

TURTLE FOUNDATION

Protecting Sea Turtles and their Habitats

Project Report Indonesia 2014



Dr. Hiltrud Cordes Program Manager Turtle Foundation

Berlianto Daniel Project Leader Indonesia

Hana Svobodová, MSc. Coordinator Education & Volunteer Projects

Dr. Thomas Reischig Scientific Director Indonesia



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Cover: Green turtle in the Derawan archipelago breathing on the surface

REPORT 2014

1. Turtle Foundation

The Turtle Foundation is an international wildlife conservation organization dedicated to the protection of the sea turtles and their habitats. The Turtle Foundation is registered as a nonprofit, tax-exempt organization in the following countries under the local legal requirements: Germany (since 2000), Switzerland (since 2006), Cape Verde (since 2012; local name: *Fundação Tartaruga*), and Liechtenstein (since 2014). The Turtle Foundation primarily conducts operational activities and currently runs two conservation projects in Indonesia and Cape Verde. The implementation of the projects in Indonesia is done by local organization, while the project partner changed in 2014 (see section “Change of the local implementing partner”).

Our aim is to prevent the imminent extinction of sea turtle populations, to enable re-growth of the depleted populations back to healthy levels, and to prevent mistreatment of sea turtles. We foster the sustainability of our conservation projects by accompanying environmental education activities and by programs to create alternative income opportunities for the local population, with a focus on environmentally compatible and sustainable use of coastal and marine habitats.

In collaboration with Indonesian nature agencies and local organizations the Turtle Foundation erected in 2002 a monitoring station on the island of Sangalaki for year-round protection of its nesting beaches. In 2006, the Turtle Foundation initiated the founding of the local organization *Yayasan Penyu Berau* (YPB; Turtle Foundation Berau), which since then was the local implementing partner of the Turtle Foundation carrying out protection work and public relations. Since 2008, further monitoring stations were built in the islands of Bilang-Bilangan and Mataha and run by YPB. After 2012 the protection program on Sangalaki was taken over by the local nature agency. On Bilang-Bilangan and Mataha, the conservation project now is operated by our new project partner *Perkumpulan Konservasi Biota Laut Berau* (Association for the Protection of the Marine Life in Berau, BLB); thus, we were able to continuously and efficiently

protect about 50 % of all green turtle nests in the archipelago against egg poaching.

2. Project background

All species of sea turtles are considered endangered or critically endangered and, despite local conservation successes in individual decades-long projects, are still declining world-wide. Turtle Foundation’s Indonesian conservation project is located in the Derawan archipelago off eastern Borneo, a group of 31 mostly smaller islands of which only four are inhabited (Derawan, Maratua, Balikpapan, Kaniungan Besar). The archipelago lies in the so-called Coral Triangle, which is considered the richest marine biodiversity hotspot in the world. Here are the world’s eighth largest nesting area of the green turtle (*Chelonia mydas*; Fig. 1), and significant feeding grounds for hawksbill turtles (*Eretmochelys imbricata*). Since 1999, all species of sea turtles and their eggs and body parts (tortoiseshell, etc.) have been nominally completely protected under Indonesian law. Nevertheless, on the Derawan islands the local government had awarded concessions for collecting green turtle eggs for decades (Fig. 1), only ending the practice in 2001. The result of this collection of almost 100% of the nests laid since the 1940’s is the precipitous decline by more than 90% of the green turtle population since then (Fig. 2). Despite the legal ban on egg collecting, there is little doubt that collection would continue virtually unchecked without systematic and continuous protection of the nesting beaches, as is still the case on the yet unprotected Islands of Belambangan and Sambit. Eggs illegally collected from the Derawan archipelago are mainly sold on the markets of Samarinda and Tarakan (the latter lying north of the Berau district), where they reach prices of currently up to 0.73 €/0.77 US\$, which is more than five times as much as a chicken egg. Thus, further decline and eventual extinction of the population can only be prevented by continuous and consequent protection of the nesting islands. With the islands of Bilang-Bilangan and Mataha, the Turtle Foundation currently protects about 50% of the turtle nests in the Derawan archipelago.

The extended coral reefs of the Derawan archipelago are also an important feeding habitat of the critically endangered hawksbill turtle. However, it is still





Fig. 1: *Left:* Newly hatched green sea turtle heading to the sea on the beach of Bilang-Bilangan Island. *Right:* In 2000, on Sangalaki, egg collecting still occurred on a large scale with the permission of the local government; the sea turtles had little chance. Turtle eggs are still threatened by poaching in all places where they are not effectively protected.

Green turtles of the Derawan archipelago: Population trend of nesting females/year

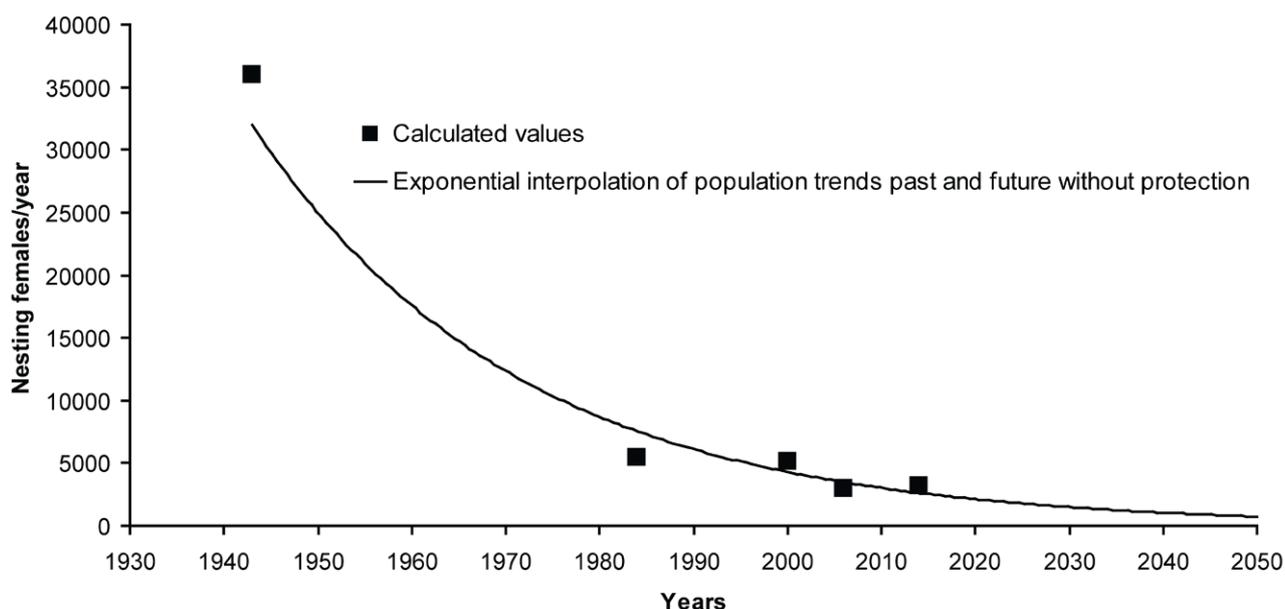


Fig. 2: The population trend of annually nesting green turtle females in the Derawan archipelago shows its drastic decline since the 1940's, when unregulated turtle egg exploitation in the area began.

unknown where their nesting areas are, and on the islands of the archipelago hawksbills nest only rarely. The current population size is therefore difficult to estimate. The main threat to these turtles in the area is primarily the hunting of juvenile, semi-adult, and mature animals. Their coveted tortoise shell is either peeled from still living animals in a very cru-

el manner, with animals slowly but surely dying, or the animals are directly killed to end up as stuffed wall decoration. On the eponymous island of the archipelago, Derawan, both tortoiseshell products as well as stuffed animals are sold illegally but openly in souvenir shops, while this habit is virtually not prosecuted by the local government. If this depletion of

hawksbill turtles continues, the population is at risk to become extinct in the mid-term.

Other threats to all sea turtles in the region are direct hunting of turtles by local and foreign fisheries (e.g., fishing fleets of China's Hainan Province), unintentional but for the turtles usually fatal by-catch in other fisheries, habitat destruction (especially illegal cyanide and bomb fishing), and environmental pollution (plastic waste, waste oils).

3. Vision & Mission

Our vision is a future where sea turtles and their habitats are sustainably protected, healthy, and safe from threat of extinction and destruction.

Our mission is to contribute to sea turtle conservation at our own project sites by cooperating with local communities to create a future where both sea turtles and people can thrive.

4. Goals

- Protection of green turtle nests on the nesting beaches of the Derawan Archipelago from illegal egg theft
- Protection of green and hawksbill turtles from poaching
- Protection of local nesting habitats of green turtles and feeding grounds of green and hawksbill turtles (seagrass beds, coral reefs) from depletion and destruction
- Information and environmental education for the local population, especially with regard to the protection of sea turtles and their habitats
- Creation of alternative livelihoods for local communities to reduce inducement for the illegal exploitation of sea turtles and the use of destructive fishing methods
- Promoting the participation of local and national authorities as well as of local communities in the protection of sea turtles
- Improving the scientific and general knowledge about the sea turtles of the project area among expert auditory and general public

5. Project location & logistics

The Indonesian Derawan islands (Fig. 3) belong to the administrative district (*kabupaten*) of Berau in the province of East Kalimantan. Kalimantan is the name of the Indonesian part of the island of Borneo. The capital of the district of Berau is Tanjung Redeb, the provincial capital of East Kalimantan is Samarinda. The headquarters and office of the local project partners of the Turtle Foundation (*Perkumpulan Biota Laut Berau*, BLB, and ProFauna) is located in Tanjung Redeb. From there, our protection programs and accompanying measures are organized. The Islands of Bilang-Bilangan and Mataha (Fig. 4), on which our beach protection program is currently running, lie in the southern part of the Derawan archipelago. These islands are, in terms of annual nesting numbers, the most important and third most important nesting islands of the green turtle in the archipelago, respectively. The project islands are uninhabited, so in order to protect the nests from poachers it is necessary to create an infrastructure including a complete and continuous supply chain of personnel, food, and drinking water.

Until late 2012, Turtle Foundation maintained a ranger station on Sangalaki Island, which lies in the northern part of the archipelago. As of the end of 2012 the protection of the nesting beaches on Sangalaki has been taken over by the local nature agency, and Sangalaki is for now not included in the active protection program of the Turtle Foundation, but still in the focus of our interest. Two other islands with significant nesting populations that have yet to be protected are Belambangan and Sambit. The main feeding grounds of the sea turtles in the archipelago are located around Pulau Panjang (seagrass meadows) and at the large coral reefs Karang Besar (near the island of Balikukup), Karang Daengalahan (between the islands of Balikukup and Mataha), and Karang Muaras (near the island of Maratua). Also the smaller platform reefs of the archipelago and the fringing reefs of its islands are important habitats of the sea turtles.

6. Change of the local implementing partner

In 2006, in Tanjung Redeb we initiated the foundation of the local organization *Yayasan Penyu Berau*





Fig. 3: Project location in the Derawan Archipelago, east of the Indonesian part of Borneo. This area is outlined with a rectangle in the inset showing Indonesia.

(Turtle Foundation Berau, YPB) as a charitable conservation organization according to Indonesian law. Until August 2014 the YPB was our local implementing partner and conducted the protection projects and the major parts of the community, education, and outreach programs. The YPB was financed almost entirely by the Turtle Foundation, only in 2013 and 2014 there had been a contribution of about 10% of the total annual project costs by the Indonesian WWF. The work of YPB was thereby closely accompanied and co-organized by the Turtle Foundation. Staff members of the Turtle Foundation visited the project at least once, but usually several times each year, and always tried to maintain contact with the management of the YPB.

Unfortunately, during 2013 we discovered serious project and financial mismanagement by the leaders of YPB. The Turtle Foundation tried to help the YPB to overcome these problems by all available means, e.g., by introducing a new and easy to use accounting software and the training of responsible collaborators on location over several weeks by the pro-

gram manager of the Turtle Foundation. However, the situation worsened again in the first half of 2014, and the irregularities in the accounting increased to an extent that the Turtle Foundation was unable and unwilling to continue sending funds for which there was no suitable accounting. Given the option of accepting a new and more qualified manager, the existing head of YPB decided instead to break ties with



Fig. 4: The southern islands of Mataha (foreground, right) and Bilang-Bilangan (background, left).

Turtle Foundation and attempt project management and operation alone.

At the same time, all the field rangers of the YPB, and who have always carried out the protection work on the islands with great dedication, passion, and reliability, but already suffered from the mismanagement of the YPB, also refused to work with the problem leaders of YPB and left both the organization and the nesting islands. The YPB leaders tried to maintain a rudimentary protection program on the islands with a few quickly hired but untrained rangers. However, it soon became apparent that the YPB alone could afford neither sustainable funding of the project nor suitable project execution, and for the first time since the start of the activity of the Turtle Foundation on Bilang-Bilangan and Mataha in 2008 considerable egg poaching happened again on the islands.

In the meantime the rangers who left the YPB founded their own conservation organization BLB, which was officially accredited by end of August 2014, and started its activity under the direction of Berlianto Daniel. Since then the BLB has worked closely together with the Turtle Foundation, which is also funding it. Unfortunately, until end of 2014 the BLB was unable to work on Bilang-Bilangan and Mataha as they did not yet had an official permit to carry out protection measures there. Therefore, the work of BLB was initially limited to establishing and strengthening the cooperation with local institutions, and to perform measures on environmental education and to develop the basis for creating alternative income sources for the local population.

Already in the early stages of the problems with YPB the Turtle Foundation began to search for more qualified management personnel and organizations. During this time we also talked with ProFauna, the largest purely domestic Indonesian conservation organization (www.profauna.net), with which the Turtle Foundation has long collaborated in the implementation of sea turtle conservation projects on Bali, as well as in public awareness programs. Later it was decided by the Turtle Foundation to foster our local conservation efforts by funding an office of ProFauna with two employees in Berau. The new office of ProFauna was opened in September 2014

and is managed by Bayu Sandi, who has some years of experience with sea turtle conservation projects on Bali. Since then, ProFauna, BLB and Turtle Foundation are closely cooperating in Berau. The main objective was to restore a permanent and efficient conservation program for marine turtles on the islands Bilang-Bilangan and Mataha. Recently (as of February 2015) the local authority for Fisheries and Maritime Affairs issued to the BLB the necessary permits to protect the nesting islands, and the BLB entered the islands to take action. Together with BLB and ProFauna we now direct our greatest efforts on a successful restart of the conservation project.

7. Description of the protective measures and results

Since the protective measures on the nesting islands Bilang-Bilangan and Mataha were carried out only until mid-August under the auspices of the Turtle Foundation (see section "Change of the local implementing partner"), all following statements about our activities on the nesting islands refer only until this time. According to our information after that time the YPB conducted beach patrols only irregularly, poachers were not actively prevented from poaching nests, data collection was carried out sporadically and unreliably, and nest relocations as well as beach cleaning did not occur.

7.1. Beach guarding

While beach guarding was done under the auspice of Turtle Foundation, the ranger stations on the islands of Bilang-Bilangan and Mataha (Fig. 5) were permanently occupied by three to six rangers, who remained on the islands for at least several weeks and who worked on a rotation system to allow for return visits and vacations to their hometowns.

To prevent organized egg poaching as well as casual egg theft by fishermen occasionally landing on the islands, the whole 2–2½ kilometers of each island's nesting beaches were patrolled at least three times a day. The first tour takes place shortly after dawn. At this time almost all the turtles have finished their egg laying. This time is most dangerous for the nests since the tracks of nesting turtles are still clearly visible and thus, nests can easily be found by poachers. Further, nests that were laid too close to the high



Fig. 5: Left: Leaving for the evening beach monitoring tour on Bilang-Bilangan. **Right:** Ranger station on Mataha

tide line can be easily identified by the rangers and be relocated to safe places at the beach or to our hatcheries. The second tour takes place in the early evening just before sunset; egg poachers may use this time to enter the islands secretly and to wait for turtles coming ashore at night. The third large tour finally took place at night, since the turtles primarily lay their nests during high tide at night, and poachers very easily can take the eggs while they are still being deposited by the nesting turtles. Of course, there is always the danger of egg theft also beyond these times, for which reason the whole day must be monitored for landing boats.

Due to continuous beach monitoring, until mid-August 2014 egg thefts had been virtually absent on the project islands.

7.2. Data acquisition

From 2002 to 2012 on Sangalaki, and since 2008 on Bilang-Bilangan and Mataha, on a daily basis the rangers have been collecting data on numbers of turtle emergences, nests laid, and eggs per nest, as well as other aspects of population and nesting behavior of green turtles on the islands. The data are being scientifically analyzed and published by us.

According to our current calculations, about 3,200–3,500 green turtle females are nesting annually throughout the entire archipelago. On the islands of Sangalaki, Bilang-Bilangan, and Mataha, an average of 3,824 (years 2003–2011), 5,436, and 2,310 nests (both 2008–2013), respectively, are laid per year (total: 11,596 nests). Together, this comprises

about 75% of all nest of the archipelago. Until 11 August 2014, we counted on Bilang-Bilangan 2,382 nests and on Mataha 971 nests, together 3,353 nests. Since data are missing for the rest of 2014, the further course of the nesting season can only be extrapolated from the data and by comparison with the graphs of the last year's monthly nesting numbers (Figs. 6, 7). It turned out that nesting numbers from January until the last fully recorded month July 2014 on both islands are in the range of the lowest nesting activity recorded for this period in the previous years (Table 1). From the 2014 nesting numbers it could not be unequivocally concluded if the peak of monthly nesting activity was already reached in July 2014 or was reached in August or September (peaks are generally between July and September), but the numbers and the relative course of monthly nesting activities in the graphs suggest that nesting activity in 2014 was clearly below the average. This is in clear contrast to the previous year 2013, which in our previous recordings was a record year for nesting activity (Bilang-Bilangan: 6,734 nests, Mataha: 2,799 nests during the whole year). Since the low nesting numbers in 2014 still are in the range of the variation in annual nesting numbers observed so far, from these numbers alone a further decline of the local green turtle nesting population can not yet be concluded.

From the numbers of nests an approximate number of hatchlings can be estimated that emerged from these nests. Extrapolated from an average of 1.5% of nests lost due natural reasons (mostly nest

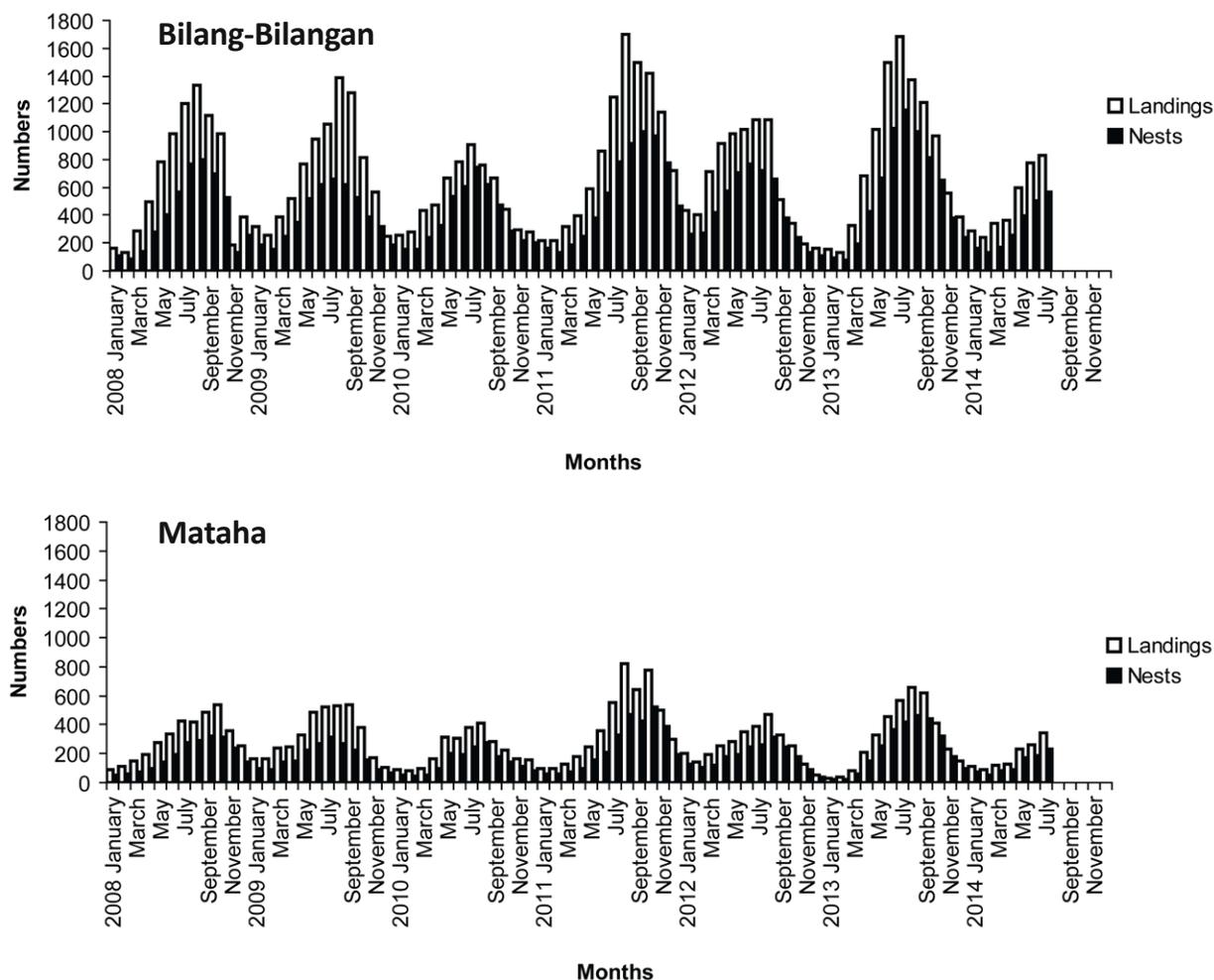


Fig. 6: The monthly numbers of emergences (Landings) and nesting events (Nests) for female green sea turtles on Bilang-Bilangan and Mataha between January 2008 and July 2014 show year round nesting with seasonal peaks between July and October. The annual fluctuations of nesting numbers show the same pattern on both islands.

plundering by monitor lizards, which are part of the island's ecosystem), from an average clutch size of 99 eggs, and from an average hatching success of about 85% we concluded that about 255,000 turtles hatched on our project islands from 1 January until 11 August 2014. Without our protection measures, this would not have been possible because the majority of the eggs would have been taken by egg collectors who have been permanently present on the islands until before the start of our protection project in January 2008, while egg collection and trade was professionally organized despite the officially legally protected status of sea turtles.

In total, on these islands, which are the largest (Bilang-Bilangan) and third largest (Mataha) nesting habitats of the archipelago in terms of nesting numbers, we protect about 50 % all nests of the entire archipelago. Adding the years of our protection work on the islands (Sangalaki: January 2000 until September 2012; Bilang-Bilangan and Mataha: each January 2008 until mid-August 2014), we calculate that about 7.7 million green turtle hatchlings were allowed to hatch as a result of Turtle Foundation's protection efforts; without protection, most if not all eggs would have been collected and eaten. According to a statistical survival rate of about 1:500–

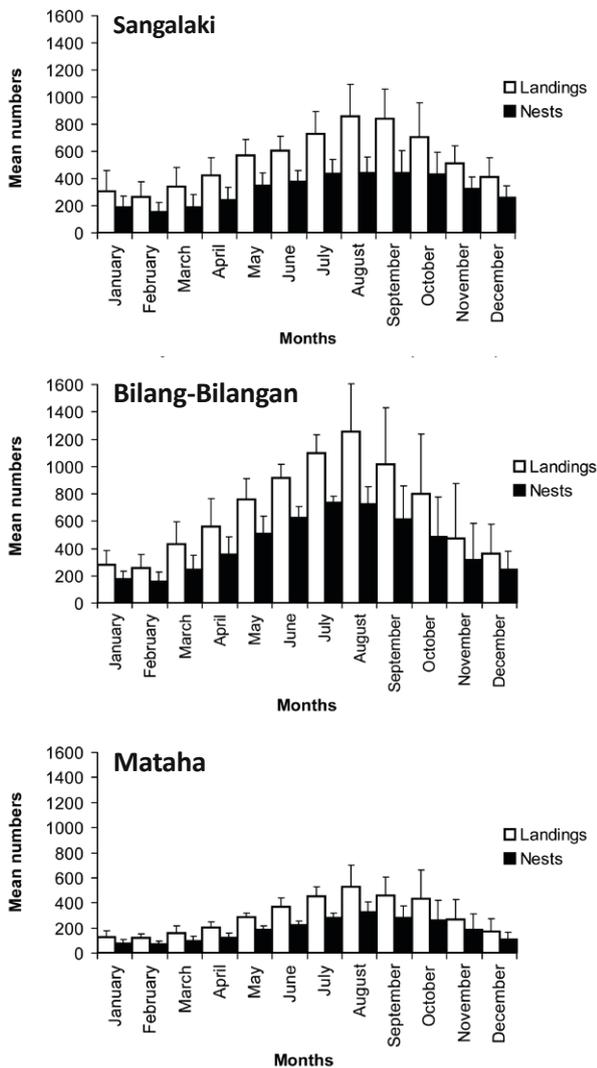


Fig. 7: The average monthly numbers of landings and nesting events show similar nesting behavior on all three islands. Most turtles nest on Bilang-Bilangan, contradicting prior reports of Sangalaki as the largest nesting area within the Derawan archipelago. Observation periods: Sangalaki 9 years (2003–2011), Bilang-Bilangan and Mataha: 6 years each (2008–2013). The error bars represent standard deviations.

1:1,000 caused by high losses during the first years due to natural reasons, about 7,400 to 14,800 of them will return to the islands in about 30–40 years for reproduction. Against the background that the current reproductive population of green turtle females in the Derawan archipelago comprises only about 10,000 animals, the number of animals saved for the future is very significant compared to the

still existing population and provides an invaluable basis for the future stabilization and recovery of the heavily depleted nesting population of the green sea turtles in the Derawan archipelago. However, to be possible to achieve this goal, protection of the nesting beaches must be continued without interruption during the next decades and expanded to hitherto unprotected islands.

7.3. Nest relocation

Occasionally, turtles will place a nest too close to the high tide line. These nests are endangered of submersion at high tides, or by groundwater rising up to the egg chambers of the nests. If eggs are subjected to salt water early in development, the eggs will die, thus in case of inundation most if not all of the clutch is lost. These nests are carefully dug up and reburied in a more suitable location on the beach or placed in enclosed, lockable hatcheries where they are protected from water, monitor lizards, and human egg thieves (Fig. 8). Turtles hatched in the hatcheries (which generally occurs at night) are released on the following day. In total, from January until mid-August 2014, 331 nests (9.9% percent of all 3,353 nests laid in this period on both islands) were relocated this way and thus, saved from destruction. On Mataha, the proportion of relocated nests (18.1%) was significantly higher than on Bilang-Bilangan (6.5%), because Mataha is flatter than Bilang-Bilangan and therefore, on many nesting places there is a higher risk that nests are inundated by rising groundwater.

7.4. Beach clean-ups

Throughout the area, the nesting beaches are strewn with garbage (plastic waste, abandoned fishing nets, etc.), which is continuously washed ashore, and which can deter nesting females and trap the hatchlings. The tasks of the rangers thus include collecting the garbage regularly. The disposal of the garbage can currently be done only by burning. Another problem is driftwood that is the result of extensive deforestation on the mainland of Borneo, washed downriver, which then floats onto the nesting beaches. Massive logs block the adult turtles from reaching suitable nesting areas, and prevent the newly hatched turtles from reaching the sea. Currently, the wood is cut and, unless used for construction or repairs on the station, it is burned. Until our rangers left the islands it was possible by continuous collec-

| | Bilang-Bilangan | Mataha | Totals |
|---|--------------------|--------------------|------------------|
| Number of nests 1 January – 31 July 2014 | 2,198 | 890 | 3,088 |
| Means for period January–July from 2008 to 2014 | 2,840 | 1,065 | 3,905 |
| So far lowest value for period January–July | 2,352 ¹ | 889 ³ | n/a ⁵ |
| So far highest value for period January–July | 3,728 ² | 1.296 ⁴ | n/a ⁵ |

Table 1: Numbers of nests on Bilang-Bilangan and Mataha for the period January – July 2014, compared with the respective means for this period and with the lowest and highest values for this period from the previous years. The nesting numbers for 2014 are clearly below average and are in the range of the lowest values that had been measured for this period so far. ¹Value occurred in 2008; ²value occurred in 2012; ³value occurred in 2010; ⁴value occurred in 2013; ⁵values not summarized since they occurred in different years

tion of newly washed up waste to keep the beaches free from plastic waste. In the meanwhile (status: February 2015) our rangers again started to collect the waste that has accumulated in large amounts since mid-August 2014.

8. Public relations and environmental education

Until the termination of our cooperation with the local implementing partner YPB, parts of our public relation, education, and outreach programs were conducted by the YPB, especially environmental school education projects. To further expand our public relation programs in the district of Berau, we employed the Czech biologist Hana Svobodová from March 2014 on. Ms. Svobodová was originally responsible for the development of a volunteer program as well as for the development of school educa-

tion events in the first place. After a promising start of the volunteer program, unfortunately it had to be temporarily stopped because of the discord with the YPB. However, Ms. Svobodová was able to carry out a series of environmental education lessons in local schools and kindergartens. During a holiday in her home country in November and December, Ms. Svobodová took the opportunity to convey Turtle Foundation's protection programs to a broader public with a series of 18 lectures at schools, universities, libraries, and zoological gardens, with newspaper articles and a photo exhibition, as well as giving interviews to radio and TV stations.

8.1. School and kindergarten projects

To educate young people about the wildlife and precious nature of their homeland, Ms. Svobodová carried out a series of 12 environmental education



Fig. 8: *Left:* After a morning beach tour on Bilang-Bilangan, rangers carry the eggs of a turtle nest rescued from inundation to the hatchery. *Right:* In the sand of the hatchery, eggs are incubated for about 55–60 days until the young turtles hatch.

lessons in kindergartens as well as in primary and secondary schools of Tanjung Redeb. Lessons and presentations were specially designed to match the respective age classes of the children. In kindergartens, children were playing with toy turtles, colored pictures about the turtle's life, and were encouraged to ask questions and to discuss with the teacher (Fig. 9). Most children thereby took a fancy about turtles and started to be interested about these animals. For primary and secondary schools various special lessons were developed taking 150 minutes and consisting of an informative and an active part (Fig. 10). With pictures, videos, and story telling about sea turtles the interest of the students on sea turtles was sparked and their curiosity ignited. Students get the basic information about sea turtle species in Indonesia, their life cycles, and their importance in the marine ecosystems. They learn about the threats to sea turtles including poaching of eggs and shell,

decrease of suitable nesting habitats due to erosion and beach development, but also about general threats to the marine environments and resources. The active part of the lessons is co-devised by the students and involves, among others, discussions with the teacher and teamwork, where conservation strategies are formulated and little presentations (posters) are prepared. The lessons are supported by specially designed memory and board games, and teaching materials.

8.2. Volunteer program

In March 2014 we started with a volunteer program, for which we use our positive experiences from our Cape Verde project, but also take into account the special local conditions. A total of ten volunteers from Czech Republic and Germany visited the Islands of Bilang-Bilangan and Mataha between March and August 2014 for 8–16 days. The volunteers partici-



Fig. 9: *Left:* Kindergarten children coloring pictures with motifs about the life of a sea turtle. *Right:* Children enjoy playing with a toy turtle.



Fig. 10: *Left:* Environmental education lesson in a local school conducted by Hana Svobodová and a ranger of BLB. *Right:* Pupils are deepening their knowledge about sea turtles and conservation in a specially designed board game, in which a young sea turtle must escape numerous threats.

pated with great commitment on beach patrols and waste management (Fig. 11). With help of the volunteers the beaches could be completely cleaned from plastic waste; a desirable situation that, however, can only be maintained by continuous collection of trash that is washed up again every day. Lacking other possibilities, plastic and other combustible waste had to be burned together with driftwood. Glass and metal waste however, which makes up a smaller portion of the waste, could be prepared for transport to the mainland of Borneo. After re-establishing our beach guarding activity we aim to continue and expand the volunteer program in 2015.



Fig. 11: Waste collection and burning on the beach of Bilang-Bilangan together with volunteers

9. Creation of alternative livelihoods

9.1. Ranger

Until the termination of the collaboration with YPB, the Turtle Foundation was financing 17 full-time jobs in Indonesia that are staffed exclusively with local personnel (the two project managers, two office workers, a logistics manager, and 12 rangers). When employees left, they were replaced and trained by experienced rangers and station managers.

After the discord with the management of the YPB all rangers left YPB, and eight of them founded the BLB, which has since been funded by the Turtle Foundation including the salaries of the rangers. During the time before BLB was able to take up the protection work on the islands again, the BLB focused on establishing and strengthening the collaboration with local institutions and authorities, as well as on measures for environmental education and the development of alternative income opportunities for

the local population. To meet the demand for more rangers for the conservation project, more rangers will be employed later.

9.2. Handicraft workshops

In the Derawan archipelago critically endangered hawksbill turtles are threatened by poaching for their coveted shell. The shell is turned into jewelry (bracelets, keyring and necklace pendants) by craftspeople from Derawan and Maratua to be sold to tourists mainly on Derawan; this is illegal in Indonesia but is currently not officially prosecuted. The BLB supported by Turtle Foundation started a capacity building initiative for craftspeople working with turtle shell, but also for other people, to enable them to produce sustainable commodities from alternative materials instead (Fig. 12). As part of this initiative, in late 2014 experienced crafts people of the BLB conducted two workshops in the villages of Payung-Payung and Bohe Silian with 10 and 12 participants, respectively. Participants were thoroughly trained in producing various sorts of sustainable souvenir articles (jewelry, lamps, pockets, household products, “turtle shaped” and other decorative arts, etc.), which should be of sufficient quality to be successfully sold to tourists, from sustainable raw materials such as coconut shell and drift wood, but also from plastic waste collected at the beaches. Some of these people formerly produced turtle shell jewelry and pledged to stop this behavior in favor of alternative products; one participant already started to sell his products on Derawan. More workshops are planned for 2015 on Derawan and Maratua, while aiming to gradually decrease the amount of turtle shell products offered on Derawan, and thus decrease the number of turtles killed in the waters of Maratua and Derawan to produce them.

10. New project: Research and impact mitigation program for hawksbill turtles in the Derawan archipelago

10.1. Background

The Derawan archipelago is not only the biggest nesting rookery for green turtles in Indonesia, it is also home to an important population of the critically endangered hawksbill turtle. Hawksbills only rarely nest on the archipelago’s islands, but they forage on its large coral reefs fulfilling important roles



Fig. 12: Left: Handicraft workshop held on Maratua. **Right:** Lamp produced during handicraft workshop

in the ecosystems of the reefs (Fig. 13). Unfortunately, the archipelago's hawksbill turtles are regularly hunted by local fishermen to produce souvenirs for tourists (Figs. 14, 15). Juvenile hawksbills are stuffed to end up as wall decorations. Semi-adult and mature hawksbills are peeled to get their shell, from which jewelry, combs, and other decorative articles are produced. Killing of hawksbills and trade in their products is illegal in Indonesia; however, law enforcement is virtually absent. The focal point of trade in tortoiseshell in the region is the Derawan Island, the main tourist center in the district of Berau. The demand for the coveted and expensive tortoiseshell has rendered the hawksbill turtle one of the world's most endangered species of sea turtles, and further exploitation at the current level might lead to the extinction of the local population in the foreseeable future. The problem is exacerbated by foreign fishermen (mostly from China, Vietnam, Philippines), which occasionally invade the archipelago with larger ships in well organized operations and thereby capture hundreds of hawksbill turtles. Adding to this is the increasing destruction of the archipelago's coral reefs, the nutritional bases of the hawksbill turtles, by marine pollution and destructive fishing practices such as fishing with cyanide and explosives.

To mitigate the threats to the hawksbill turtles in the Derawan archipelago and to provide this population a chance to survive, the Turtle Foundation in collaboration with the Gadjah Mada University of Yogyakarta (UGM) started in 2014 a combined research and impact mitigation program for hawksbill turtles in the region. Research is urgently necessary since

nearly nothing is known about the actual population size of the region's hawksbill turtles as well as about their biology, dispersal, migration routes, and nesting places. However, this information is critical to creating effective, comprehensive, and sustainable conservation strategies, and to inform the Indonesian nature agencies about the importance of the Derawan archipelago's hawksbill turtle population.

Since conservation activities on Derawan and in other areas of the region are often not very popular among large parts of the local population, and also local authorities act rather hesitantly, conservation

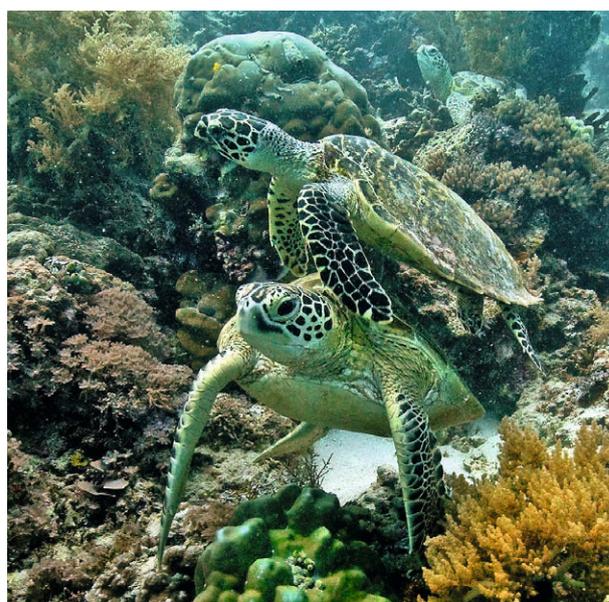


Fig. 13: Hawksbill and green turtles in the reef of the Island of Maratua



Fig. 14: *Left:* Dead hawksbill floating at sea with its shell peeled from its carapace. *Right:* Stuffed juvenile hawksbill turtles sold in a shop directly at the main road on Derawan



Fig. 15: *Left:* Turtle shell jewelry sold by street vendors on Derawan's main road. *Right:* This turtle shell bracelet, for which a critically endangered animal was killed, goes for about 3.00 US\$.

measures can only be introduced very carefully and with great sensitivity for local moods and sensibilities. Thus, we currently see the best approaches in environmental education for children and adults, creating alternative and sustainable income opportunities for the local population, and by educating tourists about the threats to the hawksbill turtles but also about legal problems tourists might experience through purchasing and exporting products from protected species like sea turtles.

The main objectives of our new project in 2014 was the exploration of the local opportunities for a comprehensive population analysis of the hawksbill turtles of the archipelago, gaining first insights about population size and occurrence of hawksbill turtles in the northern Derawan archipelago, mainly in the vicinity of Maratua Island, as well as increasing knowledge about the structures and socio-economi-

cal conditions of the population of Maratua, as far as they are relevant for the development of a conservation plan. The project was funded in 2014 by the U.S. Fish & Wildlife Service, the German Eva Mayr Stihl Foundation, and the Turtle Foundation.

10.2. Project locations: Maratua and Derawan

With an area of 384 km², the Island of Maratua is by far the largest island of the Derawan archipelago (Fig. 16). The island mainly consists of ancient coral rock lifted from the sea floor, and has a characteristic U-shaped form that is open to the south, and encompasses a large lagoon. The outer coast of the island consists of more or less steep rocks and is occasionally interrupted by sandy beaches. The fringing reefs of the west coast are generally broader and often form shallow lagoons between reef and coast, while the fringing reefs of the east coast facing the open ocean are generally narrower and steeply fall

into abyssal depths. The coast of the inner lagoon is very shallow and mostly overgrown with mangrove. Maratua is one of the four inhabited islands of the archipelago and the one with the largest population (about 3,200 inhabitants, according to official figures from the local government in 2012). The population belongs in large majority to the Bajau tribe. People on Maratua live in four villages: Bohe Silian, Payung-Payung, Bohe Bukut (also: Teluk Harapan) and Teluk Alulu. Bohe Bukut is the official seat of local government (Maratua forms a separate administrative unit at the level of the *kecamatan*), which is also the most developed village of the island. Bohe Silian, Payung-Payung, and Bohe Bukut are connected by a road, while Teluk Alulu is by land still isolated from the other villages. However, a road from Bohe Bukut to Teluk Alulu is currently under construction. Other ongoing infrastructure projects on the island include the construction of an airport at Payung-Payung, as well as the construction of a harbor in the north of the island. It is expected that completion of these projects, together with subsequent tourism development of the island as are planned by the government and private investors will bring substantial social and economic changes for the local population, and nature conservation will face great additional challenges.

The Island of Derawan encompasses only 0.45 km², and is thus several orders of magnitude smaller than

Maratua (Fig. 16). Nevertheless, the island is densely populated by about 1,600 people (as of 2014). In contrast to the rocky Maratua consisting of a lifted coral reef, Derawan is a flat sandy island (called either cay or key), which has formed on top of a platform reef. The difference between Derawan (and the other small inhabited islands of the archipelago Balikpapan and Kaniungan Besar) and other comparable, but uninhabited islands of the archipelago is the presence of fresh water bubbles through the accumulation of rain water in the ground. The majority of the population of Derawan are Bajau people, but a significant proportion originates from Sulawesi. Derawan is part of the administrative unit (*kecamatan*) Derawan of the district Berau, to which parts of opposing mainland and the islands Sangalaki, Samama, and Pulau Panjang belongs. As on Maratua, fishing is the original and most important income source of the local population, however, in recent years national and international tourism on Derawan has increased in importance. Derawan is now regarded as the most important tourist center of the district of Berau, and is the starting point for tours to the nearby islands including Sangalaki and Maratua. However, Derawan is also the center of regional trade with sea turtle products (mainly eggs and tortoise shell), and therefore, is of particular importance for the development of sustainable conservation strategies for sea turtles.



Fig. 16: Left: The inhabited Island of Maratua (right) has a characteristic U-shape and encompasses a large lagoon that is feeding ground for green turtles. The fringing reef of the island together with the reef of the southern lagoon, and also the fringing reef of the Island of Kakaban (middle) are habitat for hawksbill turtles. Kakaban is famous for its lake containing endemic jellyfish species. The small island in the bottom left corner, Sangalaki, is about the size of Derawan **Right:** The small but densely populated island of Derawan, measuring only about 950 m from west to east and 550 m from north to south.

10.3. Project part „Research“

The main goals of this research project are obtaining knowledge about the current size and structure about the hawksbill turtle population of the Derawan Archipelago, to reveal insights into population dynamics, biology, location of nesting areas, threats, and to collect any other data that could be important to develop sustainable conservation strategies. Successful conservation depends upon the cooperation of the local population, thus knowledge of the social and economic structure of the community should also be obtained. The fieldwork for our initial pilot study was conducted from late August to mid-October 2014 on Maratua and in the waters around the Maratua and Kakaban Island. The study was divided into three independent parts: 1. catching, measuring, and tagging of hawksbill turtles, 2. an interviewing study among locals, 3. a questionnaire study for recreational scuba divers. The study was carried out under the auspices and in collaboration with the Laboratory of Wildlife Ecology and Management of the Faculty of Forestry of the Gadjah Mada University (Universitas Gadjah Mada, UGM) in Yogyakarta. Head of the laboratory is Prof. Dr. Muhammad Ali Imron. Further participants of the project were two biologists from Turtle Foundation (Hana Svobodová, MSc. and Dr. Thomas Reischig), and the students of UGM Firly Maulida, Silvia Riztiarini and Ahmad Saphadi.

10.3.1. Capturing and tagging of hawksbill turtles at Maratua

Marking and recapturing of individually recognized sea turtles has since long proven as a reliable standard method to obtain individual and population data of sea turtles, and to learn about their migration routes. However, while the vast majority of mark & recapture studies is carried out on nesting turtles that are easily accessible, this is not possible for hawksbill turtles in the Derawan archipelago since they only rarely nest there. Thus, the challenge is to catch and mark enough turtles in-water that it is possible in future expeditions to re-capture enough animals to obtain significant results. Therefore, it was an important objective of the expedition to find the most efficient method for capturing hawksbills, which simultaneously is safe for the turtles, and thus, will be suitable as standard method in coming expeditions.

We tested (1.–3.) and/or discussed in detail (4.) mainly the following capturing methods: 1. catching turtles that are emerging for breathing by direct jump from a slowly cruising small boat (“rodeo method”), 2. systematic snorkeling surveys at the reef edge and hand-catching of turtles, 3. scuba diving with torches at night and hand-catching turtles resting on the sea floor, 4. catching with continuously monitored gill nets. Catching with fishing hooks as is practiced by locals was of course not considered. The “rodeo method” yielded no results after several attempts and due to specific local conditions we judged this method as generally unsuitable for this location. With the snorkeling method we caught in total five juvenile hawksbill turtles during about 35 snorkeling hours with mostly two teams generally consisting of 2–3 people (Figs. 17, 18). Additionally, we recorded 35 sightings of hawksbill turtles during snorkeling (including occasional double or multiple sightings of the same individual). To test the scuba dive method during one night we hired a suitable expedition ship (local standard wooden boat with diesel engine, length 18 m) together with crew and two local divers including dive equipment. On this night, the divers searched on three different locations of the fringing reef of the island of Kakaban, which lies about 10 km from Maratua. During this one expedition five hawksbill turtles were caught, marked, and measured (Fig. 19). Also considering the opportunities and costs of the set netting method we finally concluded that scuba diving at night is, considering efficiency, costs, potential hazards for the caught turtles, temporal and spatial flexibility, clearly superior to the other methods and thus, will become the standard method in future expeditions.

The turtles had been tagged with standard Inconel 681 tags, measured according to an extensive protocol to obtain biometric parameters, DNA-sampled for later analysis in the UGM, and photographed in a standardized manner to obtain images suitable for individual recognition of turtles (Fig. 20). The 11 hawksbills we captured (five during snorkeling survey, five during the night dive expedition, one was brought to us by a fisherman) had straight carapace lengths notch to notch (SCL_{nn}) from 33.4 up to 49.4 cm (average: 41.2 cm) and weighed between 3.37 and 16.02 kg (average: 9.01 kg). Thus, all animals were still in the juvenile or semi-adult stages. It had



Fig. 17: *Left: Hawksbill turtle spotted in the reefs of Maratua during a snorkeling survey. Right: Tagging of a hand-captured hawksbill turtle onboard the speedboat used for snorkeling surveys*



Fig. 18: *Left: Measuring of curved carapace length. Right: Weighing procedure on speedboat*

been reported by locals that on the more frequented coasts of Maratua and Kakaban mature hawksbill turtles are often caught by poachers and thus, are already becoming rare at these locations, while on more remote places like the large Muaras reef mature hawksbills are still more common. This question will be addressed in future expeditions.

10.3.2. Interviewing campaign for inhabitants of Maratua

The direct observation as well as catching and tagging turtles is essential in order to obtain accurate data from the animals, however, this approach can only cover limited areas even if the study is later extended. Therefore, we tried to use the knowledge of local people to get an overview about size and distribution of the archipelago's hawksbill turtle population over a broader geographic range. Thus, standardized questionnaires including a map have

been designed to ask people about locations, times, frequencies, and species of their recent encounters with sea turtles. Further, it was asked about social and economic circumstances of respondents, about fishing methods used, as well as about personal attitudes toward sea turtles conservation and suggestions for suitable protection measurements. The interviews were carried out by the students of UGM. A total of 187 persons were interviewees throughout all four villages; the interviewing campaign lasted from beginning of September over the end of the mark & recapture campaign (end of September) until mid-October 2014. The complex evaluation of the questionnaires is still ongoing, the results will be published in separate publications. However, already during the field work phase we have received important hints about the occurrence of hawksbill turtles in the waters around Maratua that we could directly use for the project.



Fig. 19: *Left:* Measuring of the plastron length of a hawksbill turtle captured during a night scuba dive expedition with a caliper. *Right:* Release of a juvenile hawksbill turtle from onboard of the expedition ship after tagging and measuring procedures.



Fig. 20: Parts of a standardized image series of the hawksbill turtle carrying tags number IDB0009/IDB0010 to enable later individual recognition from photos alone or in cases tags are lost

10.3.3. Questionnaire campaign for recreational divers

Another interesting and important source of information on the occurrence of hawksbill turtles is offered local dive resorts and recreational divers who spend their holidays there. While interviewing locals can provide a broader overview of the distribution of hawksbills throughout the archipelago, asking the divers could reveal more detailed information on the occurrence of turtles at certain diving locations that are regularly visited by the dive resorts; moreover, this way possible temporal and seasonal fluctuations of hawksbill turtle presence on the dive sites could be obtained.

On Maratua there are currently three dive resorts: one near the village of Bohe Bukut (Maratua Paradise Resort), one on a small island near the so-called “channel” at the eastern lagoon of Maratua (Nabucco Island Resort), the third one on the island Bakungan Kecil on the southern end of the lagoon (Nunukan Island resort). We kindly asked the managers of the resorts to distribute our specially designed questionnaires to those guests who are interested in participating in our study. The questionnaires contained a map of the diving sites in the region, and the divers could provide information on species, numbers, locations, and times of their encounters with sea turtles. The questionnaires could

be completed in a few minutes; ideally, after each dive one questionnaire should be completed even if no turtles had been seen. During our stay, a total of 12 divers contributed to our study (all staying in the resorts Nabucco and Nunukan), with 1–18 (average: 5.2) questionnaires per person completed. The study should continue over at least one year, but already in this first attempt we received valuable data that hint towards possible hotspots of hawksbill turtle occurrence off the coast of Maratua. Further, own observations have been confirmed that in distinct locations green turtles aggregate in high numbers, while hawksbills were much less abundant, but could be regularly encountered.

10.4. Project part „Conservation“

Many people in the coastal and island communities of the Derawan archipelago still live in rather precarious conditions, which is one of the most important reasons tempting people to create additional income by illegal practices like turtle hunting and blast fishing. These habits are largely facilitated by a combination of weak law enforcement and general ignorance about the complex interactions of marine ecosystems, their threats, and their role for the people whose lives heavily depend on marine resources. Further, many people in the region have negative opinions about necessary conservation measures due to a couple of reasons. Therefore, we see our best chances in establishing sustainable hawksbill turtle protection on Derawan and Maratua in a careful start involving environmental education of locals

while offering additionally income sources. However, simultaneously we want to conduct awareness campaigns for tourists to deter them from buying turtle shell products. With these activities, we want to demonstrate to local people that sea turtles are a marine resource worth of protection, and that they will reveal their maximum value if used in a sustainable way, e.g., as tourist attraction, which excludes killing them for shell and stuffing. We subsequently expect the decline of local people’s reservations towards necessary measures of turtle and nature conservation, and an enhancement of sympathy and confidence for the work of Turtle Foundation and other conservational groups active in the region.

10.4.1. Support of souvenir vendors on Derawan

As part of our new protection program for hawksbill turtles in the Derawan Archipelago, we launched a measure in support of souvenir vendors on Derawan, who in turn pledged to permanently refrain from selling turtle shell products. In exchange for this we offer coveted, sustainably manufactured souvenir products for a very interesting distributor price, which we pass to the vendors plus the transportation costs. On Derawan, for small vendors the purchase of products imported to the island is otherwise very expensive. These products (currently we focus on T-shirts printed with marine motives; Fig. 21) have high chances to be quickly sold while achieving reasonable profit margins, thus offering the chance for actual income increases. Purchase and sale of the products is organized as a revolving

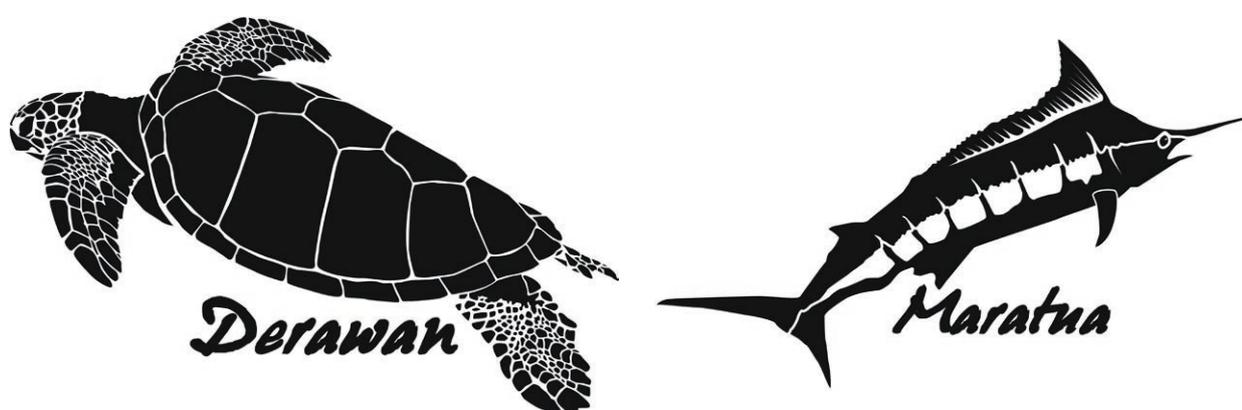


Fig. 21: Examples of motifs for the production of T-shirts delivered to souvenir vendors on Derawan

fund system, i.e., from funded stock of circulating articles sold articles are continuously replaced by using the money the vendors paid for them to the Turtle Foundation. The profit margin of about 50% remains with the vendors. Further, collaborating vendors will be asked to communicate to tourists why they are not selling turtle shell products. In 2014, we launched this initiative with a first allocation of 250 printed T-shirts of various sizes and colors in four designs. Three souvenir vendors on Derawan already joined our program and stopped selling turtle shell products. This initiative should be later extended to include more vendors. By reducing the number of souvenir vendors selling turtle products we expect to considerably reduce the amounts of turtle products offered on Derawan and thereby to reduce the hunting pressure on hawksbill turtles in the waters of Derawan and Maratua. In addition, awareness campaigns for tourists (e.g., through info flyers etc.) are in preparation, and also the handicraft workshops will be continued as part of the hawksbill turtle conservation project.

11. Partnerships

- *District Government of Berau*: The safeguard measures are carried out under license from and in collaboration with the local government of Berau.
- *Indonesian conservation authority (Balai Konservasi Sumber Daya Alam, BKSDA) and its subdivision in Berau*: The BKSDA guards the Samama nesting ground and since October 2012 the island of Sangalaki.
- *Local department of the Indonesian Ministry of Maritime Affairs and Fisheries (Kementerian Kelautan dan Perikanan Republik Indonesia, KKP)*: Responsible for issuing permits to perform conservation work on the turtle nesting islands in the southern archipelago
- *Gadjah Mada University of Yogyakarta (Universitas Gadjah Mada, UGM)*: The hawksbill research project is carried out in collaboration and under the auspice of the Faculty of Forestry of the UGM.
- *Association for the Protection of the Marine Life in Berau (Perkumpulan Konservasi Biota Laut*

Berau, BLB): The BLB is our new local project partner implementing beach monitoring on Bilang-Bilangan and Mataha, and organizes and conducts community programs (environmental education, handicraft workshops, souvenir project, outreach).

- *ProFauna*: ProFauna is the largest Indonesian nature conservation and animal welfare organization (www.profauna.net), and our program manager Dr. Hiltrud Cordes is a member of its advisory board. In the past we have supported ProFauna in its initiatives against the slaughters of sea turtles on Bali. In September 2014 ProFauna opened an office in Tanjung Redeb and is now tightly cooperating with BLB and Turtle Foundation.
- *Dive bases Nabucco and Nunukan Island Resorts and Maratua Paradise Resort on Maratua*: The dive bases support us in the hawksbill turtle research study (interviewing campaigns for recreational divers).

12. Measures of evaluation and monitoring

12.1. Internal evaluation

- Reports of the rangers about unusual events (egg theft, bomb fishing, etc.) to the project management of the Turtle Foundation and, if necessary, to the local authority and police
- Evaluation of nesting data
- Thorough training of rangers by the local project leaders
- Semi-annual site visits by project manager Dr. Hiltrud Cordes and/or project coordinator Dr. Thomas Reischig: monitoring of data collection, clarification of the strategies on the ground, discussion of problems, questions, proposals etc. with our local staff, employee attitude surveys with questionnaires
- Annual meetings of the International Board of the Turtle Foundation; developing strategies

12.2. External evaluation

External evaluation results from the publication and distribution of our annual report to all stakeholders such as sponsors, partner organizations, government departments, etc.



13. Challenges

13.1. Reorganization of the collaborations in Indonesia

Due to the termination of our collaboration with our former implementing partner YPB and the formation of BLB as our new current and future main partner on location, there are a number of technical and organizational changes that affect our project. Adding to this is the new presence of ProFauna in the Berau District and the resulting increased cooperation with ProFauna. The different roles and functions of BLB, ProFauna, and Turtle Foundation must be organized and coordinated to ensure that conservation and community programs can be continued smoothly and efficiently.

13.2. Reorganization of the beach guarding program on the southern islands

After the interruption in mid-August 2014 we were able to continue the beach monitoring program on the southern islands of the archipelago, Bilang-Bilangan and Mataha at the beginning of 2015. In the meantime, however, the ranger stations were not properly maintained, and material disappeared from the stations. The stations now must be renovated, and equipment must be replaced. Further, new rangers must be hired and trained, and the logistic and supply chain from Tanjung Redeb to the islands must be reorganized. In addition, during the time YPB tried to continue beach monitoring with a rudimentary, untrained crew alone egg poaching incidences increased considerably. We expect that because of these months of insufficient beach guarding fishermen might be still encouraged to take turtle nests, and there is an increased possibility for confrontations between our BLB team and egg thieves.

13.3. Problem Sangalaki

The island of Sangalaki was the starting point of our activities in the region in 2000, and with a contribution of about 25% to the total nesting number it is the second most important nesting island in the archipelago. Further, Sangalaki is next to Derawan the most well-known island of the region. In the public, people hearing about turtle nesting in the Derawan archipelago generally think of Sangalaki first. In September/October 2012 beach protection on Sangalaki was taken over by the local conserva-

tion authority BKSDA, which was caused by political disputes with the local administration and parts of the population of Derawan. As such, the Turtle Foundation would welcome the decision of the authority to take this duty seriously and provide staff and financial resources to operate and maintain sea turtle protection on Sangalaki. Unfortunately, there was a considerable increase of egg poaching incidences on Sangalaki, against which we formally protested and started online petitions. After changes in the management of the local BKSDA office the situation is thawing since fall 2014, and temporarily we could send some of our rangers to Sangalaki to support the BKSDA team there. We are aware that the political situation on location requires the BKSDA management to act very cautiously, but we again have reasonable hope that under the auspices of and in collaboration with the BKSDA it is possible to restore a full-fledged protection program on Sangalaki in the near future.

13.4. Political headwinds

For quite some time we have observed an increasing tendency against environmental and species conservation projects in Indonesia. Political responsibilities for nature conservation become increasingly intransparent, the already scarce public funds for nature conservation are further reduced, and economic development usually is given priority over the interests of nature conservation. The corrupt influence of economic interests in politics makes the situation in Indonesia particularly difficult.

13.5. Political restructuring of the region

The Indonesian government is currently planning to separate the southern part of the district of Berau, where we operate our project, and to establish a new district called Berau Pesisir with Talisayan as district capital. The timing of this action is still unclear, as are the administrative consequences for us. However, given our good contacts with the current local administration there we expect mainly positive impacts on our conservation project.

13.6. Beach erosion

We are currently observing increased erosion of some parts the beaches of our project islands. Since the shallow coral sand islands (coral keys) are subject to natural dynamics of continuous restructuring, the

long-term trend of this process is not yet clear, nor is the extent to which anthropogenic factors (destruction of coral reefs, climate change) are responsible for this development. For now we can only monitor the development and, as we are already practicing, to relocate those turtle nests that are endangered by inundation.

PLANNING 2015

1. Continued work on the protection of Bilang-Bilangan and Mataha

Our main goal for 2015 is the complete restoration and continuation of the beach monitoring program and the collection of turtle nesting data on the nesting beaches on the Islands of Bilang-Bilangan and Mataha. The modalities of the future collaborations of BLB, ProFauna, and Turtle Foundation regulated by a legally binding framework agreement, which will be negotiated in a joint meeting in Tanjung Redeb during 2015.

2. Sangalaki

We will stay in contact with the new management of the local BKSDA office in Tanjung Redeb, which is responsible for nature conservation of the island, and will continue to observe the development of the conservational situation on Sangalaki. Due to the reorganization of our conservation programs our possibilities for active participation in the protection of the nesting beaches on Sangalaki are rather limited for now; however, we will react to changing situations as well and as quickly as possible. Our goal is of course the complete restoration of an effective and sustainable protection of the turtle nesting beaches on Sangalaki, either with or without the active participation of the Turtle Foundation.

3. Environmental education

We plan to continue and expand our environmental education programs at local schools and kindergartens as far as our financial and human resources will allow. This will be done in the framework of the new impact mitigation program for hawksbill turtles on Derawan and Maratua, but also as part

of our original programs at other locations of the Berau district.

4. Anti headstarting campaigns

Unfortunately, in Indonesia the so-called head-starting (rearing sea turtle hatchlings and juveniles under artificial conditions for later release) is increasingly popular as an alleged means to provide to the animals better chances to survive in the ocean. However, due to rearing in unnaturally crowded and unclean conditions hatchlings are nearly always injured and sick, with most of them eventually dying. Many scientific studies indicate that this method does not successfully increase the rate of turtles surviving into maturity. Moreover, head-starting in many cases happens only ostensibly for the sake of protecting the sea turtles, but are really based on economic interests, such as tourism and the pet trade. We are currently working together with ProFauna on concepts for lobbying toward responsible authorities and other stakeholders such as tourists, hotel managements, conservation organizations, etc. At the 35th Annual Symposium on Sea Turtle Conservation and Biology of the International Sea Turtle Society (ISTS) between 18 and 24 April in Dalaman, Turkey, we will present these concepts to an international expert audience. Further, since the first edition of 5,000 copies of our bilingual (English and Indonesian) and richly illustrated anti headstarting brochure (Fig. 22) now is out of stock, we will print a new edition and distribute them in Indonesia via our local partners.



Fig. 22: School children reading Turtle Foundation's anti-headstarting brochure

5. Development of a volunteer program

Depending on the progress of the protection project on the nesting islands and the restoration of the necessary infrastructure, we are planning to restart our volunteer program, that was halted because of the discord with YPB, under the coordination of Hana Svobodová. Revenues of the volunteer program should in the long-term cover at least a part of the costs of the conservation project.

6. Research and impact mitigation program for hawksbill turtles in the Derawan archipelago

The pilot research project in 2014 revealed important first insights and experiences for the feasibility and modalities for comprehensive studies on biology and population of hawksbill turtles in the Derawan Archipelago. Such studies must be carried out in future on larger scales and over several years to provide meaningful and essential results for the development of an efficient and sustainable conservation strategy for the region's hawksbills. Therefore, for 2015 we plan a longer expedition in the Derawan archipelago carried out under the auspices and in collaboration with the Faculty for Forestry of the UGM Yogyakarta; realization and extend of the study depends on still pending approvals of grant applications for this purpose. During the expedition we expect to catch, mark, and measure between 100 and 200 hawksbill turtles. Also the interviewing study among locals and the questionnaire study among recreational divers should be continued and extended to other areas in the region. As part of our conservation concept on the Island of Derawan we started to dissuade souvenir vendors from selling turtle products to tourists. In return for the commitment not to sell turtle products any more, vendors receive T-shirts and craft products at very attractive conditions within a revolving fund program. This measure we want to expand by including more vendors and re-stocking our pool of souvenir products, while simultaneously raising awareness among tourists about the conservation and legal problems connected with the purchase of turtle products. Furthermore, a number of environmental education lessons in local kindergartens and schools as well as several handicraft workshops on Derawan and Maratua are planned

for 2015 in the framework of the hawksbill turtle project.

The implementation of all measures that go beyond the basic protection work will depend on the available funding.

OUTLOOK FOR THE NEXT YEARS

The long-term continuation, expansion, and improvement of the existing conservation projects is the main concern of the Turtle Foundation, as only with continued protection will the turtle population in the medium term stabilize and be able to recover from decades of exploitation.

In addition to the restoration of effective sea turtle protection on the islands of Sangalaki and Samama, our focus is on the still unprotected nesting islands of Belambangan and Sambit. Together, they make a contribution of at least 15% of the nesting numbers of green sea turtles in the Derawan archipelago. Their protection from egg poachers is therefore of great importance for the archipelago's turtle population. In addition, within the framework of a protection program for these islands also the protection of the nearby Muaras reef by regular sea patrols could be implemented, as this area provides an important food source for the hawksbill turtle, and which is threatened by destructive and illegal fishing methods. We have been prepared for quite a while to set up a protection program there, but have been unable to do so due to a lack of funds.

Our project on Maratua showed us new perspectives and challenges for the protection of the sea turtles in the Derawan Archipelago. With commissioning of the new airport harbor on Maratua, and by the heavy tourism development of Maratua planned by the local government and private investors, there will appear major challenges for the people and for the nature of the island. As is often the case, a few people stand to benefit greatly from development (investors, etc.), but without oversight and regulation there will likely be a concurrent deterioration of wildlife habitat and natural resources, as well as negative consequences to social, traditional and family

systems, and increasing poverty and crime among those in the community who don't reap the benefits of this development. The Turtle Foundation sincerely hopes to be able to contribute in mitigating the negative consequences of this foreseeable development. Therefore, we hope to be able to increase our efforts on Maratua over the next years, but this will largely depend on available funds and the resources available to us.

To perform successful species conservation, the creatures and habitats must be continuously protected. However, without the understanding and cooperation of the local community, all efforts will be futile in the long term. We will therefore continue our educational and environmental programs in local schools on a regular basis, knowing the younger generation will be the ones who must demand that their natural resource heritage be protected.

The creation of alternative sources of income as an alternative to destructive and unsustainable economies is essential for the sustainable success of nature conservation and species protection work. Since the beginning of our involvement in turtle conservation, we have included former egg collectors in our ranger teams, who then used their knowledge and experience for the protection of sea turtles.

In addition to our ongoing data collection, we plan research projects to lead to more accurate population surveys of the sea turtles of Derawan archipelago, including determining their migration routes and feeding grounds, as well as specific nest biology data that will help form management plans for their protection. This will be done in cooperation with Indonesian scientists.

In the long term, our goal is to gradually transfer the active protection measures for the sea turtles and their habitats into the hands of the local authorities, organizations, and communities, while for the sake of the sea turtles these measures should be

implemented in the same quality, effectiveness and sustainability as we are currently achieving. Recent events have shown, however, that this is still a longer way to go; thus, we can not yet predict when this goal will be finally achieved.

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