MINISTERE DE L'ECONOMIE
FORESTIERE ET DE L'ENVIRONNEMENT

REPUBLIQUE DU CONGO
Unité-Travail-Progrès

Wildlife Conservation Society (WCS)
Projet Parc National de Conkouati-Douli (PNCD)

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Base du Projet
Conkouati
Département du Kouilou, Congo

Rapport d'activités

Volet Recherches Ecologiques

PHASE VII : 1er Janvier 2008 - 30 Juin 2008

Rédigé par

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Financé par :

INTRODUCTION

La gestion efficace et durable d'une aire protégée passe avant tous à la maîtrise de ces différents écosystèmes, leur fonctionnement qui dépend largement de l'abondance et distribution des animaux qui l'occupent. Des recherches systématiques sont menées pour suivre la dynamique écologique du PNCD.

OBJECTIFS SPECIFIQUES

- Résultats des recensements des tortues marines, saison 2007-08 ;
- Relancer les recensements halieutiques sur les lacs et lagunes;
- Préparations et commencement du recensement des grands mammifères / impacts humaines

RESULTATS

Objectifs réalisés

- Résultats des recensements des tortues marines, saison 2007-08 ;

La compagne des tortues marines a été lancée depuis le 1er novembre 2007. Des travaux préalables ont précédé cette compagne, notamment : Le comptage des échouages, le balisage de la plage ainsi que la formation des techniciens de recensement (KUDU/PROTOMAC). Contrairement a l'année passée ou nous avions 4 sites recensés, et malgré les multiples problèmes financiers rencontrés, la compagne des tortues marines a connu cette année un succès avec la création d'un nouveau site à Longo Bondi couvrant ainsi 47 Km sur les 57 km de plages du PNCD. Notons aussi la mise en place d'une équipe composée uniquement des femmes. La méthodologie adoptée est aussi utilisé par plusieurs sites au Gabon et par l'ONG RENATURA-Congo. Les données collectées sont : Le comptage des nids, le comptage des échouages, l'identification des femelles en ponte (marquage) et le suivi des nids. Cinq équipes de 4 personnes sont logé dans des cabanes sur les plages pour toute la durée de la saison de ponte des tortues marines entre Octobre 2007 et Avril 2008. Les équipes collectent ces données sur 5 différents tronçons de plage d'environs 10km. Le chef de volet passe régulièrement sur les différents sites pour suive les travaux et pour récupérer les données. A fur et à mesure les données sont saisie sur ordinateur afin de pouvoir analyses les résultats pour la saison. Chaque année un rapport est rédigé. Le rapport finale pour la saison 2007-2008 (version Anglais) ce trouve en Annexe.

- Relancer les recensements halieutiques sur les lacs et lagunes;

La lagune Conkouati et les lacs Tchibinda, Tchivoka, Tchimpa, Manzimanouvou, ainsi que les cours d'eau de Ngongo, Louvanzi et de nombreux tributaires de ces plans d'eau renferment des différentes espèces de poissons. Une halieutique systématique qui couvre principalement un suivie des captures de pêche de deux pêcheurs sur chaque grand corps d'eau, ainsi que le suivie des activités des lamantins sur 4 sites, avait été lancée en Janvier 2006 mais suite a un délai de

versement des fonds CAWHFI/ UNF et une réduction important dans les fonds CARPE, ces activités avaient été arrêté. En Janvier 2008, les recensements halieutiques ont repris.

Pour ces recensements, toutes les captures sont suivies de 2 pêcheurs sur chaque lac ainsi que 2 pêcheurs sur la haute Conkouati et le bas Conkouati. Chaque poisson capture est identifié, mesuré et pesé. Des espèces ne pas encore identifiées sont prélevées et identifié. Les mensurations des filets utilisés sont aussi notées pour permettre de convertir le taux de capture par m2 de filet.

Les mensurations des poissons permettent de connaître le nombre et grandeur moyen des poissons capturés par espèce par m2 de filet, dans chaque corps d'eaux et par mois. Cela permet de comparer les corps d'eaux en termes de présence de poissons par espèce, et la pression de pêche. Il s'ajoute a cela que la relation entre la longueur et le poids d'un poisson est un indicateur des conditions corporelles. Entre deux poissons de la même longueur, celle qui pèse le plus sera en meilleure condition physique. Les mensurations de poids permettent aussi d'identifier les mois dans lequel les femelles portent des œufs car elles pèsent alors beaucoup plus.

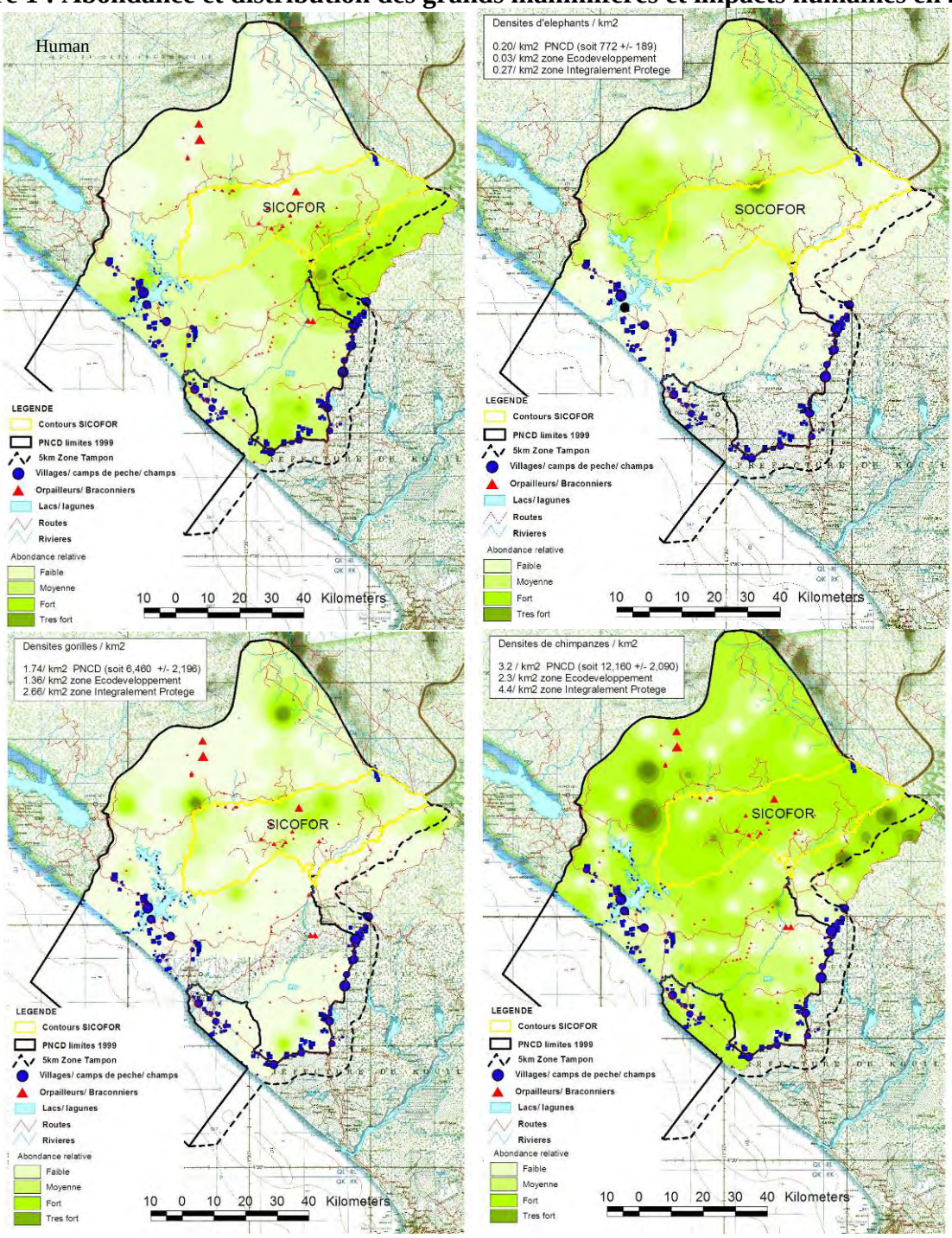
Les données sont saisies en Excel et les analyses seront après 1 ans de suivie. Les données seront aussi comparer avec ceux de 2006 pour les mois recensées afin de pouvoir identifier de fluctuations d'abondance ou dans la distribution des espèces de poissons et la pression de pêche sur 2 ans. Ces infos seront utilisé pour aider a prendre des décisions d'aménagement de la pêche (i.e. définir de règles, efforts de sensibilisation, réduction des problèmes de pression). La plupart des populations locales vivent de la pêche et les interventions afin de réduire la surpêche et changer les méthodes de pêche destructive sont délicates. Ainsi il est très important de bien scinder les problèmes et maitriser la situation réelle avant d'intervenir.

- Préparations et commencement du recensement des grands mammifères / impacts humaines

Un recensement total a été mené en 2005 dans le but de connaître, comprendre et mieux pouvoir gérer et protéger les différents écosystèmes. Le recensement nous a permis d'établir l'abondance et la distribution des grands mammifères, ainsi que l'ampleur de l'impact humain sur ces ressources (Fig 1). Ce recensement est répété en 2008 afin de localiser les changements d'abondances et distributions des grands mammifères et d'impacts humaines.

Ces résultats aident fortement a la planification des missions de patrouilles en foret afin d'être plus efficace à gérer la pression humaine et a protéger les animaux sur les sites de hautes concentrations. Ces résultats aident aussi a développer un zoning qui inclus les zones a forte abondance animale dans la zone de protection intégrale, et les zones a haute pression humaine dans la zone Ecodéveloppement.

Figure 1 : Abondance et distribution des grands mammifères et impacts humaines en 2005



Sept équipes ont été lancées sur le terrain pour le recensement de 2008 qui a débuté le 01 Juin 2008. Tous les éléments dans les équipes ont déjà participé dans des recensements similaires et la majorité des éléments étaient présent dans le recensement identique de fin 2005. Afin de rafraichir les mémoires la Directrice WCS/ PNCD, Dr Hilde Vanleeuwe, a donnée une petite formation contenant les informations comme suite :

Les animaux et les humains sont mobile et bougerons selon les pressions et l'abondance de nourriture (fructifications des espèces d'arbres). Certaines espèces ont des plus grands terroirs que d'autres. Un éléphant peut migrer des milliers de kilomètres pour trouver de la nourriture cependant que les gorilles ont la tendance de rester dans des territoires plus petits. Certains espèces sont territoriales et n'acceptent et ne partagent donc pas leurs territoires avec d'autres groupes ou individus, comme les groupes de chimpanzés et les léopards, et d'autres espèces partagent facilement leur habitat avec d'autres groupes comme les éléphants.

Pour les recensements totale on ce focalise surtout sur les signes des animaux clefs, ce qui sont les animaux qui jouent un rôle important sur leur environnement et/ ou qui risquent de disparaitre de la planète sans protection. L'éléphant de foret est une animale clef parce qu'il est le plus grand disséminateur (a travers le dépôt des crottes desquelles les graines germinent) des plantes en foret (Fig 2).

Figure 2 : Une crotte d'éléphants

Un éléphant dépose environs 17 crottes par jour et si 1 graine dans chaque crotte survie, un groupe de 10 éléphants, plante 170 arbres par jour, soit 62,050 arbres par année. Pour un pays comme le Congo, ou le bois est exploitées en grands quantités, l'éléphant est une espèce clef non seulement pour la régénération de l'environnement pour d'autres animaux, mais aussi pour l'homme, pour des raisons économiques du pays. Les chimpanzés et les gorilles sont après les éléphants, la deuxième et troisième espèce le plus important dans les régénérations des forets. Les éléphants sont chassé pour leur ivoire et les gorilles et chimpanzés pour leur cher et leurs os. Sur beaucoup de sites non protégés, ces animaux ont été exterminés.

Les abondances et la distribution des animaux ainsi que celle des humains peuvent donc changer avec le temps. Pour identifier des changements et de réadapter les efforts de conservation et de protection, il est important de répéter les recensements pour comparer les résultats avec les années antérieures. En vu des changements de comportement des animaux suivant les saisons, les recensements ce font toujours à la fin des saisons, afin que toute les signes rencontré durant le recensement soient déposé dans même saison. Pour pouvoir faire une bonne comparaison entre 2008 et 2005, la même méthode est utilisé entre saisons et entres années.

Le design du recensement systématique pour le PNCD a été développé pour le PNCD par la Directrice WCS du PNCD Hilde Vanleeuwe ensemble avec l'expert des systèmes de recensements WCS/ LLP Samantha Strindberg en 2005. La méthode utilisée est celle des Transects. Un transect est un layon droit le long lequel toutes signes animales et humaines sont recensé, en mesurant la distance des signes animales et/ ou humains (crottes, empreints, pistes, nids, douille piège, campement,…) le long du layon et la distance perpendiculaire entre le signe et le layon (Fig 3).

Figure 3 : Les mesures de distances a prendre pour un group de nids le long du layon

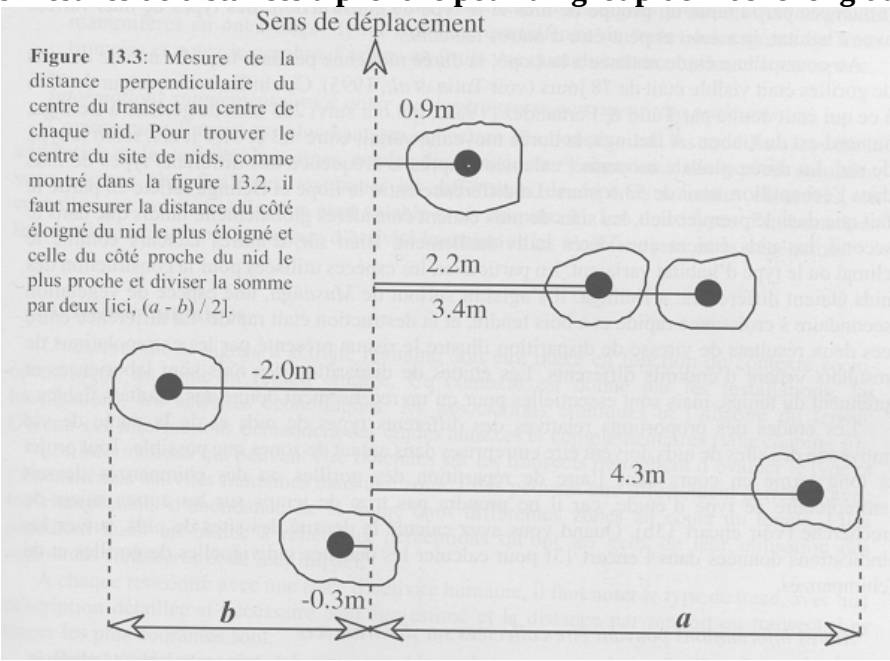


Figure 13.3: Mesure de la distance perpendiculaire du centre du transect au centre de chaque nid. Pour trouver le centre du site de nids, comme montré dans la figure 13.2, il faut mesurer la distance du côté éloigné du nid le plus éloigné et celle du côté proche du nid le plus proche et diviser la somme par deux [ici, $(a - b) / 2$].

Le taux des mesures de distance perpendiculaire entre les signes et le centre du layon permet de calculer la distance perpendiculaire moyenne, ainsi que la probabilité de détection g(x) qui dépend de la visibilité sur le terrain et les observateurs.

La surface recensée à travers les layons recensés n'est qu'une portion minuscule de la totalité de la surface. Par exemple, si sur une surface de 100km2, un taux de vingt crottes ont été observé sur dix layons de longueur de 1000m et de largeur de 10m de largeur (supposant une visibilité de 5m de chaque coté) largeur, on supposera qu'il y a 20 crottes par km2. Supposant qu'un éléphant dépose en moyenne 20 crottes par jour, cela correspond à 1 éléphant par Km2, soit 100 éléphants

sur 100Km2. Les logicielles développé a faire les cartes de distribution comparent le taux des signes recensé sur un transect vis-à-vis le taux des signes recensé sur les transects voisins.

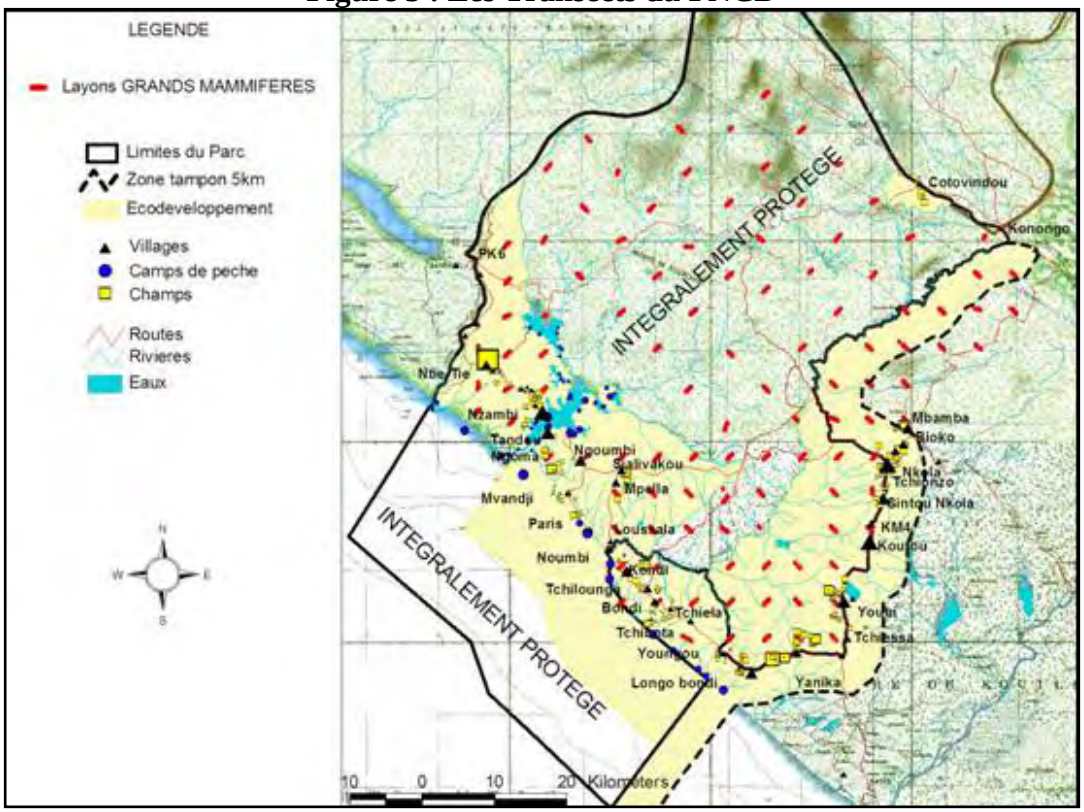
Les résultats pour toute la surface sont donc extrapolé des données récoltés sur les layons et il est important d'être très méticuleux dans la collecte des données sur ces layons afin d'éviter les résultats biaisés. Si un layon ou transect suit un sentier animal ou humain on trouvera évidemment beaucoup plus de signes que si on suit un layon droit qui est posé aléatoire sur le terrain. Afin de ne pas surestimer la population des animaux, il est ainsi très important d'assurer que les transects soient droit. Ainsi on n'utilise pas des transects plus longue que 1000metres car déjà il n'est pas toujours évident de tenir un layon droit sur le terrain (Fig 4).

Figure 4 : La réalité du terrain

Le nombre de transect posé sur une surface dépend des taux de rencontre des signes. Il faut au moins 60 enregistrements de signes d'une même espèce pour avoir faire une analyse correcte pour cet espèce. Pour obtenir assez d'enregistrements de signes par espèce dans les zones ou les animaux ne sont pas abondant (comme dans la zone ecodeveloppement ou la pression humain est élevé) il faut donc plus de transects que dans les zones moins perturbé par l'homme et les animaux sont ainsi plus commun. Pour le PNCD, le recensement systématique a été développé basé sur des informations de taux de rencontres des signes animales dans la zone écodéveloppement et la zone intégralement protégé. La concentration des layons sur la surface

de l zone écodéveloppement est donc plus forte (5km intervalles entre layons) que la concentration des layons dans la zone intégralement protégé (Fig 5). Utilisant une carte avec grille superposé de 5km des layons de 1km en longueur sont pose sur toute la superficie terrestre du PNCD (Fig 5).

Figure 5 : Les Transects du PNCD



Dans une situation idéale on propose d'avoir des équipes de 5 personnes, notamment 1 macheteur en tête, suivie par 1 observateur qui focalise son attention sur le coté gauche du layon, 1 observateur qui ce concentre sur le coté droite, suivie par 1 personne en charge du boussole (pour guider le macheteur) et un mètre métallique pour mesurer la distance perpendiculaire entre les signes et le layon, suivie par le Chef d'équipe qui note tout et qui porte le topofil (un outil qui mesure la distance le long du layon). En cas de manque d'équipes de 4 personnes, les observateurs eux-mêmes mesurent la distance perpendiculaire et le chef d'équipe guide aussi le macheteur.

Pour le recensement de 2008, chaque équipe de 4 sera pourvu d'équipement de terrain et des rations, d'un petit budget pour imprévus, d'équipement de recherche (topofil, bobines de fil de topofil, 2 boussoles, un GPS, un cahier de collecte de données.

Les données collectes se représentent comme suite :

RECENSEMENT GRANDS MAMMIFERE, 2008

Date: 01/07/2008
Chef d'équipe: Richard Boumba
Macheteur: Alfred Mavoungou
Observateur 1: Fulgence Loemba
Observateur 2 : Baka Fabrice

Transect ID	Lat	Long	Esp	sign	Age	Nbr	Dist	Dist Perp	Veg	Commentaires
R_010708_T01d	800300	9569700	Ele	Crotte	V	1	68	213	FD	
			Gor	Nid	F	4	344	-23	FM	
			Gor	Nid	F		367	-156	FM	
			Gor	Nid	F		372	-768	FM	
			Gor	Nid	F		380	97	FM	
	800766	9569999	Hom	Camp	R	1	567	47	FD	Camps braconniers/ detruit

CLEF :

- Transect ID : Code unique pour identifier le layon (ex. R_010708_T01d) ; Richard_date_Transect01_début) ;
- Latitude : Latitude du début et fin du transect, ainsi que pour des évènements particulier (ex. campement de braconniers) ;
- Longitude : Longitude du début et fin du transect, ainsi que pour des évènements particulier (ex. campement de braconniers) ;
- Esp : premiers 3 lettres de l'espèce à qui le signe appartient (Homme, Eléphant, Buffle, Sitatunga, Gorille, Chimpanzé, Panthères, Potamochere, Guib, Kob, Mandrille,…) ;
- Sign : type de signe observe (coupe, empreint, crotte, nid, camp, douille, vu, entendu, piste, champ, carcasse, …) ;
- Age : Age du signe : Vieux (V) ; Récent (R) ; Frais (F) ;
- Nbr : Nombres de signes ou groupe ;
- Dist : La distance le long des transects en mètres, mesuré avec le topofil ;
- Dist Perp : Distance perpendiculaire du centre d'un signe au transect. En cas d'un groupe de signes qui ce trouvent sur deux cotés du transect comme des nids de gorilles dans l'exemple ci-dessous, prier de utiliser un moins (-) pour indiquer la gauche du transect et un plus (+) pour indiquer la droite du transect ;
- Veg : Végétation : Foret Dense (FD) ; Foret Ouvert (FO) ; Foret Marécageuse (FM) ; Savane (S) ;
- Commentaire : pour toutes infos supplémentaires

Participants à la Formation et recensement 2008

NOM	Position	Profession/ Village
Abdon BITSINDOU	Chef d'équipe	Chef Volet Ecologique PNCD
Tibau NIASSI	element	Youbi (4 missions)
Armel Brice TATY	element	Yanika (4 missions)
Olivier DOUMBA	element	Youngou (4 missions)
Marcelin MBOUMBA	Chef d'équipe	Ntie-Tie/ ass. rech. recens 2005 (4 missions)
Edgard MAKOSSO	element	Cotovindou (4 missions)
Landry POITY	element	Nzambi (4 missions)
Claude LOEMBA	element	Ntie-Tie (4 missions)
Richard MBOUMBA	Chef d'équipe	Ntie-Tie/ ass. rech. perman PNCD (4 missions)
Brice MABIALA	element	Tandou Ngoma (4 missions)
Ange Patrick NZINGA	element	Nzambi (4 missions)
Francis BAKA	element	Tandou Ngoma (4 missions)
Justin THONIO	Chef d'équipe	Ngoumbi/ ass. rech. perman PNCD (4 missions)
Jean MAVOUNGOU	element	Ngoumbi (4 missions)
Jacques BOUANGA	element	Sialivakou (4 missions)
Dieu-Donnée KANDA	element	Ngoumbi (4 missions)
Apollinaire MAKOSSO	Chef d'équipe	Ntie-Tie / Ecogarde PNCD (2 missions)
François MAVOUNGOU	Chef d'équipe	Ntie-Tie / Ecogarde PNCD (1 mission)
Blanchard MAKAYA	Chef d'équipe	Cotovindou / Ecogarde PNCD (3 missions)
Faustin TCHIBINDA	Chef d'équipe	Nzambi / Ecogarde PNCD (3 missions)
Roger NGUIMBI	element	Nkola/ Ecogarde PNCD (2 missions)
Itoua NGAMBE	element	Madingo-K/ Ecogarde PNCD (2 missions)
Apollinaire BOUKOU	element	Mbamba/ Ecogarde PNCD (2 missions)
Gislain KOUMBA	element	Mpella/ Ecogarde PNCD (2 missions)
Souami MABIALA	element	Tandou Ngoma/ Ecogarde PNCD (2 missions)
Havy MAVOUNGOU	element	Ngoumbi/ Ecogarde PNCD (2 missions)
Fulgence LOEMBA	element	Ntie-Tie/ Ecogarde PNCD (2 missions)
Nombo BOSSIS	element	Koutou/ Ecogarde PNCD (2 mission)
Alfred LOEMBA	element	Paris/ Ecogarde PNCD (2 mission)
Christian TCHIAMA	element	Tchilounga/ Ecogarde PNCD (1 mission)
Josie MABINDOULA	element	Cotovindou/ Ecogarde PNCD (1 mission)
Aubin MALALOU	element	Bondi/ Ecogarde PNCD (1 mission)
Tchicaya BOTEQUIN	element	Madingo K/ Ecogarde PNCD (1 mission)
Idrice TCHIMBOUNGOU	element	Cotovindou/ Ecogarde PNCD (1 mission)
Jean-Parfait BATCHI	element	Mvandji/ Ecogarde PNCD (1 mission)

ANNEXE I : PHASE VII

F ERE DE L'ECONOMIE
ET DE L'ENVIRONNEMENT

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Base du Projet
Conkouati
Département du Kouilou, Congo

FINAL REPORT

Marine turtle season 2007-2008

Conkouati-Douli National Park, Republic of Congo.

For
USFWS Marine Turtle Conservation Fund

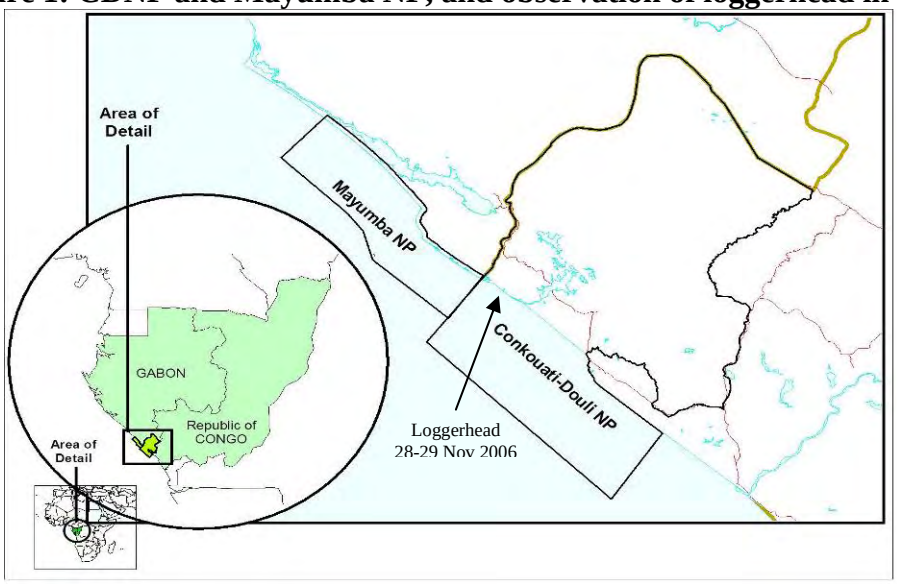
ByHilde Vanleeuwe and Abdon Bitsindou

May 2008

ABSTRACT

Conkouati-Douli National Park (CDNP) spans 60km of Congo's 170km coastline. The CDNP beach is used by 5 integrally protected species of marine turtles: Olive Ridley (*Lepidochelys olivacea),* leatherback (*Dermochelys coriacea*), green turtle (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*) and loggerhead (*Caretta caretta*). For the first-time in CNDP, a female loggerhead wearing a Monel tag (number KUD 13645) on its anterior left flipper was recorded and photographed (Bal et al. 2007; Fig 1) on the night of 28-29 November 2006. The CDNP borders Mayumba National Park in Gabon and the beaches are considered amongst the most important in the world for nesting leatherback and Olive Ridley turtles.

Figure 1: CDNP and Mayumba NP, and observation of loggerhead in 2006



At CDNP, the difference between monitored and non-monitored beaches is significant. Monitored beaches suffer a 10% combined nest and turtle poaching rate. Unmonitored beaches suffer almost 100% poaching of nesting turtles and their eggs. Other notable causes of death are accidental catches in artisanal fishnets and completely unregulated catches by Chinese commercial trawlers. Marine turtle monitoring at CDNP started in 2001 and the length of beach monitored annually varies between 20km and 40km, depending upon available finances. With financial support from USFWS-MTCF for the 2007-2008 season, combined with in-kind WCS support, the turtle teams were able to monitor 50km of CDNP's beaches. CDNP hopes to raise sufficient funds to allow monitoring of the entire 60km beachfront in the coming 2008-2009 nesting season.

The abundance of nesting turtles on the CDNP beaches varies greatly between years. The causes of these strong fluctuations are unknown. Compared to previous years, marine turtle nesting abundance was lower for the 2007-2008 seasons. As in previous years, this seems to be a general tendency for the Gulf of Guinea. In this report, we show the number of tracks, turtles, carcasses and hatched nests monitored for different species of marine turtles on different sections of CDNP beach, and we plot these results against results from previous years to illustrate annual

fluctuations. As in all previous years, Olive Ridleys and leatherbacks are proportionally most represented, and the 10km beach that is adjacent to Mayumba National Park in Gabon is found to represent the most important nesting beach at CDNP.

1. INTRODUCTION

The coastline of Congo is approximately 170km in length. It is used for nesting by at least 5 species of marine turtles. Fifty seven kilometers of this coastline lies within the Conkouati Douli National Park (CDNP). However survival of nesting turtles within the CNDP depends entirely on the presence of monitoring teams. General poverty, economical instability, and corruption tend to override any conservation sentiment. People are in general very poor, and hunting and selling of wildlife and wildlife products are a traditional means to earn money. Turtles nesting on beaches that are not monitored are likely to be poached and their nests raided for eggs. Annual funding for the deployment of monitoring teams on nesting beaches varies and the USFWS – MTCF has been, by far, the most important donor for marine turtle monitoring and protection at CDNP. In 2006-07 and 2007-08, USFWS – MTCF, together with in-kind WCS support, was the only source of financing turtle research and protection at CDNP.

In 2001-02 and 2002-03, a standard 27km section of beach was monitored and protected and over 1000 marine turtles were observed per annum. In 2003, WCS withdrew from CDNP in protest over the involvement of local officials in bushmeat traffic and sabotaging of anti-poaching efforts. As a result, no beaches were monitored during the 2003-04 season. WCS returned to CDNP after a government intervention restored Park authority. The same 27km beach was monitored in 2003-04 but only around 100 marine turtles were observed that year, a reduction of 90% to the 2002-03 season. Although natural cycles can cause important variations in observed numbers of nesting turtles between years, marine turtle numbers have recovered to even 50% of the number recorded during 2001 and 2002, and suggest that something drastic happened in the interim. As human predation on turtles and turtle eggs is close to 100% on beaches that are not monitored, a lack of funds to deploy teams on the beach has a serious impact on nesting marine turtle populations. In 2005-06, an additional beach cabin was built and 10 additional kilometers of beach were monitored and protected. In the subsequent 2006-07 season, an unanticipated reduction in funds from a major donor resulted in a complete lack of funds for marine turtle monitoring in 2006-07. An emergency fund provided by USFWS-MTCF, combined with the posting of permanent WCS-CDNP staff on the beaches allowed to protect 20km. In 2007-08, a 5th beach cabin was built and for the first time, 47km of beach were monitored and protected as a result of USFWS-MTCF finances combined with WCS-CDNP in-kind support.

Five teams were deployed in 2007-08 with instructions to monitor approximately 10km of beach. These teams comprised of 25 people whom are selected and recruited from local communities. This local hiring has made the activity popular, and competition for selection is fierce. Every year a test is devised for people wishing to participate in marine turtle research at CDNP and only the best are retained. Applicants make a serious effort. Every year young people from the village who have not yet participated in monitoring efforts or prior selection tests are welcomed and compete with a fair chance of being selected. This system of annual recruitment is excellent for the motivation of young people in the villages and allows the best (and most motivated) to

stand out. It also clearly increases the number of people from the villages that are trained in turtle conservation and awareness. This system works well if there are finances to assure it. When funding is absent or reduced, the same villagers that count on the six months of turtle monitoring revenue may engage in poaching of the resource that they would otherwise protect.

In addition to turtle monitoring, CDNP, since 2005, has adopted a turtle release scheme originally devised by Renatura, an NGO that operates on beaches outside of CDNP. The scheme aims to release marine turtles from fishnets in exchange for bobbins of nylon and the services of a fishing net mender. At CDNP there are no known turtle feeding sites, and there are fewer fishermen than outside CDNP. During the turtle nesting period, turtles cause considerable damage to fishing nets while swimming towards the shore, and local fishermen will kill captured turtles to sell their meat in order to cover the costs of fishing net repairs. The release scheme at CDNP is appreciated by local fishermen. When they kill the turtle that was caught accidentally, they need to transport the meat to the nearby city of Pointe Noire and in doing so risk of being caught by Park ecoguards. This direct exchange promoting turtle release is therefore to their advantage and quite successful. The turtle release scheme on beaches around Pointe Noire assumes very different dimensions because of the presence of two very important marine turtle feeding sites (Loango Baie and Pointe Indienne). There are also many fishermen operating close to the city. Annual turtle releases at CDNP remain below 50 cases per year, whereas several thousand turtles are released from nets and saved annually at the feeding sites around Pointe Noire by Renatura. The number of turtles released by this small and woefully under-funded NGO depends entirely on the level of funding raised.

2. METHODS

Since 2005, turtle monitors at CNDP have used monitoring sheets devised by the NGO KUDU/ Protomac. Use of these sheets allows standardization of data collection methods with other sites in Gabon, including other Wildlife Conservation Society turtle projects. Data collected includes the identifying and measuring of turtle tracks, counting live and dead marine turtles, and the monitoring of turtle nests and nest predation. Marine turtles are tagged using tagging gear provided by KUDU/ Protomac. All data is entered on the standardized KUDU/ Protomac data sheets and data is collected from the field sites once per month by a WCS-CDNP researcher charged with supervision of biological research (A. Bitsindou). He remains for a few days with each of the teams and provides necessary supervision and advice where needed. The same researcher enters all data into Excel and copies are sent to KUDU/ Protomac. At CDNP the data is used for annual analyses of marine turtle frequencies on different beaches for different species for comparison between years. KUDU/ Protomac is responsible for comparative analysis on a regional basis.

The 2007-08 season began on the 1st of November 2007. Team leaders started on October the 15th in order to help with pre-season preparations. Although we had intended to keep teams on the beaches until April 15th, the season ended on April 1st due to the substantial change in the dollar to CFA exchange rate that massively reduced our budget (CFA500:$1 to CFA450:$1).

2.1. Pre-season preparations

One month before monitoring starts the selection procedure for research assistants begins. Assistants who have participated in previous years are required to sit for a test and new applicants are interviewed. Generally, 70% of the assistants who participated in previous years are retained. Applicants from prior years showing insufficient motivation are eliminated from consideration and thus other applicants (typically younger applicants) have a fair chance of becoming marine turtle research assistants. The recruited assistants are then trained to identify turtles, tracks and nests, and also how to tag turtles. Laminated guides are provided to help the identification process (ANNEXE 1).

The turtle team selection tests attracted over 100 candidates from 10 different villages along the coast. About 50% of the assistants from previous years succeeded in the written test well enough to be retained. Another 50% (12 people) were newly recruited and trained. For the first time 5 women were selected to makeup a women-only team. If a 6th team will be composed for the 2008-09 season and sufficient women show up for the selection tests, a second womans' team may be composed.

For the 2007-08 season a 5th beach cabin was built at the extreme southern end of CDNP. It was decided that the impact of this cabin would be optimized if it was built at this location (Longobondi). If yet another cabin can be built prior to the 2008-09 season, accommodation would be provided for turtle teams along the entire shoreline of CDNP. Beach cabins are built from local materials and consist of a main building with bedrooms, and a separated sheltered kitchen/ sitting area. Every year the existing beach cabins are repaired (replacement of roofing thatch and metal hinges, etc).

Every year the monitored beaches are provided with simple signposts placed every 50m to help the research assistants locate events. The sign post are nothing more than sticks of which the end is flagged with weather resistant tape on which the distance is written with a marker pen. This process is called "*balisage*".

Figure 2: Training of team leaders by Angela Formia

Team leaders started 2 weeks earlier than the other team members to do the preparation work on the beaches (prepare/restore cabins, complete the balisage). Dr. Angela Formia, the Regional Coordinator for marine turtle work in central Africa visited the team leaders in October and provided valuable training (Fig 2). The other team members arrived at the end of October for a theoretical training, followed by a practical training, followed by the immediate start of monitoring for the season.

2.2. Recording dead turtles

During the balisage in mid October 2007, marine turtle carcasses are counted. During the season, dead turtles that strand are also recorded.

2.3. Identifying and tagging turtles

If a nesting turtle is seen, she is identified and measurements of her carapace and her head are taken. If she carries tags on her flippers, the codes are noted and if not yet tagged, she is tagged. Special metal tags and tag pliers are provided by KUDU/ Protomac for Olive Ridley and Leatherback turtles. Tags and pliers are sanitized with rubbing alcohol to reduce risk of infections. For Olive Ridley turtles, 2 tags are attached on the front flippers where they move least whilst swimming. For Leatherback turtles 2 tags are attached to the hind flippers. It is known that turtles come to the beach several times in one season to lay eggs. The tag codes help to determine the extent of beach turtles cover each season. A turtle that is identified twice (ID via tag code) is said to be re-captured.

2.4. Turtle tracks and nest monitoring

Each ten kilometer section of beach is walked in its entirety twice per night; once after sunset and once after midnight. All tracks of turtles are measured and identified by their width and the diagonal traces (symmetric or asymmetric) left by the forward flippers.

When turtles are observed or tracks are found, nests are often located as well. Nest sites are marked and monitored. Although the permanent presence of research assistants on the beaches discourages poaching, a large portion of eggs never hatch because of predation by other wildlife, mainly by crabs, monitor lizards and mongooses, and a portion are also poached by people. In the case of animal predation, typically only part of the nest is destroyed. People will typically remove nests in their entirety. This being said, the eggs of nests that have been predated upon by animals, often never hatch. At every passage of research assistants by a nest, the nest condition is noted. In case of observing the hatching, the number of hatchlings are counted as well as the number of non-viable eggs. If nest sites that are considered at risk from the tide or to close to lagoon outlets they are transplanted by the turtle teams to sites near the turtle cabins. Care is taken not to do this when it is relatively cool, and due care and attention is paid to the position of transplanted eggs.

2.5. Fishnet repair in exchange for turtle release

Following the 2005 turtle release initiative of RENATURA, a first test of the methodology was attempted at CDNP during in 2005-06. This scheme covers the costs of fishing net repairs for fishermen who voluntarily release marine turtles from their nets. The release scheme has a low cost and is quite efficient. The scheme has been retained ever since. Traffic of turtle meat has become very difficult at CDNP with the installation of permanent control posts along the beach and the road. Because of this, many fishermen now prefer to release the turtle in return for fishing net nylon and the costs of net repair covered by the Park. Bobbins of fishing net nylon are made available at the turtle cabins and the monitoring team leaders are responsible for checking

the net damage, estimating the damage and allocating the appropriate number of rolls to the fishing net repair man. To avoid abuses of the system, an agreement is signed between each village and CDNP that identifies the person tasked with net repairs. Repairs are paid at the local fixed price per day. Repair time is factored at one roll of fishing net nylon per day.

3. RESULTS

For the first time, 47km of the CDNP beaches were monitored. Another first was the selection of 5 women to makeup a women-only team. They worked very hard and produced very good results. NB. In the results described below Leatherback turtles are occasionally referred to as "Dc", Olive Ridleys as "Lo", Green turtles as "Cm" and Loggerhead turtles as "Cc".

3.1. Recording dead turtles

Nineteen marine turtle carcasses were counted on the CDNP shoreline during the "balisage" period in mid October 2007, most of which were Olive Ridley (Tab 1).

Table 1: Turtle carcasses on 57km beach, Oct07

Sites	KM	Lo	Dc	Cm	Total
Niandji	10	2	2	0	**4**
Mvandji	10	2	1	1	**4**
Paris	7	1	0	0	**1**
Kondi	10	3	1	0	**4**
Bondi	10	1	1	1	**3**
Longobondi	10	2	1	0	**3**
TOTAL	**57**	**11**	**6**	**2**	**19**

For the remaining 5 months of the turtle nesting season, 578 live turtles and 38 carcasses were found on the 47km of monitored beaches. Of those, 25 were Olive Ridleys, 2 were leatherbacks, and 11 were green turtles. In proportion to the total number of live animals observed, dead animals included1% leatherbacks, 7% Olive Ridleys, but 50% for green turtles. Of the 38 carcasses 72% were beached turtles with little or no damage. In these cases mortality caused by trawlers is inferred because local people typically consume all the meat of turtles they poach. Looking at the ratio of dead:alive, most carcasses were found on Kondi beach (12%) and unlike the other sites most of those were from local human predation (Tab 2).

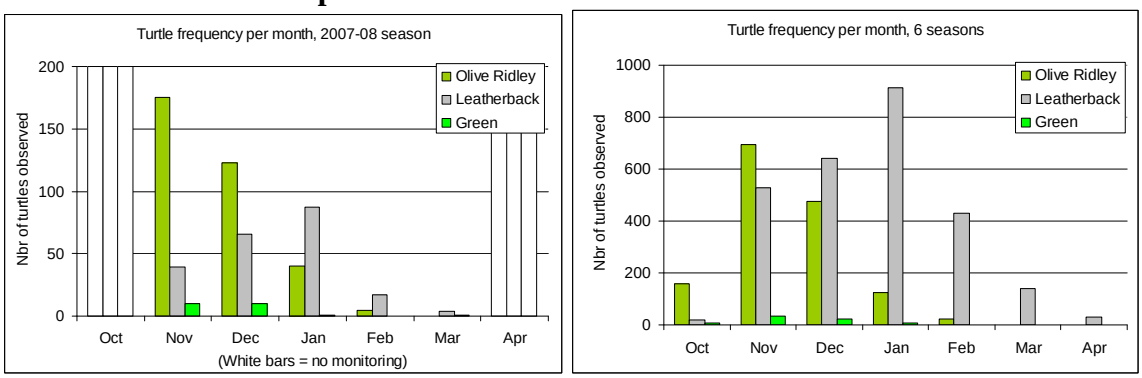
Table 2: Number of live and dead turtles between November 2007 and April 2008

2007-2008		Olive Ridley			Leatherback			Green			TOTAL		
Sites	Km	Alive	Dead	%dead	Alive	Dead	%dead	Alive	Dead	%dead	Alive	Dead	%dead
Niandji	10	111	6	5%	49	1	2%	9	0	0%	169	7	4%
Mvandji	10	47	4	9%	52	0	0%	3	2	67%	102	6	6%
Paris	7	63	2	3%	7	0	0%	4	3	75%	74	5	7%
Kondi	10	72	8	11%	53	1	2%	2	6	300%	127	15	12%
Longobondi	10	50	5	10%	52	0	0%	4	0	0%	106	5	5%
TOTAL	**47**	**343**	**25**	**7%**	**213**	**2**	**1%**	**22**	**11**	**50%**	**578**	**38**	**7%**

3.2. Identifying and tagging turtles

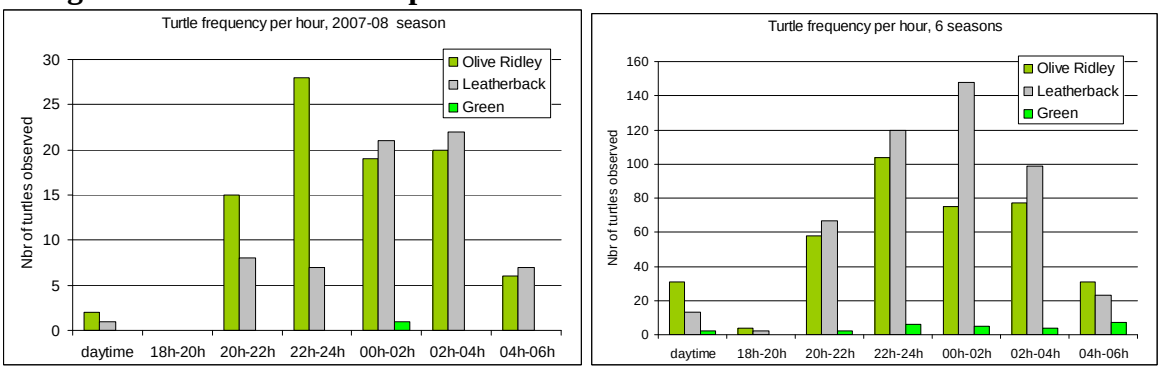
Direct observations allow establishing the months and the hours of night when different species are most commonly observed on different beaches, which is useful information for ecotourism. Slight differences were observed for different species, on different beaches and between years. The months of direct observations for the 3 most common species are shown for in Figure 3. The trend for 2007-08 follows the one of the 6 seasons combined, with November, followed by December as the peak months for Olive Ridley nesting and January followed by December as the peak months for Leatherback turtle nesting. November and December appear to be the best months for Green turtles (Fig 3).

Figure 3: Observed turtles per month for 2007-08 season and for 6 seasons combined



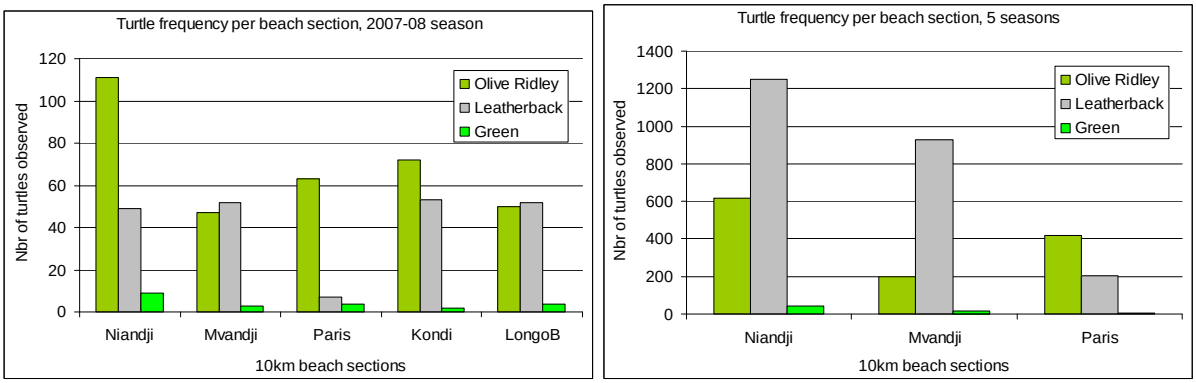
The peak hours to observe Olive Ridleys was between 22h00 and midnight both in the 2007-08 season and also for the 6 seasons combined (Fig 4). Most leatherbacks were observed between 02h00 and 04h00 at night during the 2007-08 season, although the peak hours for 6 seasons combined showed the time between midnight and 02h00 to be the best time to observe leatherbacks (Fig 4). The sample size of observed green turtles is too small to show trends.

Figure 4: Observed turtles per hour for 2007-08 season and 6 seasons combined



For the 2007-08 season, we found that Olive Ridleys were most common at Niandji, the most northern section of the 10km of beach that borders with Mayumba National Park in Gabon (Fig 5). Leatherbacks on the other hand were most commonly observed at Kondi, although the difference with Mvandji and Niandji is minimal (Fig 5). Most green turtles were observed at Niandji. All combined, Niandji remains the best beach for turtle observations (Fig 5).

Figure 5: Observed turtles per 10km beach section for 2007-08 and 5 seasons combined



3.3. Turtle tracks and nest monitoring

A total of 563 nests were monitored until their disappearance. Of those, 261 or 46% did not hatch, 179 or 32% hatched, 36 or 6% were predated by people and 87 or 15% were predated by animals (Tab 3).

Table 3: Monitored turtle nests, hatched and predated nests, 2007-0 season

2007-08		Turtle nests						Predated		%	% Predated	
Sites	**Km**	**Lo**	**Dc**	**Cm**	**Oth**	**Total**	**Hatch**	**Human**	**Animal**	**Hatch**	**Human**	**Animal**
Niandji	10	107	46	8	0	**161**	37	5	36	23%	3%	22%
Mvandji	10	46	51	3	3	**103**	28	6	28	27%	6%	27%
Paris	7	64	7	5	1	**77**	35	5	5	45%	6%	6%
Kondi	10	72	53	2	0	**127**	43	10	14	34%	8%	11%
Longobondi	10	45	46	4	0	**95**	36	10	4	38%	11%	4%
TOTAL	**47**	**334**	**203**	**22**	**4**	**563**	**179**	**36**	**87**	**32%**	**6%**	**15%**

Table 3 shows that the site *Paris* has the highest success rate of hatched nets (N=45%). In accordance to human density, also the percentage of human predation increases with distance from the Gabon border. Animal predation was lowest at Paris and in accordance the percentage of hatched nests was higher than at other sites. Animal predation is highest at *Mvandji* and *Niandji* where human density is lowest and animal densities highest. Where there are more animals, animal predation occurs more often and fewer nests hatch (Tab 3). Animals predating on nests at CDNP include mainly crabs, mongoose, and monitor lizards.

3.5. Fishnet repair in exchange for turtle release

For the 2007-08 season, 21 leatherback turtles and 7 Olive Ridley turtles were released from local fishing nets between November 2007 and April 2008. The number of turtles caught in local fishing nets depends also on the total number of turtles frequenting the beaches of CDNP.

3.6. Comparison with previous years

There are marked differences in the number of turtles visiting the CDNP beaches between years with an extreme reduction of leatherback turtles between the 2002-03 season and the 2004-05 season, possibly as a result of intense poaching or increased trawler activity (Tab 4: Fig 6 and 7).

Table 4: Marine turtles recorded during different seasons

Beaches	Km	**2001-02**		**2002-03**		**2004-05**		**2005-06**		**2006-07**		**2007-08**	
		Lo	Dc	Lo	Dc	Lo	Dc	Lo	Dc	Lo	Dc	Lo	Dc
Niandji	10	6	500	155	426	148	57	116	226	91	152	111	49
Mvandji	10	22	356	45	385	62	35	25	100			47	52
Paris	7	54	75	81	71	125	2	102	30			63	7
Kondi	10							67	52	42	69	72	53
Longobondi	10											50	52
TOTAL	**47**	**82**	**931**	**281**	**882**	**335**	**94**	**310**	**408**	**133**	**221**	**343**	**213**

Figure 6: Six years of leatherback turtles

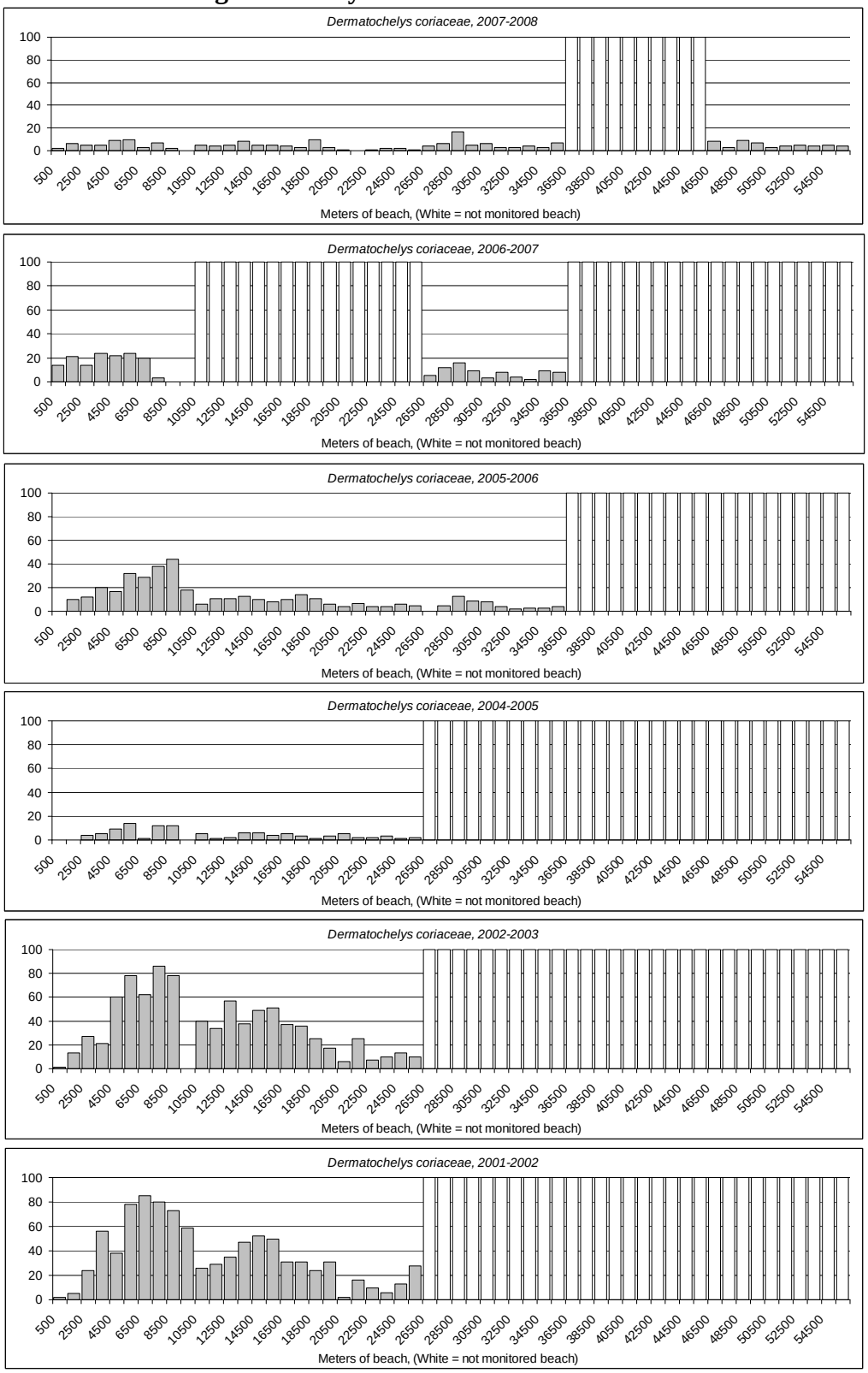


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Figure 7: Six years of Olive Ridley turtles

4. DISCUSSION AND CONCLUSION

As was already known from previous years of monitoring, the 10km of beach between the outlet of Conkouati Lagoon and the international border between Congo and Gabon is the beach with the highest nesting turtle densities in CDNP. The turtles that frequent this beach also nest on the beaches of Mayumba National Park in Gabon (Solange Nguesseno, pers. comms). Due to the reduced number of people living around this section of beach, and the presence of only 1 fishing camp, the number of dead turtles counted on this section of beach is also lowest (4%).

Although that the human population along the coast inside CDNP is low (it increases as proximity to Pointe Noire increases), human predation of turtles on beaches that are not monitored remains very high at CDNP. Years of education and sensitization efforts have had a marginal effect when compared to the presence of monitoring teams on the beaches. Most dead turtles were counted at Kondi, and unlike the other monitored beaches of CDNP where most dead turtles are consider victims of trawlers (72%), at Kondi most dead turtles were killed by local people. For green turtles in particular the damage was extensive, with 6 of only 8 observed green turtles killed by local people. In general leatherback turtles are least predated upon by local people, likely because of their enormous size making it hard to do so without being noticed by turtle team research assistants or Park ecoguards. These results suggest that either the marine turtle monitoring team did not do their job as efficiently as the other teams or that there is a conflict with the local people. An inquiry will be launched to establish what occurred at Kondi.

Results showed that the peak month for Olive Ridley nesting is November whereas for Leatherbacks it is January. Olive Ridleys are most often observed between 22h00 and midnight and Leatherbacks between 02h00 and 04h000 at night.

The ratio between live and dead turtles at CDNP showed an increase of human predation with distance from the Gabonese border, which corresponds to an increase of people. The number of hatched nests was highest at Paris, where animals and thus animal predation is lowest. Nest hatching reduce with increasing animal nest predation.

Compared to previous years, marine turtle nesting at CDNP was reduced during the 2007-08 season. Natural fluctuation occur between years although something drastic happened during the 2003-04 season for leatherback turtles, when WCS retreated from CDNP in protest f the involvement of local authorities in bushmeat traffic. Leatherbacks nesting populations were reduced by 90% and CDNP never regained even 50% of the numbers recorded in the 2001-02 and 2002-03 seasons.