behalf,

which together with information on the impact on the turtles was sufficient to bring about the ban.

WCS also gains support and collaboration from local conservation partners such as Angkor Center for Conservation of Biodiversity (ACCB). The project managed to transfer 25 sub-adult head-started terrapins, plus two confiscated adults (one from the wild in Cambodia and one from captivity in Vietnam) to ACCB for an additional assurance colony.

11. Were there any unexpected impacts (positive or negative)?

WCS conducted a socio-economic survey with local people around the conservation area to find out the importance of rivers, fisheries and biodiversity to local community, the impact of sand dredging to biodiversity and local people. Having the results from this survey and our conservation evidence from the last decade, FiA and WCS provided scientific provision to the Ministry of Mines and Energy (MME) to request the cancellation of any mining activities in the area. As a result, the MME has issue a circular and proclamation to cancel all sand mining in the area except small section next to the coastal area. This is extremely good and unexpected news for the species survival.

PART II: Project Components and Products/Deliverables

12. **Components (as stated in the approved proposal)**

List each component and product/deliverable from Grant Writer

6. Describe the results for each deliverable:

Component		Deliverable		
#	**Description**		**Description**	**Results for Deliverable**
1	Creation of a new head-starting facility/tourism activity center for the Southern River Terrapin that not only affords an expansion of previous efforts but creates a sustainable revenue stream for continuation of the project.	1.1 1.2	Construction of a new head-starting facility capable of holding 250 juvenile turtles A plan for implementing an ecotourism activity center that will provide sustainable revenue for the project over the long-term.	The center is partially constructed that now can accommodate more than 200 terrapins and some Siamese Crocodiles. The project will expand the center to higher standard including some structures for ecotourism to generate some profits for sustainable conservation.
		1.3	Launching of an ecotourism project that creates a sustainable revenue stream for the conservation of the Southern River Terrapin. A press release and evaluation survey from first	The KKRCC is officially open but not yet launched as an eco-tourism destination for the public. We will plan for it within the next three or five years.

			clients will be delivered to CEPF.	
2	Activate and engage patrol team utilizing SMART (Special Monitoring And Reporting Tool - an innovative software application designed to help rangers curb wildlife) that mitigates the threats to wild populations of the Southern River Terrapin.	2.1	Annual SMART reports detailing the terrapin team's patrol activities and how they have reduced illegal fishing	The team have produced monthly report from the law enforcement patrol using SMART to generate reports consisting of patrol maps, human activities, illegal fishing, etc.
3	Return head-started turtles to the wild and monitor their movement and survival amongst years thereby enabling the project to refine its management protocols in regards to duration of head-starting turtles.	3.1	Release 25 head-started turtles with acoustic transmitters	21 head-started terrapins were released in 2015 and they were monitored twice monthly to study their movement, habitat use and their survivorship. 25 more head-started terrapins were released in 2017. They are all attached with acoustic transmitters and the team will track them twice monthly.
		3.2	Report on the monitoring of released head-started turtles	The report of the monitoring program is being produced and a scientific paper will also be published in 2018.
		3.3	A refined management plan for head-starting Southern River Terrapins	The management plan will be produced along with the monitoring report.
4	Increase levels of nest site protection within the Sre Ambel River drainage, thereby increasing the number of juveniles recruited into the wild population annually.	4.1	An annual increase in the number of nests found	There was a decrease in the number of nests each year. In 2017 there was only one nest protected compared to two, three, and two nests in 2014, 2015, 2016 respectively.
		4.2	An annual increase in the number of animals released back into the wild	There were 25 released into the wild in 2017 compared to 21 in 2015.
5	Generate wide-spread community education programs for the	5.1	A report on the effectiveness on community education	The results from the education and awareness program were produced. A technical report

	conservation of the Southern River Terrapin.		programs in generating support for the Conservation of Southern River Terrapins. Support includes reduction of deforestation of riparian vegetation and setting of illegal fishing nets.	on socio-economic survey was also produced. Many people understand the importance of *B. affinis* conservation in the area. A few of *B. affinis* were transferred back to the project by the fishermen.
6	Stabilization of localized deforested riverbanks	6.1	An increase in sand deposition at potential nesting areas	Five nesting beaches were restored and protected by adding sand and clearing vegetation. Fencing was also constructed to protect from buffalos invading some beaches.

13. Please describe and submit any tools, products, or methodologies that resulted from this project or contributed to the results.

SMART reports were produced monthly.

WCS and FiA used Fisheries Law books and posters to raise awareness among local people and students.

PART IV: Lessons, Sustainability, Safeguards and Financing

Lessons Learned

14. Describe any lessons learned during the design and implementation of the project, as well as any related to organizational development and capacity building.

Consider lessons that would inform:

- Project Design Process *(aspects of the project design that contributed to its success/shortcomings)*
- Project Implementation *(aspects of the project execution that contributed to its success/shortcomings)*
- Describe any other lessons learned relevant to the conservation community

There are some lessons learnt during the project implementation as below:

1) We have learned that species conservation within unprotected area is challenging in terms of management, project design and implementation. There is lack of financial support and especially government support both at national and local levels. This is because there is no management plan for the area and species. It is essential that the area is classified as the Protected Area and that it will benefit to the species conservation.

2) Without proper management plan and legitimate recognition by the government, biodiversity is not safe and that it impacts to local livelihoods because when the resources are deteriorated, it eliminates the sources of local incomes. So it is vital that we should find a way to give more rights to local communities to manage their resources.
3) There is lesson learned that this species is using a larger home range than previously expected. Three individuals travelled into a different river system which is more than 90km away from the released site. Two of those were captured by the fishermen but luckily the project got the turtles back. This informs the project that we need to expand the current conservation area to another river system to ensure that this species will be well protected.

Sustainability / Replication

15. **Summarize the success or challenges in ensuring the project will be sustained or replicated, including any unplanned activities that are likely to result in increased sustainability or replicability.**

The project has been working with the Ministry of Environment (MoE) for the last year to put the area into Sre Ambel Protected Area (Figure 20). This will offer better management and conservation of *B. affinis* as well as biodiversity and local livelihoods. The proposed protected area map has been created and some funding is secured for the processes of developing the protected area.

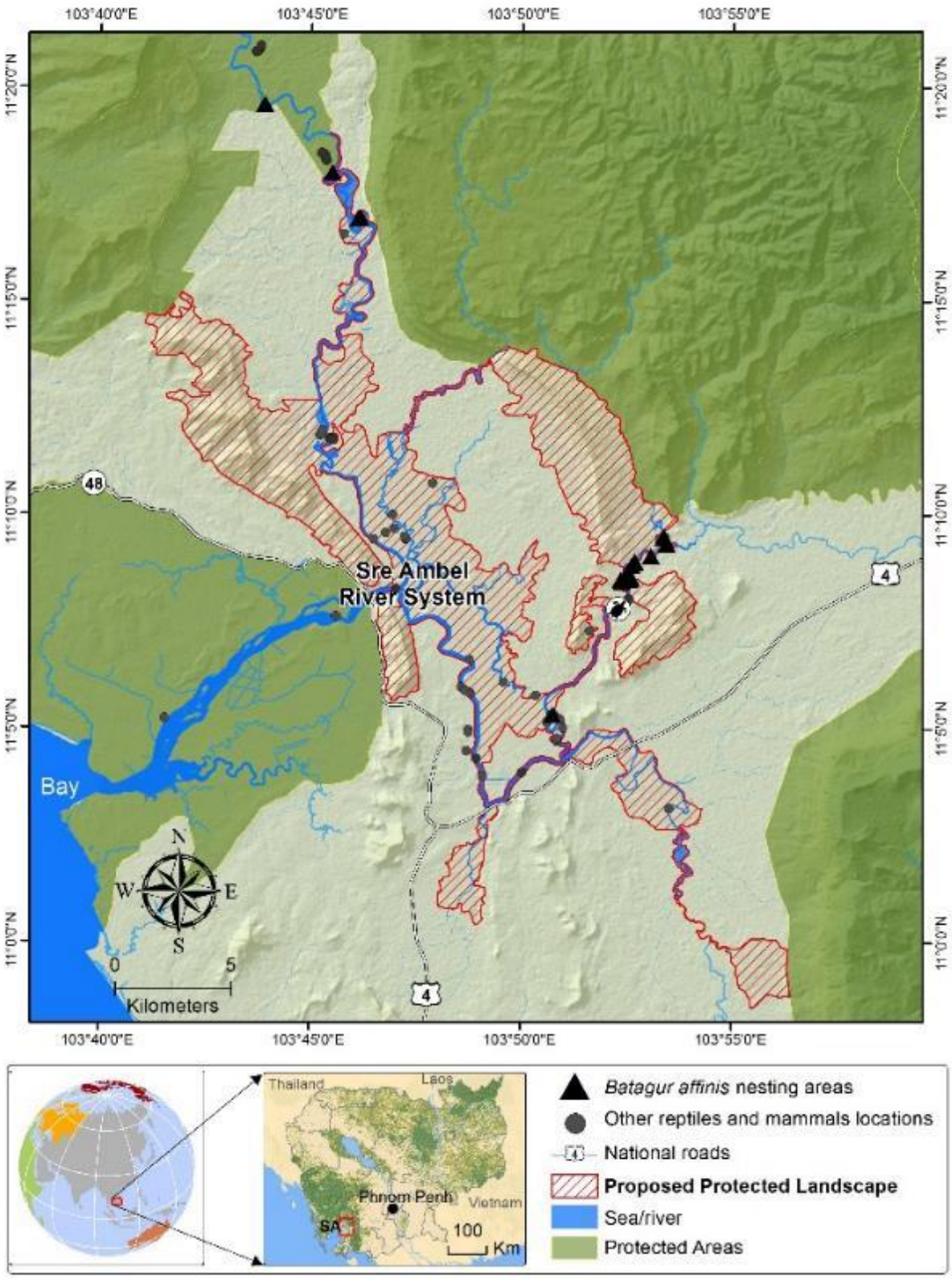

Figure 20. The proposed Protected Area within Sre Ambel River system

WCS is also working with FiA to put some sections of Sre Ambel River system into Community Fisheries (CFi). Four CFis are proposed to be established. This will legalize local people to sustainably conserve their fisheries resources including *B. affinis* by using their legitimate rights to ensure that there is no overfishing and collection of fisheries resources.

Safeguards

16. **If not listed as a separate Project Component and described above, summarize the implementation of any required action related to social or environmental safeguards that your project may have triggered.**

None relevant

Additional Funding

17. **Provide details of any additional funding that supported this project and any funding secured for the project, organization, or the region, as a result of CEPF investment**

    a. **Total additional funding** (US$)
    US$ 357, 285.00
    b. **Type of funding**

Please provide a breakdown of additional funding (counterpart funding and in-kind) by source, categorizing each contribution into one of the following categories:

Donor	Type of Funding*	Amount	Notes
Wildlife Reserve Singapore	A	US$100,475	Counterpart and conservation funding
National Geographic Society	A	US$29,000	Species monitoring
Chicago Zoological Society (CBOT)	A	US$4,850	Community, river, turtles and fisheries resource survey
SAVE OUR SPECIES	A	US$37,960	Conservation Activities
USFS	B	US$35,000	Establish Community Fisheries
Rainforest Trust	B	US$150,000	Establish Protected Area

** Categorize the type of funding as:*

A Project Co-Financing (other donors or your organization contribute to the direct costs of this project)

B Grantee and Partner Leveraging (other donors contribute to your organization or a partner organization as a direct result of successes with this CEPF funded project)

*C Regional/Portfolio Leveraging (other donors make large investments in a region because of CEPF investm*ent or successes related to this project)

Additional Comments/Recommendations

None

18. **Use this space to provide any further comments or recommendations in relation to your project or CEPF.**

The project was extremely successful in moving in situ and ex situ conservation forward to improve the conservation situation of Southern River Terrapin. WCS remain fully committed to working with our partners to ensure the survival of the species, and to expand lessons learned to other chelonians.

PART IV: Impact at Portfolio and Global Level

CEPF requires that each grantee report on impact at the end of the project. The purpose of this report is to collect data that will contribute to CEPF's portfolio and global indicators. CEPF will aggregate the data that you submit with data from other grantees, to determine the overall impact of CEPF investment. CEPF's aggregated results will be reported on in our annual report and other communications materials.

Ensure that the information provided pertains to the entire project, from start date to project end date.

Contribution to Portfolio Indicators

19. **If CEPF assigned one or more Portfolio Indicators to your project during the full proposal preparation phase, please list these below and report on the project's contribution(s) to them.**

Indicator	Narrative
N/A	

Contribution to Global Indicators

Please report on all Global Indicators (sections 16 to 23 below) that pertain to your project.

20. **Key Biodiversity Area Management**

Number of hectares of Key Biodiversity Areas (KBA) with improved management

Please report on the number of hectares in KBAs with improved management, as a result of CEPF investment. Examples of improved management include, but are not restricted to: increased patrolling, reduced intensity of snaring, invasive species eradication, reduced incidence of fire, and introduction of sustainable agricultural/fisheries practices. Do not record the entire area covered by the project - only record the number of hectares that have improved management.

If you have recorded part or all of a KBA as newly protected for the indicator entitled "protected areas" (section 17 below), and you have also improved its management, you should record the relevant number of hectares for both this indicator and the "protected areas" indicator.

Name of KBA	# of Hectares with strengthened management *	Is the KBA Not protected, Partially protected or Fully protected? Please select one: NP/PP/FP
KMH30 Sre Ambel	*28,000*	*NP*

** Do not count the same hectares more than once. For example, if 500 hectares were improved due to implementation of a fire management regime in the first year, and 200 of these same 500 hectares were improved due to invasive species removal in the second year, the total number of hectares with improved management would be 500.*

21. Protected Areas

Number of hectares of protected areas created and/or expanded

Report on the number of hectares of protected areas that have been created or expanded as a result of CEPF investment.

Name of PA*	Country(s)	# of Hectares	Year of legal declaration or expansion	Longitude**	Latitude**

** If possible please provide a shape file of the protected area to CEPF.*

** Indicate the latitude and longitude of the center of the site, to the extent possible, or send a map or shapefile to CEPF. Give geographic coordinates in decimal degrees; latitudes in the Southern Hemisphere and longitudes in the Western Hemisphere should be denoted with a minus sign (example: Latitude 38.123456 Longitude: -77.123456).

22. Production landscape

Please report on the number of hectares of production landscapes with strengthened biodiversity management, as a result of CEPF investment. A production landscape is defined as a landscape where agriculture, forestry or natural product exploitation occurs. Production landscapes may include KBAs, and therefore hectares counted under the indicator entitled "KBA Management" may also be counted here. Examples of interventions include: best practices and guidelines implemented, incentive schemes introduced, sites/products certified and sustainable harvesting regulations introduced.

Number of hectares of production landscapes with strengthened biodiversity management.

Name of Production Landscape*	# of Hectares**	Latitude***	Longitude***	Description of Intervention

* *If the production landscape does not have a name, provide a brief descriptive name for the landscape.*

***Do not count the same hectares more than once. For example, if 500 hectares were strengthened due to certification in the first year, and 200 of these same 500 hectares were strengthened due to new harvesting regulations in the second year, the total number of hectares strengthened to date would be 500.*

*** Indicate the latitude and longitude of the center of the site, to the extent possible, or send a map or shapefile to CEPF. Give geographic coordinates in decimal degrees; latitudes in the Southern Hemisphere and longitudes in the Western Hemisphere should be denoted with a minus sign (example: Latitude 38.123456 Longitude: -77.123456).

17. Beneficiaries

CEPF wants to record two types of benefits that are likely to be received by individuals: formal training and increased income. Please report on the number of men and women that have benefited from formal training (such as financial management, beekeeping, horticulture) and/or increased income (such as tourism, agriculture, medicinal plant harvest/production, fisheries, handicraft production) as a result of CEPF investment. Please provide results since the start of your project to project completion.

17a. Number of men and women benefitting from formal training.

# of men benefiting from formal training*	# of women benefiting from formal training*
9	3

**Please do not count the same person more than once. For example, if 5 men benefited from training in beekeeping, and 3 of these also benefited from training in project management, the total number of men who benefited should be 5.*

17b. Number of men and women benefitting from increased income.

# of men benefiting from increased income*	# of women benefiting from increased income*
9	3

**Please do not count the same person more than once. For example, if 5 men benefited from increased income due to tourism, and 3 of these also benefited from increased income due to handicrafts, the total number of men who benefited should be 5.*

17c. Total number of beneficiaries - Combined

Report on the total number of women and the number of men that have benefited from formal training and increased income since the start of your project to project completion.

Total # of men benefiting*	Total # of women benefiting*
9	3

**Do not count the same person more than once. For example, if Paul was trained in financial management and he also benefited from tourism income, the total number of people benefiting from the project should be 1 = Paul.*

18. Benefits to Communities

CEPF wants to record the benefits received by communities, which can differ to those received by individuals because the benefits are available to a group. CEPF also wants to record, to the extent possible, the number of people within each community who are benefiting. Please report on the characteristics of the communities, the type of benefits that have been received during the project, and the number of men/boys and women/girls from these communities that have benefited, as a result of CEPF investment. If exact numbers are not known, please provide an estimate.

18a. Please provide information for all communities that have benefited from project start to project completion.

Name of Community	Community Characteristics (mark with x)							Type of Benefit (mark with x)									# of Beneficiaries	
	Subsistence economy	Small landowners	Indigenous/ ethnic peoples	Pastoralists / nomadic peoples	Recent migrants	Urban communities	Other*	Increased access to clean water	Increased food security	Increased access to energy	Increased access to public services (e.g. health care, education)	Increased resilience to climate change	Improved land tenure	Improved recognition of traditional knowledge	Improved representation and decision-making in governance forums/structures	Improved access to ecosystem services	# of men and boys benefitting	# of women and girls benefitting
Boeung Trach	x								x					x	X	x	4	1
Boeung Preav	x								x					x	X	x	1	1
Bak Angruth	x	x							x					x	X	x	2	0
Khsach Sor	x								x					x	X	x	1	1

*If you marked "Other" to describe the community characteristic, please explain:

18b. Geolocation of each community

Indicate the latitude and longitude of the center of the community, to the extent possible, or upload a map or shapefile. Give geographic coordinates in decimal degrees; latitudes in the Southern Hemisphere and longitudes in the Western Hemisphere should be denoted with a minus sign (example: Latitude 38.123456 Longitude: -77.123456).

Name of Community	Latitude	Longitude
Boeung Trach	$11^0$04’02”	103^0 50’37”
Boeung Preav	$11^0$07’24”	$103^0$46 24”
Bak Angruth	$11^0$16’16 “	$103^0$46 24”
Khsach Sor	$11^0$06’23”	$103^0$50 60”

19. Policies, Laws and Regulations

Please report on change in the number of legally binding laws, regulations, and policies with conservation provisions that have been enacted or amended, as a result of CEPF investment. “Laws and regulations” pertain to official rules or orders, prescribed by authority. Any law, regulation, decree or order is eligible to be included. “Policies” that are adopted or pursued by a government, including a sector or faction of government, are eligible.

19a. Name, scope and topic of the policy, law or regulation

No.		Scope (mark with x)			Topic(s) addressed (mark with x)														
	Name of Law, Policy or Regulation	Local	National	Regional/International	Agriculture	Climate	Ecosystem Management	Education	Energy	Fisheries	Forestry	Mining and Quarrying	Planning/Zoning	Pollution	Protected Areas	Species Protection	Tourism	Transportation	Wildlife Trade
1	MME SARACHOR: 235 dated on 10 July 2017 about "measure management of sand mining industry in Sre Ambel, Tatai, Trapaing Roung, and Koh Por River Systems in Koh Kong Province"		x				x		x	x		x		X		x		x	
2	MME Prakas: No 236 issued on 10 July 2017 about "stopping all types of sand from Koh Kong to aboard"		x				x		x	x		x		X		x		x	
3																			

19b. For each law, policy or regulation listed above, please provide the requested information in accordance with its assigned number.

No.	Country(s)	Date enacted/ amended MM/DD/YYYY	Expected impact	Action that you performed to achieve this change
1	Cambodia	07/10/2017	The regulation will stop any sand mining in the river system. This will result in the restoration of sand beaches and the return of fish prawn- the food source of the terrapin and local people.	The project provided some scientific results from all our findings to MME about the importance of our species conservation and how the negative

			Breeding females might come back to nest at this river.	impacts of sand dredging had to local community and our species.
2	Cambodia	07/10/2017	The regulation will stop any sand mining in the river system. This will result in the restoration of sand beaches and the return of fish prawn- the food source of the terrapin and local people. Breeding females might come back to nest at this river.	The project provided some scientific results from all our findings to MME about the importance of our species conservation and how the negative impacts of sand dredging had to local community and our species.
3				

20. Best Management Practices

Please describe any new management practices that your project has developed and tested as a result of CEPF investment, that have been proven to be successful. A best practice is a method or technique that has consistently shown results superior to those achieved with other means.

No.	Short title/ topic of the best management practice	Description of best management practice and its use during the project
1	Spatial Monitoring And Reporting Tools	This is the technique that is used for reporting information from field patrols. All information is entered onto the computer to produce reports for future law enforcement plan and strategic management for projects.
2		

21. Networks & Partnerships

Please report on any new networks or partnerships between civil society groups and across to other sectors that you have established as a result of CEPF investment. Networks/partnerships should have some lasting benefit beyond immediate project implementation. Informal networks/partnerships are acceptable even if they do not have a Memorandum of Understanding or other type of validation. Examples of networks/partnerships include: an alliance of fisherfolk to promote sustainable fisheries practices, a network of environmental journalists, a partnership between one or more NGOs with one or more private sector partners to improve biodiversity management on private lands, a working group focusing on reptile conservation. Please do not use this tab to list the partners in your project, unless some or all of them are part of such a network / partnership described above.

No.	Name of Network/ Partnership	Year established	Country(s) covered	Purpose
1	Turtle Survival Alliance	2001	Cambodia	To tighten the cooperation and sustainably secure funding for the species
2	Wildlife Reserve Singapore	1971	Cambodia	Conservation of globally endangered species of freshwater turtles and tortoises in Cambodia

Part V. Information Sharing and CEPF Policy

CEPF is committed to transparent operations and to helping civil society groups share experiences, lessons learned, and results. Final project completion reports are made available on our Web site, www.cepf.net, and publicized in our newsletter and other communications.

Please include your full contact details below:

23. **Name: Som Sitha**
24. **Organization: Wildlife Conservation Society**
25. **Mailing address: #21, Street 21, Tonle Basac, Chamkarmorn, Phnom Penh**
26. **Telephone number: +855-23 219 443**
27. **E-mail address: ssom@wcs.org**

Annex 1: The socio-economic survey within Sre Ambel River system in 2016

I. Methodology

a. Research Team

WCS and the Cambodian Fisheries Administration (FiA) partnered with the University of Queensland, Australia (UQ) for the design and execution of this applied research project. A postgraduate researcher from University of Queensland provided WCS and FiA with both technical support for the project design and questionnaire and also *provided* guidance for enhancing the technical capacity of the local researchers in social science research methodology. The actual field research was led by a WCS Technical Advisor (Som Sitha); the research team consisted of two WCS staff and a voluntary undergraduate student (Figure 1).

Figure 1. Research team discussing the survey with the village chief

b. Study Area

The study was designed to capture data from eight villages located along the Sre Ambel river system where the project has interacted with local people during previous years (Figure 2). These are the villages located closest to the river, and therefore are assumed to be those who make most use of it.

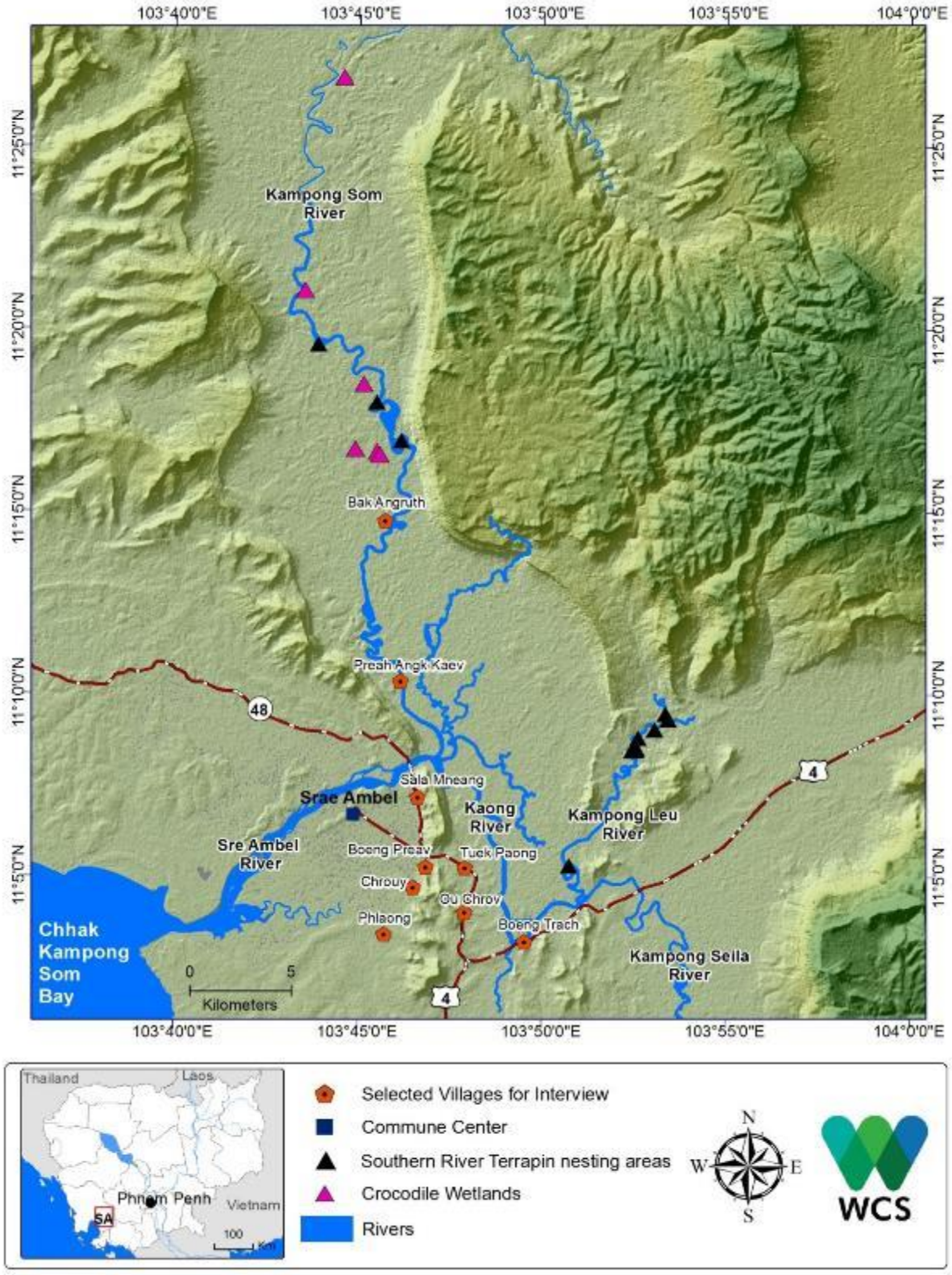

Figure 2. Map of selected villages in Sre Ambel river system

c. Field survey

To capture data on community interactions with the river system, a team of local Cambodian researchers (managed by WCS Species Conservation Advisor, Sitha Som) visited households in selected villages and invited people to participate in a questionnaire-based interview (Annex1 and 2). Questionnaires are a key tool for collecting socioeconomic data and have been frequently used to inform conservation policy (Bajracharya *et al.,* 2006).

The research team visited eight villages, across three communes. Sample sizes were generated based on population numbers collected by village chiefs in the annual census, and using proportionate stratification of population size. 319 of 2,221 households were sampled, which equated to approximately 14% of the population of each of the villages that live alongside the rivers (Figure 2). Households were randomly selected. The team tried to interview the household head (normally male) because they are most likely to have the best knowledge of household use of the river resources. Before starting each interview, the team explained the purpose of the interview, what the data would be used for, and obtained signed consent in line with University of Queensland ethics procedures.

Prior to the interview survey, a ninth village located close to the area with a similar situation was selected to test the questionnaire. This was to ensure that the questionnaire was working well and would allow the team to adjust the questions when found errors were found during the testing. These data were not included in the analysis.

The research team also used the Focus Group Discussion (FGD) method to gather further information about the use of the river and turtle and crocodile distribution in their area. A map and a set of questions were used to guide the discussion (Annex 3). The map was adjusted according to each village location. People were asked to point or draw on the map the locations where they saw turtle and crocodile as well as the location of illegal fishing activities. The map from each village was then digitized for analysis (Annex 4).

d. Data Analysis

Field staff used controlled, random walk sampling, in order to collect a sample based on community population with a confidence level of 0.95 and an error margin of 0.05 (as per Bernard & Gravlee, 2014). Section 1 was based on the USAID Poverty Assessment Tool developed for Cambodia (USAID, 2011). Sections 2 and 3 were developed by undertaking a series of informal, semi-structured interviews with key stakeholders in a trial community, prior to project commencement.

II. Results

4.1. General information

319 household interview surveys were conducted. Approximately 50% of participants were male, indicating that in many cases the head of household was not available for interview. For Focus Group Discussions (FGD), we asked the village chief to invite no more than 10 people to

participate in the discussion. After the FGD, all maps (annex 5) were photographed to keep all the information for map digitization.

4.2. River utilization

Koh Kong province is known as a forested area with a lot of rivers flowing from the mountains into the sea. The results of the survey indicated that people use the rivers for six main purposes, namely: transport, drinking, bathing, fishing, collecting NTFPs and agriculture. The vast majority of the people depend on the rivers for fishing. Collecting non-timber forest products was the next most important use followed by transportation. Other purposes such as agriculture, bathing and drinking water were deemed of less importance by local people (Figure 3).

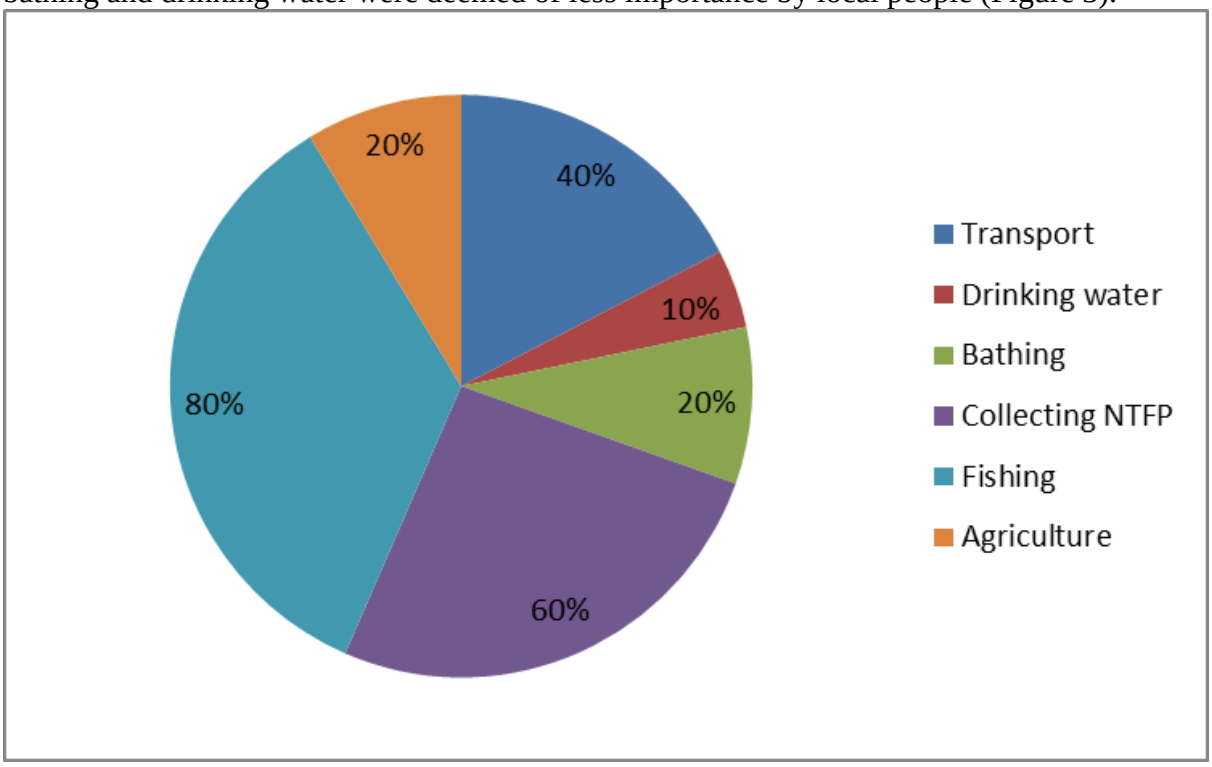

Figure 3. Proportion of local people using the river for different purposes

4.2. Fish population trends

The survey aimed to discover people's perceptions of the trend in fish populations over the past 20 years and 10 years compared to now. Almost all respondents said that there had been a sharp decline in fish population compared to the past. Whereas 85% said there is much less fish in the river compared to 20 years ago (the highest category of decline), less than 30% of people said that there were much less fish compared to 10 years ago. More than 60% stated that fish populations are currently less than 10 years ago. This finding shows that people perceive that fish populations have declined a lot compared with 20 years ago, and continued to decline during the last ten years, albeit at a reduced rate. People were clearly concerned, which is unsurprising since their lives depend largely on catching fish (Figure 4).

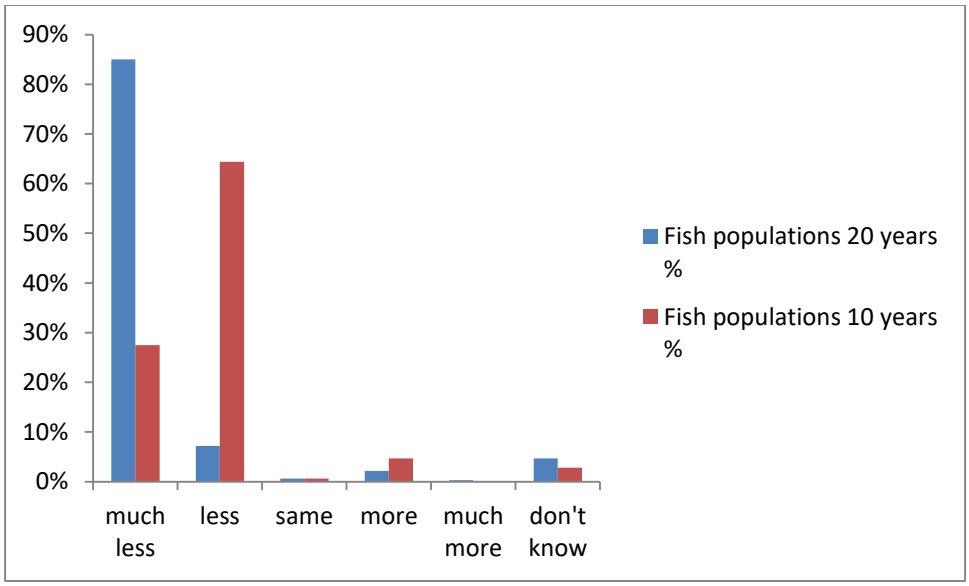

Figure 4. Community perceptions of fish population trends over the last 20 years

The proportion of people who agreed that they can catch enough fish to feed their family was roughly equal with the proportion who said that they cannot catch enough fish to feed their family. However, only about 3% said that they can catch enough fish for trading while more than 35% respondents stated that they cannot catch enough fish for trading. The result further indicates a concern over the decline in the fish population (Figure 5).

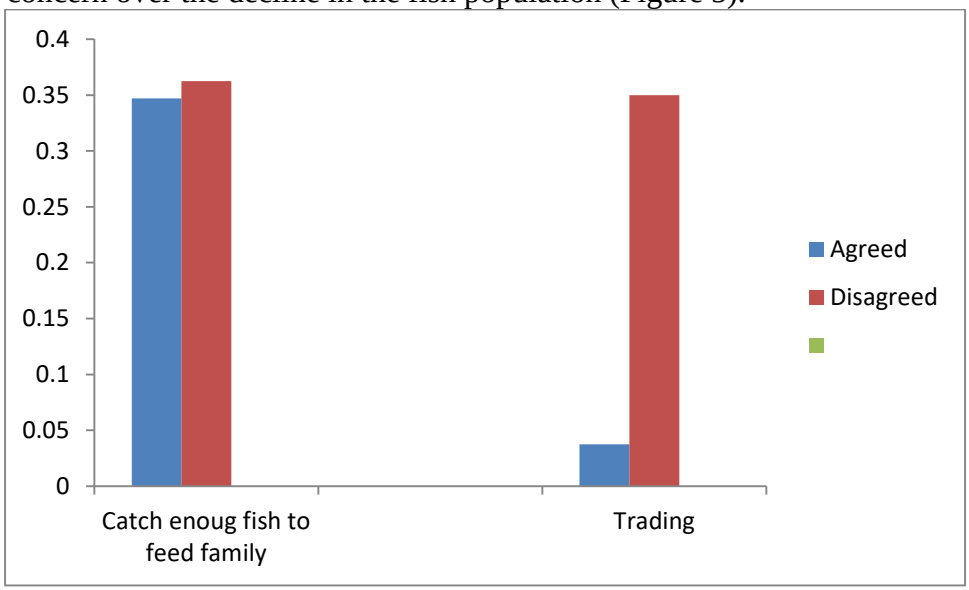

Figure 5. Perception of fish catch for home consumption and trading

4.3. Negative impacts on fish populations

Local people reported that more than thirty years ago fish were very abundant and they could catch large fish in large quantities daily. However, now there are few fish and they are typically small. Local people identified some causes that have led to this decline. Overfishing using illegal fishing gears such as electro fishing, bombing, illegal fishing nets, and spears is thought to be the primary cause of fish declines in the Sre Ambel River system. These practices have been done by

both the local community and fishermen from outside the area without proper control or enforcement. The area is not registered as the protected area or conservation zone. There is no proper regulation for fishery management.

Coupled with overfishing, there are two other causes of fish declines, namely clearance of riparian vegetation and loss of surrounding forests and grassland to agriculture. These activities have a lot negative impacts on fish, causing soil erosion and devastating flooded forest habitats. Many loggers also used illegal fishing gears to fish in the rivers. These are not the only reasons of fish population declines. In 2007, the government of Cambodia issued a license to a private company to dredge sand along the Sre Ambel River system for commercial purposes. Local people believe that this has led to the decline in the fish population. It pollutes the river water, collapsing the river bank, devastating spawning grounds, pumping all fish eggs, and physically killing fish as well as large animals like the Royal Turtle (*Batagur affinis*). It also destroys sand beaches along the rivers which are the nesting sites for the Royal Turtle (Figure 6).

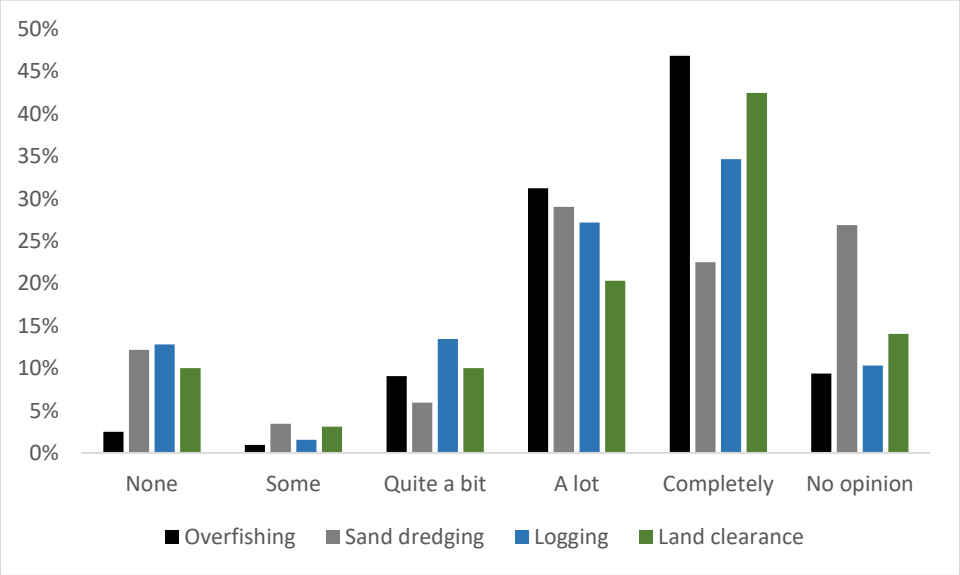

Figure 6. Perceptions of causes of fish decline in Sre Ambel river system

Local people also reported that pressure from people outside the community was a cause of fish declines. As mentioned above, this is due to the fact that the community itself does not have authority to manage their own natural resources. Of the surveyed interviewees, more than 40% said that outsiders often came to fish in their area while more than 20% of them said they sometimes came to fish (Figure 7).

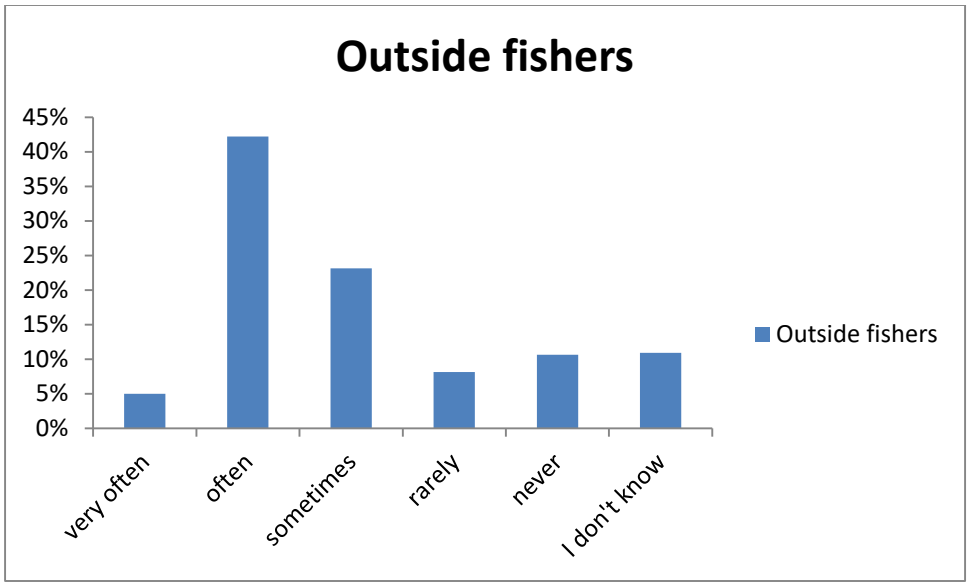

Figure 7. Community perception on the frequency of outsiders fishing within the Sre Ambel river system

Nearly one third of participants considered that illegal fishing took place 'very often' or 'often' in their area. Two thirds of people considered that illegal fishing happened, whilst some local people (22%) tended not to share their perception on this matter by saying 'I don't know' and 14% saying that it 'never' happened (Figure 8).

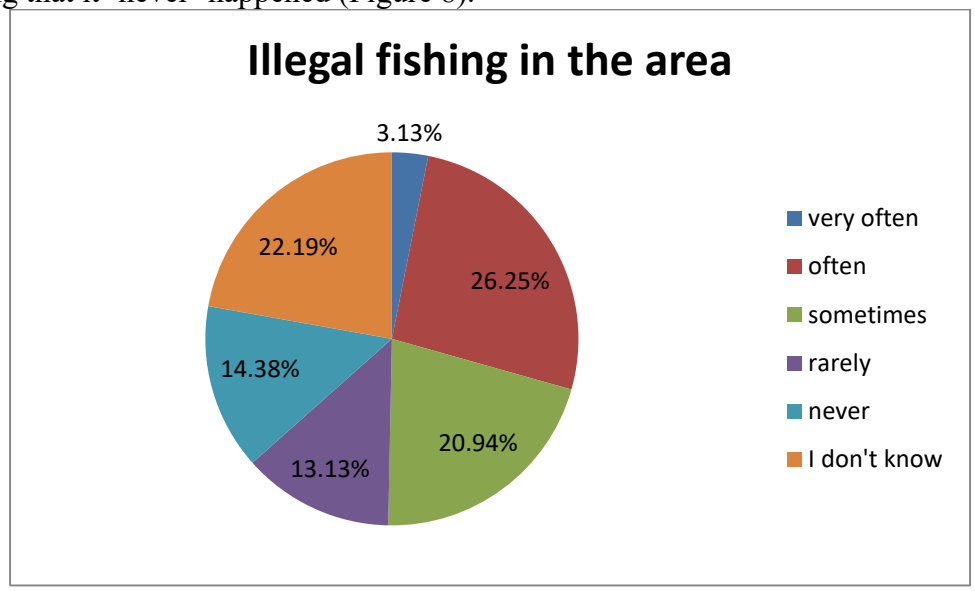

Figure 8. Community perceptions of illegal fishing in the Sre Ambel river system

4.4. Turtle and crocodile distribution

The interview survey indicated that that there is a low population of *B. affinis* in the river system. Of those 319 interviewees, there were only 126 reported sightings of turtles between 1966 and the present day. The numbers of reported sightings increased in 2015 and 2016. Of these, the Royal Turtle accounted for 94 sightings of these sightings and showed a similar trend of increasing reports in recent years. This might be because people tend to remember and recount

recent sightings better than older encounters. Half of the interviewees were females who have spent little time on the rivers (Annex 1 maps of village drawing).

4.5. Local perceptions on turtle and crocodile conservation

The majority of interviewees said that they have never hunted turtle or crocodile or collected turtle and crocodile eggs (Figure 9). A small number of people reported that they hunted turtles or collected their eggs. However, such data should be interpreted with caution because in interview surveys people frequently under-report illegal behaviors, such as hunting.

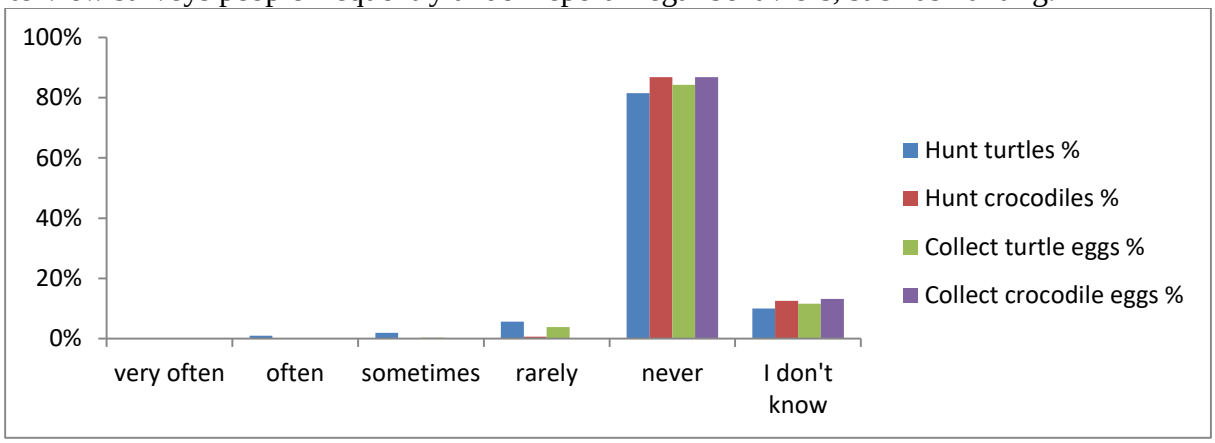

Figure 9. Local perceptions toward turtle and crocodile hunting

In regards to local perceptions towards Royal Turtle and Siamese Crocodile conservation, people view the species as relatively important. About half of them said that they would report the caught animals to conservation NGOs or local authorities or release them straight into the river. The rest of them argued that they would sell, eat or keep them if they caught these species (Figure 10).

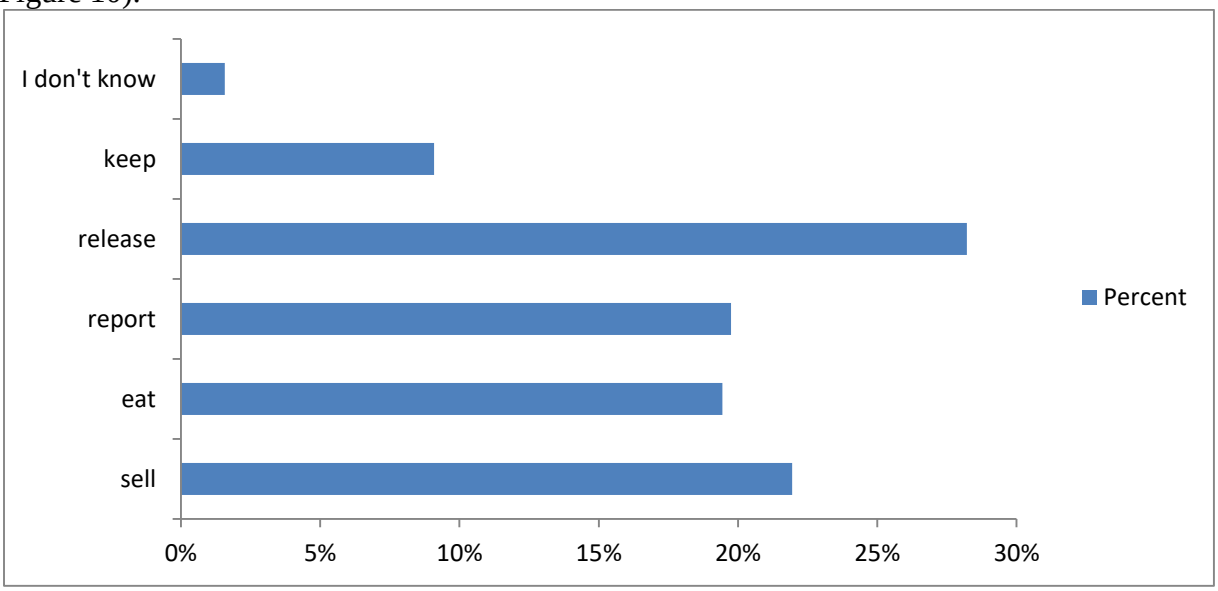

Figure 10. Local perceptions toward turtle and crocodile conservation

4.6. Family Economics

Fisheries resources are the main source of income generation for communities along the Sre Ambel river system. Nevertheless, a lack of management and regulation of activities on the river

together with limited financial support from government and NGOs has caused a decline in fish populations. As a result of a lack of opportunities in the village, a lot of young people are now migrating to work as laborers in throughout Cambodia and Thailand. They cannot generate enough income from fishing and other NTFP products in the village. Women actively raise livestock for additional income, including pig, cow, buffalo, and chickens. As well as fishing, micro-businesses, and agricultural farming, more than 51% of the households are now depending on working as a hired labor force to provide for their family (Figure 11). Many families are now struggling to support their households.

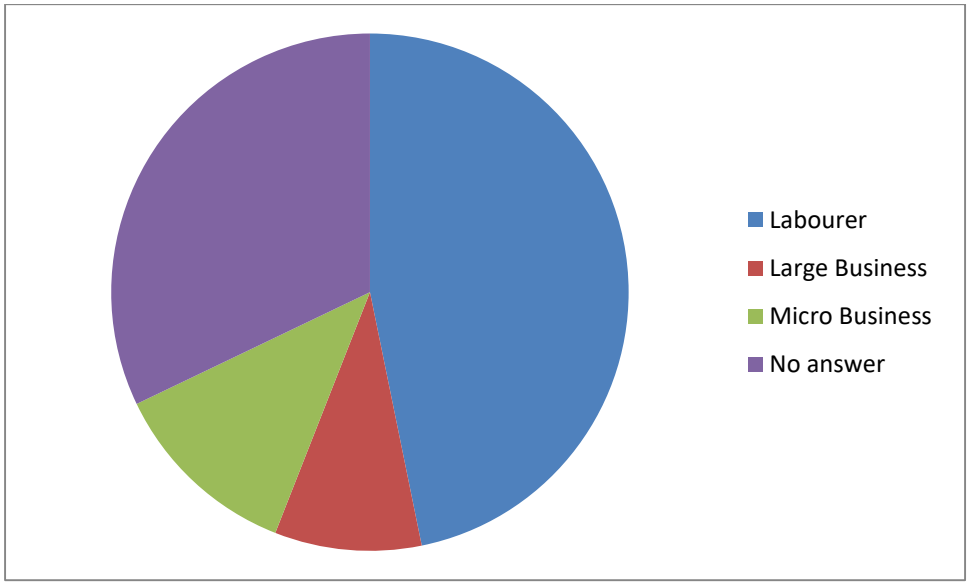

Figure 11. Sources of income generation for households in the targeted villages

5. Conclusions

Based on results from this survey, people who live along the Sre Ambel river system are very much dependent on extracting resources from the rivers for their daily income generation. It also supports their daily lives through fishing, drinking water, transportation, and NTFPs. People who live along the river upstream use the water the entire year for drinking, agriculture and fishing. However, people who live downstream depend on drinking water for only the rainy season.
The Sre Ambel river system serves as the main source of fish to support the family diet of the people in the study area. In the past people could earn a lot of income from trading fish. The fish population has been declining for more than twenty years, with only about a third of people saying that they can catch enough fish to feed their family.

Illegal fishing practices are reportedly still happening in the Sre Ambel river system, including electro-fishing, spear, large fishing nets and bombing. If these activities continue, it will have adverse impacts on fish stock, local communities and the Royal Turtle population.
Large numbers of people feel good about the Royal Turtle and Siamese Crocodile conservation projects. They expressed their desire to conserve the species. Some suggest that they would report any accidentally caught turtle and crocodile to the project or release them back into their habitat. It is also significant that large majority of people are willing not to hunt turtle or crocodile including large individuals and eggs.

According to the survey, local households are living in a critical condition where their resources are becoming scarce since there is no proper management measure and plan. There is unsustainable collection of fisheries resources and NTFPs. Fish populations that used to support their families are now depleted. A lot of people are moving to find work in other areas of the country, or moving to Thailand.

6. Recommendations

Because of the importance of the Sre Ambel river system to local communities, it is vital that we address the degradation of natural resources. The Ministry of Environment (MoE) have expressed their desire to designate the area as a protected area, which would go some way towards ensuring the protection of resources that are vital to local communities, turtles and crocodiles. MoE-managed protected areas are zoned into four functional zones, including zones that permit sustainable community-based resource extraction, according to a plan developed through a participatory process. It is recommended to pursue this course of action.

The Fisheries Administration (FiA) has also expressed a desire to support local communities to establish Community Fisheries along the Sre Ambel river system. Within these the community could develop local-level regulations to sustainably manage aquatic resources. As part of this process, FiA could put some of the river sections into conservation areas, where resource extraction is prohibited. It is also recommended to pursue this course of action.
Law enforcement should be further strengthened to reduce threats to the fish population as well as conservation of turtles and crocodiles. Since more than half of people said that they would eat, keep or sell a turtle if they caught it, it is recommended to develop a network of local informants so that people can easily report turtles that they or others have caught, hand them over to the relevant authorities and return them to the river.

Sand dredging was thought by local people to have a significant impact on not only fish populations and Royal Turtles, but also local livelihoods. It destroys fish habitats, fish spawn, collapses river banks and destroys turtle nesting beaches. Previous experience has shown that sand dredging destroyed nesting beaches along the Kampong Som river and no more turtle nests have been found there since. The cessation of sand-dredging along the Sre Ambel River system is therefore recommended, since it would benefit both turtles and local people.