Assessment of *Chelodina mccordi* current status and community awareness along the Lake Iralalaro, Timor-Leste

Research Institute for the Environment and Livelihoods
Charles Darwin University

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ASSESSMENT OF *Chelodina mccordi* CURRENT STATUS AND COMMUNITY AWARENESS ALONG THE LAKE IRALALARO, TIMOR-LESTE

SUMMARY

The Long-necked turtle *Chelodina mccordi* is critically endangered under the IUCN red list criteria. The Timor-Leste subspecies (*Chelodina mccordi timorensis*) is restricted to a small area of lacustrine habitat near the eastern tip of Timor in the Lake Iralalaro, Lautém District. The Projetu Lenuk Lorosa'e aims to collect vital information about the biology of *C. mccordi* for future research and management actions, while bringing awareness about the status of this species at a local and national level. Data was collected during two surveys along the Lake Iralalaro (Nino Konis Santana National Park). Threats were identified by direct observation and during local community meetings. Human harvest is the main threat in the area. Factors that may be reducing the capacity of this turtle to survive in the face of human harvest include habitat modification by buffalo and cattle and nest predation by pigs and dogs. Fire is also likely to be an important factor causing decline. During the dry season, turtles reportedly aestivate in tall grass or stay in the shallow waters of the Lake. Human-induced fire around the lake edges is likely to kill turtles or expose them to predators. Climate change may also play an important role in modifying harvest pressure. Major turtle harvest events, where groups of locals travel to the Lake and attempt to harvest many turtles at once, are restricted to extremely dry years when the Lake recedes to its minimum level. A drier climate would increase the number of major harvest events and decrease turtle harvest relief years such as 2013, when high water levels prevented intense harvest. During this first phase we (1) raised awareness about the Critically Endangered status of *C. mccordi* in local communities; (2) provided environmental educational materials for teachers locally (3) collected essential data to initiate a long term monitoring project that can be continued by the community and park staff; and (4) trained park rangers and national students that can potentially continue their studies researching this species.

SUMMÁRIO

O Cágado-de-pescoço-comprido *Chelodina mccordi* é considerado criticamente ameaçado pelo o critério da lista vermelha da IUCN. A sub-espécie do Timor-Leste (*Chelodina mccordi timorensis*) possui uma distribuição restrita à área de habitat lacustre no extremo Leste da Ilha de Timor, na Lagoa Iralalaro, Distrito de Lautém. O objetivo do Projetu Lenuk Lorosa'e consiste em coletar informações vitais sobre a biologia de *C. mccordi* para futuros projetos de pesquisa e manejo, e ao mesmo tempo conscientizar a população local à respeito do status desta espécie à nível regional e nacional. Dados foram coletados durante dois trabalhos de campo na região da Lagoa Iralalaro (Parque Nacional Nino Konis Santana). Ameaças à esta espécie foram identificadas através de observação direta e durante reuniões com a comunidade local. A maior ameaça à esta espécies nesta região é a caça. Entre os fatores que potencialmente reduzem sua resiliência à caça estão a modificação do ambiente por búfalo e gado e predação dos ninhos por porcos e cães. Queimadas ao redor da Lagoa também são um importante fator no possível declínio desta espécie. De acordo com a comunidade, durante a estação de seca, os cágados estivam na grama alta ou permanecem nas águas rasas da Lagoa. Queimadas no entorno da lagoa provavelmente matam os animais que estão estivando os os expõem à predadores. Mudanças climáticas também podem influenciar e modificar a pressão de caça. Eventos de caça, onde grupos de moradores locais se dirigem à Lagoa e caçam um grande número de cágados, são restritos aos anos de seca intensa, quando a água da Lagoa retrocede ao seu nível mínimo. Um clima mais seco aumentaria a frequência de eventos comunitários de caça e diminuiria a frequência de anos como o de 2013, quando o nível das águas da Lagoa se manteve alto e preveniu a ocorrências dos eventos de caça. Durante esta primeira fase do projeto, nós (1) conscientizamos as comunidades locais em relação ao cágado *C. mccordi* e seu status de criticamente ameaçado; (2) fornecemos material de educação ambiental para os professores à nível local; (3) coletamos dados essenciais para o desenvolvimento de um projeto de monitoramento à longo prazo que pode ser estabelecido pela comunidade e funcionários do Parque Nacional; e (4) treinamos guardas florestais e estudantes do Timor Leste para que possam eventualmente continuar pesquisando e protegendo esta espécie.

INTRODUCTION

The Roti Island Long-necked turtle (*Chelodina mccordi*) is a recently described species (Rodhin et al., 1994) that is considered critically endangered under the IUCN red list criteria (IUCN, 2012). It is also included on CITES Appendix II (CITES, 2004) and cited as one of the world's 25 most endangered freshwater turtles (TCC, 2011). It is restricted to permanent and semi-permanent shallow eutrophic lakes and swamps on Roti Island (Indonesia) and the swamps and rivers in the Lake Iralalaro region of Timor-Leste. The combination of a restricted range, limited habitat, and the intense collection of animals in the wild for the international pet trade drove the species to near extinction in the area where it was originally discovered (Roti Island, Rodhin et al., 2004), and it is now considered critically endangered to nearly extinct in the wild (Iskandar, 2000, Samedi and Iskandar 2000, IUCN/SSC TFTSG and ATTWG 2000).

The Timor-Leste subspecies (*Chelodina mccordi timorensis*, figure 1) is restricted to a small area of suitable habitat near the eastern tip of the island of Timor (Kuchling et al., 2007). The two subspecies from Roti and Timor-Leste are now recognized as divergent island forms of *C. mccordi* (Georges and Thomson, 2010). The subspecies of Timor-Leste was originally collected in the area of Lake Iralalaro (Los Palos), but also occurs in the lowland of Irabere River to the southwest of Los Palos in the Iliomar subdistrict (Kuchling et al., 2007).

Figure 1. Timor-Leste subspecies (*Chelodina mccordi timorensis*)

There are reports of abundant *C. mccordi* in Timor-Leste, with the collection of up to 30 turtles per day by local people of Malahara village (EPANZ Services 2004; Middleton et al. 2006). However, Kuchling et al. (2007) revisited this region and suggested that the absence of a rigorous interview protocol by the earlier reports probably produced dramatic exaggerations and reflected neither present abundance nor recent past exploitation patterns. Kuchling et al. (2007) did report local exploitation at subsistence level for food and trade in local markets at Los Palos. This exploitation and local trade seems to be opportunistic and unorganized, with prices varying from two to four dollars per turtle. On the other hand, this local exploitation might impact on small populations of *C. mccordi*. Indeed, there are anecdotal reports of *C. mccordi* declines close to human population centres (Kuchling et al. 2007).

No population data or status assessment is available for the subspecies on Timor-Leste. Although this species is not considered rare within its habitat, its limited range makes Timor-Leste populations prone to the same fate as the populations on Roti Island (Kuchling et al.,

2007). This relatively new taxon is at high risk of rapid exploitation and extirpation (Stuart et al. 2006). According to Rodhin et al. (2004), there is an urgent need for studies that determine the ecological parameters for this species and a need to improve our understanding of the threats to its survival. The implementation of a monitoring and conservation program in its area of occurrence has the potential to protect this species from the international pet trade and local overexploitation.

This project aims to collect vital information about the biology of *C. mccordi* for future research and management actions, while bringing awareness about the status of this species at a local and national level. The Timor-Leste sub-species was previously described at the Lake Iralalaro. A previous herpetological survey confirmed the presence of a population of *C. mccordi* in this area (O'Shea, 2009). Concomitantly to the survey and community interviews, we worked in partnership with Timor-Leste schools and Government Departments to produce a booklet to raise awareness of the issues faced by *C. mccordi*. Feedback surveys were performed at schools, government departments and park staff to measure the effectiveness of our work.

This report documents the findings and activities of the 2014 Lenuk Lorosa'e Project at Los Palos, Lautém district, Timor-Leste, from the 1st to the 28th of February and from the 6th to the 12th of July. We initiated a program of mark-recapture study, promoted capacity building at government and university level and raised awareness in the communities and schools, with a particular emphasis to students of the first, second and third cycle of the schools in the Lake Iralalaro area.

The specific objectives of this study were:

- Train Timorese personnel (National park staff and undergraduate students from Timor-Leste) to monitor and protect *C. mccordi.*
- Bring awareness about the conservation status of *C. mccordi* through the development of activities and the production of learning materials.
- Collect vital information about the biology of *C. mccordi* for future research and management actions.

MATERIAL AND METHODS

Approach and Methods

Our approach was to work in partnership with the Basic Education Department, Ministry of Agriculture and Fisheries and National Directorate of Protected Areas which provided appropriated logistics and feedback. An extensive literature review was conducted prior to the fieldwork. We consulted experts with previous experience with *C. mccordi* and fauna surveys in the Los Palos area to determine the most suitable approach for this project. Rangers and undergraduate students were responsible for the translation from Fataluku and Tetum to English and Portuguese during interviews. Oversight of the project was provided by Dr Carla Eisemberg and Prof Keith Christian from Charles Darwin University.

Monitoring

Due to the high water level in February 2014 and local sensitivities (sacred areas), it was not possible to install traps at the Irasekiro River as originally proposed. Instead, we surveyed three areas along the inundated grassland and forest of the Lake Iralalaro edge (Figure 2; 8°26'58''S / 127°10'05''E).

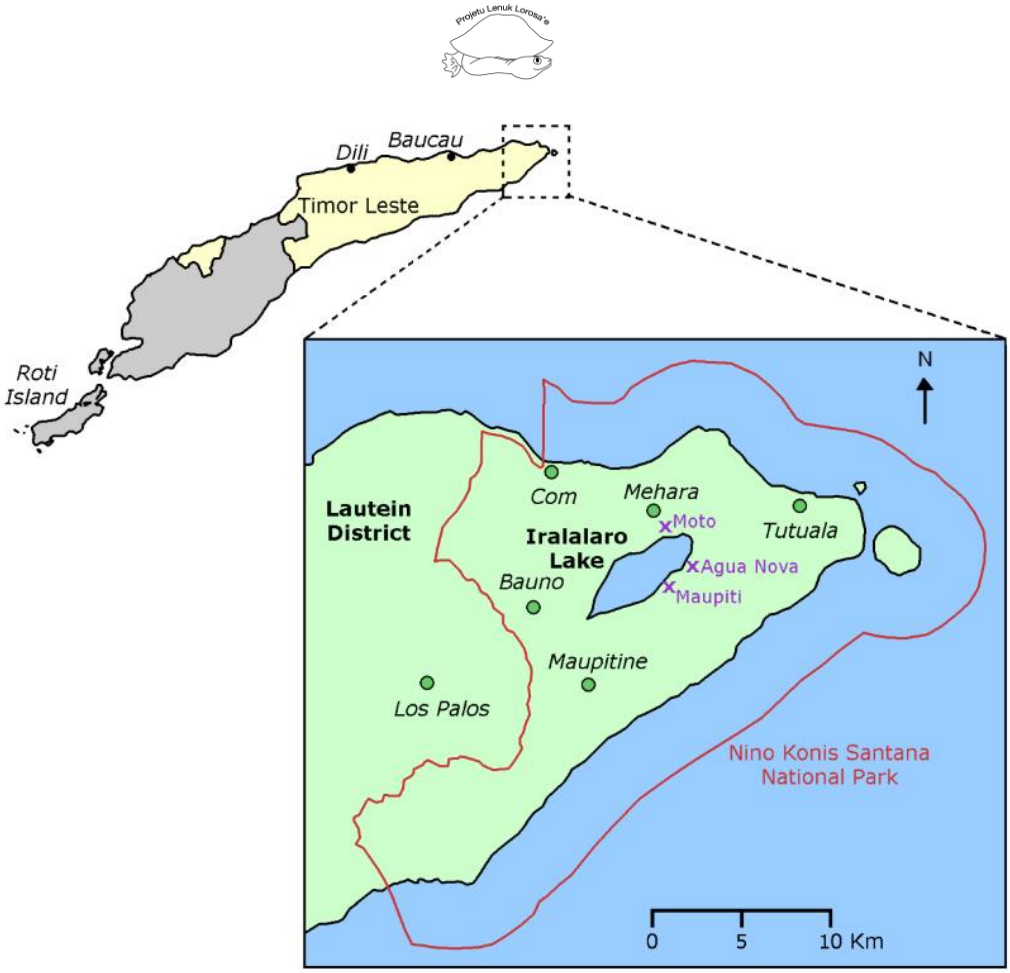


Figure 2. *Chelodina mccordi* survey locations at Lake Iralalaro. The three trapping sites in January 2014 are marked as **X** on the map.

Three forest rangers (Guarda Florestais: Mr Albino Pereira, Mr José Ramalho and Mr Gil Cabral) from the National Park participated in our surveys. They helped identifying suitable locations for the surveys and local turtle experts for the interviews (Figure 3). The Agua Nova (Irakusalu/Iramiri – S 08º26'58'', E 127º10'05''**)** was suggested by the forest rangers which regard the place as famous for having turtles according to locals. The area is characterized by a flood plain, seasonally inundated, *Nauclea* forest, with cheese tree present (*Morinda sp.*), the water depth was approximately 0.5 m in February and aquatic plants present (Water Lilies). The Moto Swamp (Mehara – S 08º24'48'', E 127º09'14'') was suggested by a turtle expert (Mr Gonzaga – Interview 02). Turtles were captured in this area in 2012. The area is a flood plain, seasonally inundated, with *Nauclea* forest and water depth of approximately one meter. The Moto Swamp site is heavily used by buffalo and pigs and no aquatic plants are present. The Maupiti Site (S 08º27'47'', E 127º09'42'') was also suggested by the forest rangers as an area famous for having turtles according to locals. This area is similar to Agua Nova but with a sparse *Nauclea* inundated forest.

Figure 3. Projetu Lenuk Lorosa'e team (Mr. Nazario, Mr. José, Mr. Gil, Dr Carla, Ms. Elda, Mr Bertanizo and Mr. Albino – From the left to the right) in February 2014.

To capture *C. mccordi*, we will use seven snorkel traps (Legler, 1960, Figure 4) with modifications (Georges, Guarino & White, 2006). Traps were baited with rice, worms, vegetables and fresh fish from the Lake (no tuna or sea fish was used due to local taboos. Traps were checked and re-located to different spots every three days (Appendix 1.1). The total survey period was nine days in February (10-19-Feb) and three days in July (8-10/July). These dates corresponded to the university breaks, when Timor-Leste undergraduate students will be available to participate. Data loggers measured the temperature of the water during the surveyed period. Water temperature was recorded every 30 minutes while the trap was in the water.

Figure 4. Timor Leste CDU students (left) and Nino Konis National Park Rangers (right) learning how to set a snorkel traps, which was used to capture *C. mccordi* at Lake Iralalaro in January and July 2014 (Moto Swamp on the Left and Agua Nova on the Right).

Species biology

Turtles were measured to obtain a straight line carapace length to the 0.01 mm; weighed to the nearest 0.01 g and sexed by examination of the tail (Figure 5). We also measured curved carapace length, linear width, curved width, plastron length to tail notch, tail notch to cloaca

and head width. We attempted to detect eggs in female turtles by palpating their abdomen through the inguinal pocket. Plastral annuli was recorded for estimation of age (Appendix 1.2). Community interviews were performed to infer the population trends of *C. mccordi* according to local knowledge and also assess the local level of awareness about this species. Data collected was analysed to give an initial overall assessment of the population.

Figure 5. Timor Leste CDU students and Nino Konis National Park ranges (Guarda Florestal) learning how to take *C. mccordi* measurements at Lake Iralalaro.

Community perceptions

We conducted semi-structured interviews (Appendix 1.3) with local experts from the 10th to the 19th of February and from the 8th to the 11th of July. Local experts were identified with the help of the Forest Rangers and Village Chiefs (Chefes de Suco). Sixteen interviews were performed with respondents located at the Sucos (Village) of Mehara (Aldeias Loiquero, Poros and Porlamano) and Maupitini (Aldeias Vailoru and Malahara).

We obtained basic personal information in regard to the respondents (Sex, age, years of education, occupation, years living in the area). Interviewees were questioned about the number of different types of turtles found in the area as well as their general description and names in the local language (Fataluku). Specific questions were asked about the biology (preferred habitat during different seasons, nesting areas and behaviour), harvest (capture methods and harvested animal destiny), population status (more, less and same) of *C. mccordii* as well as future management suggestions for this species. We also questioned about local taboos related to *C. mccordi* that could potentially help on future conservation projects as well as local stories which could be used during the awareness programs.

School material production

We organized meetings in February with local primary schools and the Education Department of Timor-Leste to discuss the possibility of producing an illustrated booklet about *C. mccordi* biology and current status. According to the demand and requests, a book was developed in Tetum for the 6th grade (according to the specification of the new curriculum that has been developed). We printed 250 copies (and 100 copies of the teachers supplement) of the booklet entitled “Lenuk Kakorok Naruk Timor-Leste Nian”.

Figure 6. Meetings with teaches from Mehara Schools to discuss the Lenuk booklet.

The booklet was distributed regionally in July 2014 to the 6th grade at Los Palos (8July, 103 students) and Mehara (9July, 45 students). To evaluate the effectiveness of the booklet in class, we invited Ms Judy Attwood from the Ministry of Education Basic Education Curriculum Reform Project (Natural Science). During the class activity, Bertanizo Guro and Elda Guterrez read the book in class. Students' engagement and satisfaction were assessed (Figure 7). The booklet and teachers supplement were also distributed to the Ministry of Agriculture and Fisheries, the National Directorate of Protected Areas, the Ministry of Education and Basic Education Department. Feedback about the book and language was requested for all departments (Appendix 1.4). The comments and corrections were incorporated into the booklet and a final version was created, which is ready to be printed and distributed to all primary schools of Timor-Leste.

Figure 7. The booklet entitled "Lenuk Kakorok Naruk Timor-Leste Nian" been distributed and explained and evaluated at the Los Palos and Mehara primary schools.

Community engagement and feedback

From the 3rd to the 27th of February and from the 3rd to the 11th of July we organized 38 meetings with the government departments, school teachers and coordinators and Sucos and Aldeias chiefs. The number of people present in these meetings varied from two to 15 (5.2 ± 2.7) and occurred in Dili, Los Pales, Mehara and Maupitini (Figure 8).

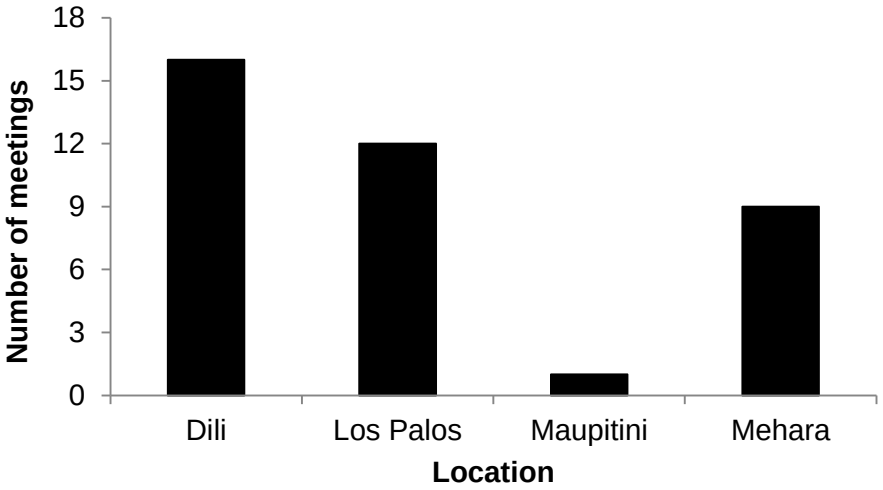


Figure 8. Number of meetings according to their location (City, Suco).

We organized in total 38 meetings. The aims of these meetings were to: obtain permission for the research in the National Park Area and its related sucos, exchange information about the region and the turtle, explain and raise awareness about our project, organize and schedule further meetings and workshops, discuss the school material to be developed, present the project results and discuss the findings and future steps and deliver school material and ask for feedback (Figure 9).

To evaluate the level of satisfaction in regard to the Projetu Lenuk Lorosa'e, we requested all members of the Projetu Lenuk Lorosa'e to complete a feedback form (Appendix 1.5).

Figure 9. Introductory meeting with the Ministry of Agriculture and Fisheries, Mr. Lourenço Borges Fontes on the 3rd of February, 2014 (Left) and with Mehara chefes de Aldeas and Suco on the 13th of February 2014 (Right).

RESULTS

Monitoring

Seven adapted snorkel traps were used to survey Agua Nova, Moto and Maupitini (Table 1). Only one trap was successful on capturing one female *C. mccordi*. This animal was captured using a trap donated by University of Canberra in July, which has a more complex frame than those used during the February survey. We used fresh captured fish from the Iralalaro Lake during the July survey.

Table 2. Snorkel traps used to survey the three selected areas in Iralalaro Lake in February and July, 2014.

Trap	Start day	End day	Place	Installation	Turtles captured
TR01	10/02/14	12/02/2014	Agua Nova	Horizontal	0
TR02	10/02/14	12/02/2014	Agua Nova	Horizontal	0
TR03	11/02/14	13/02/2014	Moto	Horizontal	0
TR04	12/02/14	13/02/2014	Moto	Vertical	0
TR05	18/02/14	19/02/2014	Maupiti	Horizontal	0
TR06	18/02/14	19/02/2014	Maupiti	Horizontal	0
TR07	8/07/2014	9/07/2014	Agua Nova	Vertical	1
TR07	9/07/2014	10/07/2014	Agua Nova	Vertical	0

Trapping time was very restricted during this trip. For future surveys we suggest a more structured approach and longer periods of monitoring in different seasons (dry and wet season). We also suggest the use of fresh fish from Lake Iralararo as bait and the construction of more traps in the same format as TR07 (Figure 10). New culturally acceptable areas for monitoring should also be identified to increase the number of traps in the water at a given time.

Figure 10. Successful capture of *C. mccordi* with Trap TR07 on July 2014 at Agua Nova Site, Iralararo Lake.

We placed the water temperature loggers in the three main monitoring sites in February 2014 in close proximity to the traps (Figure 11). The Moto Swamp temperature logger was lost. Water temperature at Agua Nova and Maupiti varied from 26.4 to 32.2 ^{o}C (Table 2, Figure 11).

Table 2. Water temperature for the surveyed areas of Agua Nova and Maupiti. Water temperature was recorded every 30 minutes while the trap was in the water.

Trap ID	Location	Start (Day /Time)	End (Day /Time)	Temperature		Number of recordings
				Average (^{o}C)	Range (^{o}C)	
TR01	Agua Nova	10/02 12:00	12/02 13:00	29.7 ± 1.3	27.8 - 32.2	99
TR02	Agua Nova	10/02 13:00	12/02 13:00	28.0 ± 0.5	27.2 - 28.8	97
TR05	Maupiti	18/02 12:00	19/02 12:00	27.3 ± 0.7	26.4 - 28.6	49

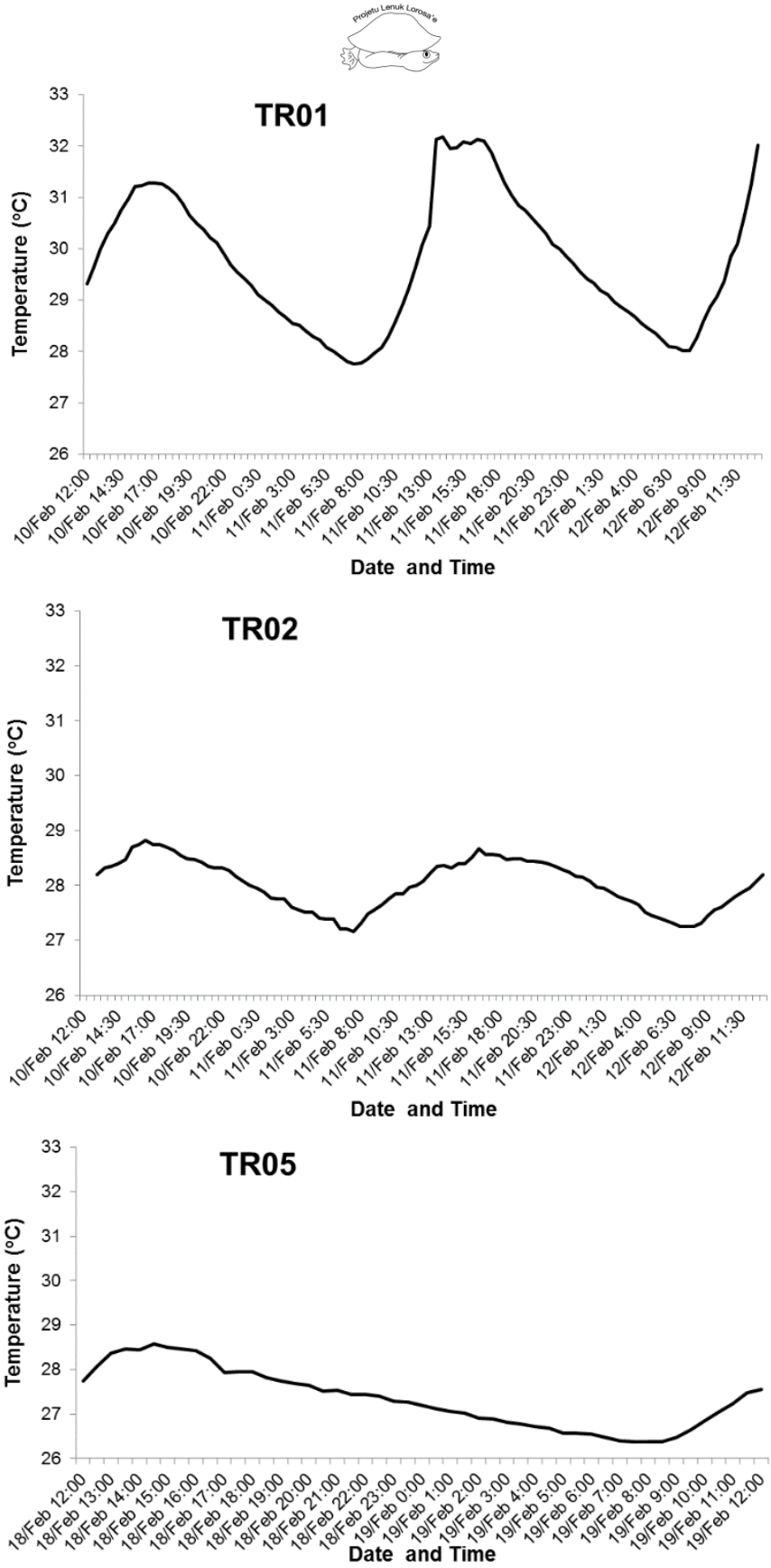


Figure 11. Water temperature for the surveyed areas of Agua Nova and Maupiti. Water temperature was recorded every 30 minutes while the trap was in the water.

Species biology

We identified the sex (Figure 12), measured, weighted and counted Plastral annuli for ten *C. mccordi* from Lake Iralalaro (Table 3). With the exception of CM11, which was captured during the Projetu Lenuk Lorosa'e monitoring, all specimens were pets.

Figure 12. Differences between male and female *C. mccordi* at Lake Iralalaro.

Pets were captured in the dry season (April to October) of 2012 (n = 2), 2013 (n = 2) and 2014 (n = 3) and the wet season (November to February) of 2012 (n = 2). Most animals were captured by hand during the day (Table 4). For one turtle, the hunter was not present and it was not possible to obtain data on the occasion of capture.

Table 3. Carapace and plastron measurements *C. mccordi* at in the Lake Iralalaro region in 2014. Linear Carapace Length: LCL; Curved Carapace Length: CCL, Linear Width: LW, Curved Width: CW, Plastron Length to Tail Notch: CPL; Tail Notch to Cloaca: TNC, Head Width: HW, Plastral Annuli: PA, Annuli Not Visible: NV

ID	Sex	LCL	CCL	LW	CW	CPL	TNC	HW	Weight	PA
CM01	M	157.9	17	114.3	13.2	128.2	24.7	27.3	498	2
CM02	F	183.8	19.8	141.6	15.8	149.1	20.8	31.3	777	4
CM03	F	199.6	21.8	150.1	18	157.7	29.7	34	1030	NV
CM04	J	109.1	11.8	80	9.4	94.8	12.3	21.8	178	1
CM05	F	208.5	22.2	146.2	17.6	164.9	25.7	36	1080	NV
CM06	F	209.1	28.9	160.4	25	165.5	-	35	1660	NV
CM07	M	180.4	27	132.2	21	144.3	-	30.3	770	2
CM09	F	121.5	25.1	109.5	22.3	150.3	13.1	31.7	1125	NV
CM10	M	118.5	25.2	100.5	21	139	36.7	29.7	1010	4
CM11	F	232.4	38	177	27	175.8	36.5	37.9	2340	NV

Table 4. Information on capture day, time and method for the ten *C. mccordi* measured at the Lake Iralalaro region in 2014.

ID	Capture day	Capture time	How	Destiny
CM01	Dry season, 2013	midday	by hand	Pet
CM02	August, 2012	during the day	by hand	Pet
CM03	August, 2012*	during the day	by hand	Pet
CM04	November, 2012	midday	by hand	Pet
CM05	October, 2012	midday	by hand	Pet
CM06	April, 2013	night	by hand	Pet
CM07	Unknown**	afternoon	by hand	Pet
CM09	Wet season, May 2014	morning	fishing line	Pet
CM10	Wet season, May 2014	morning	fishing line	Pet
CM11	09, July, 2014	15:00	UC trap	Released

* Same time as CM02; ** Hunter not present during interview

When data from this project is plotted with the data from Kuchling et al. (2007) we observe similar trends (Figure 13). It is possible to determine the sex of an individual with a linear carapace length larger than 120 mm. Females usually have a wider carapace than males of similar carapace length. The smallest and largest animal observed had a carapace length of 82 mm and 232 mm respectively. Only females were larger than 220 mm. All turtles were captured after 2011 and it is unlikely we measured the same animal as Kuchling et al. (2007).

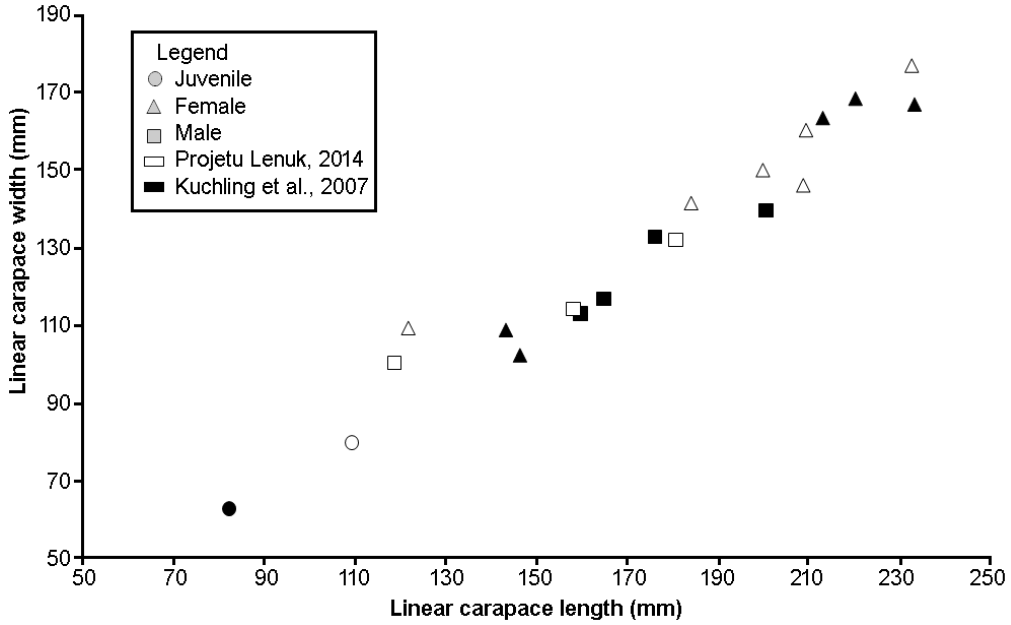


Figure 13. Carapace size for *C. mccordi* measured during the Projetu Lenuk Lorosa'e in 2014 and Kuchling et al. (2007).

Animals more recently captured (Measurement made less than three months after capture) presented a higher weight/carapace length ratio (Figure 14). The only two pets captured in 2014 were visually in better conditions than those captured in the previous two years. The female captured by the Project during the July survey was the largest and heaviest of all animals measured.

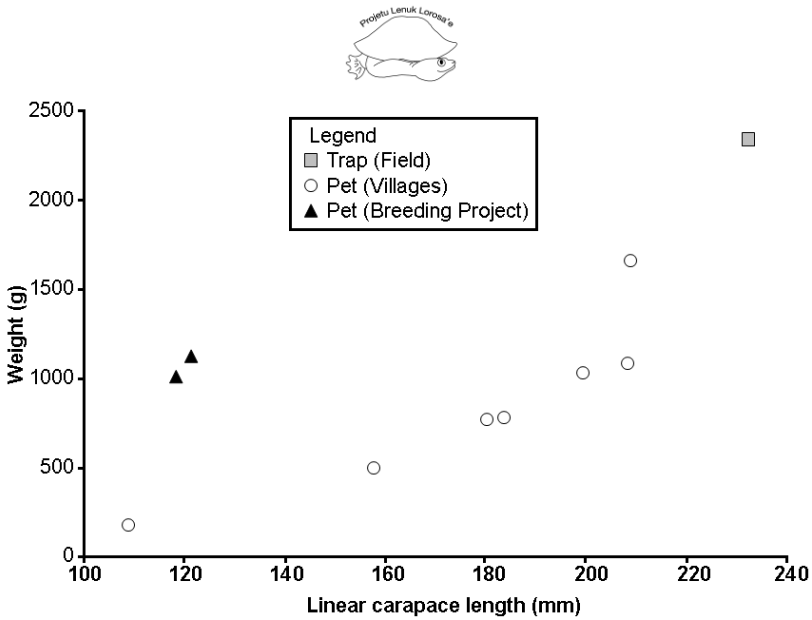


Figure 14. Linear carapace length of *C. mccordi* plotted against weight. Pets captured recently (triangles) or during the project monitoring survey (square) had higher Weight/Carapace length ratio.

The two most recently captured pets were a male and female caught in May 2014 (Figure 12). This was the only case of a household that possessed both sexes. Although captive breeding was not part of our original aim for the first phase of the Projetu Lenuk Lorosa'e project, we identified this case as an opportunity to observe the community response to the possibility of building small captive breeding facilities in their backyard. Thanks to the generous donation of Judy Attwood from the Timor Department of Education, we were able to provide Mr Luiz Mozinho (The owner of the two turtles) with $300 USD in materials to build a pond, where the turtles would be protected and comfortable.

Mr. Luiz was very enthusiastic and started the construction as soon as we provided the materials (Figure 15). Due to our time constraints, we were not able to stay to observe the facility finalized. However, it is important to emphasise that these types of facility will need the input of experts on captive breeding to be successful in the long term. The aim of this activity was to insure a positive impression from the community in regard captive breeding programs and guarantee their willingness to listen to expert advice on the construction of an appropriate captive breeding facility in the future.

Figure 15. Initial construction of a fenced pond for the male and female *C. mccordi* by Mr Luiz at Mehara Suco in July, 2014.

Community perceptions

The sixteen local experts interviewed aged from 19 to 90 years old (Figure 16). Fifteen were male and one was female. Their years of formal education ranged from zero to 12 years (Figure 17). Of those interviewed, three were Aldeia (Village) chiefs, eight were farmers, three were forest rangers and one was a member of the Suco council.

The number of years these experts were living in this area varied from eight to 72 years, representing from 11% to 100% of their lives (Figure 18). Those living for less than 50% of their lives in the area are originally from other villages also in close proximity to the Lake Iralalaro.

Figure 16. Charles Darwin University undergraduate students conducting semi-structured interviews at Mehara Suco in February and July 2014.

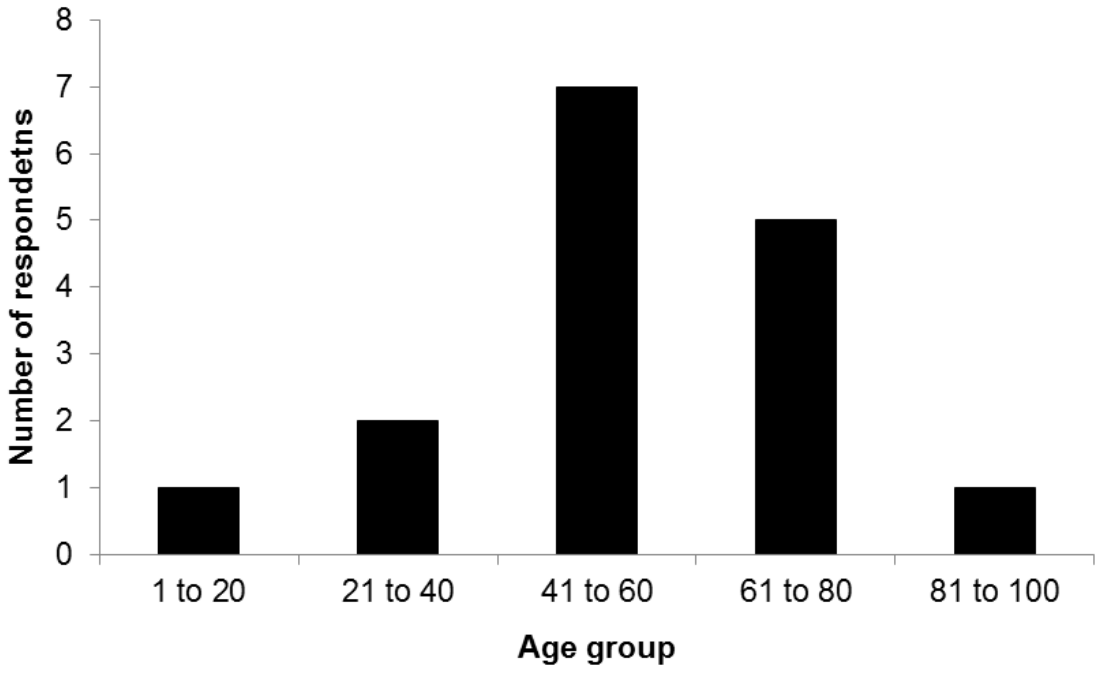


Figure 17. Age group of local experts interviewed in February and July 2014 at the Lake Iralalaro surroundings.

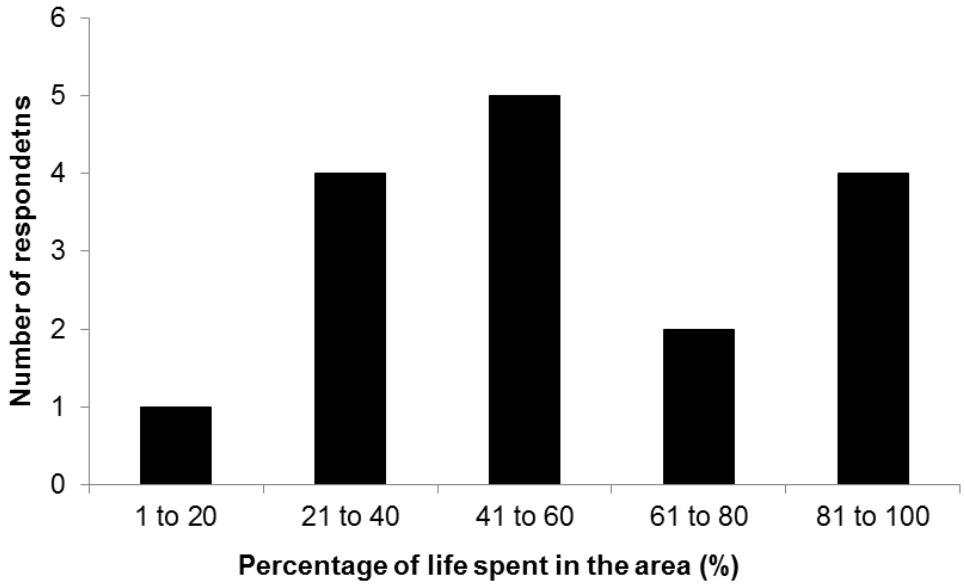


Figure 18. Percentage of life that local experts lived in the area. Local experts were interviewed in February and July 2014 at the Lake Iralalaro surroundings.

Experts identified one (n = 1), two (n = 13) or three (n = 2) types of turtles living in the Lake. Eight experts cited the long-necked turtle Veu (White plastron) and Sepe veu (Red plastron). Both types of turtles were identified as *C. mccordi* with different plastron colours (Figure 19). Four people defined Veu and Sepe Veu with the generic name of Veu Mani Lohai (Long-neck-turtle). Two people defined the red-plastron turtle as Sepe Veu but provided a different name to the white plastron type (Pai Veu: Pig-turtle or Veu Ratunu: Queen-turtle).

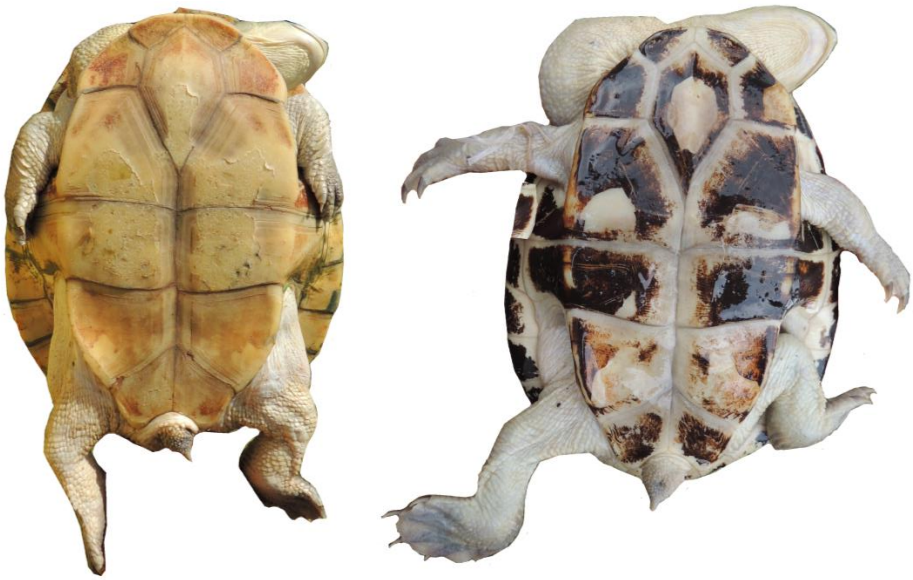


Figure 19. Long-necked turtle (*C. mccordi*) with different plastron colours. Most experts identified Veu (White plastron) and Sepe veu (Red plastron) as the two types of turtles that lived at the Lake Iralalaro.

One person only recognized Sepe Veu. Two people described a third species under the name of Veu Akanara (Maid turtle) or Veu Manikava (Short-necked turtle). This third species of turtle is described as been similar to the other two types with the exception that it has a

short neck. We did not find a specimen of this third species during the 2014 project. The personal perspective in relation to the turtle population status varied between different Sucos. All experts in Maupitini agreed that *C. mccordi* population has been decreasing lately, while 50% of the experts in Mehara think the population is increasing, 33% reckon the population is declining and 17% do not know. The reasons for populations increase or decline also varied between Sucos (Figure 20).

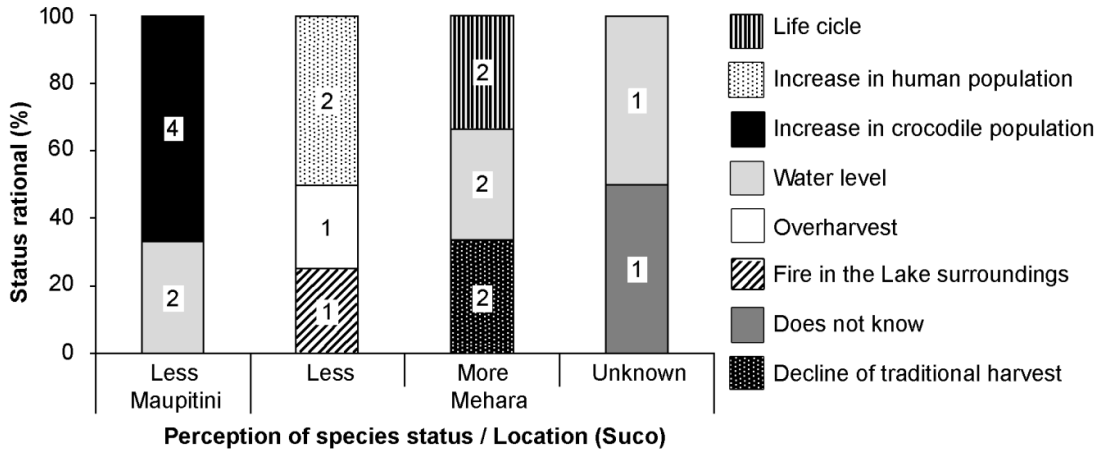


Figure 20. Perspective on *C. mccordi* population status (More or less turtles than used to be or unknown) and reasons for population change (turtle life cycle, increase in human or crocodile population, high water level - inundation of harvest sites, overharvest, fire and decline of traditional harvest) given by the experts from two Sucos (Mehara and Maupitini) around the Lake Iralararo.

Experts in Mehara cited three main reasons for the population increase. According to two experts the community can rely on the life cycle of this turtle that is always producing more eggs and hatchlings to continuously increase the population numbers. Two experts cited the decline of traditional harvest as the main reason for population increase. Two experts cited the recent increase on the water level and consequent decline of harvest as the main reason for higher numbers of turtles in the Lake. Higher water level inundates traditional harvest areas which become inaccessible. Among the reasons given by the experts for *C. mccordi* population decline was the increase on the human and crocodile population, overharvest and fire in the Lake surroundings (Figure 20).

"Since 2008, when people declared Konis Santana a park that was the time when people were told to reduce harvesting of turtle. But there is no traditional restriction"
Amancio Mendes

Threats to the *C. mccordi* population were also identified by direct observation and during local community meetings. Human harvest is the main threat in the area. Factors that may be reducing the capacity of this turtle to survive in the face of human harvest include habitat modification by buffalo and cattle and nest predation by pigs and dogs. Fire is also likely to be an important factor causing decline. During the dry season turtles reportedly aestivate in tall grass or stay in the shallow waters of the Lake.

"If people don't take the eggs then pigs will destroy the eggs"
Acacio da Silva

"When we went fishing my dog barked and showed me the nest"
Albino Pereira

Human-induced fire around the lake edges is likely to kill turtles or expose them to predators. Climate change may also play an important role in modifying harvest pressure. Major turtle harvest events, when groups of locals travel to the Lake and attempt to harvest many turtles at once, are restricted to extremely dry years when the Lake recedes to its minimum level. A drier climate would increase the number of major harvest events and decrease turtle harvest relief years such as 2013, when high water levels prevented intense harvest. There is also a potential for the introduction of the Chinese Pond Turtle (*Mauremys reevesii*) turtle in the Lake, since individuals of this species were kept as pets in the region. Locals also mentioned the Black-spined Toad (*Duttaphrynus melanostictus*), which was introduced recently in the area.

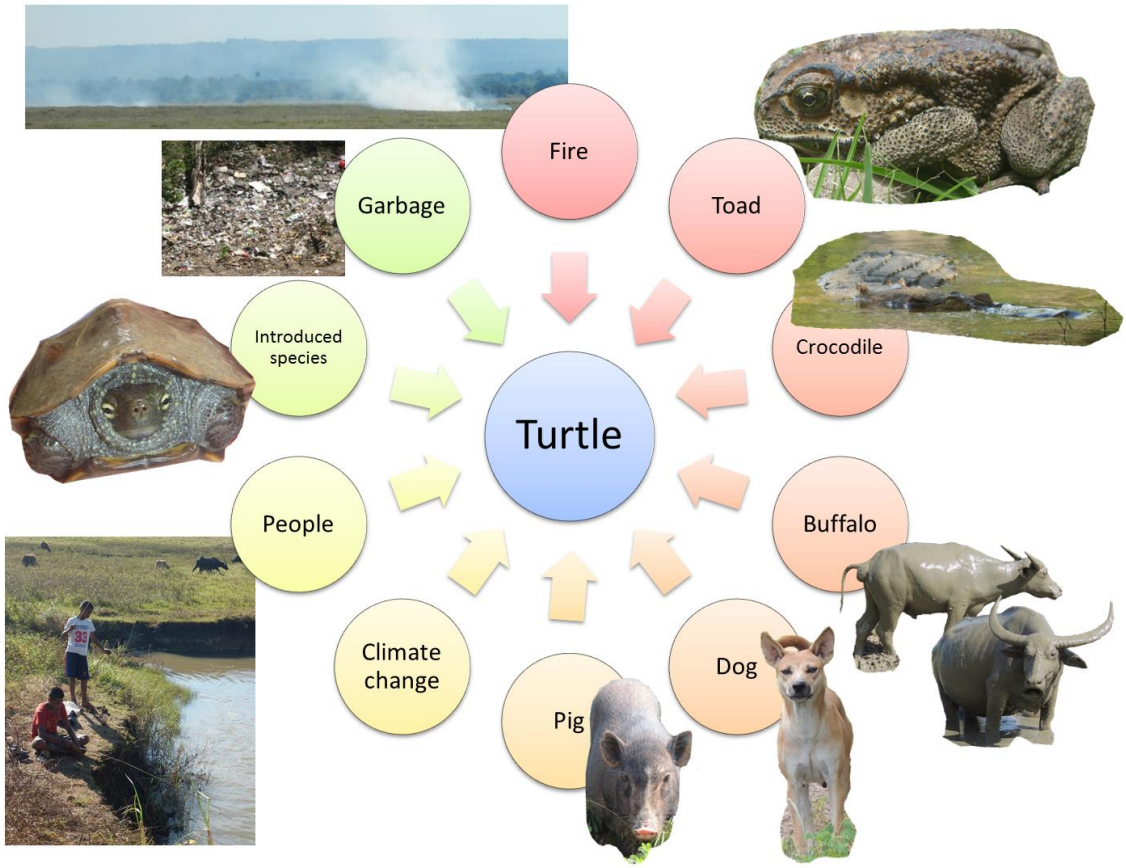


Figure 21. Threats to the *C. mccordi* population were also identified through direct observation, local community meetings and interviews with local turtle experts.

While asked what actions should be taken to improve the turtle population in the Lake, the most suggested options by experts were captive breeding and harvest ban or management (Time restriction: Not harvesting turtles until water level is at its lowest). Experts also mention the removal of crocodiles, increase awareness among the communities around the Lake, government intervention, protection of small ponds and fire management (Figure 22).

"Turtles will not die in land except when people burn the grass"
Adriano Dias Qintas

"People burn grass during the dry season to obtain the green grass for cattle". After the fire, they find turtle shells. The turtle meat is usually eaten by birds"
Mateus Pedro

"I caught turtle during the dry season while burning the grass. We will take the turtle alive. When people burn the grass, the turtle will run to the land and people can easily catch it".
Adriano Dias Qintas

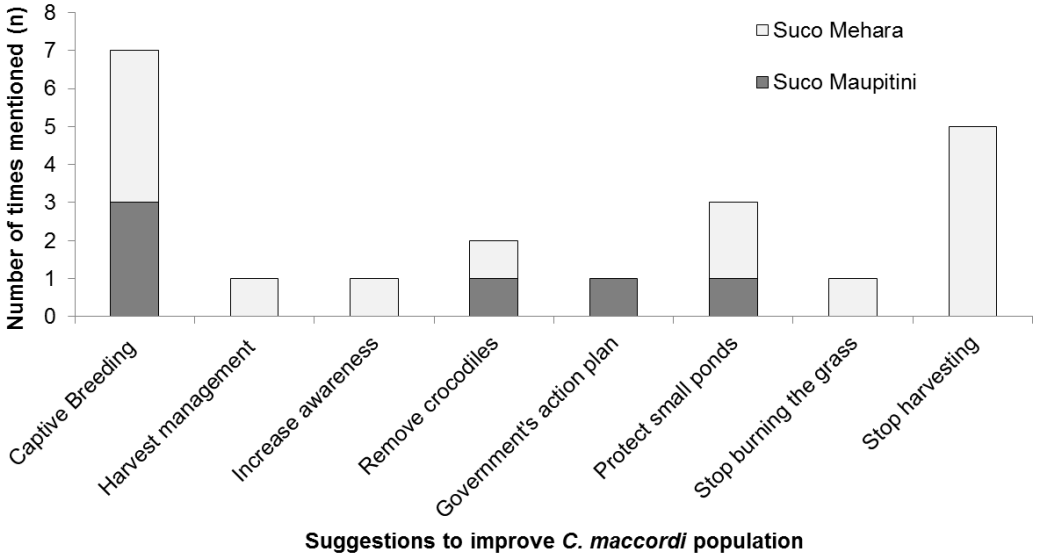


Figure 22. Actions suggested by local experts to improve the *C. mccordi* population in the Lake Iralalaro. Harvest management: Not harvesting turtles until water level is at its lowest.

Experts cited tree methods to capture *C. mccordi*. Animals are captured using fishing line or using a bamboo stick in shallow water probing the mud. According to the experts, the bamboo makes a characteristic sound when it hits the carapace. Turtles are also captured by hand at the edge of the Lake or under the dry grass. (Figure 23).

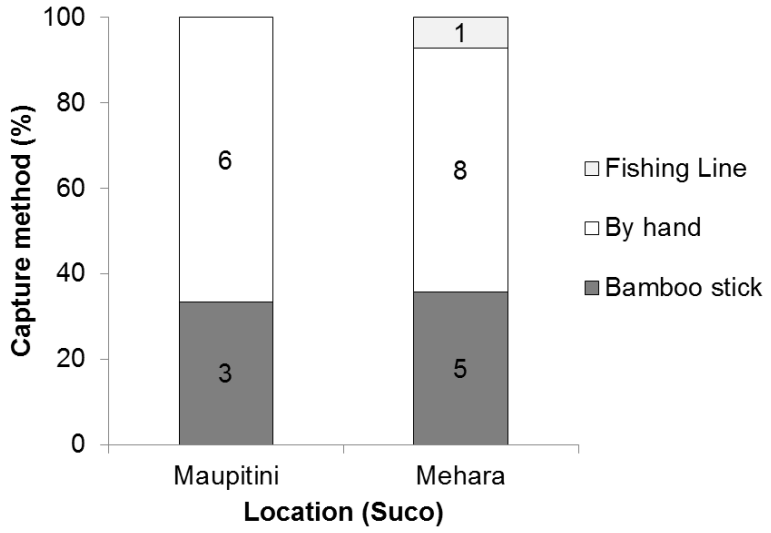


Figure 23. Capture methods used to harvest *C. mccordi* at the Lake Iralalaro are displayed according to number of times it was mentioned by experts in the two Sucos (Villages).

All respondents with the exception of one admitted having eating turtles. However, keeping captured *C. mccordi as pets* was also a common practice around the Iralalaro Lake, with 43% of the experts keeping turtles as pets (Figure 24). Children in both Maupitini and Mehara prize their pet turtles, and will not accept money in exchange for their animals (Figure 25). Turtles are kept in buckets, in the toilet water tank or in semi-natural conditions.

“I have a pet turtle in the swamp but you can't go there because it is a sacred place”
Vicente de Araujo (Traditional owner of the Lake).

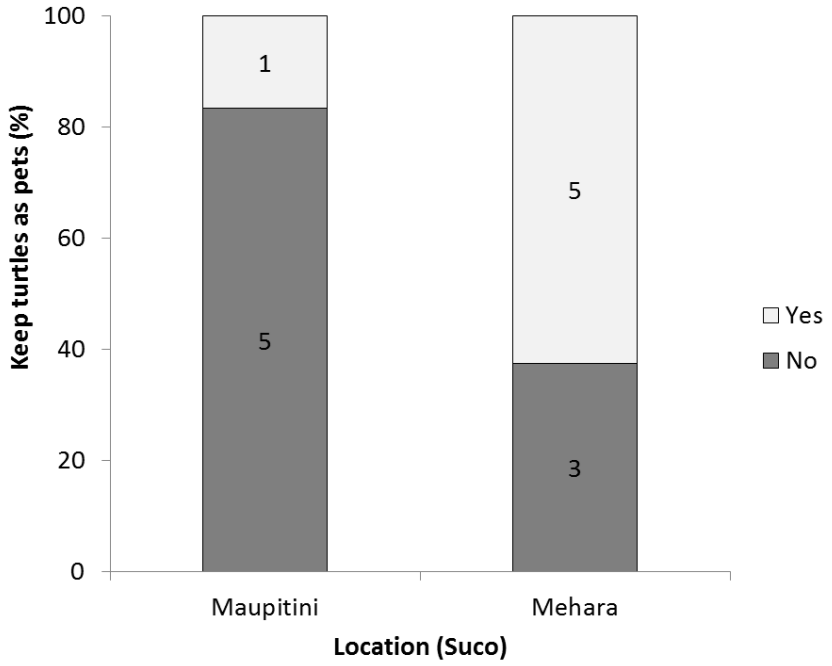


Figure 24. Percentage of experts that keep *C. mccordi* as pets in Maupitini and Mehara Sucos.

Chelodina mccordi is described by turtle experts as living in the Lake Iralararo, both in the water and outside, estivating in the tall grass during the dry season. It also lives in the rivers, creeks and swamps of the Los Palos region. Twelve experts (n = 14) have seen *C. mccordi* outside the water (nesting or estivating). Two experts mentioned the best time to see the *C. mccordi* outside the water was at night during the full moon. It was mentioned by one respondent that turtles are particularly common in the road 24 hours after heavy rain.

Twelve experts have caught females with eggs inside. From those that have observed pregnant females, ten agree that the females nest in the dry season (July to October), one suggested that *C. mccordi* has two nesting periods (one in the dry season and another in the beginning of the wet season and one described the nesting period as restricted to February (End of wet season - when water level drops).

"The turtles do not dig themselves in the mud but hide under the big the grass during the dry season"
Adelino Gonzaga

"When the habitat of turtle gets dry during the dry season they will came to the land, when the wet season arrive and water level increase they will come to the water"
Albino Pereira

Figure 25. Children from Mehara with their pet *C. mccordi*. We gave them the children's book "Lenuk Kakorok Naruk Timor-Leste Nian (The long-neck turtle of Timor Leste) in exchange for letting us measure their pet turtle.

Once again, 12 respondents have seen nests of this species. Nine respondents agreed that the nests were found in the dry season, while one respondent found nests in both seasons and two respondents couldn't remember the period they found the nest. Nests are found in the mud, close to the edge of the water and around the swamps. According to experts, hunters are able to find the nest due to a small hole in the mud. They can also see the plastron mark made by the female after nesting and a little mound indicating the location of the nest. Experts can also identify *C. mccordi* footprints. In some cases, dogs are used to find nests.

Turtles are mainly captured during the dry season. Capture with fishing line can occur in both seasons. Capture by hand or using the bamboo stick usually occurs during the dry season. According to experts, during the wet season the hunter needs to use a canoe and it is harder to find the turtle. This study confirms Kuchling et al. (2007) suggestion that earlier reports of the collection of up to 30 turtles per day by local people (EPANZ Services 2004; Middleton et al. 2006) is the product of the absence of a rigorous interview protocol which probably produced dramatic exaggerations and reflected neither present abundance nor recent past exploitation patterns.

Events when many members of the community gather together and go to the Lake with the main aim to collect *C. mccordi*, might occur once or twice every year during the dry season when the Lake is at its lowest level. During such rare events, the community can harvest up to 30 *C. mccordi*. The capture of 30 animals in a day is considered possible but unlikely and usually less than 20 animals are capture during these events. In very wet years, when the water of the Lake remains high during the dry season, such harvest event will not occur. This was the case in 2012, which was considered a very wet year. We suggest that these events have a potential to become a community-based conservation and management program for monitoring the population of *C mccordi* in the Lake, where the hunters would mark and recapture the turtles instead of harvesting them.

"Based on the understanding of the community they commit to harvest it once or twice a year"
Adelino Gonzaga

"Long time ago people went for hunting and people might have got 20 or more turtles"
Caetano da Assunção

“Catching turtle is a habit of the community. Something they do during their leisure time”
Acacio Da Silva

No expert reported ever selling turtles or turtle eggs. The answer for this question might have been influenced by the presence of Park Rangers during the interview. Respondents reported having seeing turtles being sold, especially before Timor-Leste independence from Indonesia. Prices would depend on the size of the turtle and the buyer. Hunters would be willing to sell *C. mccordi* to their neighbours for $1 USD. However, prices for foreigners would vary according to the time, size and wiliness of the buyer to pay high prices for a specimen. Before independence, it was reported that Indonesians would pay from $1.5 USD (small turtle) to $2.5 USD (big turtle). Animals were then eaten or sent to Indonesia. After Independence, there are records of foreigners buying *C. mccordi* from $20 to $50 USD.

"I have heard rumours about foreigners coming around three years ago and buying turtle"
Amancio Mendes

“Some tourist came here and saw people had turtle, the tourist gave money to the people to take photo and then leave the turtle back to water”
Lirio Mendes

No respondents identified any type of traditional restriction in regard to turtle harvest or consumption. There is no particular time, capture method, sex, size, area, period or special occasions that should be avoided while harvesting *C. mccordi*. There are serious restrictions about killing crocodiles and snakes due to traditional beliefs, but these beliefs are not extended to turtles. Crocodiles and snakes are seen as ancestors that should be respected.

“Timorese believe crocks are their ancestors and do not hunt them”
Acacio da Silva

Another belief that should be taken in account while planning future monitoring projects in the Lake Iralalaro is the restriction of the use of material that has been used in the sea. No material from the sea or that had contact with the sea should be used in freshwater bodies.

“Bate and trap cannot have touched or come from the sea. It will spoil the water, and people will die or get very sick. They will go crazy”
Adelino Gonzaga

We identified a traditional owner of the Lake Iralalaro. This is a hereditary title and the owner is responsible for setting the rules for fishing and harvesting in the Lake vicinities. Mr Vicente Araújo, the present owner of the Lake, has announced in recent years that *C. mccordi* harvest should be banned. According to one respondent, the rationale behind this recent ban was the possibility of financial gain exploiting this species in the near future. However, many community members do not follow his rules. Conservation projects should encourage the continuity of such traditional rules.

“The crocodile talked to me and prohibited people to catch turtles. Most people still engage in this practice but few don't. Someone that don't respect they will get a disease. Younger people also included”
Vicente de Araujo (Owner of the Lake)

“The restriction that was made by old man Vicente, the owner of the Lake, says that people shouldn’t go catching turtles but people still go”.
Albino Pereira

"The native people had announced that people should stop eating turtles because in the future it will be more valuable"
Boaventura Da Silva

We identified traditional stories involving the long-necked turtle. These stories explain the origin of the Long-neck turtle as well the relationship between species:

"I heard from my grandparents that turtles came from coconut shell. One day there was a heavy rain and flood in the area where they lived, then here was a girl sitting on the top of roof and held the coconut shell and she throw it down in the water. Suddenly it turned into a turtle"
Boaventura Da Silva

"I got this story from my father. There was a snake on the land, then a dog saw the snake and started barking. After that the snake ran towards the swamp and the dog chased the snake. The dog owner ran towards the swamp too. Suddenly, the snake hid under a shell of coconut. When the dog owner tried to find the snake, it turned into a turtle and run towards the water"
Albino Pereira

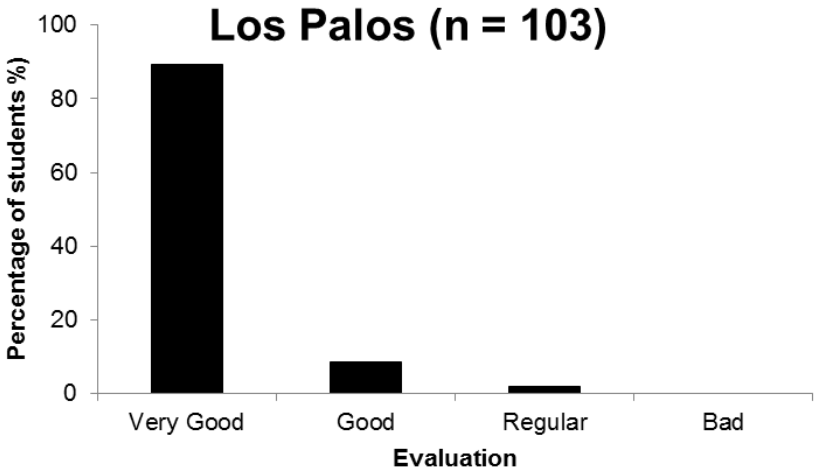
*"Veu Ratunu (*C. mccordi *– white plastron) and Veu Akanara (unidentified short-neck turtle) cannot stay in the same place, otherwise Veu Ratunu as queen will bite the Veu Akanara which is its maid. Veu Ratunu and Sepe Veu (*C. mccordi *– red plastron) will not attack each other because they are in the same level. If Veu Ratunu and Veu Akana are put in the same bucket Veu Ratunu will bite Veu Akanara until death"*
Adelino Gonzaga

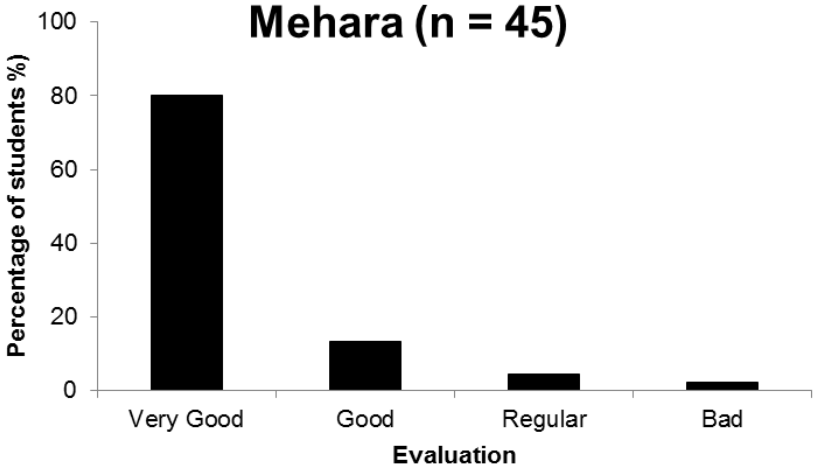
School material production

The sixth grade students from both Los Palos and Mehara were able to read the booklet and engage in the lecture presented by CDU undergraduates. Both book and lecture were delivered in Tetum (Figure 26).


Figure 26. Sixth Grade Students from Mehara and Los Palos during the lecture and book evaluation.

Students were given the book as a reward at the end of the lecture for participating and evaluating the book and activity. The book and activity reached an average score of 9.5 (from 0 to 10) among students. Lecture and book were ranked as very good (87%) by most of the students (Figure 27).





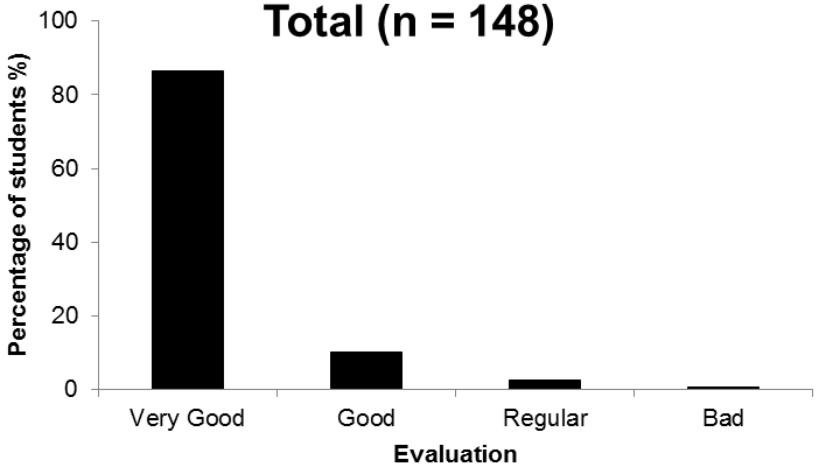


Figure 27. Percentage of students in Los Palos and Mehara that considered the *C. mccordi* lecture and book “very good”, “good”, “regular” or “bad”.

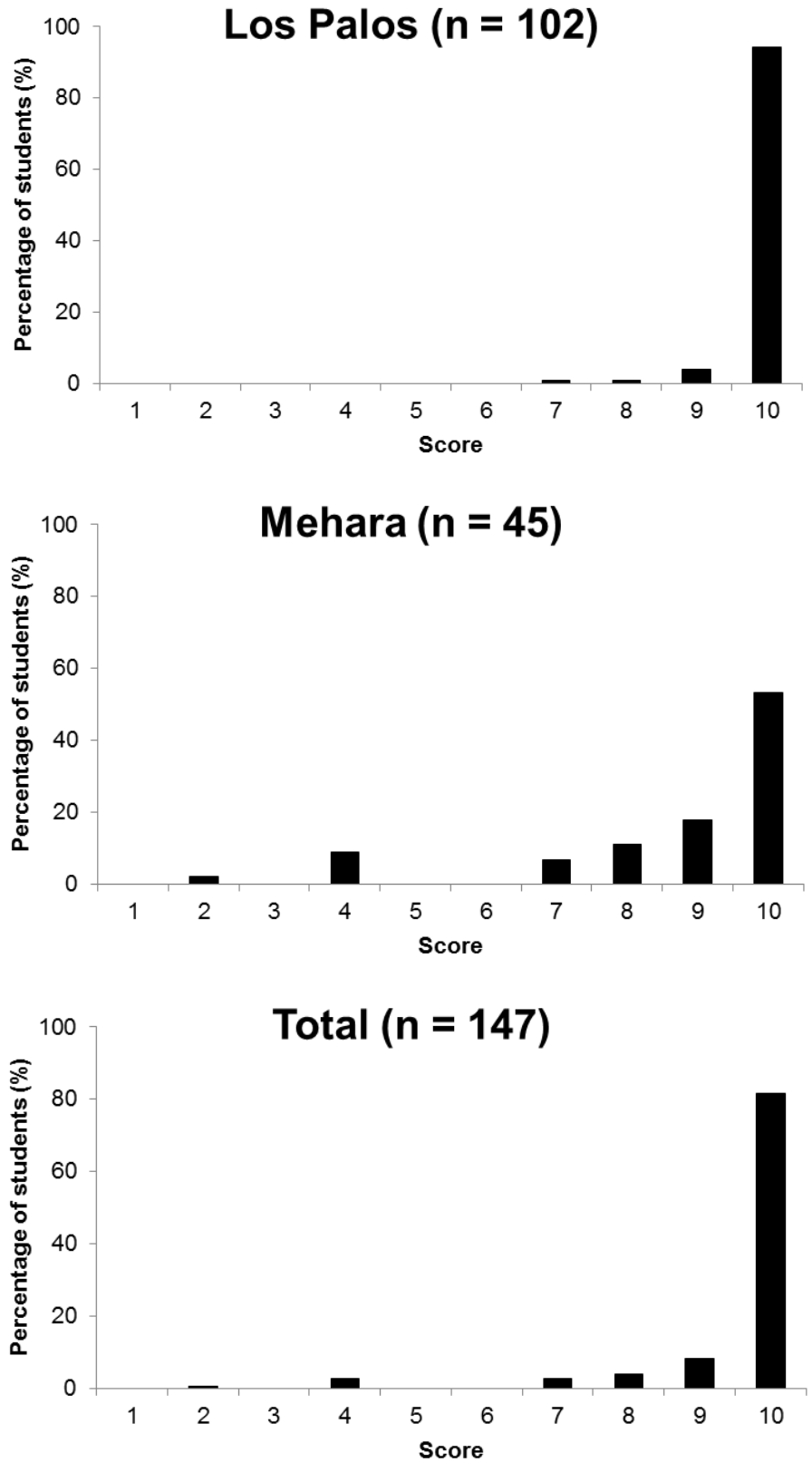


Figure 28. Percentage of students in Los Palos and Mehara that scored the *C. mccordi* lecture and book from zero to ten (zero = really bad; ten =excellent)

"I am really happy because of being given this book about the long neck turtle and I can understand the words"

Felizita Via de Leria Pereira (6th grade student from Los Palos)

"It is very good. I am really happy because of being given the book of long neck turtle. Now I can learn about this turtle"

Warlina Erfavia (6th grade student from Los Palos)

Community engagement and feedback

We received 17 completed feedback forms evaluating the level of satisfaction in regard to the Projetu Lenuk Lorosa'e and the school material. Respondents were teachers and personnel from the Department of Education and Department of Agriculture and Fisheries (Figure 29 and 30).

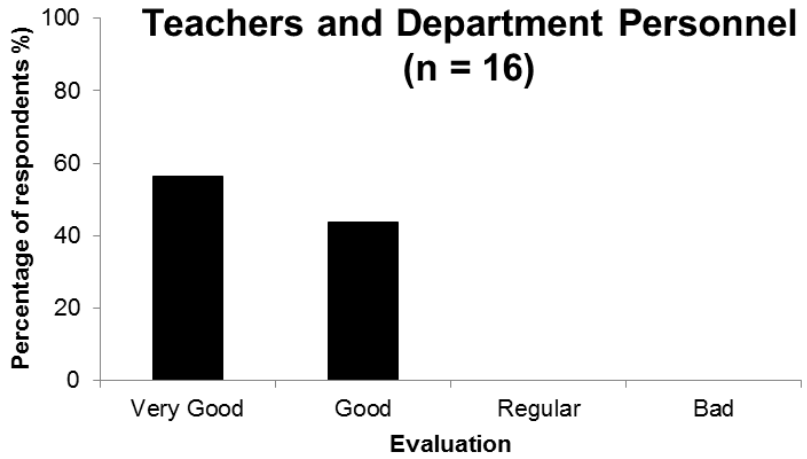


Figure 29. Percentage of teachers and department personnel in Los Palos, Mehara and Dili that considered the *C. mccordi* book "very good", "good", "regular" or "bad".

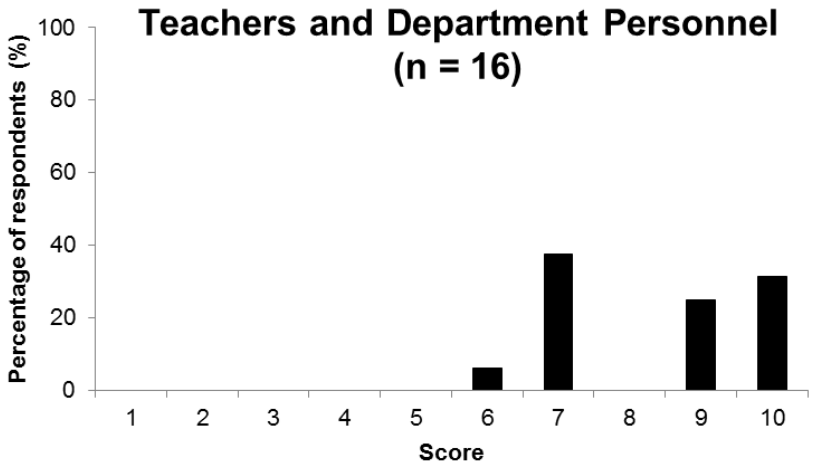


Figure 30. Percentage of teachers and department personnel in Los Palos, Mehara and Dili that scored the *C. mccordi* book from zero to ten (zero = really bad; ten =excellent).

Comments in regard the school material were generally positive with remarks in regard to the Tetum grammar and orthography. The book was submitted to the Department of Education, which reviewed the language used and corrected the structure and spelling, according to Tetum Orthography. The revised book is now approved and endorsed by the Department of Education (Appendix 2). According to the Department of Education, 12,500 copies of the book and 1,500 copies of the teacher materials would ensure the incorporation of these resources into the curriculum and that all students in Timor become aware of the long-necked turtle of Timor-Leste.

Comments from local 6th grade teachers in relation to the school material:

"This book of Timor-Leste long neck turtle is very good for 6th grade student. I am the teacher of 6th grade, I am really happy because this book helps us, to be used in teaching our students"
Francisco Barros (Los Palos)

"We really appreciate for your presence in teaching our student about how to protect the life of turtle in their environment in the Iralalaru Lake so its population will always increase"
Antonio do Carmo (Mehara)

Comments from the Department of Education personnel in relation to the school material:

"Excellent presentation of critical information. Perfect for use in primary across Timor"
Curt Gabrielson (Dili)

"The story is really good, because a lot of people don't recognise (don't see) this Long-Necked Turtle. From this story, people can know that in Iralalaru there are Long-Necked Turtles"
Santina Cardoso (Dili)

"This project really needs to be conducted as no one has taken care of these animals (veu) so far. From this program I think it will be able to wake up the community living there to put their attention and take care of these animals"
Hortencio Valentim Cristovao (Dili)

Comments from the Curriculum Reform Project personnel in relation to the school material:

"This is a good topic to introduce the Long-Necked Turtle and way to protect them, and this is good for grade 6 students. However, we would like this project to fix the translation to make the correct structure and spelling, according to Tetum Orthography"
Mario (Dili)

Comments from Minster of Agriculture and Fisheries in relation to the school material:

"I really appreciate this research as it creates this book with the awesome figures of long-necked turtle. From this research we can know our natural resources in Timor-Leste, especially in Los Palos"
Hipolito de Jesus (Los Palos)

We also requested all members of the Projetu Lenuk Lorosa'e Team (Figure 31) to provide feedback. The team consisted of three Forest Rangers from Nino Konis Santana National Park (Jose Ramalho Albuquerque, Gil Mendes Cabral and Albino Pereira), one employee from the Ministry of Agriculture and Fisheries (Nazario de Jesus Pacheco), two undergraduate Environmental Science students from Charles Darwin University (Elda da

Costa Guterres and Bertanizo Guro da Costa) and one member of the Ministry of Education Basic Education Curriculum Reform Project (Judy Attwood).

Figure 31. Members of the Projetu Lenuk Lorosa'e Team during the 2014 fieldwork.

The book and activity reached an average score of 8.9 (from 0 to 10) among participants (Figure 32). Activities were ranked as very good or good (Figure 33). In general, comments were positive with all participants willing to continue working on this project and learning more about the *C. mccordi*.

Comments from Forest Rangers from Nino Konis Santana National Park in relation to the activities developed by the Projetu Lenuk Lorosa'e:

"In this project I learnt a lot such as: measuring the turtle, weighing, and how to put the trap in the water so the turtle can come in, and taking photograph of the turtle"
Jose Ramalho Albuquerque

"I want to participate again so that it improves my capacity and experience and I will be able to know more deeply about thee turtle"
Gil Mendes Cabral

"I have not given 100% because I still want to know how the turtle live and how much it growths every year, I am hoping that you will be back next year"
Albino Pereira

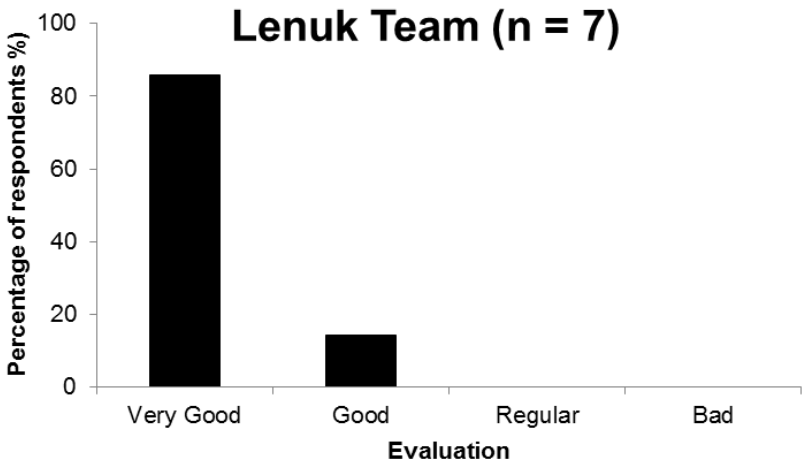


Figure 32. Percentage of Projetu Lenuk Lorosa'e Team that considered the *C. mccordi* book "very good", "good", "regular" or "bad".

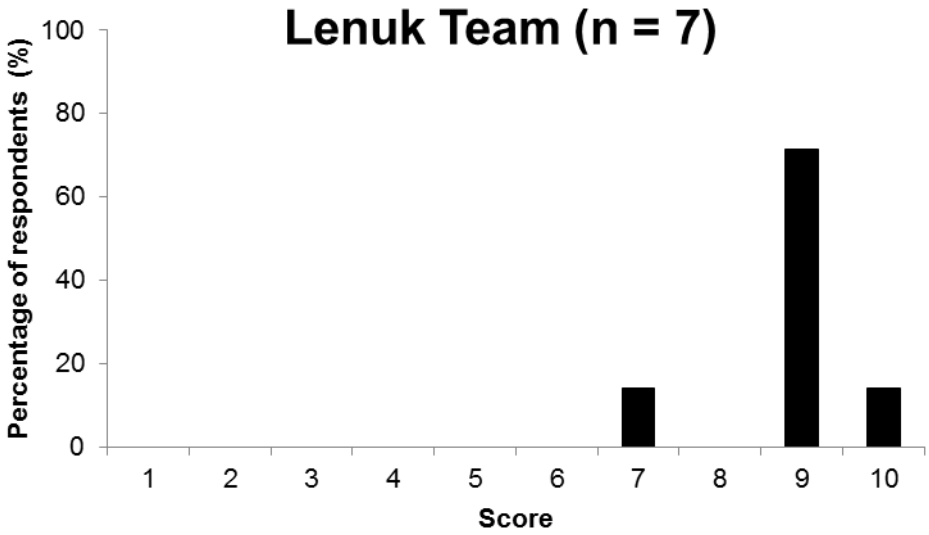


Figure 33. Percentage of Projetu Lenuk Lorosa'e Team that scored the *C. mccordi* book from zero to ten (zero = really bad; ten =excellent).

Comments from undergraduate Environmental Science students from Charles Darwin University in relation to the activities developed by the Projetu Lenuk Lorosa'e:

"My favourite activity was dealing with the communities, sharing information with the grade 6 students and measuring the turtle and taking note. Most these activities related to my major and I love to do that. And it helps me improving my life skill"
Elda da Costa Guterres

"*This project improved my skills and knowledge about natural resources in my country, specially turtle, as well as dealing with community. This project is really helpful in developing the environment of my country, thus I would like to contribute towards this development. I will also be able to make connections with people working in the environmental area, and also can gain a lot of experience and can be put in my CV"*
Bertanizo Guro da Costa

Comments from Judy Attwood, from the Ministry of Education Basic Education Curriculum Reform Project:

"The Project succeeded in getting the turtle book into a lot of homes in Los Palos and Mehara. For many it will be their first book"

RECOMMENDATIONS

Community-based *C. mccori* population monitoring should happen in accordance with the local beliefs and sensitivities. New trapping areas should be identified to start a long term monitoring program that would cover both dry and wet seasons. The possibility to transform the hunting events, when many members of the community go to the Lake with the main aim to collect *C. mccordi*, from a harvest activity to a monitoring activity should be explored.

We recommend a captive breeding model in the Lake Iralalaro region, with small family-base centres in Bauro, Mehara, Maupitine and Poros, where families would raise a few turtles in an

enclosure that will allow reproduction and egg laying. A big centre at Los Palos would be responsible for receiving and incubating the eggs and head-starting the hatchlings. However, a feasibility study with captivity breeding experts is necessary to access the viability of this recommendation.

We recommend that future conservation activities on *C. mccordi* at Lake Iralalaro should also focus on the identification and protection of dry season refugia and nesting areas, taking in account pig and dog predation, buffalo and cattle ground tramping and fire. When possible, nests should be protected on-site or relocated to the Los Palos Primary School centre. Hatchlings should be pit-tagged and released in Lake Iralalaro during community and schools events that would raise awareness about the importance to protect this species. However, more information about the Timor-Leste Long-necked Turtle biology and population ecology are needed to guarantee the success of the Projetu Lenuk Lorosa'e.

PROJETU LENUK LOROSA'E PUBLICATIONS

Eisemberg, C.C., Reynolds, S., Costa, B.G., Guterres, E.C., Christian K.A. 2014. Threats to the Long-necked Turtle *Chelodina mccordi timorlestensis* in the Lake Iralalaro region, Timor-Leste. 51st Annual Meeting of the Association for Tropical Biology and Conservation. Cairns, Australia. Oral Presentation.

Eisemberg, C.C., Reynolds, S., Costa, B.G., Guterres, E.C., Christian K.A. 2014. Projetu Lenuk Lorosa'e – Chelodina mccordi timorlestensis conservation and environmental education program in Timor-Leste. The 12th Annual Symposium on the Conservation and Biology of Tortoises and Freshwater Turtles, Orlando, USA. Poster Presentation.

Eisemberg, C.C. 2014. Lenuk Kakorok Naruk Timor-Leste Nian. (The Long-Necked Turtle of Timor-Leste). ISBN 978-0-646-92253-9. Charles Darwin University Uniprint, Darwin. (This is a booklet for school children that has been incorporated into the primary school curriculum in Timor-Leste).

Costa, B. C. 2014. Techniques to monitor and assess the populations of freshwater and sea turtles in Timor Leste. Student Placement - Unit SID300 Professional Practice in Science. School of Environment. Charles Darwin University. Darwin, Australia.

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APPENDICES

Appendix 1 - Research Forms

Appendix 1.1. Trap information

Trap reference:	Trap number:
Start day:	Start hour:
End day:	End hour:
Initial condition:	Final condition:
Location:	Place:
Trap Photos:	
Location description:	
Vegetation description:	
GPS:	Installation:
Reason:	Turtle evidence:
Number of turtles captured:	People involved:
Turtle IDs:	
Obs.:	

Appendix 1.2. *Chelodina mccordi* information

Turtle reference:	Shell ID:
Hunter:	Recorder:
Record day/time:	Capture day/time:
Trap number:	Place:
GPS:	How:
Sex:	Egg:
Destiny:	Condition:
LCL:	LPL:
LW:	CCL:
PLTN:	TNTC:
HW:	Weight:
Trip aim:	Plastral annuli:
Carapace photo:	Plastron photo:
Head photo:	Eye photo:
Carapace photo:	Plastron photo:
Obs.:	

Appendix 1.3. Local perception - Interview

Interview number: _____ Recorder: _____

Day: _____ Location: _____

GPS: _____ Sex: _____ Age: _____

First Name:_____ Family name: _____

Years of education: _____ Job: _____

Number of people living in the house: _____ Family photo: _____

Number of years living in this location: _____ Previous locations: _____

Are there turtles in this area? ( ) Yes ( ) No How many types? _____

Local Name: *Chelodina mccordi*: _____ Language: _____

Others:

Name:	Description:

***Chelodina mccordi*:**

Status: ( ) Very hard to see one, or: you see them almost every: ( ) week ( ) month ( ) year

Estimation of decline: ( ) More now ( ) Less now ( ) Same

Why? _____

Is there anything affecting the number of turtles? ( ) Yes ( ) No ( ) Do not know

If yes, what? _____

Can people improve the number of turtles? ( ) Yes ( ) No ( ) Do not know

If yes, what? _____

Do you harvest this turtle? ( ) Yes ( ) No *If yes go to Hunter datasheet

***Chelodina mccordi* habits:**

Where do they live? _____

_____

Do you see them outside the water? _____ If yes, what time of the year? _____

Do you catch females with eggs inside? _____ If yes, what time of the year? _____

Appendix 1.3. Local perception – Interview (cont.)

Have you seen a nest of this species? _____ If yes, when can you find them? _____

Where did you find the nests? _____ How? _____

How do you catch turtles? _____

When do you catch the turtles? (If there is more than one method of capture, ask each one separately)

Time of year: _____

Time of day: _____

Other observations: _____

What do you do with the turtle?

( ) eat ( ) keep as pet ( ) sell it alive ( ) sell it dead

How often do you sell them?

( ) always sell them ( ) never sell them ( ) sell more often than eat
( ) eat more often than sell ( ) eat and sell in the same amount

Price of one turtle: _____

Price of one egg: _____

Where do you sell them? _____

Who do you sell them to? _____

How many turtles did you catch last year? _____

Obs: _____

Are there any traditional restrictions in relation the harvest of this turtle: ( ) No ( ) Yes:

( ) Time ( ) Gear ( ) Turtle sex ( ) Turtle size ( ) Fishing areas

( ) Period year ( ) Special moments ( ) Particular people cannot eat ( ) other

If yes explain: _____

_____
_____

Are people still engaged in the restricted practice? ( ) No ( )Yes

If not, why? _____

_____

Do you have any traditional stories about this turtle? ( ) No ( ) Yes:

Would like to share with us? ( ) No ( ) Yes:

Do you mind if we record it? ( ) No ( ) Yes:

Story:

_____

Appendix 1.4. Evaluation form – Teachers and Departments Feedback

Name: _____

School/Aldeia: _____ **Grade/Subject/Organization:** _____

Date: ____ / ____ / 2014

1) **Mark with a "X" which one of these boxes represent your feeling about the Projetu Lenuk Lorosa'e workshop and book:**

 VERY GOOD	 GOOD	 REGULAR	 BAD

2) **Which score would you give to this project workshop and book (Mark with an "X")?**

0	1	2	3	4	5	6	7	8	9	10

3) **Comments:**

_____

_____

_____

_____

_____

_____

Appendix 1.5. Evaluation form – Project Lenuk Lorosa'e Team

Name: _____

City/Suco/Aldeia: _____ **School/Grade/Organization:** _____

Date: ____ / ____ / 2012

1) **Which activities did you participate during the Projetu Lenuk?**

_____

_____

What did you learn with the Projetu Lenuk?

_____

_____

Would you like to participate on this project next year? Why?

_____

_____

What was favorite activity? Why?

_____

_____

Mark with a "X" which one of these boxes represent your feeling about Projetu Lenuk:

 VERY GOOD	 GOOD	 REGULAR	 BAD

2) **Which score would you give to this project (Mark with a "X")?**

0	1	2	3	4	5	6	7	8	9	10

3) **Comments:**

_____

_____

Appendix 2 - Letter from the Timor-Leste Department of Education

V GOVERNO CONSTITUCIONAL
MINISTÉRIO DA EDUCAÇÃO
Gabinete da Vice-Ministra da Educação Pré Escolar e Ensino Básico

Dr Carla Eisemberg de Alvarenga
Research Institute for the Environment and Livelihoods,
Charles Darwin University, Darwin, Northern Territory, 0909, AUSTRALIA

Ofício : /GVM-PEEB/ME/X/2014, de 6 October

Assunto : Request for Lenok Kakoruk Naruk Book and Teacher Supplement

Dear Dra. Eisenberg:

Thank you for the copies of your book about the long-necked turtle, along with the supplement for teachers. All of the advisors and teachers working on the Ministry's curriculum reform project have seen the materials and rated them very highly.

One of our international consultants was present when your Timorese undergraduate students presented workshops about these books to students in schools in Los Palos and Mehara. She reported about the enthusiasm with which students responded to the resources. She believes that this was because of the nature of the resources and because students are unaccustomed to seeing resources about their country. She also reported about the total interest and awe that some other children displayed when they were informally given copies of the book.

As you may know, Timor Leste is currently reviewing the curriculum from pre-school to grade 6. We would like to include the use of the book and teacher supplement in our natural science curriculum. Would it be possible for you to be able to print 12,500 copies of this book, along with 1,500 copies of the teacher supplement? If so, we would be able to incorporate this book into the general natural science curriculum, which would be a real asset to the curriculum. This would ensure that all students in Timor become aware of the long necked turtle, the threats to it and of the beauty of Lake Irolalaru which is in our first national park, Nino Konis Santana National Park. As this is the first resource of its kind here, we sincerely hope that it can be an integrated part of the curriculum.

*Ministério da Educação, Rua Tuana-Laran, Vila-Verde, Dili,Timor-Leste ; E-mail: dsoares5@yahoo.com; tel: **77045022** ; **78239611**)*

Appendix 3 - Letter from the Timor-Leste Department of Education (cont.)

V GOVERNO CONSTITUCIONAL
MINISTÉRIO DA EDUCAÇÃO
Gabinete da Vice-Ministra da Educação Pré Escolar e Ensino Básico

The production of 12,500 copies of the book will allow a distribution of approximately 1 book per 4 students in grade 6 and 1 copies of the teacher supplement per teacher.

Thank you very much for your consideration of this request. Please let me know if there is anything else I would need to do to help this along. For any technical questions, please contact my advisor for basic education, Debbie Katzman, at gueradeb@hotmail.com, and she can follow up on any information needed.

Sincerely,

The Vice Minister of Preschool and Basic Education

Dulce de Jesus Soares, MA

Ministério da Educação, Rua Tuana-Laran, Vila-Verde, Dili,Timor-Leste ; E-mail: dsoares5@yahoo.com; tel: 77045022 ; 78239611)