GHANA OCTP BLOCK

Sea Turtles Pre-construction Survey Report

ABSTRACT

Results of the Nov-Dec 2015 preconstruction sea turtles survey demonstrate that the beaches within the area of influence (AoI) for the OCTP Development project are utilized by sea turtles as nesting habitat. During the survey period (24th November to 1st December 2015), no nesting was observed in the stretch of the beach were landfall construction is expected (between Sanzule and Anwolakrom), although it is considered suitable for nesting. Within the project AoI, nesting of Olive Ridley was observed and four activities (3 nests and 1 non-nesting emergence) were encountered. Nesting was noted to be more frequent to the west of the AoI.

Sea turtles are reported to nest primarily from October to February with peak nesting occurring in October. The FGDs revealed that community members encounter sea turtles during their day to day activities. However, knowledge of community members about sea turtle species and their ecological roles was generally very poor. The only importance assigned to sea turtles by the majority of the community is as meat and as a source of income when killed and sold. A few community members pointed out that sea turtles are valued as bringing tourism to the area and because they feed on jelly fish, which, when present in large numbers, are considered a threat to fisheries.

SUMMARY OF REVISIONS

February 2016	02	Issued for Final Review	ESL/ERM	HSE & CI Manager Juan Deffis	Development Project Manager Ezio Miguel Lago
January 2016	01	Draft Issued for comments	ESL/ERM	HSE & CI Manager Juan Deffis	Development Project Manager Ezio Miguel Lago
DATE	***REVISION***	***REVISION DESCRIPTION***	***PREPARED***	***CHECKED***	***APPROVED***

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ACRONYMS

Acronym	Definition
AoI	Area of Influence
BAP	Biodiversity Action Plan
CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Conservation of Migratory Species
EIS	Environmental Impact Statement
EHS	Environmental, Health, and Safety
ESIA	Environmental and Social Impact Assessment
EPs	Equator Principles
EPFI	Equator Principles Financial Institutions
FGDs	Focus Group Discussions
GPS	(Handheld) Geographic Positioning System
GWS	Ghana Wildlife Society
IESIA	Integrated Environmental and Social Impact Assessment
IFC	International Finance Corporation
IFI	International Finance Institutions
IPIECA	International Petroleum Industry Environmental Conservation Association
IUCN	International Union for the Conservation of Nature
NGO	Non-Government Organisation
NNE	Non-Nesting Emergence
NRC	National Research Council
OCTP	Offshore Cape Three Points (Integrated Oil and Gas Project)
OGP	International Association of Oil & Gas Producers
ORF	Onshore Receiving Facility
REDO	Resource and Environment Development Organization
ToR	Terms of Reference
UNEP	United Nations Environmental Programme

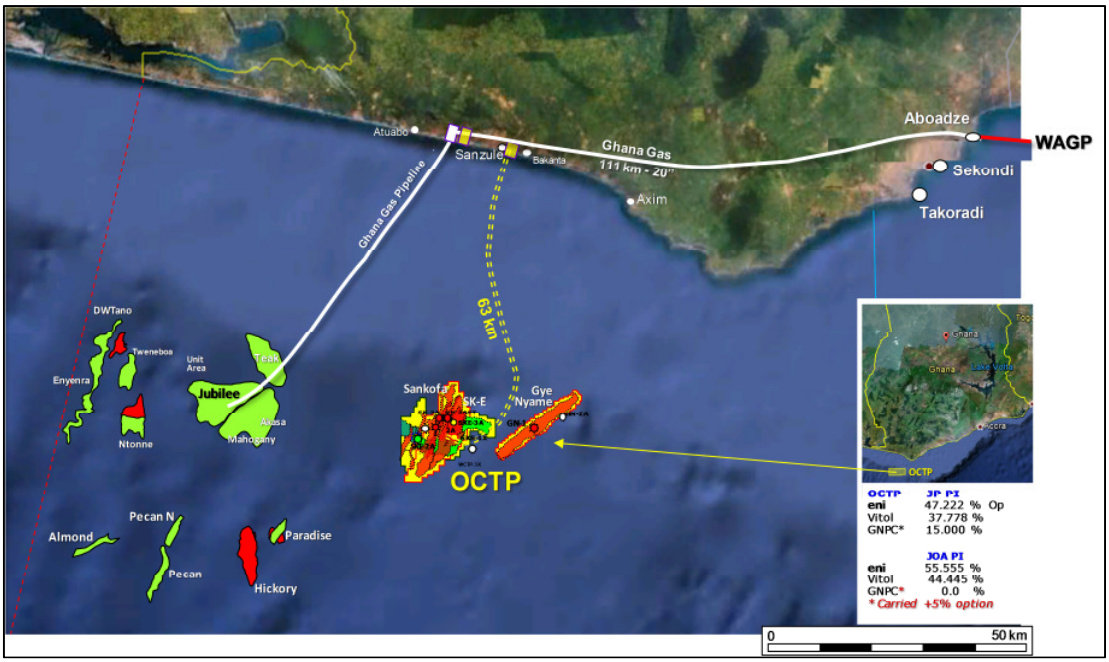
1 INTRODUCTION

Eni have proposed the OCTP Development Project in Ghana which comprises 19 offshore wells for oil and gas extraction together with the installation of offshore processing facilities, a gas pipeline and an onshore receiving facility with a compression station. The planned pipeline landfall is located at a beach between Sanzule and Anwolakrom. The construction and operation of these facilities have the potential to impact sea turtles and their habitat.

1.1 PROJECT BACKGROUND

The OCTP Development is illustrated in Figure 1.1 and involves three offshore oil and gas fields - Sankofa Main, Sankofa East and Gye Nyame – all located about 60 km offshore of the Western Region, and a gas export pipeline to shore.

Figure 1.1 Project Location



Source: eni, 2014

Lights, noise, human presence and physical obstacles associated with the Project could prevent or reduce the success of turtle nesting on beach habitat within the Project Area of Influence (AoI). The Project activities considered to pose most potential risk to sea turtles are the planned works on the beach area for the pipeline landfall close to the Onshore Receiving Facility (ORF) in Sanzule.

This sea turtle survey report begins to address the commitments made within the Environmental Impact Statements (EISs) for the Project and to the requirements of International Finance Institutions (IFI), given the importance and conservation status of these species.

1.2 LEGISLATIVE FRAMEWORK

1.2.1 National Legislation

In Ghana, all sea turtle species are protected through the Wildlife Conservation Regulations of 1971, L.I. 685, which prohibit the hunting, capture or destruction of sea turtles.

There are no traditional regulations which protect sea turtles at the communities of interest. However, the national protection laws have been broadcasted and promoted by traditional authorities within their communities.

1.2.2 International Protocols & Conventions

The Republic of Ghana is a signatory to a number of international conventions on environmental protection and conservation, including the following which are directly relevant to sea turtles:

- Ramsar Convention on Wetlands of International Importance (Ramsar, Iran), 1971.
- Convention on the Conservation of Migratory Species (CMS), 1979 (Bonn Convention), which entered into force in Ghana 1988; including the Memorandum of Understanding Concerning Conservation Measure for Marine Turtles of the Atlantic Coast of Africa, signed by Ghana on November 1999.
- African Convention on the Conservation of Nature and Natural Resources (adopted in Algeria on September 15, 1968 and signed by Ghana on October 9, 1969).
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1975.
- Convention on Biological Diversity (CBD), 1992.

Several sections of the Convention on Biodiversity are relevant to eni Ghana's proposed activities, including:

- Art. 8: requires in-situ ecosystem conservation and protection of threatened species or populations, as well as of customary use and traditional practices of local communities;
- Art. 10: obliges states to adopt measures to minimize effects on biological diversity, to protect customary community practices, and to support local efforts to remedy degradation of biodiversity;

Traditional sea tenure and access to marine living resources should receive support under Articles 8(j) and 10(c), which require protection of sustainable customary use of biological resources, and preservation of traditional knowledge and practices of local communities relating to conservation and sustainable use. Article 10(d) requires a Party to support local populations to develop and implement remedial action in degraded areas where biological diversity has been reduced.

1.2.3 Lender Safeguards and International Conventions

International Environmental and Social Performance Standards

The Equator Principles (EPs) are an approach by financial institutions to determine, assess and manage environmental and social risk in project financing. These Principles have been adopted by a wide range of financial institutions to manage the social and environmental risks associated with their potential investments and consist of the following Principles:

- Principle 1 Categorization of projects;
- Principle 2 The borrower has to conduct an Environmental and Social Impact Assessment (EIA);
- Principle 3 Applicable Social and Environmental Standards;
- Principle 4 Action Plan and Management System;
- Principle 5 Consultation and Disclosure;
- Principle 6 Grievance Mechanism;
- Principle 7 Independent Review;
- Principle 8 Covenants;
- Principle 9 Independent Monitoring and Reporting;
- Principle 10 Equator Principles Financial Institutions (EPFI) Reporting.

The EPs are adopted by the majority of financial institutions and are applied where total project capital costs exceed US$10 million. The EPs are primarily intended to provide a minimum standard for due diligence to support responsible risk decision-making. The EPs are based on the International Finance Corporation Performance Standards on social and environmental sustainability and on the World Bank Group Environmental, Health, and Safety Guidelines (EHS Guidelines)[1].

The International Finance Corporation (IFC) Performance Sustainability Framework and Performance Standards comprise the following elements:

- Policy on Environmental and Social Sustainability;
- Performance Standards' on Environmental and Social Sustainability; and
- Access to Information Policy.

The IFC Performance Standards considered relevant consist of:

- Performance Standard 1: Assessment and Management of Social and Environmental Risks and Impacts;

1 http://equator-principles.com/resources/Frequently%20Asked%20Questions.pdf

- Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources.

The African Development Bank Policies and Guidelines have various policies and guidelines that may apply, which include:

- The Bank Group Policy on the Environment (2004);
- Integrated Environmental and Social Impact Assessment (IESIA) Guidelines (2003); and
- Bank Group's Handbook on Stakeholder Consultation and Participation (2001).

1.2.4 Industry Best Practices, Standards and Guidelines

There are several industry best practices for offshore development. Those of relevance include but not limited to;

- OGP (2007) Environmental, Social Health Risk and Impact Management Process.
- OGP (1997) Environmental Management in Oil and Gas Exploration and Production.
- IPIECA (2011) Guidance on Improving Social and Environmental performance: Good practice Guidelines for the Oil and Gas Industry.

2 OVERVIEW OF SEA TURTLES

2.1 SEA TURTLES

Sea turtles play an important role in the marine ecosystem, as well as the terrestrial environment. Their functions span from ecological through research to humanitarian aspects and have dietary, medical, cultural, economic and religious significance (Laqueux, 1998; Robinson and Redford, 1991; Freese, 1997). Turtles consume diverse forms of prey, including jellyfish, crustaceans, sponges, tunicates, sea grasses and algae.. In the sea, juvenile turtles are eaten by predators including crabs and sharks. The loss of various sea turtle species at a certain area would therefore result in effects at the ecosystem level.

Sea turtles have been found to promote the growth and development of reefs and sea grasses (Bjorndal, 1980; Thayer et al., 1984; Maylan, 1988; Leon and Bjorndal, 2002). The life cycle of sea turtles requires that part of it be completed on land, at the beach. By coming ashore to nest, they transport nutrients from highly productive marine habitats such as sea-grass beds to energy-poor habitats like sandy beaches (Bouchard and Bjorndal, 2000). This helps reverse the usual flow of nutrients from land to sea and enhance vegetation growth at the beach, helping stabilize the beach by reducing erosion. The presence of sea turtles in a region may also provide employment opportunities and support local development through the revenue they generate through ecotourism.

Different sea turtle species prefer different types of beach habitat for nesting. For example Olive Ridley (*Lepidochelys olivacea*) and Leatherback (*Dermochelys coriacea*) most often utilize open areas, *e.g.* wide beaches with steep slopes and sand bars at river mouths, while Hawksbill turtles (*Eretmochelyss imbricata*) prefer small island beaches and often nest under overhanging vegetation (Shanker *et al.*, 2003a; 2003b). The beach-type preference of Green turtles (Chelonia mydas) ranges from large open to small cove beaches (Shanker *et al.,* 2003a; 2003b).

The selection of a nesting site by marine turtles is based on several physical and chemical parameters including beach elevation /accessibility, beach height, substrate type (sandy beaches are required for nesting), grain size and compressibility of sand, and thermal variation (Stoneburner and Richardson, 1981). The presence of vegetation on the beach has also been found to play a role in the nest site selection (Bustard and Greenham, 1968). Turtles nesting in vegetated beaches are more successful in digging egg chambers because plant rootlets help bind the sand grains and prevent slippage. On the other hand, dense roots of vegetation in the substrate may constitute an obstacle to digging, resulting in the abandonment of the nesting attempt (and is one of the factors which may result in a non-nesting emergence, NNE).

2.2 SEA TURTLES IN GHANA

Sea turtle nesting in Ghana was first reported by Irvine (1947), who documented the Loggerhead , Green, Hawksbill (, Olive Ridley and Leatherback as the five main species that nest in Ghana. Although Olive Ridley, Green and Leatherback turtles are reported in the literature as currently nesting on most sandy beaches along the coast of Ghana (Agyekumhene *et al*., 2010; Amiteye, 2002); only Olive Ridley and Leatherback appear to nest frequently and in appreciable numbers (Allman and Armah, 2008). The Olive Ridley is known to show the highest relative abundance in Ghana (Agyekumhene, 2009; Amiteye, 2002).

Although sea turtle nesting activity occurs along the entire sandy coast of Ghana, distribution is unlikely to be consistent due to differing habitat suitability. Nesting intensity along the Ghanaian coast increases from west to east coast, with highest observed concentrations on the 80 km stretch of beach between Prampram and Ada Foah in the Greater Accra region (Amiteye, 2002). However, major nesting activities also occur in the Central and Western Regions and some parts of the Volta region. Grain size analysis conducted for beaches along the eastern coast (Ada Foah) where nesting is highest in Ghana revealed that sea turtles nesting in these areas preferred medium grain size for nesting (Agyekumhene, 2009).

Globally, sea turtles face numerous threats associated with their terrestrial and aquatic habitats. In Ghana, sea turtles are exposed to a significant number of threats, including during the primary nesting season from October through March (Armah *et al*., 1997; Agyekumhene, 2009). The main threats to the survival of Ghanaian sea turtle populations are anthropogenic. Sea turtles are harvested and their eggs routinely collected when deposited in proximity to fishing communities and the oil from sea turtles is collected as it is believed to be of medicinal value (Mangar and Chapman, 1996, Amiteye, 2002). The eggs of sea turtle are also destroyed by predation from animals, inundation by high tides, and erosion of sandy beaches (Table 2.1).

Adult turtles are also often accidentally captured in commercial and artisanal fisheries, which are a major source of mortality to the species in the aquatic environment. These animals are typically adults that may be breeding and feeding in the area. Other threats include habitat degradation through pollution, artificial illumination of nesting beaches, accumulation of beach debris and changes in beach morphology (accelerated by sand mining) which prevents females ascending nesting beaches (Agyekumhene, 2009; Wellens-Mensah, *et al*., 2002; Armah *et al*., 1997).

Table 2.1 Some threats to nests of sea turtles in Ghana. Average clutch size is 82 ± 11 for Leatherback and 119±14 for Olive Ridley

Causes of nest mortality	% of nest destroyed	
	Leatherback	Olive Ridley
Predation by dogs	10.8	76.7
Inundation	60.8	11.7
Erosion	8.1	5.8

Source: Agyekumhene, 2009

No published data on sea turtle activity or threats exists specifically for the Project area. However, Mr. Bernard Azane Eholade (representative of Ghana Wildlife Society in the area and Tourist Officer) shared with the field team the mode of operation of their sea turtle program and the type of data they collect (see details in section 4.2 and in Appendix C). He also shared specific data regarding the species and numbers of sea turtles encountered during their surveys, which has been used in this report to supplement the data collected in Nov-Dec 2015.

2.3 SEASONALITY OF NESTING

Olive Ridley, Green, and Leatherback turtles are known to routinely nest in Ghana; the current nesting pattern of Loggerhead and Hawksbill turtles is yet to be fully documented(Agyekumhene, 2009; Amiteye, 2002). However, there has been one confirmed nesting of Loggerhead in Ghana was on the beach of Prampram along the eastern coast (Allman *et al*., 2012).

Unconfirmed reports of fishermen catching Loggerhead and Hawksbill turtles at sea (Tanner, 2014; Alexander *et al*., 2012) may suggest that these species may still be utilizing Ghana's waters for feeding and possibly nesting on remote areas of Ghana's sandy beaches.

Nesting periods are reported to differ for each sea turtle species in Ghana. Olive Ridley is documented to nest year round while Leatherbacks nest primarily between November and February (Agyekumhene, 2009; Amiteye, 2002), with a few recorded in October, March and July, suggesting early and late nesters (Agyekumhene, 2009). Green turtle nesting has been recorded between June and August and also between November and December.

The table below shows the nesting periods of those species of turtles which currently nest in the Western region of Ghana.

Table 2.2 Key nesting periods of sea turtles in the Western region of Ghana

Species	J	F	M	A	M	J	J	A	S	O	N	D	Nesting Status in Western Ghana
Leatherback													Reported by GWS
Olive Ridley													Confirmed: (Reported by GWS/ WildSeas: Confirmed by ESL)
Green turtle													Reported by GWS/ WildSeas/ESL)
Hawksbill													No Imformation
Loggerhead													No information

Key: Confirmed | Likely | Reported

Note: Direct observations were made in November and December, which is why both months are marked as Confirmed. One nest was observed to have hatched in end of November, so considering that incubation period in Ghana (around 50 days), October has also been considered as Confirmed.

3 METHODOLOGY

3.1 OBJECTIVES

The aim of the sea turtle pre-construction survey was to obtain information to assess the conservation importance of the beaches in the Project AoI for sea turtles. The survey included an assessment of the suitability of the sandy beach for sea turtle nesting. This will enable the proposed project to ascertain potential impacts on the species and its habitat and implement mitigation measures for the protection of sea turtles and their habitat.

The sea turtle surveys were also conducted as part of the commitments made within both EIS Reports and the requirements of International Finance Institutions (IFI), given the importance and conservation status of these species.

Specifically, the objectives of the surveys were as follows.

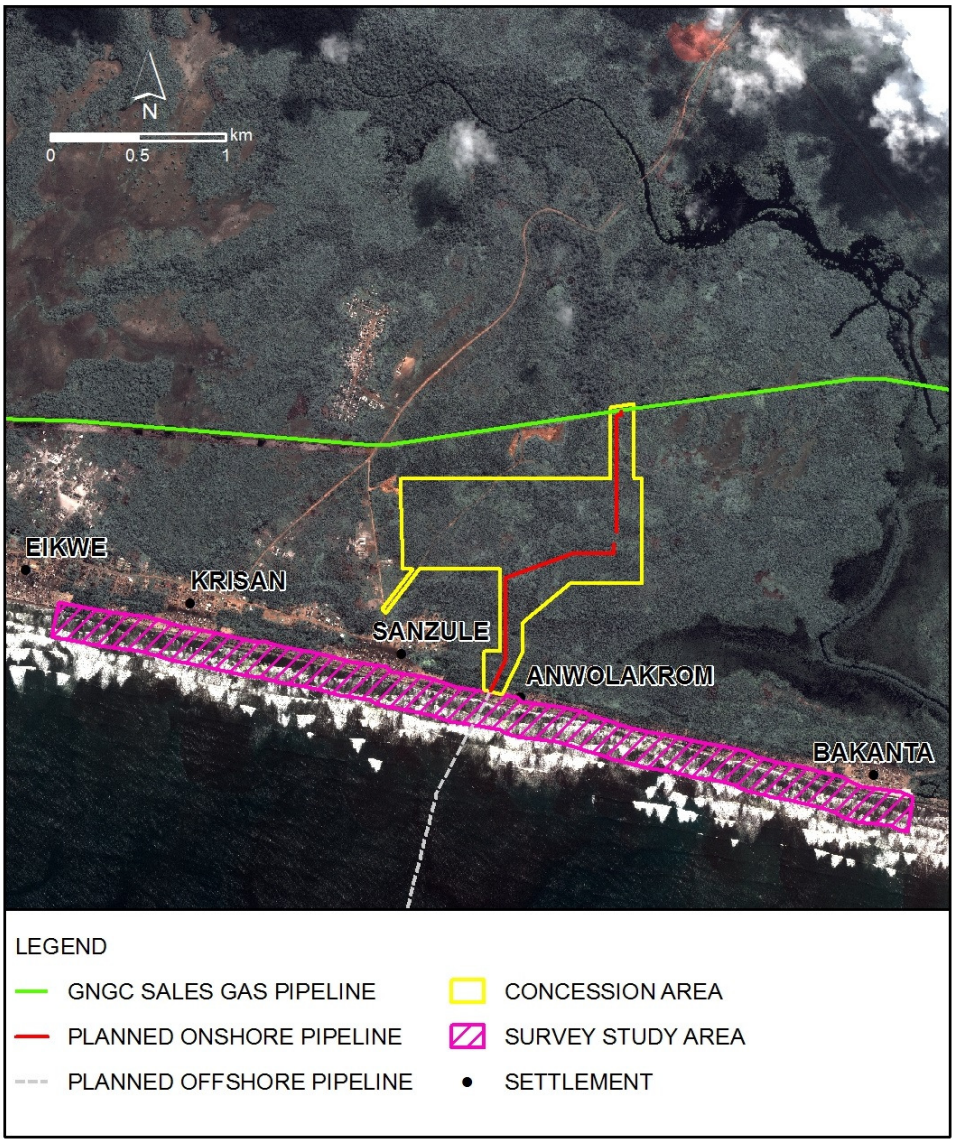
- Assess the potential of the beach to support turtle nesting
- Determine any evidence of nesting by sea turtles in the area
- Assess the threats to sea turtles in the area
- Ascertain the perceptions and knowledge of local communities about sea turtles nesting in the area

3.2 FIELD SURVEY AREA

The nesting sea turtle survey study area covered the beaches within the Project AoI, which is taken to extend for approximately 2.5 km either side of the pipeline landfall location, in order to cover the direct area of disturbance of the pipeline landfall works (taken to be a 300 m buffer around the pipeline centerline) as well as potential indirect effects derived from the construction and operation activities in the ORF, or due to the increased human pressure in the area (Figure 3.1). This area includes the beaches of Bakanta, Anwolakrom, Sanzule, Krisan and and Eikwe villages.

In addition to the Project AoI, supplementary information was collected by ESL for adjacent beaches, covering an area of approximately 12 km to the west (to incorporate the area in which NGOs operating from the village of Benyin are active), and 3 km to the east. This overall study area, including the Project AoI which was directly surveyed, plus the wider area from which contextual information was collected, is shown in the Results section, Figure 4.2.

Figure 3.1 Approximate Project AoI for nesting sea turtles



Source: ERM 2015

3.3 FIELD SURVEY METHODOLOGY

Field surveys were conducted from to 24th November to 1st December 2015 by a five member team, led by A.K. Armah and A. Agyekumhene, and assisted by three local field assistants J. Ackah, A. Addai and J.P. Boakye.

A day time beach habitat survey was conducted on the 24th November 2015 to collect information on the nature of beach and communities along the beach. This survey involved walking along the beaches within the Project AoI at low water and collecting data as follows.

Beach characteristics:

- Width of intertidal area and width of the beach;
- Beach slope;
- Beach vegetation;
- Available beach area for nesting sea turtles;
- Presence of anthropogenic activities on the beaches.

Inland characteristics:

- Current inland habitat;
- Presence / absence of human activity (recorded and differentiated during the daytime and at night); including interviews with local people to ensure any seasonal activity in the area is also considered.

Surveys to record turtle nesting activity were conducted by patrolling the survey study area on foot at dawn (starting at 2 am and ending at 6:00am) and at night (starting at 7pm and ending at 12am) along the beaches within the Project AoI (Figure 3.1). All-night patrols were also conducted on two nights (starting at 7pm and ending at 5am the following day). Altogether, a total of 12 patrols were conducted over the 7 days period; 1 day patrol, 4 night patrols, 5 dawn patrols and 2 all night patrols.

The dawn surveys were carried out to pick up any traces of nocturnal activity before it was removed by the tides, while night surveys were aimed at directly observing any turtle presence and identifying the species involved. Data to be recorded during the night time survey included:

- Direct recording of turtle nesting activity, including species identification and if they are nesting.
- Record of unsuccessful nesting emergence, termed non-nesting emergence (NNE) – i.e. returned to ocean without nesting.
- Location and characteristics of nests found and unsuccessful nesting attempts, including the reason for this, if known.
- Data on estimated clutch size, if it is possible to directly observe the turtle nesting.
- Details of any stranded sea turtles, if found, (including species identification, state and carapace measurements).
- Identification of any direct human or predator interference to nest.

Nests were located by following tracks left behind by the turtle during ascent and descent on the beach. The tracks were also used to determine the species of turtle. NNEs were also determined by following track up the beach to the point where the turtle turned and descended. For both nests and NNEs, the location was recorded using an Etrex Garmin Global Positioning System (GPS). All recording was made using red light headlamp to prevent the disturbance effect of white light to turtles emerging from the sea. The position of the nest on the beach relative to the tide mark was also recorded using a 15-m flexible tape measure. Data taken were recorded onto the pre-developed data sheet (See Appendix A).

3.4 COMMUNITY ENGAGEMENT

27 FGDs and one-on-one interviews were held with various categories of resident within the local communities within the Project AoI (Sanzule, Anwolakrom, Bakanta and Krisan).

Two Non-governmental organisations (NGOs) active at national/local level for sea turtle conservation where also engaged during the survey. This includes Ghana Wildlife Society (GWS) and Wild Seas NGO, who run a turtle conservation programme ('Bahari Karuna') in the area.

3.4.1 Engagement with NGOs

GWS has an ongoing Marine Turtles Conservation Programme, which includes research and conservation, addressing the sources of mortality threatening the sea turtles of Ghana. They are also currently working with the Ellembelle District Assembly (among others) to enhance local capacity to monitor (and act upon) environmental threats of the emerging oil and gas industry. The GWS office Manager Mr. Bernard Azane Eholade was engaged in Benyin on 27th November, and information shared has been used to enhance this report (see details in section 2.2., Table 4.5 and Figure 4.1). Meeting minutes are presented in Appendix C. In addition, 6 tour guides which were affiliated to GWS were also engaged for FGD and results are presented in Appendix C.

The Wild seas Bahari Karuna project aims at conserving the sea turtles and sharks through community work and involvement. A worker of WildSeas was interviewed on 27th November and meeting minutes are presented in Appendix C.

A third NGO, Friends of the Nation (FoN) partnered the Coastal Resources Center (CRC) project from 2009 to 2014 with the slogan Hen Mpoano (Our Coast) worked with coastal communities in the Western region to ensure inclusive and integrated management of Ghana's coastal and marine ecosystems. Their work in the Western Region has been instrumental in spreading the message of nature conservation (including sea turtles) to local communities. They are based in Takoradi and occasionally conduct education programmes and mangrove restoration in the area of interest. Their representative was travelling at the time of the field visit and could not be engaged.

3.4.2 Community Engagement

The objective of community engagement was to identify the various species of sea turtles that visit the beach, gather information about turtle nesting activity in other seasons, and identify potential threats such as egg harvesting for human consumption.

The target groups that participated in the FGDs were beach users (such as experienced fishermen and fish mongers), as well as youth and elders of the local communities.

A guidance questionnaire (See Appendix B) was used during focus group discussions. Questions were aimed at eliciting information from each group regarding the following aspects:

- Ascertain community knowledge of turtles and how the species are perceived in the community.
- Confirmation whether turtles have been observed during day to day activities on the beach (fishing, washing, leisure etc.).
- Timeframe of observations (season, time of the day, regularity etc.).
- Species observed in the area (identification from a set of photographs and description)
- Presence of animal predation.
- Past and present local traditional rules over when turtles can/cannot be taken.
- Observation of egg harvesting for human consumption, and who within the community is involved (women, children, and young men).
- Confirmation whether changes in fishing practices have affected the numbers of turtles that are caught as bi-catch.

Following is a summary of the community engagement activities undertaken in Nov-Dec 2015.

Table 3.1 Summary of community engagement activities (Nov-Dec 2015)

No.	Organisation/Group	Date	Location	Attendees
1	Chief Fisherman and Elders of Eikwe	28-11-15	Home of Chief Fisherman	6
2	Fishermen of Eikwe	28-11-15	Cemetery	5
3	Youth of Eikwe	28-11-15	Beach	9
4	Women Fishmongers of Eikwe	28-11-15	Home	3
5	Fisherman of Eikwe	28-11-15	Public place of Eikwe	1
6	Fisherman of Krisan	28-11-15	Home	1
7	Fishermen of Krisan (including Chief Fisherman)	27-11-15	Beach	4
8	Fishermen and Elders of Krisan	27-11-15	Beach	4
9	Youth of Krisan	27-11-15	Beach	4
10	Youth, elders and fishermen of Krisan	28-11-15	Home	6

No.	Organisation/Group	Date	Location	Attendees
11	Fisherman of Krisan	27-11-15	Home	1
12	Youth of Sanzule	27-11-15	Beach	4
13	Elder of Sanzule	27-11-15	Beach	1
14	Fishermen of Sanzule (including Chief Fisherman)	27-11-15	Home of Chief Fisherman	5
15	Women Fishmongers of Sanzule	27-11-15	Beach	4
16	Youth, elders and fishermen of Sanzule	27-11-15	Beach	5
17	Fishermen of Awonakrom	26-11-15	Beach	6
18	Youth, elders and fishermen of Awonakrom	26-11-15	Beach	4
19	Fisherman of Awonakrom	26-11-15	Home	1
20	Women Fishmongers of Awonakrom (Volta)	26-11-15	Home	2
21	Youth – Tour Guides with Wildlife Society.	28-11-15	Premises of GWS	6
22	Women Fishmongers, fisherman and trader of Bakanta	27-11-15	Workplace of one participant	5
23	Youth (electrician & student) of Bakanta	26-11-15	Home	1
24	Elder of Bakanta	26-11-15	Home	1
25	Fishermen (youth) of Bakanta	26-11-15	Public School	5
26	Fisherman of Bakanta	26-11-15	Bakanta Catholic Primary School Area	1
27	Youth (student) of Bakanta	26-11-15	Bakanta Catholic Primary School	1

4 SURVEY RESULTS

4.1 FIELD SURVEY RESULTS

Surveys of the beaches within the Project AoI confirmed that the sandy beaches are suitable for sea turtle nesting (Table 4.1). Evidence of four fresh sea turtle emergences, all by Olive Ridley, were observed along the beaches of the Project AoI (Table 4.2) over the eight day survey period (Table 4.3). Of the four emergences recorded, one resulted in a non-nesting emergence (NNE) while the remaining three were successful nesting emergences (see Figure 4.1). Five nests were recorded outside of the Project AoI in the beach area around Beyin to the west, and eggs from an eroded nest were recorded outside the Project AoI in the beach area to the east (Table 4.4).

These observations confirm the presence of Olive Ridley in the area; however no sign of activity during the 8 day survey period was recorded for the four other sea turtle species (Leatherback, Green, Loggerhead and Hawksbill) documented by Irvine (1947) to use Ghana's coastal area for feeding and nesting.

Four older Olive Ridley nests were also recorded within the Project AoI and marked by volunteers of GWS in the area (Table 4.5). Three of the nests were marked *in situ*, while one nest was relocated into a hatchery constructed by GWS at Krisan to prevent erosion by high tides.

A total of 10 nests were recorded on the properties of beach resorts outside (to the west of) the Project AoI during the field surveys. These nests were relocated from the wild by egg collectors and community volunteers to areas in front of the beach resorts and enclosed in wooden boxes. Eight of these nests were located in front of the Beyin Beach Resort (BBR) with 2 located in front of the Tenak Beach Resort (Table 4.5). Of the 8 nests at BBR, 1 hatched during the surveys, which is indicative that the nest was deposited earlier in the nesting season. Local people interviewed reported that the majority of eggs relocated to the resorts originated to the west of the Tenack Beach resort, outside the Project AoI.

Results prove that Olive Ridley nest within the Project AoI in the month of November and one Olive Ridley nest which was hatched at the time of survey suggests that nesting also occurs during the month of October, as the incubation period for Olive Ridley in Ghana has been reported to be between 50-70 days (Agyekumhene, 2009). This observation confirms the information gathered during the community engagement (Section 0).

Threats to nesting sea turtles which were directly observed during the survey period are listed in Table 4.2. In addition to human activity, including sand mining, nests deposited on the sandy beach in the Project AoI are susceptible to erosion or inundation by the high tides due to the narrow nature of some sections along the beach. Artificial lighting on the beach in front of some communities in the Project AoI can also disorient both nesting females and hatchlings.

4.1.1 Habitat survey results

Table 4.1 Characteristics of survey beach

Beach Section	Community Name	GPS Location		Nature of slope	Width		Beach Vegetation (Dominant)	Available Beach for turtle nesting	Anthropogenic activities on beach	Threats to sea turtle nesting on Beach
		Northern	Western		Intertidal	Back Beach				
1	Eikwe	04.96319°	002.4737°	Mainly gentle; small section outside the community has cliffs under coconuts	18 m	5 m	*Cocos nucifera*	Limited About 2m wide	Beach Seine fishing (D/N)	Inundation of nests; eroding beaches evident in roots of coconut showing in the air
2	Krisan	04.96138°	002.46461°	Gentle beach	2 m	14 m	*Cocos nucifera; Ipomea pes caprea*	Narrow	Beach Seine fishing (D/N); Sand mining (D)	Artificial Light from the main ECG Pole in the community
3	Sanzule	04.95960°	002.45587°	Mainly gentle	9 m	32 m	*Cocos nucifera; Ipomea pes caprea*	Wide	Beach Seine fishing (D/N); Sand mining (D); Block moulding (D)	Debris (Plastic, fallen coconut branches, old fishing nets); vehicular movement at back beach
4	Anwolakrom	04.95733°	002.44559°	Mainly gentle	21 m	15 m	*Cocos nucifera*	Wide	Beach Seine fishing (D/N); Lobster fishing (N); Fire wood collection and selling (D); Resting sheds for fishermen (D)	Vehicular movement at back beach. Reduction area available for female nesting from firewood gathering at the beach.

Beach	Community	GPS Location		Nature	Width		Beach	Available	Anthropogenic	Threats to sea
5	Bakanta	04.95343°	002.42966°	Mainly gentle	25 m	17 m	*Cocos nucifera*	Wide	Beach Seine fishing (D/N); Resting sheds for fishermen (D);	Vehicular movement at back beach

Anthropogenic activities presented are those observed during the survey. Time of Anthropogenic Activity represented in parenthesis against activity. D= Daytime; N= Night time; D/N = Day and Night

4.1.2 Sea Turtle Observations Results

Table 4.2 Information on survey beach

Beach Details			
Observers:	A. K. Armah; A. Agyekumhene; John Ackah: Augustine Addai; John Paul Boakye		
Month/Year:	November 2015		**Threats along Beach:** Sand mining; Block moulding: Erosion; Nest inundation; Artificial beach front lighting; Disturbance of beach sand from human activities (e.g. vehicular movement, beach seine fishing; firewood gathering, etc.)
Survey Method:	Walking		
Survey Types:	Day; Night; and Dawn		
GPS Start point:	**N** 4.96488°	**W** 002.48170°	
GPS Finish point:	**N** 4.95343°	**W** 002.42966°	

Table 4.3 Sea turtle activities encountered within the Project AoI during surveys

SN	Date	Time	Species	Activity	GPS Position		Distance from tideline	Track (Visible/ Faint/None)	Comments/ Observations
					North	West			
1	30/11/15	02:20 am	Olive Ridley	Nest	04.96454	002.47958	7 m	Visible	Turtle abandoned first egg chamber; Turtle was unable to access back beach because of cliff of about 1.2 m high; nest was deposited below the cliff
2	30/11/15	3:19 am	Olive Ridley	NNE	04.96242	002.46955	12 m	Visible	Cliff of 1.7 m high present; Turtle could not access back beach for nesting due to high cliff
3	30/11/15	4:02 am	Olive Ridley	Nest	04.96028	002.45876	7 m	Visible	Presence of flat beach clop; Nest on back beach under coconut vegetation; Nest away from the settlement areas
4	30/11/15	4:52 am	Olive Ridley	Nest	04.95582	002.43873	3 m	Visible	Soil at the back beach compacted by human activities like beach seining; Very shallow egg chamber (about 3 cm from soil surface to eggs) due to hard ground; Nest under threat of inundation or washout

Table 4.4 Sea turtle activities encountered outside Project AoI during survey

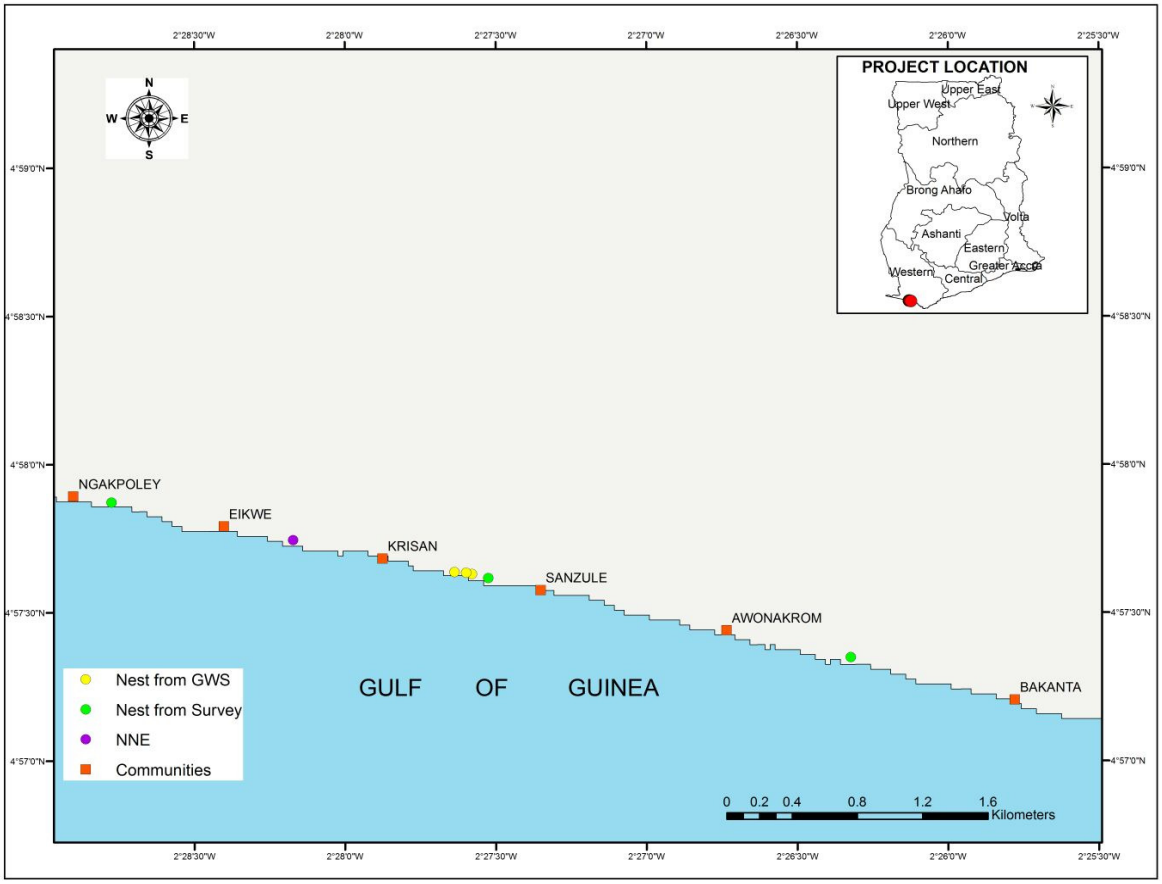
SN	Date	Time	Species	Activity	GPS Position		Distance from tideline	Track (Visible/ Faint/None)	Comments/ Observations
					North	West			
1	25/11/15	02:25 pm	Olive ridley	Eggs	04.94600	002.39942	-	None	Eggs from eroded nest lying on sand
2	26/11/15	12:04 am	Olive ridley	Nest	04.98546	002.58631	4 m	Faint	Nest on intertidal below berm
3	28/11/15	05:45 am	Olive ridley	Nest	04.98366	002.57817	1 m	None	Cliff of about 1.7 m high
4	28/11/15	06:40 am	Olive ridley	Nest	04.98581	002.58693	27 m	None	95 eggs relocated due to threat of eroding.
5	30/11/15	05:51 am	Olive ridley	Nest	04.98520	002.58496	3 m	Faint	Nest within *Ipomea pes-caprea* vegetation; Attempted poaching of nest by human;
6	30/11/15	06:08 am	Olive ridley	Nest	04.98408	002.57992	5 m	None	1st and 2nd egg chambers abandoned due to roots of coconut impeding digging

Table 4.5 Existing sea turtle nests recorded both within and outside the Project AoI before the survey period (source: GWS)

SN	Species	Activity	GPS Position		Distance from tideline	Track (Visible/ Faint/None)	Comments/ Observations
			North	West			
1	Olive ridley	Nest	04.96050	002.45967	17 m	None	Nest marked by GWS volunteer within Project AoI
2	Olive ridley	Nest	04.96057	002.45999	13 m	None	Nest marked by GWS volunteer within Project AoI
3	Olive ridley	Nest	04.96061	002.46063	15 m	None	Nest marked by GWS volunteer within Project AoI
4	Olive ridley	Nest	04.96127	002.46366	12 m	None	Nest located inside hatchery built by Ghana Wildlife Society at Krisan within Project AoI
5	Olive ridley	Nest	04.98496	002.58352	37 m	None	Nest at Tenack beach resort beach (outside AoI, close to Beyin)
6	Olive ridley	Nest	04.98486	002.58321	37 m	None	Nest at Tenack beach resort beach (outside AoI, close to Beyin)
7	Olive ridley	Nests	04.98848	002.59580	19 m	None	8 nests relocated to in front of Beyin Beach Resort (outside AoI); one nest had hatched with 50 hatchlings

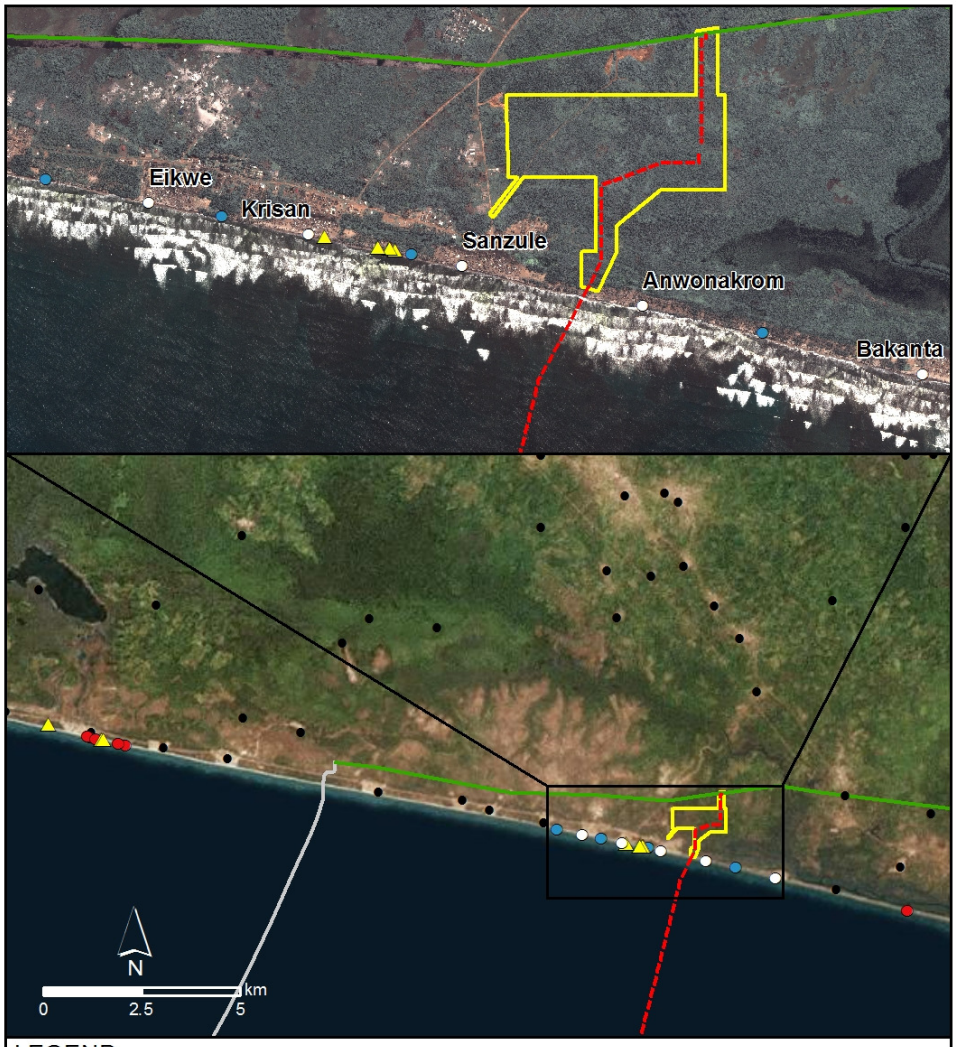
*** Actual date and time of nest deposition by turtle not known. All nests in table were visited on the 25/11/15*

Figure 4.1 Map of Project AoI showing activities observed



Red squares indicate major communities; Green dots indicate nests observed during survey; Purple dots represents non-nesting emergence; yellow dots represents nest marked by Ghana Wildlife Society volunteers before surveys were conducted.

Figure 4.2 Map of overall study area showing observations made both within and outside the Project AoI



4.2 COMMUNITY ENGAGEMENT RESULTS

A total of 96 individuals from six communities (Bakanta, Awonakrom, Sanzule, Krisan, Eikwe and Benyin) were interacted with through the use of 27 FGDs and one-on-one interviews. Even though Benyin is to the west of the surveyed area, it was selected for FGDs due to the presence of the NGOs such as GWS and Wild Seas, who are dedicated to sea turtle conservation in the area. Groups targeted in the FGDs were experienced fishermen, women groups (fishmongers and smokers), youth and elders of the communities.

While some local community members (see Appendix C) describe sea turtles as animals that lived in the sea, most of them also perceive sea turtles as a source of meat. Some respondents also acknowledge that sea turtles come to lay eggs on the beaches. Sea turtles were mentioned by respondents during FGDs as being important because they provide food, income when sold, tourism and bring fish. Fishermen were quick to add that sea turtles, though important, destroy their fishing nets when entangled in the net and cause all their catch to escape; however they reported that recently the occurrence of this is very rare (ranging between 3 and 10 years depending on respondent).

Local community members in the Project AoI encounter sea turtles both at sea and on the beaches. Those respondents that encounter sea turtles at sea do so when fishing. Sea turtles when they come to the beach to nest are also seen by some of the community members who go on the beach to walk, wash or fish (beach seine). The communities also use the beach area as a place of convenience and they sometimes sight sea turtles when doing so. The sight of a turtle brought joy to community members in the past when they were allowed to eat the meat; but most community members are now indifferent at seeing a turtle. Sea turtle sightings were reported to be seasonal, with most community members reporting an average of 3 turtles sighted on the beach during a single year.

Five species of sea turtle were identified and reported by some local people as known from the area; Leatherback, Olive Ridley, Green, Hawksbill and Loggerhead. Although the leatherback was easy and quickly identified, not all community members could distinguish between the 4 hard shell turtles from photographs shown to them; the Olive Ridley, Green, Loggerhead and Hawksbill were thought to be the same species by most respondents. Nesting activity during the past three 5 years was reported for only the Leatherback and the Olive Ridley with the Olive Ridley laying the highest number of nests.

Nesting was reported to occur primarily from October to February, which is in line with some of the observations made during the field surveys. August was also reported as a nesting month. The actual species of turtles nesting in August as reported by the respondents could not be ascertained as respondents' identification between the hard shell species presented a source of error. Green turtles have been reported to nest between June and August on some beaches in Ghana in the past (Amiteye, 2001) with Olive Ridley nesting year round (Agyekumhene, 2009). These two species could therefore be the

species reported by respondents. Nesting numbers by turtles was reported to have reduced drastically in the area in the past 3 to 10 years and even local fishermen reported that they rarely encounter sea turtles at sea. Although the surveys were conducted within the peak nesting season, low evidence of nesting density was recorded in the Project AoI during the survey timeframe. This is aligned with the responses from the local fishermen and community members, who describe a decrease in sightings over the past years.

The decline in sea turtles in the survey study area is likely to be attributed to harvesting of turtle eggs and female turtles by humans, who represent the main predators in the area. There are no dogs or pigs kept in in the Project AoI so egg predation by domestic animals was reported to be non-existent by community members. Dogs were, however, reported to predate eggs along beaches outside the Project AoI by GWS tour guides. GWS tour guides also reported predation of eggs by wild animals such as hawks, kites, crows and crabs. They also mentioned large fishes as predators of hatchlings.

There are no traditional regulations which protect sea turtles in the communities; however the national protection laws have been broadcasted by traditional authorities within the various communities. Community members therefore adhere to the national regulations because their chiefs have asked them to and because of this, the communities report that turtles are not harmed in the area. This is however at odds with reports from some community members of poachers who hide and capture turtles for sale to other communities and reports of community members who collect turtle eggs for sale to beach resorts to bury in front of their hotels for tourists to see the hatchlings when these nests hatch.

Protection of sea turtles in the area has, however, much improved due to its promotion by the traditional authorities and also community education by organizations such as Ghana Wildlife Society and the Integrated Coastal and Fisheries Governance Initiative/Friends of the Nations (Hen Mpoano). The presence of the 'Bahari Karuna' turtle conservation programme run by the Wild Seas NGO in the area may contribute to beach patrols efforts but their presence is yet to be felt in reducing poaching and egg collection on the beaches.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

Observations made during the field survey show that the coastal areas within the Project AoI provide suitable habitat for nesting sea turtles. Evidence of sea turtle nesting was recorded in the Project AoI and its immediate adjacent beaches, though Olive Ridley was the only species recorded during the surveys. Although all five species of turtle documented in Ghana were reported by some local fishermen as known from the area, only two species (Leatherback and Olive Ridley) are reported by these fishermen to currently nest in the area, but in very low density. Olive Ridley was reported as the dominant species in the area, which was confirmed during the survey. The nesting season in the area primarily occurs from October to February, although nesting activities are also reported to occur in September and August.

The numbers of turtles both on the beach and in the sea has declined over the years, resulting in low utilization of the coastal areas in recent times. Major threats to sea turtle in the area identified during the surveys and FGDs include harvesting of nesting females, collection of eggs, beach sand mining, erosion, nest inundation, and artificial beach front lighting. There are no traditional regulations protecting sea turtles in the area but national laws afford some protection of sea turtles in the area. These national laws are largely observed by the local communities because the traditional authorities support the national laws. There are currently a few organisations, including GWS and Wild Seas (Project "Bahari Karuna") supporting sea turtle conservation in the area through education and beach patrols.

The ecological significance of the Project area as nesting habitat for sea turtles was not determined due to the limited survey timeframe. The sensitivity of the area to impacts from activities of the proposed Project with respect to sea turtle nesting could therefore not be fully established. Notwithstanding this, the available evidence, including the fact that the beaches provide suitable habitat that is known to be used by nesting sea turtles suggests that the Project AoI should be treated as an important nesting site. The Project should therefore put the necessary measures in place to mitigate any potential threat to the sea turtles and their nesting habitat.

5.2 RECOMMENDATIONS

Based on the results of the field surveys and FGDs, the survey team proposes the following approach to management and monitoring:

1. The landfall construction area footprint should not extend outside that which is currently predicted (the pipeline centreline plus a 300m buffer either side).
2. At the end of the construction phase, all waste and disposable materials must be properly disposed of and not left at the beach.
3. Use of light during construction should be minimal and lights used should be 'turtle friendly' where possible, *e.g.* amber LED. Directional lighting, screening devices and motion sensors should be fitted on all lights close to the beach to prevent the effect of beach front lights on turtles.
4. Construction works should be avoided during the known peak nesting season in the Project AoI (October to February) and should include the expected incubation period for nests laid in February (March and April). This will reduce the chances of impacts to turtles and their nests. Active monitoring in other areas of Ghana has recorded nesting at the beginning of March (Agyekumhene, 2009) and this could also be true for the Project AoI since there have been no comprehensive surveys during these months to show otherwise. Avoiding construction in the month of May should therefore also be considered based on the results of monitoring activities.
5. A sea turtle conservation taskforce should be set up and trained and equipped to monitor the beach for a full incubation period before, and during, the construction phase. Selecting members of the taskforce should be a responsibility of the chief and chief fishermen of the communities to give volunteers the traditional backing and support. This will favour sustainability of the taskforce and recognition of taskforce members by the community. The taskforce should involve local community members, especially the youth, to help create employment in the community. This would also help attain support of local communities.
6. In addition, surveillance should be carried out during the known major nesting season (October to February) and extend at least to April to allow for the possible hatching of nests that were deposited later in the major season. August has also been reported by community members as nesting period, so this should be investigated at least during the first year. All nests observed during surveys should be marked and revisited to determine hatching success.
7. It is recommended to extend monitoring beyond the Project AoI; particularly to the west, due to its suitability for nesting and the apparently higher activity which was recorded in this area and reported during the engagement sessions. Having the taskforce patrol this area will help minimize some of the threats identified during the survey; poaching of female turtles and egg collection by humans.

8. A number of sea turtle management and conservation actions will be developed as part of the Project Biodiversity Action Plan (BAP) for sea turtles. As a last resort, where *in situ* protection is not possible, or highly unlikely to be successful, or if an individual nest is considered to be in a dangerous location (e.g. close to water, prone to erosion), then eggs deposited during the construction period should be relocated into a constructed safe zone (preferably a guarded hatchery located as close to the site as possible to improve the hatchling imprinting of the nesting beach). Relocation protocols should be developed as part of the Project BAP. Training of the taskforce should be carried out by an institution or NGO who has long experience in sea turtle conservation issues in Ghana such as the Resource and Environment Development Organization (REDO) or Friends of the Nation (FoN).

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7 PHOTO GALLERY

Plate 1: A section of beach in front of Eikwe showing gentle (flat slope)

Plate 2: A section of beach between Eikwe and Krisan showing evidence of erosion. Roots of coconut trees indicate washing of beach sand from underneath the coconut. High slope makes it impossible for sea turtles to access back beach.

Plate 3: A section of the beach between Krisan and Sanzule showing suitable back beach (under coconut trees) for sea turtle nesting

Plate 4: Sanzule fishing community situated right at the high tide mark leaving not enough area at the back beach for sea turtle nesting.

Plate 5: Sand mining on the nesting beach at Sanzule for block molding poses a threat to sea turtle nesting habitat in the area.

Plate 6: Beach area around Anwolakrom used for resting and relaxation by community member. Continuous walking over nests poses a threat to sea turtles along the beach.

Plate 7: Debris accumulation at the back beach around Anwolakrom poses threat to sea turtles

Plate 8: Vehicular movement on beach (day and night) between Sanzule and Anwolakrom is a potential source of disturbance (noise and light) to nesting turtles.

Plate 9: Beach area at Anwolakrom used for fuelwood gathering and selling

Plate 10: Beach area at east of Bakanta outside the project's footprint. Intense erosion coupled with dense vegetation renders area unsuitable for sea turtle nesting.

Plate 11: Sea turtle nest washed by erosion at the east of Bakanta, outside the project AoI.

Plate 12: Beaches along on the eastern section of project area after Bakanta. High cliff prevents sea turtles from ascending the back beach. Nest deposited below cliff are threatened with erosion or inundation.

Plate 13: Beach front light coming from high wattage bulb close to the beach at Krisan community.

Plate 14: Sea turtle conservation sign post erected by Ghana Wildlife Society to educate community members and visitors. Sign is located at Eikwe by the main road leading to Sanzule. Below are A.K. Armah (right) and assistant Andrews Agyekumhene (left)

Plate 15: Sea turtle conservation by local beach resorts.

Plate 16: Local Beach resort supporting sea turtle conservation in the area. Sign post is located close to the entrance of the Resort at Beyin.

Plate 17: One-on-one interview with community member at Bakanta. In the picture are Andrews Agyekumhene (right) respondent (middle) and staff from ENI (left) doing the translation from English to Nzema and vice versa.

Plate 18: Focal group discussion with fishermen after beach seine fishing on the beach at Anwolakrom.

Plate 19: Focal group discussion with fishermen mending their nets on the beach at Anwolakrom.

Plate 20: Turtle nests relocate to infront of Benyin beach Resort. In the picture is Bernard Azane Eholade, staff of Ghana Wildlife Society.

Plate 21: Hatched nest in front of Benyin Beach Resort. Hatchlings crowded in the shade at the corner of the box to avoid lethal heat from the sun.

Plate 22: Survey team, A.K. Armah (in cap), Andrews Agyekumhene (Squatting) and staff of Ghana Wildlife Society releasing hatchlings in front of Beyin Beach resort to avoid dehydration from sun

Plate 23: Volunteer of Ghana Wildlife Society (John Paul Boakye) standing by a hatchery at Krisan.

Plate 24: Data recording during night surveys close to Eikwe. Red lights are used to avoid the disorienting effect of white light on turtles.

Plate 25: Team members taking a break at Sanzule beach after a long walk on night surveys.

Plate 26: Turtle nest located below the cliff between Ngakpoley and Eikwe (Figure 4.1).

Plate 27: Survey team member using crawls to identify sea turtle species

Plate 28: Egg chamber abandoned by turtle at areas close to Tenak Beach resort east West of the project AoI. Roots of coconut interfered with successful evacuation.

Plate 29: Sea turtle nest encountered during dawn patrols between Anwolakrom and Bakanta. In the background is a vehicle on the moving on the beach.

Anwolakrom

Plate 30: Staff of Tenak Beach resort burying relocated eggs in front of the resort.

8 APPENDICES

Appendix A: Sea Turtle Evidence Recording Sheets

<table>
<tr><th colspan="4">Project: eni Ghana OCTP Development
Sea Turtles survey: TURTLE EVIDENCE RECORDING SHEET</th></tr>
<tr><td>Specialist:</td><td colspan="3">Date and time (indicate if night or day):</td></tr>
<tr><td rowspan="2">Survey Point Code:
WP</td><td colspan="2">Geographic system considered:</td><td></td></tr>
<tr><td>Waypoint Coordinates:</td><td>X:</td><td>Y:</td></tr>
<tr><td rowspan="3">Turtle presence
(to be filled only if life turtle individuals are observed)</td><td>Species observed</td><td colspan="2"></td></tr>
<tr><td>Number of individuals</td><td colspan="2"></td></tr>
<tr><td>Behaviour / Activity</td><td colspan="2"></td></tr>
<tr><td>Trace evidence of turtle presence (to be filled in case of observation of traces and not live individuals)</td><td colspan="3"></td></tr>
<tr><td>Stranded sea turtles (including species identification, state and carapace measurements)</td><td colspan="3"></td></tr>
<tr><td>Nests found (Yes/No and record precise location and characteristics)</td><td colspan="3"></td></tr>
<tr><td>Estimated Clutch size</td><td colspan="3"></td></tr>
<tr><td>Presence of emerging hatchlings</td><td colspan="3"></td></tr>
<tr><td>Evidence of predation on eggs or hatchlings?
(If so, indicate predator species or human interference with nests)</td><td colspan="3"></td></tr>
<tr><td>Unsuccessful attempts of nesting detected?
please indicate the cause if possible</td><td colspan="3"></td></tr>
</table>

Appendix B: Focus Groups discussions: Sea turtle presence in survey area and interaction with local communities

Project: eni Ghana OCTP Development Sea Turtles Focus Groups: Sea turtle presence in survey area and interaction with local communities	
Name of Interviewer:	**Date and time:**
Community Name:	**Location:** *(beach, elders home, public space, etc.)*
User group: *(youth, women, elders, fishermen)*	**Number of individuals in Focus Groups and group details / description:** *(age range, gender, attitude / behaviour etc.)*
Observation / general comments *(body language, general attitude/behaviour, other information not covered in checklist)*	
I. Community knowledge and perception of sea turtles - perception positive / negative / neutral, potential use of turtles (***sensitive!***), turtles protection / conservation	
II. Observation of turtles during day to day activities at the beach – confirmation of whether turtles have been observed during day to day activities at the beach (fishing, washing, leisure, etc.), frequency, reaction when this happens	
III. Time frame of observations – season, time of the day, regularity	
IV. Species observed –different species observed, frequency of appearances for each, potential increase or decrease of presence in recent years	
V. Signs of animal predation – presence of animal predators on the beach (specify which animals), threats to turtles and hatchlings	

VI. Traditional rules protecting turtles – past and present local traditional rules over when turtles can / could or could not be taken, respect / implementation of these rules, perception / opinion regarding these rules
VII. Observation of egg harvesting for human consumption (*Sensitive, do not ask question directly!)* - Identification of which groups within the community are involved (women, children, youth, etc.), identification of potential other uses of turtles (meat consumption, shell trade, etc.)
VIII. Potential effect of changes in fishing practices on the number of turtle caught up on the bi-catch – changes in the number of turtle catches in recent years, changes in numbers and frequency of sea turtle presence on the beach, investigate change in current fishing practices

Appendix C: Completed Data Sheets from Focus Groups Discussions