Association for the Protection and Understanding of the Environment

UPDATE AFTER FIVE YEARS OF MARINE TURTLE MONITORING IN GAMBA, GABON (2002-2007)

TECHNICAL REPORT

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In collaboration with

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Introduction

Considering the environmental concerns on global level, and following other countries in the Congo Basin, Gabon has been endowed with a network of 13 National Parks, representing the countries ecological and biological wealth. One of the characteristics of the country's recognized biological diversity is the presence of nesting sites for several marine turtle species of the cheloniidae family and one of the dérmochelyidae family.

The presence of four species of marine turtles in Gabon, of which some estimates go as far as 30% of the worlds nesting leatherback (*Dermochelys coriacea*) population (see 2006 report) and their endangered status, make them flagship ship species for conservation and scientific research.

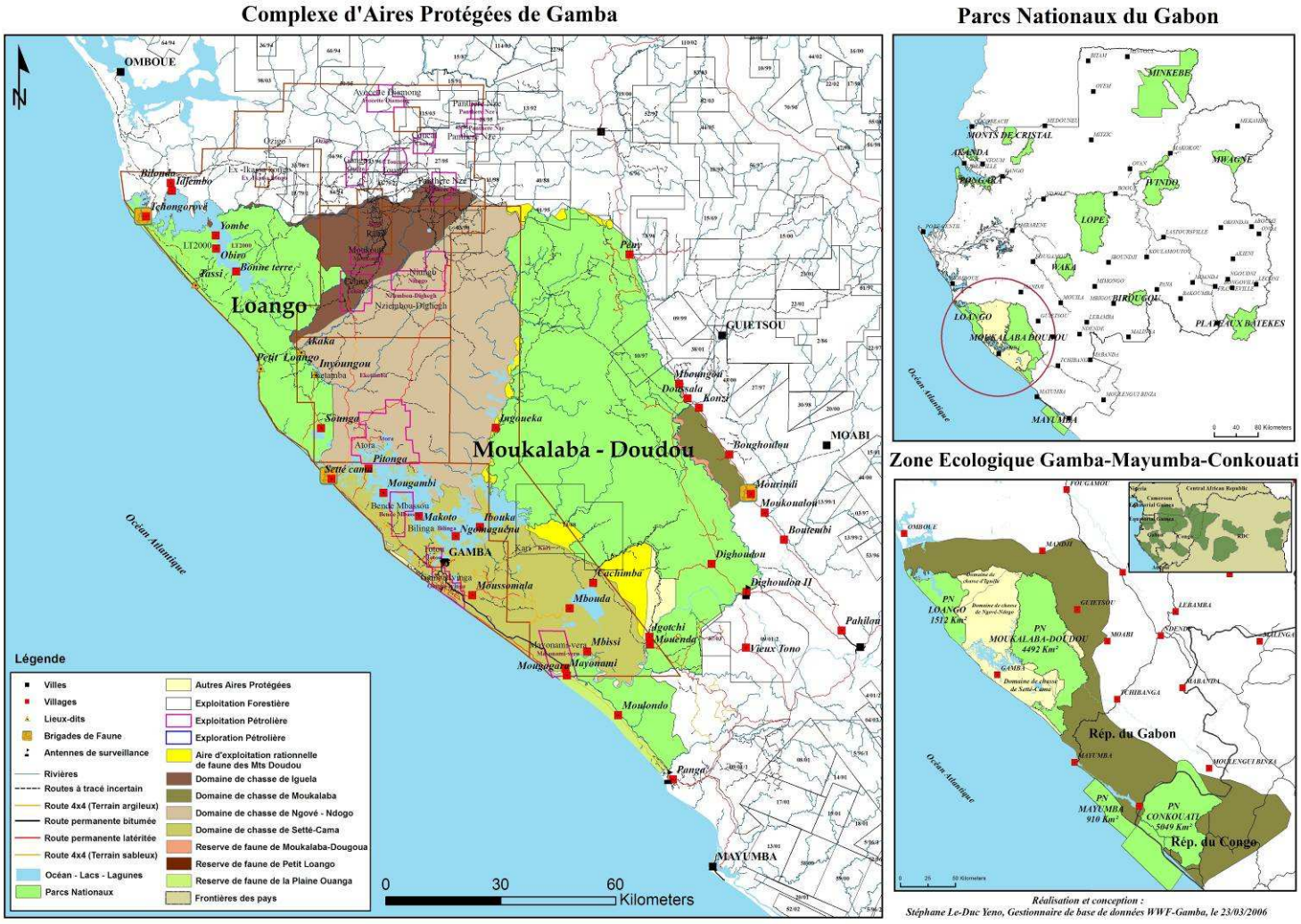
The beaches near Gamba town situated in the Gamba Complex of Protected Areas (GCPA) are part of these privileged nesting sites for marine turtles. The 200 km of coastline of the Complex receives an average of 2000 turtles every year (see 2006 report). Since 2002, the NGO Ibonga-ACPE in collaboration with WWF and his partners (PROTOMAC) contributes every nesting season to the monitoring and daily research on 5.75 km of beach near Gamba.

For the 2006-2007 nesting season, the activities of Ibonga's monitoring team started at the 5th of November 2006 till the 31st of April 2007 (including one week preparing the camp), thanks to financial support from the RAPAC (Réseau des Aires Protégées d'Afrique Centrale) and the UICN (the World Conservation Union).

This report will firstly present the geographical context, the different conservation activities, before showing the final results and analysing these results, to end with suggestions for future activities and the conclusion.

I - Geographical context

The GCPA is situated in the coastal Gamba-Conkouati Landscape, one of the 11 Congo Basin priority landscapes. The Complex consists of eight protected areas totalling a surface of 12000km². Situated in the South West of Gabon, with 200 km of coastline, the GCPA has a humid warm equatorial climate, leading to a high biodiversity.



The Gamba Complex of Protected Areas (Source: Monitoring Unit, WWF-Gamba)

Gamba town, characterised by its activities related to the oil industry, nature conservation and tourism, is situated right in the middle of the GCPA with an estimated population of 7000 inhabitants.

The beaches around Gamba and the rest of the Complex consist of a loose sandy texture and so favouring nesting of marine turtles. Marine turtle monitoring is executed on three different levels in time (and space): daily, weekly and monthly.

- A daily zone of 5.75 km corresponding with the beach nearest to Gamba, called “Pont Dick”, is patrolled twice every night on foot.
- A stretch of coast north and south of the daily patrolled zone, totalling 75 km is monitored weekly by quad.
- During peak season (December-February) aerial surveys for the entire Gabonese coastline are conducted in cooperation with all marine turtle partners in Gabon on a monthly basis.

II – General Context

Within their wide range of activities, Ibonga-ACPE is committed to put sustainable management mechanisms into place in the GCPA, in which, since 2002, marine turtle conservation takes an important place. These activities are within the framework of the research activities within the Complex under the direction of the regional Marine Turtle Programme (PROTOMAC) and in cooperation with WWF and KUDU, recently taken over by URTOMA.

This study provided important qualitative and quantitative information on different levels.

- On local level, it helps authorities in their decision making concerning conservation management.
- On national level, this study is executed within the framework of the National Marine Turtle Partnership who ensures training for all conservation partners (3 national NGOs, 2 International NGOs, 1 regional Programme) to standardize data collection protocols. The results of this study will also be integrated into the national database to contribute the national status report on marine turtles.
- On regional level this study is part of the PROTOMAC Programme, which aims to promote marine turtle conservation initiatives and to create cohesion between all marine turtle partners in Central Africa.
- On a global scale, this study contributes to the protection of highly migratory and endangered species.
  All marine turtle species have been listed in Annex 1 of the CITES (forbidding international trade to and from signatory countries) and Annexes 1 (except the flatback) and 2 of the CMS (strict conservation of the species and necessary agreement on international cooperation). They are all also listed on the IUCN red data list as “Endangered” (*Chelonia mydas, Lepidochelys olivacea, Caretta caretta*) or “Critically endangered” (*Dermochelys coriacea, Lepidochelys kempii, Eretmochelys imbricata)* except for the flatback turtle which is listed as data deficient.
  Apart from DNA and Isotopes sampling, post mortem and pathology analyses have been added to the protocol this year to improve bio-geographical knowledge as well as species characteristics and health.

III - General Objective:

The work carried out on the beaches near Gamba has as general objective to protect the marine turtles nesting at the site, to collect quantitative et qualitative sound data on the females and to participate in research in agreement with international partners.

IV - Methodology

4.1 The turtle Camp

Source : Gil Avery Mounguéngui, 2007

Photo 1: Presence in the turtle camp

Source : Gil Avery Mounguéngui, 2007

Photo 2: The Camp

To adequately run the monitoring activities Ibonga and WWF built a small camp on the nesting beach to permit permanent presence on site.

4.2 The team

Source : Gil Avery Mounguéngui, 2007

Photo 3: The team at start of a patrol

Source :Jean-Luc, Décembre 2007

Photo 4: Coordinator with injured leatherback

The monitoring team consisted of six research assistants (4 Ibonga employees and 2 WWF) and Ibonga's technical coordinator as well as a Swiss volunteer for several months. All team members had benefited from national training organized by the National Marine Turtle Partnership.

4.3 Activities

The research team is divided in two teams of two persons to carry out the nocturnal patrols on foot every night on a stretch of beach of 5.75 km.
The first patrol (from 21H30 till 24H00) is entirely used for biometry, tagging and to take biological samples. The second patrol (from 3H30 till 6h00) also implicates nest counts as returning to the camp from the outer edge of the patrolled beach at first daylight, to record total nest numbers.

Most important activities during the patrols are:

- Biometry, consists of measuring of every turtle encountered during the patrols (curved carapace length and width)
- Tagging, consisting of on the one hand the attachment of flipper tags, type "Monel", on every turtle to ensure identification on medium-long term, and on the other hand injecting Passive Integrated Transponder (PIT) tags into all encountered leatherbacks to be able to identify the individuals in the long term.
- Biopsies, for which three types of biological sampling have been conducted.

Genetic and isotope sampling are carried out simultaneously and is done by taking 1cm² of turtle epidermis, which is subsequently cut in two equal parts to be put in test-tubes with a salt solution for conservation.

For pathological sampling, parasites on the turtles are collected (epibionts) as well as tumours (fibropapilloma) found on the body. The samples are put into test-tubes with ethanol or formalin to ensure long term conservation.

Source :Guy-Roland Makaya,Janvier 2007

Photo 5: inscription of test tube after sampling

The sampling protocol guarantees security and hygiene for the researcher as well as for the animal.
Each sample is taken while:

> wearing chirurgical gloves
> disinfecting de sampling site before and after operations
> using new equipment (blades) for every individual
> sterilising all equipment with 70% ethanol or flame before each operation

It has to be admitted that the sampling frequency was very irregular this year due to lack of permanent presence of competent personnel in the field (see also discussion).

- *Awareness raising*

The team tried to orient all visitors and made them aware of the importance of the beach as nesting site as well as of the monitoring activities it implies. Brochures have been distributed describing the nesting procedure and a code of conduct for visitors observing this phenomenon. Four information panels are also erected for the same reason at the end of the only road accessing the beach.

Source : Gil Avery Moungüengui, 2007

Photo 6: Information panels at beach entrance

The production of these awareness raising tools were made possible by a financial support of the FFEM (Fond Français pour l'Environnement Mondial) and the Dutch development cooperation trough the WWF.

- *Aerial surveys*

Field presence on the four different sites in Gabon, Pongara, Iguela, Gamba and Mayumba, covers about 20% of the total Gabonese coastline of 800 km. The different teams record annual fluctuations on each site, but to confirm if these are due to in-country migration or country or region wide fluctuations, a larger stretch of coastline needs to be monitored. The same goes for population estimates, as nest densities vary along the coast, data from the different field sites can not simply be extrapolated for the entire Gabonese coast to calculate the marine turtle nesting population for Gabon. Aerial surveys are therefore an important tool for marine turtle conservation, not only to observe change in marine turtle nesting patterns and to estimate the nesting population on 800 km of coast but even so to collect data on pollution (oil and tree trunks), habitat change and trawler fishing. In the 2005-2006 nesting season three aerial surveys have been executed per (peak) season with an average interval of one month. During the 06-07 season three aerial surveys have been executed using the same protocol, in cooperation with Claude Caillet, a French forester. To maximize the encounter rate, a high tide at midnight, leading to a low tide at 6 am is necessary to record all fresh nests laid in that period. Surveys are therefore executed between 6 and 10 am before the incoming tide erases the tracks. Only fresh tracks laid the night before are accounted for. Because of their predominant presence in Gabon and the good visibility of their nests from 80 meters altitude the surveys are focused on leatherback nesting and to a lesser degree on the three chelonian species also found nesting in Gabon, olive ridleys, green turtles and hawksbill turtles.

V - Results and Analyses

5.1 Results

The table below resumes the essential qualitative and quantitative data of the entire 2006-2007 nesting season (November 2006 till March 2007)

Species	Number of Nests	Tagged	Tagged with PIT	Recaptured PIT	Recaptured tags
DC	553	148	85	6	17
LO	63	24	/	/	1
Other	7	2	/	/	O
Total	623	174	85	6	18

Source : IBONGA-ACPE, Janvier 2007

Table 1: Quantitative results of nests, tags and remigration

5.1.1 Nests counts

Figure 1 shows the actual presence of the two most important species and the "other" species observed, sporadically found and sometimes lacking proper identification. Thus a total of 553 leatherback *(Dermochelys coriacea)* nests have been recorded, 63 Olive ridley *(Lepidochelys olivacea)* nests and 7 nests belonging to the hawksbill or green turtle (identified or not), resulting in 89%, 10% and 1% respectively.

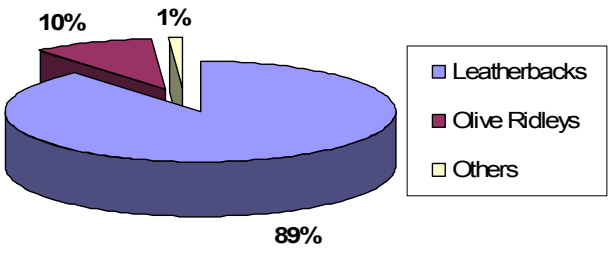


Figure 1: Nest numbers per species on Gamba beach

5.1.2 Tagging

As data on nesting numbers results from the nest counts every morning, it has to be noted that not of all these individuals have been encountered at night to be subjected to identification and so to tagging. Tagging results show that 148 leatherbacks, 24 olive ridleys and 1 green turtle (*Chelonia mydas)* and 1 hawksbill (*Eretmochelys imbricate)* have been marked with flipper tags, totalling 174 individuals (see table 1)

This season, seventeen (17) leatherbacks re-migrated to the Gamba beach, against one (1) single olive ridley. This results in a total of 18 recaptures of which 3 lost one tag, which needed to be tagged again. This brings the total number at 192 tagged or recaptured turtles, representing an encounter rate of about 30% of the total nesting population on 5,75km. The rest of the population, 70%, has only been identified by their nest, during the nests counts.

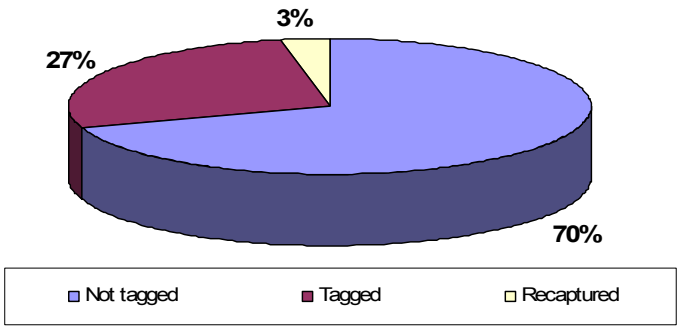


Figure 2: Numbers of tagged turtles of total nesting population

PIT tagging is restricted to leatherback turtles, only 85 individuals have been tagged in this way. In addition 6 have been recaptured with a PIT tag. So during this season 91 individuals have been identified with a PIT tag. Due to technical constraints not all tagged leatherbacks have been injected with a PIT tag.
Finally, it can be concluded that of the 623 female marine turtles that have frequented the Gamba beach, of which the majority (89%) are leatherbacks, 30% have been measures and tagged and 16% of all leatherbacks also got PIT tagged.

This year's results correspond with former years, observing a larger number of leatherbacks as olive ridleys, as well as the sporadic presence of green turtles and hawksbills
Within country migration as a result of recaptured tags on other monitored beaches can be found in the national report.

5.1.3 Biometry

Concerning the two most important species, we can find the biometry results in the table below.

	Leatherbacks		**Olive ridleys**	
	Maximum	Minimum	Maximum	Minimum
CCL	**178**	**130**	**80**	**64**
CCW	**120**	**97**	**80**	**67**
Mean CCL	**141,06**		**70,92**	
Mean CCW	**107,03**		**68,16**	

Table 2: Biometry results, CCW=Curved Carapace Width, CCL=Curved Carapace Length

Leatherbacks are naturally larger than olive ridleys. The table is to show the maximum and minimum of this season's populations and an average species size of the nesting populations. The mean carapace size can be compared with other nesting populations around the world to identify the different nesting populations. No significant changes our found compared to previous years.

5.1.4 Aerial surveys

The aerial data collected show higher densities of leatherback nests during the 06-07 season compared to the 05-06 season (figure 3). The total number of nests counted during the last season has doubled compared to the 05-06 season. Beach survey data from Gamba beach does not confirm this same trend (see chapter 5.2.2 & 5.2.3), meaning that the three days the aerial surveys were conducted are not fully representative for the overall seasonal nest densities for the entire coastline. Though other beach sites will probably confirm the trend the aerial surveys indicate.

	Season 05-06	Season 06-07
December	638	594
January	310	949
February	118	584
Total	**1066**	**2127**

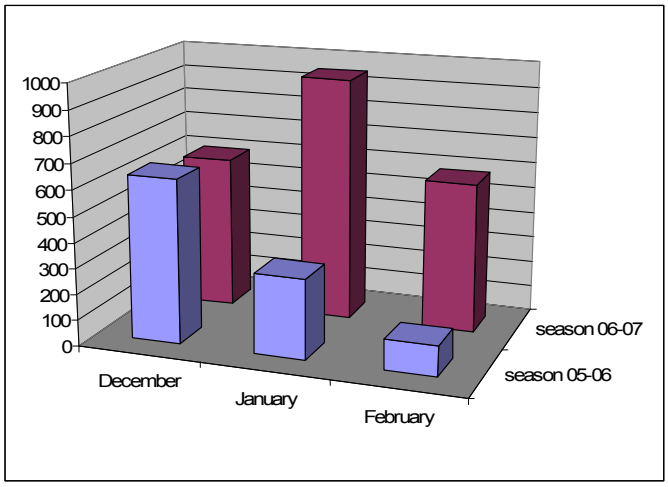


Figure 3. Number of leatherback nest per flight for the 05-06 & 06-07 season

5.1.5 Beach Cleanup

The various sorts of waste coming from the sea or the continent are also a menace to the nesting turtles. In the end of each season the team carries out a cleaning operation on 6 km of beach. The operation takes place during the last two weeks of the season using plastic bags and scales to weigh the amount of waste collected on the nesting site. During the first season ('03-'04) of the cleanup programme we found 1725 kg of waste on the research beach which equals 300 kilograms per kilometre of beach. On 2 kilometres alone we found 238 syringes, 1796 bottles and 1154 (parts of) shoes and 361 pens. The second season 184 kilogram's of garbage per kilometre of beach was collected, leading to an overall figure of 1034 kilos. During 2005-2006 another 980 kilo's was washed up and last year 766 kg of non biodegradable waste has been collected. The quantities are still enormous, but decreasing. If the decrease is due to less pollution by humans or because of our cleaning operation itself, or another cause, has to be confirmed.

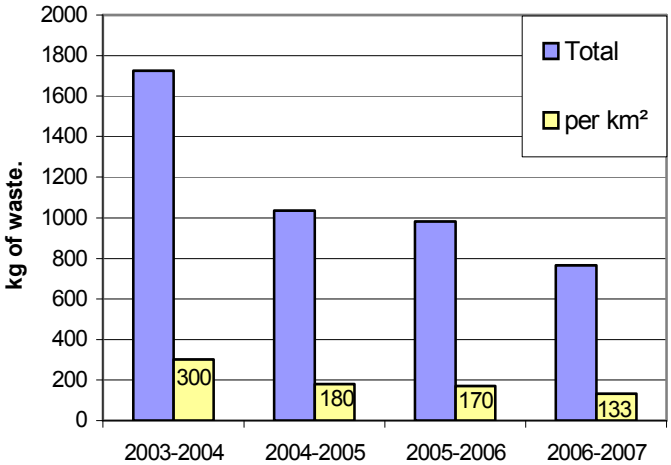


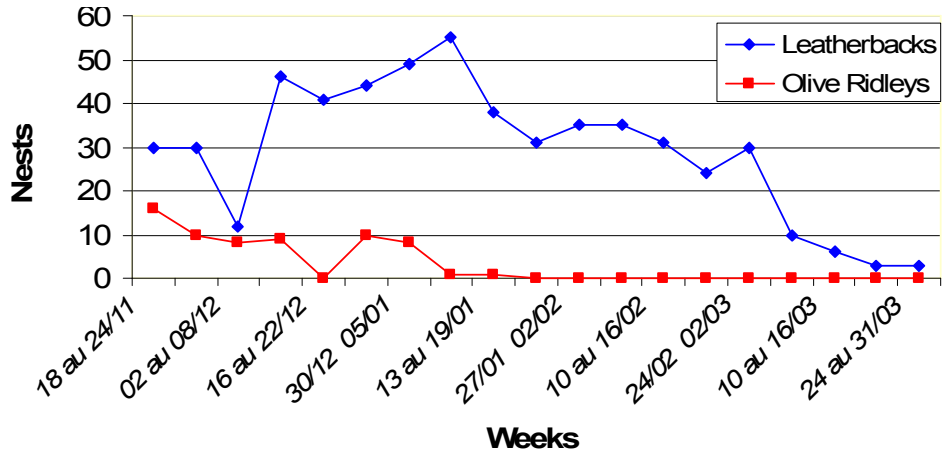
Figure 4: Kilograms of waste collected each year in the research area (5,75 km)

5.2 Analysis

5.2.1 Intra-seasonal nesting fluctuation

The data collected on a daily basis, permits comparisons on several different levels. The figure below shows the number of turtles observed per species per week, for the two mainly observed species, the leatherback and the olive ridley. It shows that that the olive ridleys were only present during the first eight weeks of the research period in November and December.

However for both species during those eight weeks a comparable fluctuation in nesting numbers is noticed. It shows a decline during the first three weeks, a light growth in numbers during the fourth week, a decline during the fifth week, a growth again during the following two weeks and a decline in the eighth week, ending the season for the olive ridleys.



The graph obviously shows the end of the nesting season for the olive ridleys which starts two months before that of the leatherbacks. It also illustrates the superiority in numbers of leatherbacks nesting on the beach compared to the olive ridleys, during the entire 2006-2007 nesting season.

It is also shown that during the research period the number of nesting leatherbacks increases progressively from its initial value (29), to reach its optimal value of 55 individuals per week during the eighth week in mid-January, before decreasing towards 30 individuals in mid-February until the end of the nesting season at the end of March.

For olive ridleys to the contrary, despite the slight increase described above, the nesting numbers always decrease to be inferior to the initial weekly nesting numbers (16 individuals) towards zero nests during the ninth week (mid-January). Even if the olive ridleys are still present during this period, they are very rare, with only one nest a week during the month of January.

Figure 5: Fluctuations of nesting numbers per species per week (semaines)

These observations are explained by the hypothesis that the nesting season for the olive ridley turtles starts before that of the leatherbacks. This means that our research period covers the beginning of the leatherback nesting period but only the final period of the nesting season for olive ridley in Gabon.

5.2.2 Inter-seasonal nesting fluctuations

To create an overview to show the general nesting population trend, all nesting data over the last 5 years has been compiled. Figure 6 below shows these inter-seasonal variations for the leatherback population on the Gamba beach from 2002 till 2007.

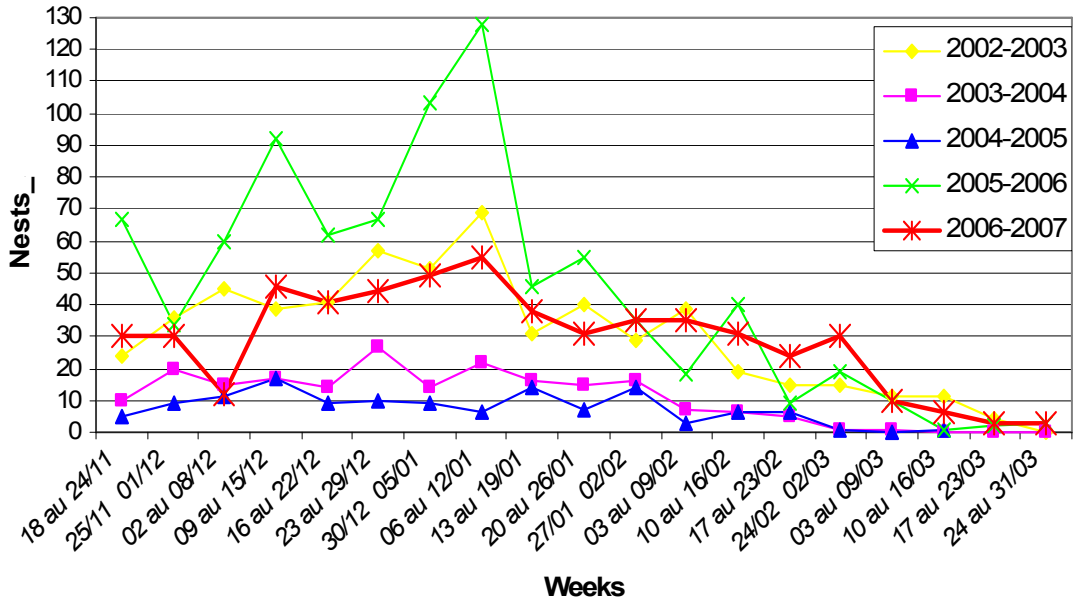


Figure 6: Fluctuations of leatherback nesting numbers per week (semaines) for five seasons (2002-2007)

The graph shows that last season's results present similarities with the precedent seasons. It clearly shows peak nesting periods (4th and 8th week) and periods of depression (5th and 9th week) and intermediate periods.

These results strengthen the hypothesis that similar nesting patterns are found for the leatherback turtles each season. These remarkable similarities are well emphasized by the presentation of the data on a weekly basis.

Even if it is evident that leatherback nesting numbers follow the same pattern every season (strong increase, peak in January followed by a decrease), to confirm any population trend requires an additional several years of research and comparative analysis with other nesting sites on a national, regional and as well as global level.

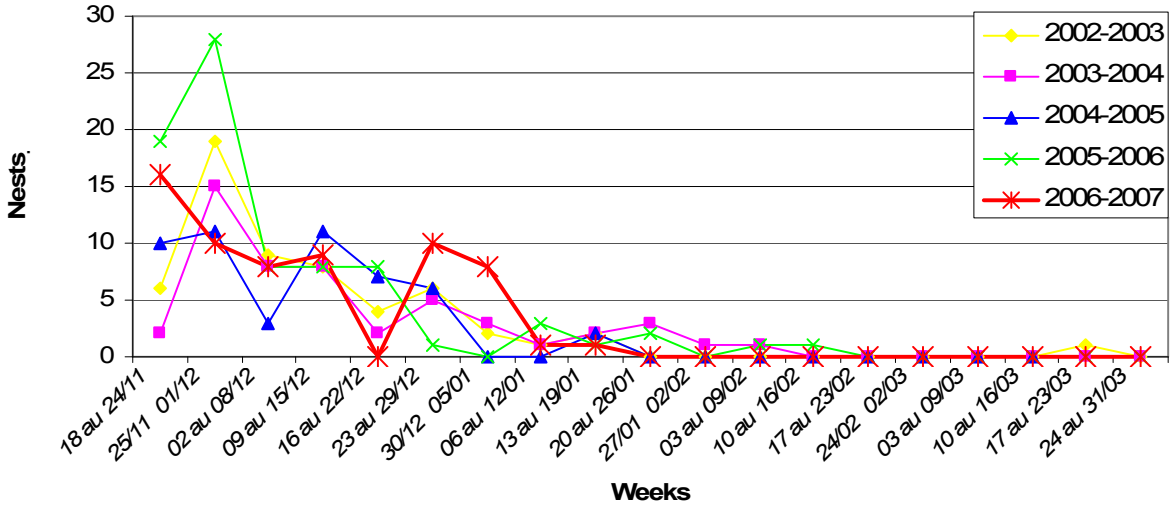


Figure 7: Fluctuations of olive ridley nesting numbers per week for five seasons (2002-2007)

Looking at the comparative data for the olive ridley nesting numbers (see figure 7) over the last five years, the same conclusion can be drawn for it shows higher numbers of nests in certain periods (2nd, 4th and 6th week) and lower numbers in other periods (3rd, 5th and 8th week).
If during certain years this species is still present till February, last year nesting had come to an end as early as mid –January. Moreover the graph confirms that no olive ridley turtles have been found on our beaches after Mid February. This emphasizes the argument mentioned above, which states that the defined research period corresponds with the last phase of the olive ridely nesting season.

5.2.3 Nesting population trends

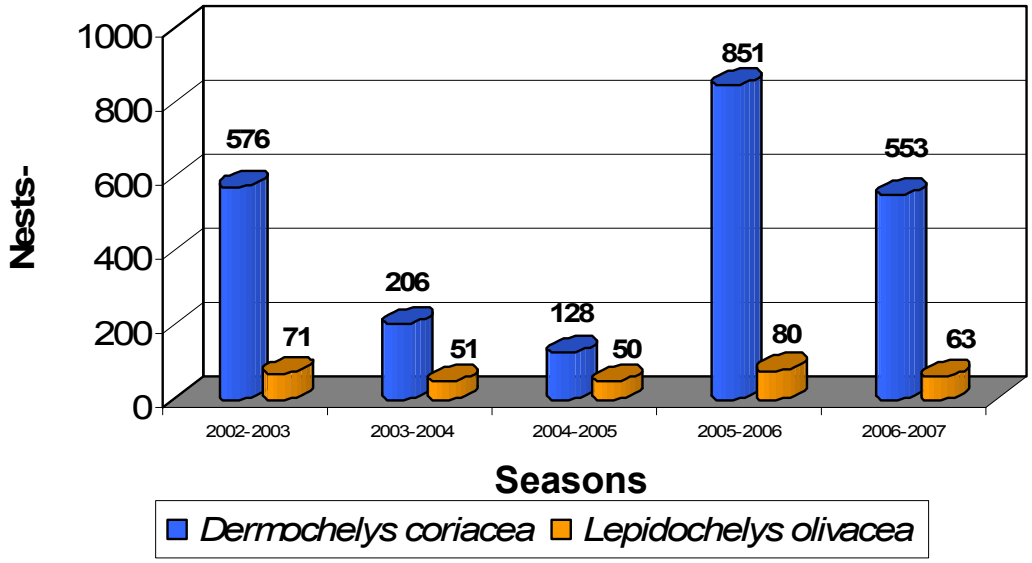


Figure 8: Annual Fluctuations of leatherback and olive ridley nesting numbers per week for five seasons (2002-2007)

The marine turtle population nesting on the beaches of Gamba varies every year. Graph 8 shows the actual numbers found on the 5.75 km of beach per species since the start of Ibonga's beach monitoring programme. The first three years show a continuous population decrease for the leatherbacks as well as for the olive ridleys. Contrarily the fourth year represents an increase in population for all species. Leatherback numbers go for example from 128 individuals in 2004-2005 to 851 in 2005-2006, an almost

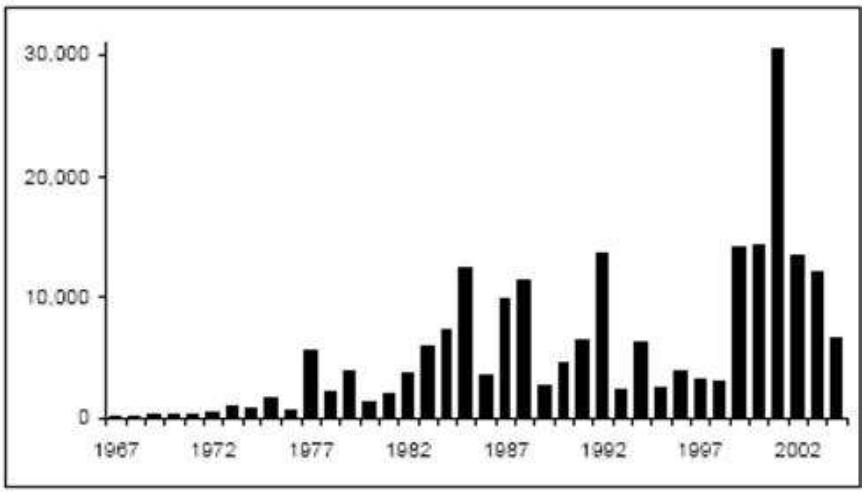


Figure 9: Leatherback nest numbers for Suriname (a combination of rough counts, corrected counts, estimates and observations during PIT tagging surveys) in the period 1967-2004 (Hilterman & Goverse, 2004)

7 fold increase compared to the season before. Last season this population has on the contrary decreased from 851 recorded previously to 553 (≅2/3)
This trend seems to resemble the data recorded in Suriname over more than thirty years of nest monitoring were a succession of decreases and increases marks the nesting population dynamics

This can partly be explained by the fact that the nesting population isn't the same every year looking at the individuals. However, it is noted that the observed nesting cycle is different from the two or three years generally taken as inter-nesting periods (varying per species). It is therefore, that long term monitoring and tagging are of necessity to confirm any population trend. The number of recaptured turtles will as well serve as an important parameter to achieve this.

5.2.4 Nesting behaviour

Concerning nesting behaviour, a geodynamic phenomenon has been observed at the Gamba site. Two principal factors are believed to be threatening the success of an important number of nests; the tide and the vegetation. Studies have been caries out already during the 2005-2006 season confirming the damage caused by inundation and roots (see 2006 report) but it seemed that this year's often extraordinary high high tide line made turtles lay their nests in even worse conditions, leading to concerns by the monitoring team about the outcome of the eggs. On almost 4 km (of the 5.75 km), the high tide line reached the coastal vegetation obliging the turtles to nest under or at the high tide line or directly in the vegetation, minimizing the success rate of the numerous eggs.

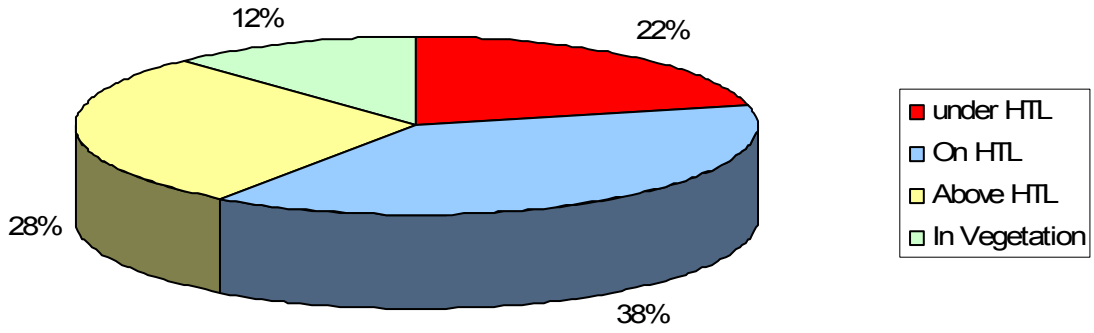


Figure10: Percentage of observed nests (n=590) compared high tide line (HTL) and vegetation

If more profound research on nest ecology would have permitted to obtain more objective results, the position of each nest relative to the high tide line and vegetation was nevertheless recorded. The results are presented in the figure 10. It shows that from the 590 dentified nests, only 28% are situated above the high tide line and the remaining 72% is divided between, the vegation (12%), at the high tide line (38%) and under the high tide line (22%). So, about 425 nests are threatened with inundation, erosion and thus a higher chance of failure.
This situation is worsened by the mutating geography of the beach. In fact the series of high tides on the vegetation edge sometimes creates an exceptional relief, preventing the turtles to climb towards the high tide line. Even if they succeed in crossing this slope they find themselves in the vegetation and between the washed up logs (photos 7 & 8).

Knowing the number of threats the juveniles face apart from this phenomenon, these figures should be taken into account while searching for palliative solutions. At the moment it is proposed to at least clean the entire site before the nesting season.

Source : Gil Avery Mounguéngui, 2007

Photo 7 : La végétation et la présence de grumes

Source : Gil Avery Mounguéngui, 2007

Photo 8 : Le relief de la plage

5.2.5 National nesting patterns (Aerial Surveys)

Profound data analysis is still in process by Matthew Witt at the University of Exeter, but first analysis show that the distribution of leatherback nests along the Gabonese coast is mostly concentrated in the four sites were field teams are present including an area south of Port Gentil. The maps (figure 11 & 12) show the number of nests per surveyed kilometre represented in squares of 10 by 10 kilometres to visualize the data. Note that it is not the number of tracks per square but per kilometer of surveyed coast. The figures confirm similar distribution patterns for the both seasons but lower nesting numbers during the 05-06 season.

Rough population estimates could be made using the total numbers of tracks per flight. During the last season, in the three peak months December, January and February we could consider an average of 2127 / 3 ≈ 700 nests per night (see figure 3). We could estimate that for the months November and March nest densities are half as high so as much as 350 nest per night for the entire country. For the three peak months that makes 90 nights with 700 nests is 63,000 nests. For November and March this makes 350 times 60 is 21,000 nests. For the entire season a total of 84,000 can thus be estimated. Considering an average of 5 nests per season per female we can consider that 16,800 individual female leatherbacks have used the Gabonese coast as nesting habitat during the last nesting season, stretching from November 2006 till March 2007. These figures confirm that Gabon receives the largest leatherback population in the world. For comparison, Hilterman and Goverse (2002) estimated 30,000 nests in Suriname in 2001, 15,000 in French Guyana, and a total of approximately 50,000 in Suriname, French Guyana and Guyana combined (Angela Formia, 2005). Even when using the same calculations for the 05-06 season a total of 43,000 nests, resulting in 8,600 female leatherbacks are estimated. This is still the largest nesting population recorded within the borders of one nation.

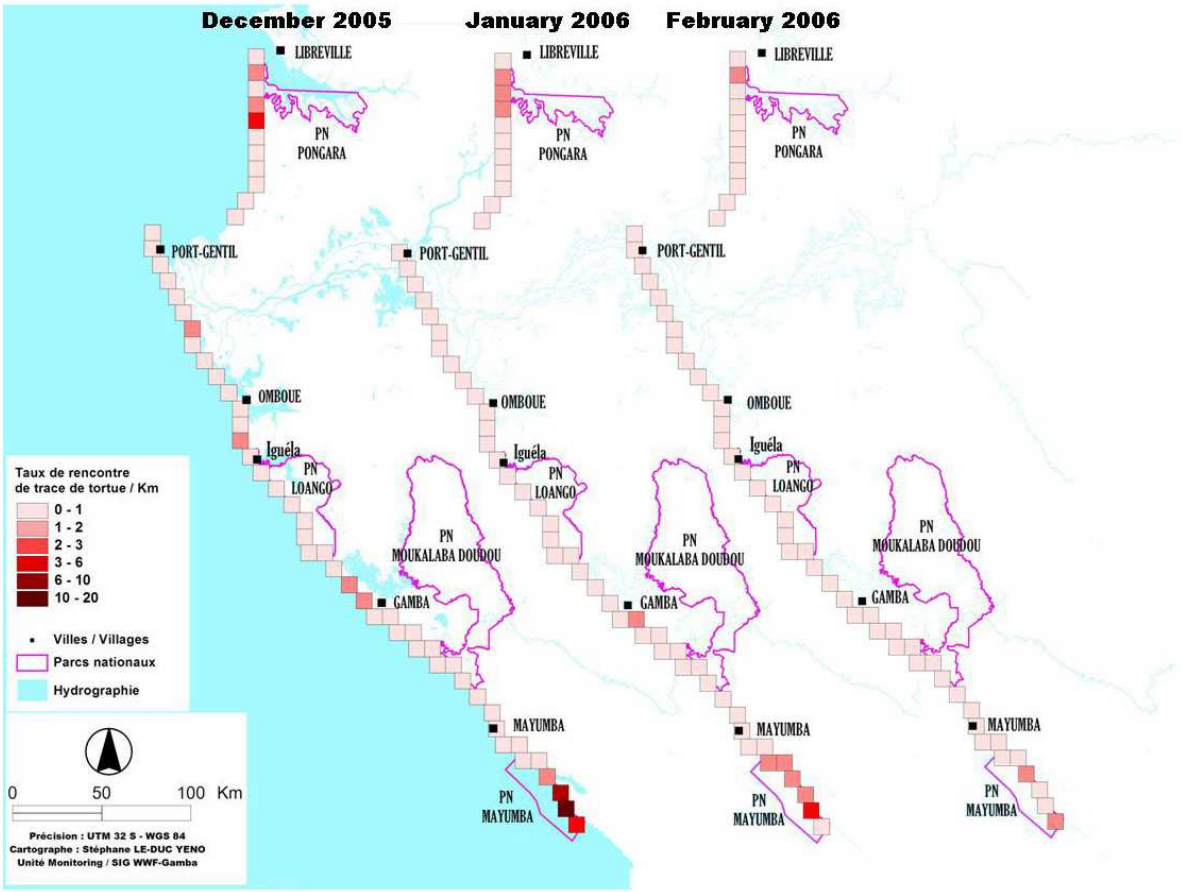


Figure 11: Distribution of leatherback nests during the 05-06 season per aerial survey (taux de rencontre=encounter rate)

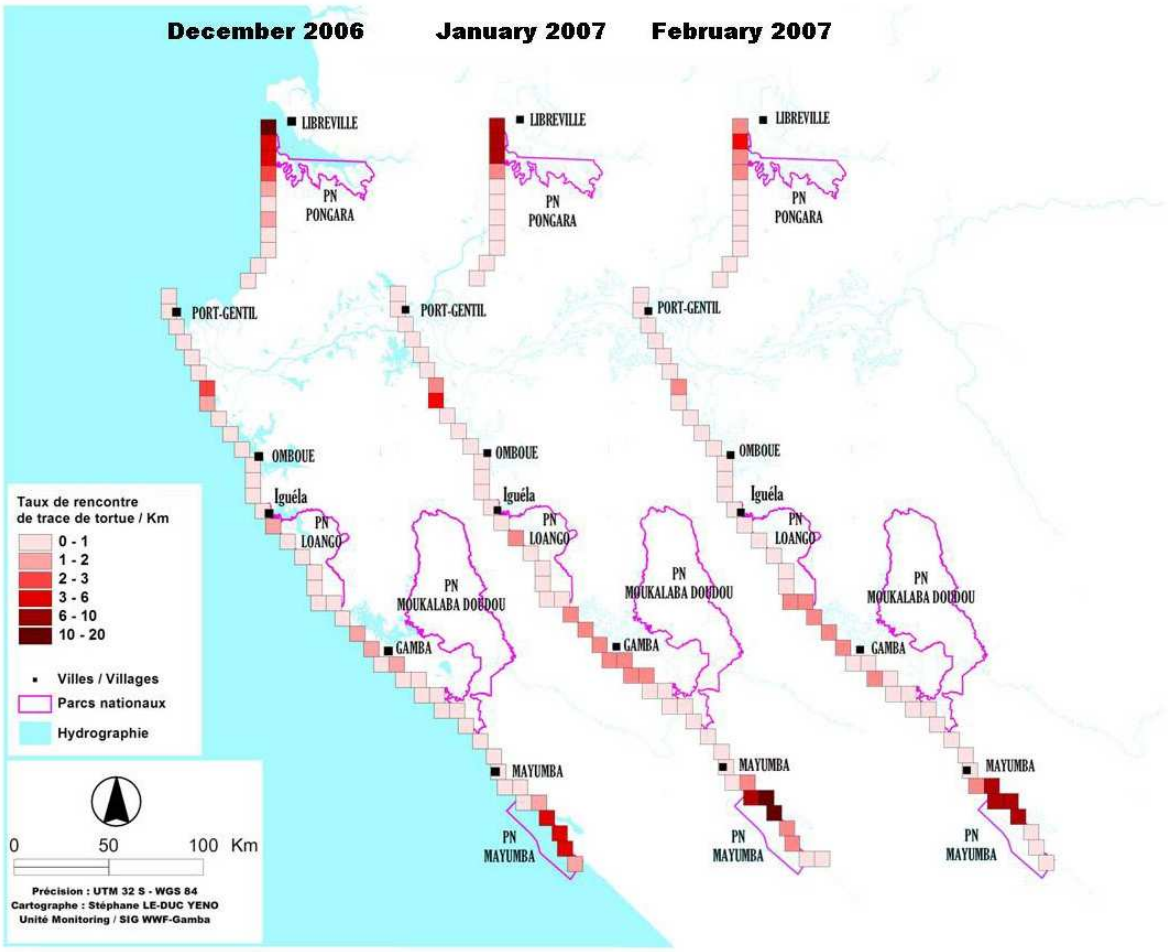


Figure 11:.Distribution of leatherback nests during the 06-07 season per aerial survey (taux de rencontre=encounter rate)

VI - Migrations

The figure 13 below visualizes the migration of all leatherbacks in the Atlantic Ocean fitted with ARGOS satellite transmitters in the framework of the Trans Atlantic Migration Programme of WWF. Three leatherbacks called “Caroline”, “Ibonga” and “Quasimoda” were equipped with the transmitters while nesting in Gabon. Of the three turtles tagged on 5 March 2006 only Caroline (represented by the blue line) is still emitting today, Ibonga stopped emitting after 4 months on July 2nd (white line) and Quasimoda emitted till the 21st of April 2007, for 13 months (purple line). The exact reason for discontinuation of the transmitters is not known but could be simply due to technical failure of the equipment, or the death of the turtle due to predation or fisheries. For more up to date information visit: http://www.panda.org/about_wwf/where_we_work/latin_america_and_caribbean/our_solutions/marine_turtle_programme/projects/leatherback_tracking_project/tracking_logs/index.cfm)

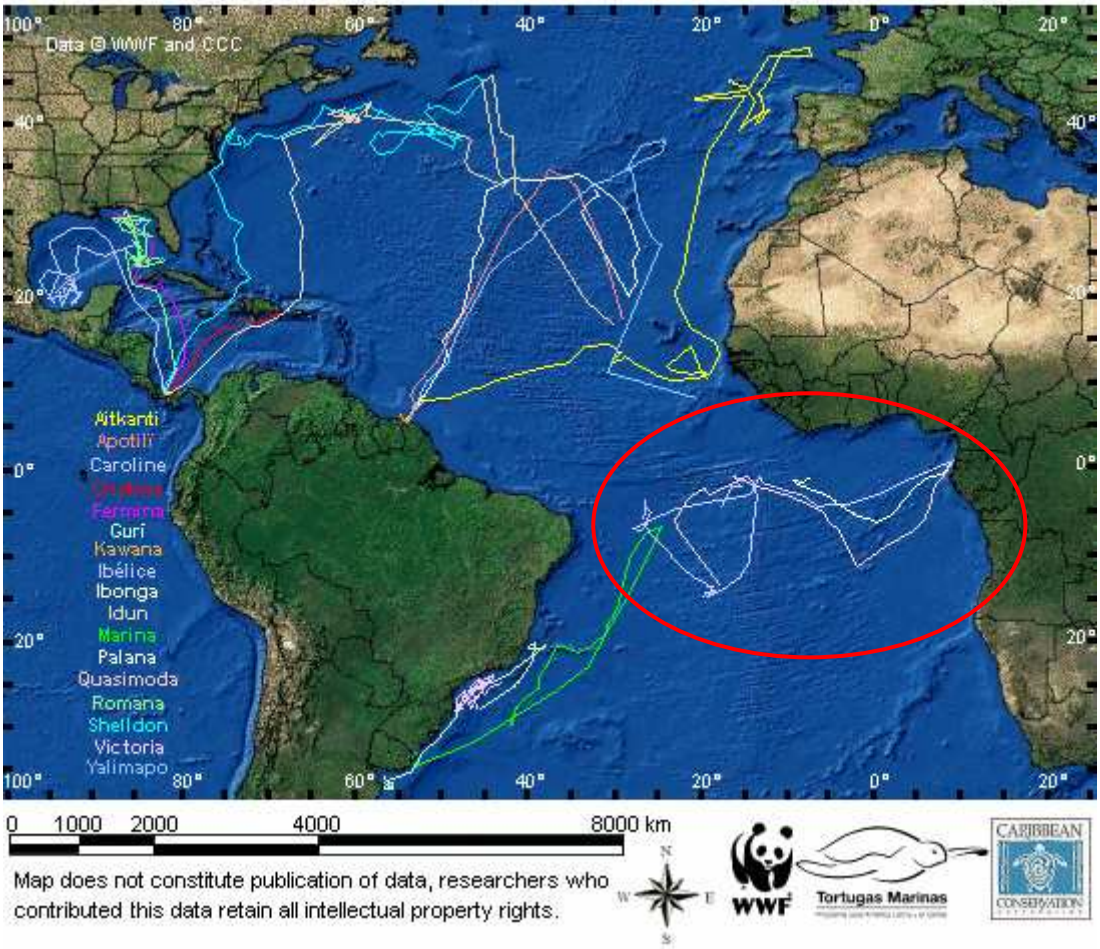


Figure 13:.Leatherback migration in the Atlantic Ocean (copied from www.panda.org), turtles tagged in Gabon encircled in red

VII –Threats

Apart from the threats summoned above, this season outcome is positive concerning anthropological threats, as no nests have been victim of human predation in the research zone. This is certainly the result of five years of presence of a monitoring team on the beach. Their regular patrols must have dissuaded the possible poachers.
These results are also without any doubt due to the Ibonga's awareness raising efforts in Gamba and its surroundings.
Natural threats are meanly caused by the large amounts of crabs present on the nesting site, and the numerous logs. Seventy one cases have been recorded were logs had an impact on the nesting of females or on the juveniles.

The various sorts of waste coming from the sea or the continent are also a menace to the nesting turtles, wounding the turtle and making it sometimes entirely impossible to nest. The cleaning operation has always taken place during the last two weeks of the season using plastic bags and scales to weigh the amount of waste collected on the nesting site. This activity is envisaged to be repeated at the beginning of the next season to provide a clean nesting area.

VIII - Discussion

The 2006-2007 season activities have been satisfactory despite of some setbacks such as delayed supply of certain equipment such as tags and pliers, and the difficulties some team members had to properly use some the equipment at the start.

Another aspect was the presence of numerous tourists in the beginning of the season unaware of the behaviour requested on this nesting beach. As a solution information panels were erected on the beach and brochures were distributed in large numbers.

It has also been noted that certain data collection procedures as proscribed by the National Marine Turtle Partnership, have proven difficult to realize in the field, such as the creation of a photo reference for every turtle.
It also appears that the training on biological sampling has been insufficient. In fact, the training on the issue had not been well apprehended or had been incomplete for the research assistants. The late arrival (end of January) of the technical coordinator and the low numbers of turtles encountered during the patrols between February and March (only 30 percent encounter rate) made that only 36 individuals have been sampled.

The weekly patrols executed at the beginning of the season have been interrupted at an early stage due to multiple mechanical problems with the quad, making it impossible to cover the 75 km stretch of beach between Sette Cama in the North and Mayonami in the South. As this problem persisted till the end of the season, no weekly data has been collected.
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Multiple signs of poaching of turtle nests near the village of Sette Cama 40 km north of Gamba might be the consequence of these unfortunate circumstances. This information revealed by the local population, implies the necessity of a second turtle camp in the area, not only for protection, but also to be able to increase the value of marine turtles as a tourist product. As the village is situated just south of the Loango National Park, it is highly implicated in tourism related activities, but the lack of adequate facilities leaves the demand by tourists to observe these rare reptiles unfulfilled.

IX - Conclusion

Ibonga's marine turtle monitoring programme contributes to the process to develop and implement sustainable natural resource management in the Gamba Complex of Protected Areas. It also follows the objectives to protect marine turtle species on national, as well as regional and international level

To attain the results implied by the monitoring and research objectives as agreed with its partners (RAPAC, WWF, UICN, PROTOMAC, the National Turtle Partnership), the NGO Ibonga carried out daily activities on 5750 m of prioritized coast near Gamba.

After five years of monitoring (2002-2007) the results of this programme show that after a decrease in the leatherback nesting population for three years, the population increased during the fourth season to 860 on 5,75km. That year the leatherback population nesting on the coast of the Gamba Complex (200 km) was estimated at 2500 individuals. This year more than 600 turtles have been recorded on the Gamba beach. These results could confirm two theories: the monitoring period corresponds with the final stage of the olive ridley nesting season, and the weekly nesting fluctuations of the different turtle species follow an identical scheme every year.
On the other hand, 71 nests were influenced by the washed up logs on the beach. Thoughts have been expressed to investigate the possible failure of 70% of the observed nests imposed by the geodynamics caused by the high tides often reaching the vegetation. It is envisaged to mark and monitor the nests again, as has been done during the 2005-2006 season, to enable to quantify the real consequences of this phenomenon.