

# The Nature of Conflict

Understanding Knowledge and Perceptions of and Attitudes towards Sea Turtle Conservation in Orissa



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# Understanding conflict

The topic of nature conservation is today incomplete without discussion and disagreement over its negative impacts or conflicts with resource users. With more and more humans seeking to share already contested and over-exploited ecosystems, these social-ecological spaces develop into contentious political spaces involving rights and control over resources. A number of factors then drive conflict between humans over the subject of wildlife conservation. Orissa, on the east coast of India is one of the three global sites where synchronous nesting of thousands of olive ridley turtles occurs, making this a well-recognised ecological region.

More recently, however, Orissa has come to be viewed as an area of intense and violent conflict between local communities and the state over the subject of development and conservation. The struggles of tribal and coastal communities against mining interests, large industries and port development to resist forced displacement and destruction of their natural resources are well known in the country today. In the seascape, traditional fisher communities have begun aggressively resisting official marine conservation laws, which they view as exacerbating their social and economic condition (ICSF 2009).

Through the present project, we sought to examine conflict and conservation of sea turtles in Orissa. We investigated the perceptions of actors in conservation regarding the subject of conservation and conducted an assessment of the perceptions of traditional fishing communities about conservation based on their proximity to the area of conflict (or conservation). The present project also gathered information on the fishing practices in this region to better understand livelihoods – often viewed as a threat to conservation. Fishing methods in Orissa range from artisanal shore seines, entanglement nets (trammel nets), hook and line fishing, and a wide

variety of gill nets and trawl nets. So far, sea turtle mortality in Orissa is reported to occur most often in bottom trawl nets, multifilament gill nets, and large meshed monofilament gill nets. Besides the incidental take from fishing operations, other threats to the turtles include *Casuarina* plantations along the nesting beaches which have caused a loss in nesting habitats and artificial illumination from towns and highways, particularly at the Rushikulya site (Karnad et al., 2009). Proposals for commercial ports and other large-scale anthropogenic activities near the mass nesting beaches are likely to pose a threat to this population as well. Given the escalating threats to sea turtles and the marine environment in general, it is necessary to examine views on conservation measures in the state, impacts of coastal development on the marine environment and ideas about scientific information in problem solving.

As might be expected, there is no single common view between the various categories of fisherfolk (traditional and mechanised), government departments, scientists and conservationists on the existing sea turtle protection measures in operation in Orissa. The conflicts arising out of the lack of agreement on conservation is also attributed to failure of all these groups to come together to work out effective, appropriate commonly agreed conservation measures.

However, there has been a gradual shift in this scenario and starting with the formation of the Orissa Marine Resources Conservation Consortium in December 2004, where diverse groups including the traditional fishworkers, turtle biologists, local conservation groups and NGOs met to address issues of common concern. Our study also focused on the effectiveness of such measures, perceptions about the same and ideas to overcome the negativity associated with conservation practices and practitioners.



Figure 1: The state of Orissa with 6 coastal districts

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# The state of Orissa

The knowledge of Orissa's waters, and the use of her coastal resources is not by any means new. The history of this region straddles this and the previous millennium and bears evidence of early sailing knowledge both for maritime trade and fishing. The coastal boundaries of the earlier state extended into modern Andhra Pradesh in the south and West Bengal to the northeast. The Andhra as well as Bengali influences and characteristics that are plainly visible in Orissa's coastal culture today, thus find origin in the long history of the state.

Modern Orissa is located between the 17°-48' and 22°-34' North latitude and 81°-24' and 87°-29' East longitude. The Bay of Bengal forms the eastern coastal boundary of this territory and the coastline measures 480 kilometres. Being in a tropical zone, the summer months between April–June are hot with temperatures often rising to 50°C. Coastal tracts are granted some relief from the moderating influence of the sea. The state is drained by several rivers, the six important ones being the Subarnarekha, the Budhabalanga, the Baitarani, the Brahmani, the Mahanadi and the Rushikulya. Paradip can be taken to be the dividing point between the northern and southern coast of the State. The continental shelf of Orissa measures about 24,000 sq km and extends upto 120 kilometres off the northern coast where the Mahanadi, Baitarani and Brahmani rivers bring heavy sediments. In the southern coast the shelf is about 40 kilometres wide. The northern coast consists of a complex of deltas, estuaries, marshes, mangrove forests and an extensive tidal area, whereas the southern coast has sandy beaches, open shores and a deeper continental shelf.

The differences in coastal ecological and oceanographic conditions between the north and the south are responsible for the occurrence of different fisheries, different fishing techniques, knowledge, craft and gear and are also reflected in different cultural and social practices in the two regions. The various studies conducted by the Bay of Bengal Programme (BOBP) in Orissa between the 70s and 80s attest to this (Tietze 1985). These conditions also determine the presence of specific flora and fauna in the region.

The history of marine fisheries in Orissa and knowledge about the fishing communities of the state is still somewhat obscure and therefore inconspicuous. However, Orissa is well known for the ecological treasures it nurtures. Besides harbouring the famous salt-water crocodile (*Crocodylus porosus*) in the mangrove forests of Bhitarkanika, Kendrapara district, Orissa's coastal waters and beaches are the breeding and nesting grounds of olive ridley sea turtles (*Lepidochelys olivacea*). Orissa has 6 coastal districts further divided into administrative blocks (See Figure 1).

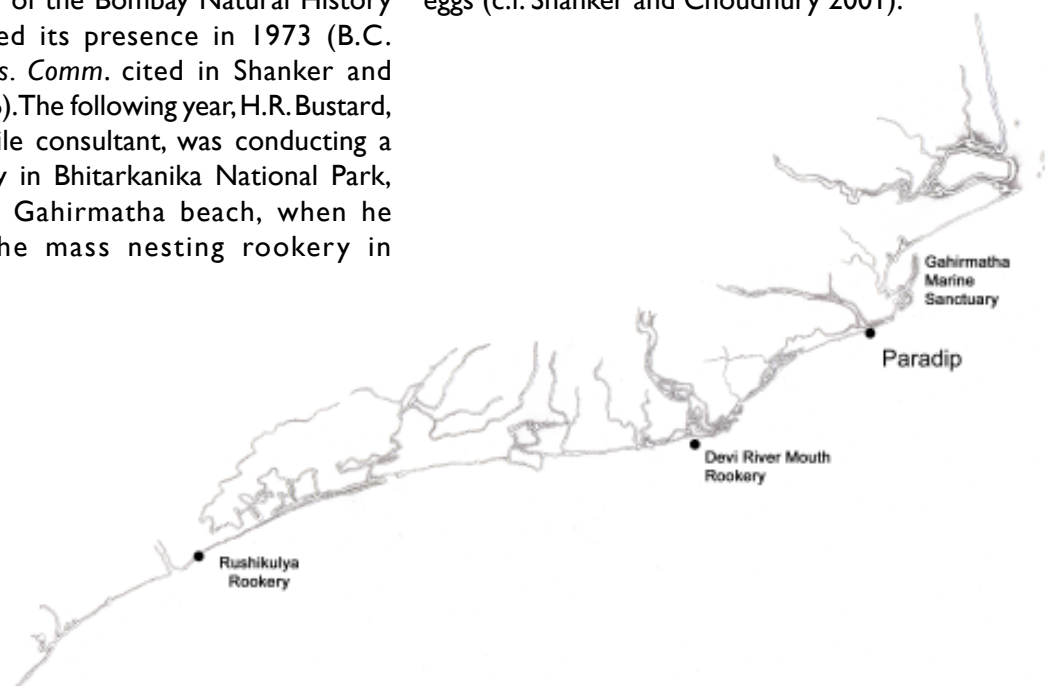
## Sea turtles – flagships of marine wildlife

Five species of sea turtles are found in Indian waters and four of them nest on either the mainland or offshore islands, but only the olive ridley turtle nests along most of the mainland coast. Although they are the smallest of the sea turtles, in recent times, olive ridleys have attracted much attention because of extensive media coverage of the extraordinarily large numbers nesting and also stranding dead, particularly in the state of Orissa. Olive ridley turtles nest along both coasts of India and the offshore islands, including the Lakshadweep off the west coast, in the Arabian Sea, and Andaman and Nicobar islands in the Bay of Bengal, off the east coast (Kar and Bhaskar 1982). Low density nesting (1 – 5 nests with eggs / km / season) probably occurs along the entire coast wherever sandy beaches are available. On the east coast, a few thousand turtles nest annually in both the states of Tamil Nadu (Bhupathy and Saravanan 2002) and Andhra Pradesh (Tripathy *et al.* 2003); and over a hundred thousand turtles nest most years during mass nesting events, or “*arribadas*”, at Gahirmatha in Orissa (Shanker *et al.* 2004a).

Though locals had been exploiting the turtle eggs at Gahirmatha beach for many decades, the occurrence of mass nesting on this beach was not known to the scientific community until J.C. Daniel and S.A. Hussain of the Bombay Natural History Society indicated its presence in 1973 (B.C. Choudhury *Pers. Comm.* cited in Shanker and Choudhury 2006). The following year, H.R. Bustard, an FAO crocodile consultant, was conducting a crocodile survey in Bhitarkanika National Park, which includes Gahirmatha beach, when he ‘discovered’ the mass nesting rookery in

Gahirmatha and declared it as the ‘world’s largest’ (Bustard 1974; 1976). Subsequently, two additional mass nesting sites were discovered farther south, one at Devi River mouth near Puri in 1981 by C.S. Kar of the Orissa Forest Department (Kar 1982), and another at Rushikulya, just before the border with Andhra Pradesh, in 1994 by B. Pandav of the Wildlife Institute of India, Dehradun (WII) (Pandav *et al.* 1994).

The population that nests on the east coast of India comprises a distinct genetic stock (Shanker *et al.* 2004b). Each season for nearly two decades, thousands of dead olive ridleys have washed ashore on the coast of Orissa, drowned in fishing nets (Silas *et al.* 1983; Pandav 2001; Wright and Mohanty 2006). Much of this mortality is attributed to drowning in trawl nets (Pandav and Choudhury, 1999), but recent accounts suggest that gill nets may also cause large scale mortality (Wright and Mohanty, 2001). Several hundreds of olive ridley carcasses also wash up every year south of Orissa, on the coast of Andhra Pradesh (Tripathy *et al.* 2003), and also in Tamil Nadu (Bhupathy and Saravanan 2002). In addition to fishery related mortality, olive ridley populations are threatened by pollution, habitat destruction (e.g., sand mining, beach armouring and lighting) and depredation of eggs (c.f. Shanker and Choudhury 2001).







## Direct take to incidental catch

Prior to independence in 1947, the local zamindar (landowner or collector of land revenue) levied a duty (called 'andakara') for the collection of eggs from the Gahirmatha mass nesting beaches (Dash and Kar 1990), and between 1947 and 1975, the Orissa Forest Department issued licenses for egg collection. Eggs were sold in the riverside villages of Bhitarkanika and also transported in large numbers to Calcutta. Locally, in Bhitarkanika, turtle eggs were preserved in large quantities by sun drying and then used as cattle feed. The estimated legal take for just the 1973 season was 1,500,000 eggs, but the actual take may have been considerably more (*ibid*). In addition, adult ridleys were hunted offshore of Gahirmatha for the meat market in West Bengal from at least the 1960s until the early 1980s (Dash and Kar 1990). When mechanization of local fishing boats was introduced in the 1970s, the turtle take increased dramatically, and some authors estimate that over 50,000 turtles were shipped to Calcutta each breeding season (Biswas 1982; Das 1985). The Indian Wild Life (Protection) Act was introduced in 1972, is the strongest national legislation for the protection of endangered species. The implementation of this Act by the Orissa Forest Department, with the support of the Coast Guard, ended the legal meat trade by the early 1980s (Dash and Kar 1990).

Incidental mortality of turtles in trawl nets was first reported for Orissa in the 1980s, when the death of a few thousand turtles annually was documented (Silas *et al.*, 1983; James *et al.*, 1989), although there would have been more strandings each year since only a relatively small portion of the coast was covered, and surveys were carried out for only a part of the season. In the 1990s, recorded carcasses increased from 5,000 in 1994 to 15,000 in 1999 (Pandav and Choudhury, 1999) and since then, ten to twenty thousand dead turtles have been counted on the Orissa coast each year (Wright and Mohanty, 2006). In 2001/02, one portion of a gill net that washed ashore near Gahirmatha had over 200 dead turtles entangled in it (*ibid*), showing that the threat from this fishery also has to be addressed, though

only a few large instances of gill net mortality have been recorded. Bearing in mind that the carcasses that wash up on the beaches are only a proportion of the animals that died at sea (Epperly *et al.* 1996), the numbers of turtles killed annually have truly been extraordinary.





# Turtle science in Orissa

A number of scientific studies have been undertaken in Orissa on the nesting, mortality, behaviour and ecology of sea turtles in Orissa. Numerous scholars have conducted research on olive ridley turtles in Orissa, many resulting in Ph.D. (CS Kar, B. Pandav, B. Tripathy, Suresh Kumar) and Masters dissertations (K. Ram, D. Karnad, M. Muralidharan, E. Fatima, S. Mallik). A brief summary of conservation related research on olive ridley turtles in Orissa is provided below:

- Mass nesting beaches were discovered at Gahiramtha (Bustard 1974; 1976), Devi (Kar 1982), Rushikulya (Pandav *et al.* 1994) were documented. Populations were not estimated using standard techniques till the 2000s (reviewed in Shanker *et al.*, 2004a), barring in 1999 in Gahirmatha (Shanker *et al.* 2004a) and 2004 and 2005 at Rushikulya (Tripathy 2005). Over the last few years, populations have been monitored on a regular basis at Rushikulya by the Centre for Ecological Sciences, Indian Institute of Science (IISc), Bangalore (K. Shanker *et al.*, unpubl. data).
- An increase in sea turtle mortality was documented from a few thousands in the early 1990s to more than 10,000 per year by the mid 1990s (Pandav, 2000). A review of data suggested that this population may be on the verge of a decline, based on evidence from the failure of arribadas, a decline in adult sizes and high fishery related mortality (Shanker *et al.*, 2004a). However, nesting data since the early 2000s does not support this (K. Shanker *et al.*, unpubl. data).
- Nearshore surveys have shown that sea turtles occur in discrete areas which have been named as 'reproductive patches'. These reproductive patches have been located off the coasts of Gahirmatha (Pandav, 2000; Ram, 2000) and Rushikulya (Tripathy, 2005), and are expected to occur in the offshore waters of other mass nesting beaches such as Devi River mouth. The patches are about 50 – 75 km<sup>2</sup> in size, and extend to a distance of about 5 – 6 km offshore. Recent studies continue to document sea turtle aggregations in the nearshore waters of the mass nesting beaches (Wildlife Institute of India, unpubl. data, Suresh Kumar, in prep.)
- Tagging studies were initiated in the 1970s in Orissa (Dash and Kar, 1990). The Wildlife Institute of India tagged 10,000 nesting turtles and 1600 mating pairs in offshore waters from 1995 – 1999 (Pandav 2000). Results showed that olive ridley

turtles migrate between mass nesting beaches (Pandav, 2000). Tagged turtles were recovered from southern Tamil Nadu and Sri Lanka, indicating that at least some of the olive ridleys that nest in Orissa migrate to these areas.

- Satellite telemetry studies were initiated by Wildlife Institute of India (WII) in 2001, with 4 turtles; WII tagged more than 60 turtles with satellite transmitters between 2007 and 2009. Broadly, the results show that some turtles remain in the offshore waters of Orissa, moving within 50 and 200 km of the coast, while others the coast of Sri Lanka and the Gulf of Mannar. Genetic studies confirmed the results of tagging and showed that there is no genetic difference between nesting populations in each of the mass nesting beaches. More significantly, the results revealed the distinctiveness of the population on the east coast of India, and suggested that they may be ancestral to populations in the Atlantic and Pacific oceans (Shanker *et al.*, 2004b). Current studies are documenting differences between the east and west coasts, and examining the Orissa population in greater detail (Ema Fatima, unpubl. data)
- Satellite imagery studies suggest that the failure of mass nesting at Gahirmatha in 1997 and 1998 is due to natural causes such as erosion and reduction in the nesting habitat due to the impacts of successive cyclones (Prusty *et al.*, 2000).
- A recent study on the impact of lighting confirms that olive ridley hatchlings show preferential orientation towards low wavelength and high intensity light (Karnad *et al.*, 2009). The study also shows that beach plantations of introduced *Casuarina equisetifolia* acted as an effective light barrier when planted about 50 m away from the high tide line reducing as much as 50% disorientation. A study was also conducted on site selection by olive ridley turtles in Rushikulya rookery (Muralidharan, 2009)

Apart from these results, many studies have included documentation of a number of variables including clutch size, hatching success, adult and hatchling morphometrics, etc. Ongoing research programmes (mainly WII and IISc) continue to monitor nesting and offshore populations. Additionally, a long term study was initiated on temperature and sex ratios (in the context of climate change) by the Indian Institute of Science in 2008.



# Conservation initiatives for olive ridleys

The conservation of olive ridleys in Orissa has been discussed and debated since the early 1970s when the large scale legal/incidental take of turtles from Gahirmatha was widely reported (Davis and Bedi 1978; see also Frazier 1990). In the early 1980s, numerous petitions and letter writing campaigns were supported and endorsed through the *Marine Turtle Newsletter*, an international newsletter, (Mrosovsky *et al.* 1982; Mrosovsky 1983a), and several hundred letters were in fact written to the Prime Minister Indira Gandhi (Mrosovsky 1983b). J. Vijaya, a young, adventurous field biologist conducted field surveys in the early 1980s and reported on the large numbers of turtles being sold in fish markets near Calcutta (Vijaya 1982 ; Moll *et al.* 1983), and this, along with her photographs of hundreds of turtle carcasses (published in *India Today*, 1982), brought even more attention to the extraordinary numbers of turtles being killed in Orissa. The subsequent (or consequent) support of Prime Minister Gandhi, and her initiative to involve the Coast Guard in protecting the marine area at Gahirmatha, helped drastically reduce the direct take to a point where it was thought to be negligible. However, even then, the threat of incidental mortality had been documented by none other than Dr. E.G. Silas, then Director of the Central Marine Fisheries Research Institute (Silas, 1984). In the 1990s, another young field biologist, Bivash Pandav of the Wildlife Institute of India, Dehradun, reported thousands of stranded carcasses on Gahirmatha and other neighbouring beaches, attributed to high incidental mortality in offshore trawling, and he advised immediate remedial action (Pandav and Choudhury 1999; Pandav 2000). Beginning in 1999, Operation Kachhapa has provided continuous support for field surveys and media attention to the 'plight of the ridleys'. In 2000, the Annual Symposium of Sea Turtle Biology and Conservation passed two resolutions on this issue: the "Urgent need to review coastal development plans in order to conserve olive ridley sea turtles as well as critical nesting habitat for the turtles and other endangered species on the Orissa coast, India" and the "Urgent need to reduce trawling related mortality of olive ridley sea turtles on the Orissa coast, India." (Anonymous 2000). All

told, there has been a tremendous amount of attention focused on the olive ridleys in Orissa, both nationally and internationally; and this has directly involved the highest offices of the nation, and it has been ongoing for decades.

To reduce turtle mortality and safeguard the future of the species, the Wildlife Protection Society of India (WPSI) launched "Operation Kachhapa" (OpK) in 1998. The programme was run in partnership with the Wildlife Society of Orissa (WSO) and the Orissa Forest Department (*kachhapa* is the Oriya word for turtle) (Wright and Mohanty 2005). One of the mandates of Operation Kachhapa was to reduce mortality by implementation of the existing legislation. Towards this end, they supported the Forest Department by hiring private trawlers to be used for patrolling the nearshore waters of Gahirmatha, paid legal expenses and provided legal advice for prosecuting trawlers caught fishing illegally. They have also substantially raised awareness about turtle related issues through the media, much of which has targeted mechanised fishing as the main problem that needs to be solved (Wright and Mohanty 2006).

As part of its international campaign titled 'Defending our Oceans' the international environmental NGO Greenpeace embarked on a series of intervention along the Orissa coast starting in 2005. Their activities included patrolling the waters around Orissa's Gahirmatha Marine Sanctuary, documenting and observing mass nesting. The organisation decided to undertake offshore patrolling with a view to 'making the nesting season of 2006 safer for sea turtles' as reported in their press releases. In January 2006 Greenpeace deployed buoys to demarcate the boundaries of the GMS – a demand made by different categories of fishworkers and also a directive of the Supreme Court's Central Empowered Committee. This action was to meet with mixed reactions and also opposition from the representatives of fishworker groups of the area who expressed disappointment at being further restricted from fishing. Greenpeace has also focused on coastal development in Orissa

particularly on the implications of a commercial port at Dhamra built by TATA Steel with construction company Larson & Toubro. WWF is another international NGO that has had its presence in turtle conservation by means of supporting local organisations in turtle monitoring and conservation efforts, setting up hatcheries, interpretation centres and so on.

A number of local conservation groups have grown over the last decade in Orissa. These are largely

local village based groups of youth who have either been employed formerly as field assistants by scientists and who now engage in sporadic monitoring nesting and mortality along the coast. Some of these groups are registered while others are not. A profile of such organisations appears in issue 1 of the newsletter *Indian Ocean Turtle Newsletter (IOTN)* (Anon 2005) and an updated list appears in Issue 13 of IOTN.



# Legislations for the protection of sea turtles in Orissa

We present key events related to sea turtle conservation legislation in Orissa, which is a combination of species and habitat protection (Table 1). The key legislations in operation in the state are the Indian Wild Life (Protection) Act, 1972, the Orissa Marine Fisheries (Regulation) Act, 1982 and Orissa Marine Fisheries (Regulation) Rules, 1983. Numerous subsequent interventions and

orders have been issued by the judiciary and official committees at the State level. They are also under protection from International Conventions such as Convention on Migratory species (CMS) and Convention on International trade on endangered species of wild Flora and Fauna (CITES), to which India is a signatory.

Table 1: Turtle conservation legislations

<i>Species protection</i>	
1972 and 1977	Introduction of the Indian Wild Life Protection Act (WLPA). The olive ridley is listed on Schedule I as a protected species in 1977.
<i>Fisheries management regulations</i>	
1982 – 1983	Orissa Marine Fisheries Regulation Act (OMFRA), 1982 and Rules, 1983 introduced.
1983	OMFR Rules introduced. It outlined different fishing zones for different fishing crafts
<i>Turtle Habitat Protection</i>	
1994	OMFRA: Biennial orders prohibiting fishing at Gahirmatha. Reissued periodically.
6.06.1997	OMFRA seasonal prohibition (Jan–May) on fishing by trawlers at Devi and Rushikulya 20 km seaward radius. Reissued periodically.
27.09.1997	Declaration of the Gahirmatha Marine Sanctuary (GMS) under the WLPA.
10.10.2003	State High Power Committee (HPC) recommends that the State Government consider proposals for the Devi and Rushikulya areas to be declared as Wildlife Sanctuaries.
04.02.2005	OMFRA seasonal prohibition (November–May) on fishing by motorised boats and trawlers at Devi and Rushikulya for a distance of 10 km.
<i>Access regulation</i>	
21.05.1998	State HPC issues restrictions on fishing within the Gahirmatha Sanctuary.
<i>Fishing Gear Regulation</i>	
6.12.1997	OMFRA order mandating use of Turtle Excluder Devices (TEDs) on trawlers
17.04.2001	OMFR Rules mandating 'mechanised fishing vessels' to use a TED
<i>Judicial intervention</i>	
7.03.2003	Interim orders on turtle conservation from the Central Empowered Committee (CEC) of the Supreme Court of India
10.10.2003	HPC prohibits fishing by trawlers and gill-netters in the Dhamra mouth, Devi mouth and Rushikulya mouth from 1 <sup>st</sup> November to 31 <sup>st</sup> May 2004.
7.04.2004	Revised CEC directions on fishing regulations



## Species protection under the Wild Life (Protection) Act

Records show that till the mid 70's Orissa openly supplied local as well as distant markets like Kolkata with turtle meat and turtle eggs (Kar, 2001). The Wild Life Protection Act (WLPA) came into force in 1972 and all sea turtles found on the Indian coast were included in the list of protected species in Schedule I of the Act in 1977. The WLPA declared the consumption, trade, hunting and injury of turtles as prohibited, and the enforcement of the Act eventually led to the decline in turtle trade in Orissa by the 1980s (*ibid*).

Significantly, the WLPA does not make a clear distinction between incidental or accidental capture in fishing nets and poaching. Therefore fisherfolk found with sea turtles in their fishing nets can be penalised in the same manner as poachers, irrespective of whether the catch takes place within or outside a protected area. Enforcing officers are vested with considerable powers and the penalties of the WLPA are heavy, comprising a combination of a term of imprisonment and fines. The nesting beaches and offshore waters at Devi and Rushikulya, being turtle habitats by definition, are also required to be protected during the breeding and nesting season by the Orissa Forest Department.

## Declaration of the Gahirmatha Marine Sanctuary

On 27<sup>th</sup> September 1997, the Government of Orissa declared Gahirmatha, one of the world's largest nesting beaches and its waters as the Gahirmatha Marine Sanctuary (GMS) under section 26(1)(b) of the WLPA. This comprises parts of the nesting beaches (uninhabited islands and sand spits) and the near shore waters around the area. The marine sanctuary was divided into a core area measuring 725.5 km<sup>2</sup> and a buffer zone measuring 709.5 km<sup>2</sup>. The total area of the GMS measures 1435 km<sup>2</sup>. The notification of the GMS states that no fishing activities are to be permitted in the core area throughout the year. The WLPA also does not mandate that the Government undertake a consultative process of 'settlement of rights' (as provided in section 19-25 of the WLPA) if the proposed protected area is comprised of reserve

forests or territorial waters. The Act however provides that '*adequate measures should be taken to protect the occupational interests of local fishermen*'. Section 26(2) states that '*the right of innocent passage of vessels and boats through the territorial waters shall not be affected by the notification*'.

As proof of having taken adequate measures to protect the interests of local fisherfolk, on 21<sup>st</sup> May 1998, a High Power Committee (HPC) constituted by the Government of Orissa, met to decide on fishing rights within the core and buffer zone of the GMS (Government of Orissa, 1998). The HPC maintained that no fishing would be allowed in the core area. For the buffer area of the sanctuary, a region located for the most part beyond the core area, the HPC decided to permit only catamarans and crafts using motors less than 10 h.p and monofilament nets ('*of smaller net size and length*'). This was also made a condition for registration of the fishing boats. However these decisions were drafted in exclusivity with no proof of any consultation with local fisherfolk from the region surrounding the sanctuary.

This created problems in implementation. For example, the finer details of enforcing these fishing regulations such as proof of '*innocent passage*', assessment of number of marine fisherfolk requiring access rights, process of obtaining permits to pass through the core area of the GMS to the buffer zone were overlooked. Despite the problems in implementation at the Gahirmatha Sanctuary, the State Government through its High Power Committee, is pursuing the idea of according Protected Area status (under the WLPA) to the Devi and Rushikulya areas (See Table I - event dated 10.10.2003). This proposal to create two additional sanctuaries has met with disapproval from all quarters including from the Orissa Marine Resources Conservation Consortium – a multi-stakeholder platform for conflict resolution and collaborative marine conservation in Orissa.

## Turtle conservation through the Orissa Marine Fisheries (Regulation) Act

The Orissa Marine Fishing Regulation Act (OMFRA), 1982 and the OMFRA Rules, 1983 prohibit all mechanised fishing within 5 km of coast. It is now

being recognised that fisheries regulations play a very critical role in turtle conservation. By keeping mechanised vessels away from near shore waters, reproductive congregations are protected to a great extent. Section 4(1) of the OMFRA empowers the State Government to introduce regulations in any specified area for different categories of fishing vessels and fishing gear. Rule 16 (1) of the OMFR Rules states that the waters five kilometres from the shore is reserved exclusively for non-mechanised traditional fishing crafts, and that no other type of mechanised fishing vessel shall be allowed to operate in the area. Mechanised fishing vessels (including trawlers) upto 15 meters of length are allowed to operate only beyond five kilometres of the coastline. Current studies indicate that turtle congregations are found mainly within five kilometres from the shore (Pandav, 2000; Tripathy, 2004). Consequently a better implementation of this fisheries regulation will reduce considerably trawler induced turtle mortality. The OMFRA also imposes a ceiling on the number of mechanised vessels that can be licensed to operate along the Orissa sea-coast. The present limit, as notified under Form VI, Rule 17 of the OMFRA Rules, 1983, is one thousand vessels. There are however a large number of illegal and unlicensed vessels operating in violation of this rule.

Since 1994 the Government of Orissa has been issuing biennial orders under the Orissa Marine Fisheries (Regulation) Act (OMFRA) prohibiting all fishing within 20 km of the Gahirmatha coast, which extends 35 km south from the mouth of the Rivers Brahmani and Baitarani. The ban on fishing in these waters is round the year and is not only for the turtle season. It is reissued at the end of each term at least till 2004. The Fisheries Department of the Government of Orissa introduced a seasonal prohibition on fishing by trawlers for a distance of 20 km from the seashore at the Devi (Jatadhar River mouth to Devi River mouth) and Rushikulya (Chilika River mouth to Rushikulya River mouth). The ban was only for the turtle season from January to May every year. In 1997 the OMFRA was amended to prohibit mechanised fishing within 20 km of coast around both the Devi River mouth and Rushikulya from January to May. This was amended again in 2005 to prohibit fishing by motorised boats and trawlers within 10 kilometres from the shore (in Devi and Rushikulya areas) for

a period between November and May.

### **Gear regulation examples: The Turtle Excluder Device (TED) and self-regulation by the OTFWU**

In the mid 90's the United States of America modified Section 609 of Public Law 101-162 of the Endangered Species Act, 1973 and made it mandatory for countries exporting shrimp to the U.S to set in place a marine turtle conservation programme comparable to that of the U.S (for a review, see Bache and Frazier, in press). However the United States has been insisting on recognising only the usage of TEDs as suitable conservation measures in order to permit shrimp imports from India. A notification issued under the OMFRA in 2003 makes Turtle Excluder Devices (TEDs) mandatory for all trawlers operating in the state's waters. In addition, the Central Institute of Fisheries Technology (CIFT) has developed an indigenous TED (Dawson & Boopendranath 2001) which costs as little as Rs. 2000.00 (equivalent to ~ USD 50.00 at the rate of exchange in mid 2004). Compelled to use TEDs, shrimp exporting trawlers from Orissa and other Indian coastal states, have been issued over a few hundred free TEDs by the Marine Products Export Development Authority, an institution under the Ministry of Commerce (Choudhury 2003). Moreover, a few hundred TEDs were said to be in use in Andhra Pradesh, the state south of Orissa (Bavani Sankar & Anantha Raju 2003). Despite the very clear regulation for mandatory use, the indigenous technological advances, and the free provision of the equipment, TEDs are not currently used in Orissa (Wright and Mohanty 2006 *and personal observation*).

Some attempts at popularising TEDs and other devices such as the trawl guard in Orissa have also been undertaken with assistance from local NGOs like Project Swarajya. But the TED rule is universally violated since all trawlers insist that the accompanying catch - loss from the use of TEDs is too high a cost. On the other hand, the Orissa Traditional Fish Worker's Union (OTFWU) decided to spontaneously ban a few nets along the entire Orissa coast – the sting ray net (a large meshed multifilament net), the large meshed monofilament pomfret net and the ring seine. Of these, the former two are well known to result in turtle mortality.

There is little information about the enforcement of this ban. Recent reports suggest that the union has not been able to enforce the ring seine ban and attribute this to the non-cooperation from the fisheries department.

### **Judicial intervention for turtle protection**

The Central Empowered Committee of the Supreme Court of India, which was constituted in 2002 to examine the implementation of legislation pertaining to forest and wildlife issues, has taken up the cause of turtle conservation in Orissa. In a recent petition filed before the Central Empowered Committee (CEC) appointed by the Supreme Court of India (Shri Alok Krishna Agarwal vs. Union of India State of Orissa and others), the petitioner outlined matters related to non-implementation of turtle protection measures and other threats to turtles in Orissa. In its first interim directions in this petition, dated 7<sup>th</sup> March 2003, the CEC imposed a complete ban on all gill net boats operating in the waters off the three mass-nesting sites.

However after much agitation from the traditional fishworker organisations, led by the OTFWU, these orders were revised. The final orders of the CEC dated April 2004 are detailed and pay more attention to the nature of restrictions for the traditional fisherfolk. At the Devi and Rushikulya site, trawlers are prohibited from fishing for the months of November till May for a distance of 20 kms towards the sea from the high tide line (point 3.1.1 of the CEC report). At these two sites, in the offshore turtle congregation areas, artisanal fishing (with sails and oars only, and in limited numbers) is permitted. Motorised fishing boats of particular specification (using small mesh size, monofilament nets upto 300 metres) are permitted in all areas except the congregation areas at these two sites. The CEC also stated that in addition to the sting ray net, the ring seine net and the sea bass net, all nets measuring 140 mm and above, whether monofilament or multifilament are to be prohibited in Orissa, until there is sufficient proof that they are not a threat to turtles (point 3.3.5 of the CEC report). The CEC also laid out specific orders regarding issuing of permits, licences and detailed documentation of fishing crafts and gear and identification mechanisms.

However the CEC orders uphold the fishing regulations within the Gahirmatha Marine Sanctuary. In effect there continues to be a ban on fishing within the core area of the Marine Sanctuary for any category of fisherfolk and fishing practice. The existing regulations in the buffer zone also remain.

While the OTFWU has welcomed, in general, the CEC's revised April orders, it is still advocating for more relaxations within the Gahirmatha Marine Sanctuary. It is to resolve some of these issues that collaborative actions on sea turtle conservation planning and implementation are being initiated in Orissa

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# Conflict over sea turtle conservation

Clearly, it is neither the absence of adequate legislation, nor a lack of concern locally, nationally or internationally, that has led to the failure to reduce mortality from turtle-fisheries interactions. Currently, trawler owners and captains are unwilling to abide by the rules of either the marine protected areas and other areas closed to them. A Turtle Excluder Device has been indigenously designed by the Central Institute of Fisheries Technology, Kochi, and initial studies have shown that catch loss is > 10 % (Gopi *et al.* 2002; Boopendranath *et al.* 2006). However, trawler owners have refused to consider them for various reasons. The Orissa Trawler Associations (for large and small trawlers) have long complained that they are only one of the many threats to sea turtles, and that they are being singled out (Behera 2006). The trawler owners also argue that the turtle protection measures will result in a loss of catch and that they have been subjected to unfair targeting as a principal cause of turtle decline, while equally significant threats such as habitat loss and beach lighting remain unregulated (*ibid*). Many turtles also die in gill nets (Wright and Mohanty 2006), though few major instances of gill net mortality have been documented. Interestingly, trawler owners had similar complaints during the implementation of TEDs in the USA in the 1980s (Weber *et al.* 1995; Tucker 1997). In response to large scale media reports of trawling related turtle mortality, trawler owners have put forth suggestions that turtles die of 'migration fatigue', 'labour pains' and other fabricated excuses such as toxic pollutants (Shanker and Mohanty, 1999). One of the causes of failure to reduce turtle mortality may be that in attempting to instigate protective measures by legal mechanisms and policing, conservationists have failed to take into account the heterogeneity of the trawling community, which includes owners, operators and workers. Obviously, each of these sub-groups needs to be motivated differently, some by economic and others by social incentives. In sharp contrast to the situation in

Orissa, state fisheries agencies have encountered far less resistance in the implementation of TEDs in Andhra Pradesh (Sankar and Raju, 2003), where the legacy of turtle conservation carries far less emotional baggage. From less confrontation and polarisation of the issues. Whether or not TEDs are currently in actual use in Andhra Pradesh, reports from this region have a more positive attitude towards TED implementation than those from Orissa. It remains to be seen whether this positive engagement of the fishing community by the State (State Institute of Fisheries Technology, Kakinada) will continue and result in effective implementation of TEDs and reduction in turtle mortality.

In Orissa, on the other hand, even the traditional fishworkers associations have started parallel protests similar to those of the trawler owners<sup>1</sup>. They too have begun perceiving turtle conservation as being anti-people, even though the spirit of the OMFR Act is in fact designed to protect traditional fishing rights rather than turtles. In Orissa, on the other hand, even the traditional fishworkers associations have started parallel protests similar to that of the trawler owners, since they perceive turtle conservation as being anti-people, even though most of the OMFRA regulations were in fact designed to protect traditional fishing rights rather than turtles. The media attention on the OMFRA as a tool for turtle protection has in fact promoted this being perceived as a bone of contention between traditional fishworkers and turtle conservationists, when in fact none exists. The lack of clarity in what constitutes a traditional method of fishing has also allowed mechanised fishers to garner the support of other fishing communities. While OMFRA regulations are clear with regard to sizes of mechanised crafts, the definitions of what constitutes a mechanised craft or mechanised fishing is absent. There is also no mention of regulations for motorised crafts,

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<sup>1</sup> Letter from Orissa Traditional Fishworkers' Union (OTFWU) to P.V. Jayakrishnan, Chairman, Central Empowered Committee dated 19.2.2004 titled "Prayer of the traditional fishermen of Orissa for hearing on turtle issues". The letter responds to the Interim Orders of the CEC dated 7 March 2003, and objects to the complete ban on fishing in several zones off the Orissa coast. The letter comments on various aspects including gear and craft, fishing rights in the Gahirmatha Marine Sanctuary, and proposals to declare Devi and Rushikulya as sanctuaries. It recommends that "traditional fishermen should be made partners in conservation at all levels", that decisions with regard to banning traditional gear should be based on scientific data, and should be taken in consultation with fishermen, and suggests other measures for managing these areas.

especially those with outboard engines. These can vary in size and capacity, and many small scale fishermen use these to reach their fishing grounds. Regulation of net types and sizes is also not adequately addressed. Recent pronouncements by the government and the Central Empowered Committee of the Supreme Court have tended to lump all boats with motors together, thus including the small scale fishermen along with trawlers and large gill netters<sup>2</sup>. This has also resulted in the harassment of these small scale fishermen by enforcement agencies like the Forest Department, which has led to disillusionment among local communities with both the government and with conservationists<sup>3</sup>. However, based on comments from numerous individuals and organisations, including the Orissa Traditional Fishworkers' Union, the final report of the CEC makes a distinction between mechanised, motorised and non mechanised fishing vessels<sup>4</sup>. Again, it remains to be seen whether this distinction will in fact be respected during enforcement.

Over the past twenty years, local biologists, conservation activists and forest officials have alternately (and sometimes simultaneously) hailed the Orissa population of turtles as the 'worlds largest' and as 'highly endangered' (c.f. Shanker *et al.*, 2004a). Both claims have their value – while the former is a matter of pride and public attention, the latter is the means of attracting large amounts of conservation funds and promoting regulations and protected areas. However, as a consequence of the hype that has been generated over this issue, nearly every conservation action has been a hurried reaction to a particular threat, resulting in short-term remedial measures. Although some of these actions are necessary, conservationists also need to pursue long-term solutions, which embrace the needs of the local people. The focus on trawlers has also diverted attention from a host of other threats that sea turtles face. Light pollution and massive disorientation and mortality of hatchlings, habitat degradation and the conversion of vast expanses of nesting beach into forestry plantations

of questionable value and egg depredation by feral animals have not received nearly enough attention (Pandav 2000). This is not to mention the depletion of fisheries stocks, destruction of marine environments critical for fisheries and the on-going favouritism of over-capitalized, poorly regulated fisheries export ventures at the cost of countless marginalised, small-scale fishers – a sector of the population that could be a major ally to turtle conservation initiatives.

### **Development activities around the Gahirmatha Marine Sanctuary**

Anthropogenic activities near Gahirmatha and the other nesting sites clearly include illegal aquaculture farms, proposed port construction and operation, industrial sand mining, proposed construction facilities for offshore oil exploration and artificial illumination from industries, towns and other residential areas near the coast. The Wildlife Conservation Strategy adopted in the year 2002 states that lands falling within 10 km of any protected area should be declared an Ecologically Fragile Zone. Such zones would have the possibility of regulating environmentally destructive activities while permitting benign ones. There are also laws for the protection of the coastal environment such as the Coastal Regulation Zone Notification, 1991 and the Water Pollution Act, 1974. These regulate the activities of industries in the coastal zone. There are a number of activities on the coast that are in violation of these laws. Some examples include the reported release of untreated effluents by Oswal Chemicals and Fertilisers Ltd at Paradip and of Jayshree Chemicals at Ganjam, the extensive prawn farms along the Kendrapara and Jagatsingpur coast etc. Proposed projects such as the proposed commercial port at Dhamra, just ten kilometres north of the nesting beach at Gahirmatha, lie outside the boundary of the Sanctuary but will have significant negative impacts on this ecologically sensitive site.

<sup>2</sup> Central Empowered Committee, Interim Orders, 7<sup>th</sup> March 2004, Application No 46 Alok Krishna Agarwal versus Union of India, State of Orissa and others

<sup>3</sup> see Letter from OTWFO to P.V. Jayakrishna

<sup>4</sup> Central Empowered Committee, 2004, 'Visit of Central Empowered Committee to Orissa from February 10-14, 2004'



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# A comparison of fishing practices, attitudes to and perceptions of sea turtle conservation along the southern Orissa coast\*

**Sasmita Mallick**

In examining the controversial subject of sea turtle conservation and fisheries in Orissa, we find that much of the conflict arises from the framework of conservation itself – mainly in the manner it is introduced, applied and interpreted. Given this background, we hypothesize that villages adjoining areas where sea turtle conservation is focussed (namely mass nesting beaches and their offshore waters) should have higher levels of both awareness about sea turtles, but also harbour greater conflict regarding sea turtle conservation.

The villages around Rushikulya on the southern coast of Orissa are important from various points of view. This is probably best known as one of the three mass-nesting sites for olive ridley turtles. It has also been part of the conflict over excessive conservation measures for sea turtles. The negative impacts of fishing restrictions exacerbate livelihood concerns in this area which has seen migration of youth due to lack of natural resource based employment options, deteriorating health and education levels. There is, however, a strong presence of a traditional fisherfolk union and a growing fisherwomen's organisation. There are also a number of community-based village level conservation groups who have engaged with sea turtle research and conservation efforts over the last decade.

Our study sought to explore the attitudes, perceptions and awareness of these communities about sea turtle conservation, natural resource management and conservation and fisheries laws

in villages adjacent to the mass nesting beach (Rushikulya) and in villages north and south of the mass nesting beach. The study also documented the different kinds of crafts and gears used by the fishing community in this region.

Nine fishing hamlets in the vicinity of Rushikulya rookery were included in the study and were classified as mass nesting villages, villages north of the mass nesting beach (hereafter northern villages) and villages south of the mass nesting beach (hereafter southern villages).

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\*This section is an extract from Sasmita Mallick's Master's Dissertation bearing the same title.

# Villages around Rushikulya

## Mass nesting villages

The southern most rookery of olive ridley turtles in Orissa near the mouth of river Rushikulya was discovered in 1994 (Pandav et al., 1994). The mass nesting beach is located on the northern side of Rushikulya River mouth. The rookery is situated 320 km south of Gahirmatha mass nesting beach (Lat. 19° 22' N and Lon. 85° 02' E) sea turtle nesting at this rookery takes place along a stretch of ~5 km immediately north of Rushikulya River mouth from the village Punabandha to Kantiagarh village. The three marine fishing villages close to the mass nesting site included in the study were:

### **Gokhurkuda**

Gokhurkuda is a small village with approximately 150 families. These families are migrants from Andhra Pradesh. The languages they speak are telugu and oriya. The primary occupation of these villagers is fishing. A large number of people from this village are also involved in conservation related work during mass nesting. The villagers complain that the catch has reduced drastically in the past few years and hence, a majority of the youth migrate to cities in search of work.

### **Podampetta**

Podampetta and Gokhurkuda are neighbouring villages in proximity to the rookery. Larger than Gokhurkuda, there are about 350 families in Podampetta, with all of them actively involved in fishing. Surprisingly, this village had a fairly large number of youth involved in fishing in comparison to the other village which is hardly 2 km away.

### **Prayagi**

Although Prayagi is not close to the mass nesting site, sporadic nesting does occur in this area and people from this village do go to the mass nesting area for fishing. It is a small village of about 50 families. Apart from marine fishing, fishers from this village also fish in Chilka. Unlike other villages the settlement is far from the *tanda* or fishing base.

This village does not have any fibre glass boat, only *kattamarams* (a traditional craft made tying a 3-5 logs) or *katha teppas*. With these craft, it is not possible to venture very far into the sea and they mostly fish in the offshore waters.

## Northern villages

As one moves north along the coast from the mass nesting beaches, the trend in fishing shifts partly away from marine fishing. All the three villages fish in Chilika lake a considerable part of the year. Sporadic nesting of sea turtles is known to take place in all of these villages. Also, as one moved from the mass nesting villages to the northern villages, the fluency in spoken Oriya increased.

### **Ramlanka**

Ramlanka is further north of Prayagi, approximately 15 km from Rushikulya. There are about 150 families in the village.

### **Siandi**

Siandi was the smallest of all the villages surveyed with only 25 families. It is about 30 km from Rushikulya. Here the people fish half of the year in Chilika and the other half in the sea. There are no fibre glass boats in the village.

### **Khirisahi**

This village lies in Puri district. It is an island village with Chilika on its periphery. It is located approximately 50 kms from the mass nesting site. There are about 150 families in the village. The villagers too have to travel a long distance to reach the *tanda* or fish landing area.

## Southern villages

In southern Orissa, the craft and gear used are quite modern in comparison to other areas. A majority of the gear operated were multifilament gill nets. The villages surveyed were:



**Gopalpur**

This village is quite modern with the port in its vicinity. While Gopalpur has a sizeable fisher population, many of its residents work in non-fishing related professions. Better known as Gopalpur on Sea it is a popular tourist destination with several hotels and tourist facilities. It was a centre where fibre and wooden boats were constructed. Several respondents held the fishing activities of Gopalpur as responsible for the mortality of sea turtles in this area.

**Bada Arjipalli**

Bada Arjipalli is 16 kms from the mass nesting area. This is a large settlement with over 350 families. Some of the villagers work in the Gopalpur port. In this village there is a large variation in the socio-economic strata of the people with fairly well-to-do residents sharing this space with those in much lower economic classes.

**Pati Sonapur**

This village is located on the southern Orissa border and few people here speak fluent Oriya. The village is connected to Andhra Pradesh by road, but not Orissa. This is also an island village, with the sea on one side and river Bahuda on the other. This is the remotest of all the villages. It is approximately 60 km from Rushikulya and has more than 350 families, all involved in fishing. Fish catch is substantial in this village with truckloads being exported to the neighbouring states of Andhra Pradesh and Tamil Nadu. The predominant fishing gear in this village was the *ring jalo* a small purse seine which was earlier banned by the OTFWU. This net brings in substantial catch and has been the subject of much controversy.



# Methodology

This study aimed to document the different kinds of gears and crafts used in the marine villages and developing an understanding of peoples' awareness, perception and attitude towards the sea turtles, conservation, fisheries laws and management. The study included both primary and secondary data. While secondary information was collected from official sources and libraries, primary data were collected through field surveys between March and May 2010.

Nine fishing villages of the districts of Ganjam and Puri were selected for field survey. Twenty respondents from each of the nine villages were randomly selected comprising 10 young and 10 old persons. The respondents were aged between 15 and 65 years, which was stratified into young in the age group of 15 to 35, and old in the age group of 35 to 65, keeping in mind that the villagers go fishing at an early age of 15 to 16 and continue going till they are capable. All the respondents were male as women do not participate in fishing; moreover the field survey had to be carried out in a very short span of time, and women's roles were not examined. The total number of samples collected was 180.

A detailed primary survey based on a semi-structured questionnaire was carried out to collect primary data required for the study. Questionnaires were prepared pre-tested, revised and finalised (see Annexure II.) The questionnaire included both open and close ended questions. Prior to the preparation of the questionnaire, several informal discussions were conducted with individuals and groups from the selected villages. Besides general information about the respondents and their families, the questionnaire covered their opinion on laws, sea turtles, and the government.

The data was collected using a dictaphone and then transcribed. The primary data was coded and entered into spreadsheets for further analysis. Standard statistical tools were used to derive inferences with respect to the objectives of the study.

The field methods involved:

1. Daily field visits to the villages. Field study with different user groups and knowledgeable individuals helped to understand different aspects better.
2. Weekly visit to the *tandas* of the villages in the study during the week to document the gear and craft in use and the catch in each of the gear and craft.
3. Weekly visit to the beaches of the village in the study during the week to enumerate the number of stranded turtles.
4. Visits to the sea along with the fishermen to check for interactions with sea turtles.
5. Identification of user groups on the basis of age.
6. Interviews with respondents of different ages

Information from primary sources:

1. Individual interviews of user group members, and discussion with other knowledgeable people in the village.
2. Group discussions
3. Interaction with other family members.
4. Measurements of the nets/gears.
5. Photo documentation of the craft and gear

Information from secondary sources

1. Reports, papers, and gazetteers were referred to for secondary data.
2. Different field exercises were conducted to gather information about the community and their lives.

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# Data analysis

Primary data collected during the survey was analysed both quantitatively and qualitatively.

## Questionnaire design and analysis

The questionnaire had 55 questions on the following topics: gear and craft, sea turtle biology, interaction of fisheries with turtles, conservation, and involvement in conservation. While questions on craft and gear were used to document the various fishing gear & craft in use, the rest were evaluated to determine the knowledge of the respondents on various aspects of sea turtles and conservation. The questionnaire comprised of both open ended and close ended or qualitative and quantitative questions. Narrative responses to the open-ended questions were elicited.

Binary questions (Yes and No) were compared quantitatively in terms of proportions of respondents providing affirmative/negative answers. Other quantitative questions (Eg. Number of turtles seen) were quantified as frequency distributions. Some open ended questions (Eg. Knowledge of sea turtle nesting) were coded and quantified; for example, we used the degree of detail in answers about nesting as an index of the knowledge of sea turtle nesting and hence translated narrative answers to a numerical value. Finally, some qualitative questions were analysed only as narratives.



## Results and Discussion

Data collected through the primary survey along with the secondary data were analysed using qualitative and quantitative tools and the results are presented below.

### Levels of awareness, perception and attitude

The questionnaire was broken down into questions on knowledge of sea turtles, attitude towards sea turtles, awareness of fisheries law, role of the community, and the level of fisheries related interaction. Each of the themes had a few open ended and close ended questions that were further analysed. We discuss this by theme.

#### Awareness of sea turtles

Sea turtles are known to nest sporadically all along the coast of Orissa, other than the three known mass nesting sites (Gahimatha, Rushikulya, and Devi river mouth). Every year, they migrate in large numbers to the offshore waters of Orissa..They are known to congregate from November onwards

and nesting is known to start from January. During this period they are seen mating in the offshore waters and come ashore to nest. Hatchlings emerge about two months later and locate the sea by orienting towards the brighter horizon. Based on these facts, respondents were asked a few basic questions on the biology of turtles.

a) All the respondents stated that they had seen sea turtles. This is not surprising since all the respondents were fishermen who go out into the sea for fishing. Similarly all the respondents were aware that these sea turtles come ashore to nesting and lay eggs.

All the villages studied had a general idea about sea turtles and were aware of their presence . However, the levels of awareness did vary across the villages. The mass nesting and northern villages were equally aware of turtles, whereas the level of awareness in the southern villages was lower. (Figure 1) Bada Arjipalli had the lowest levels of awareness followed by Gopalpur and Pata Sonepur.

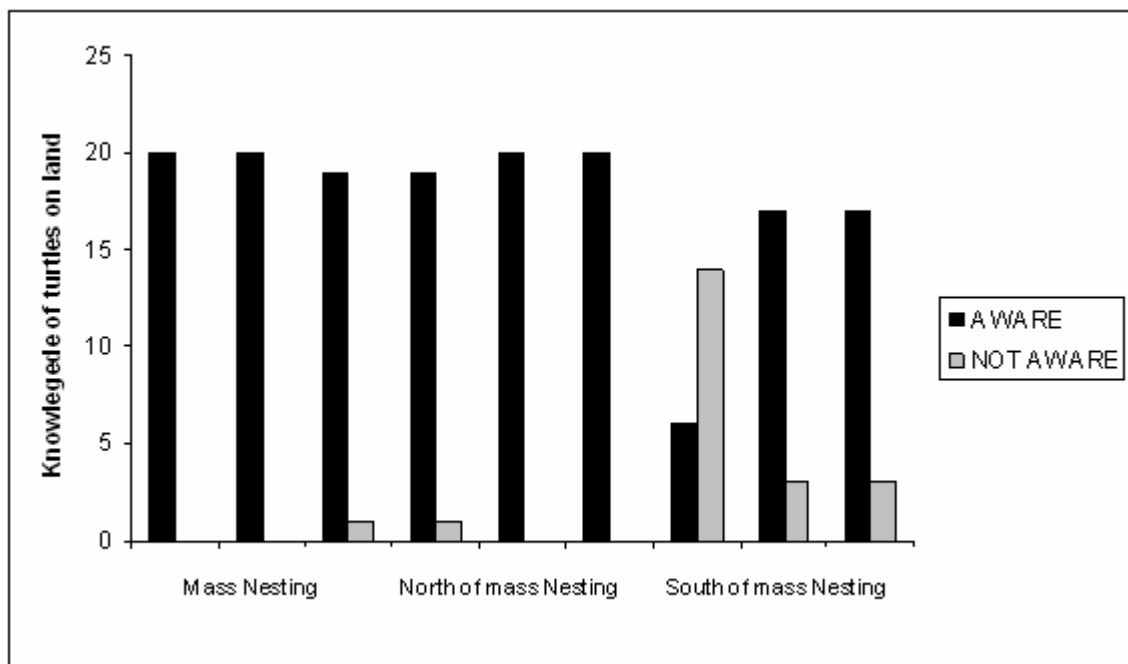
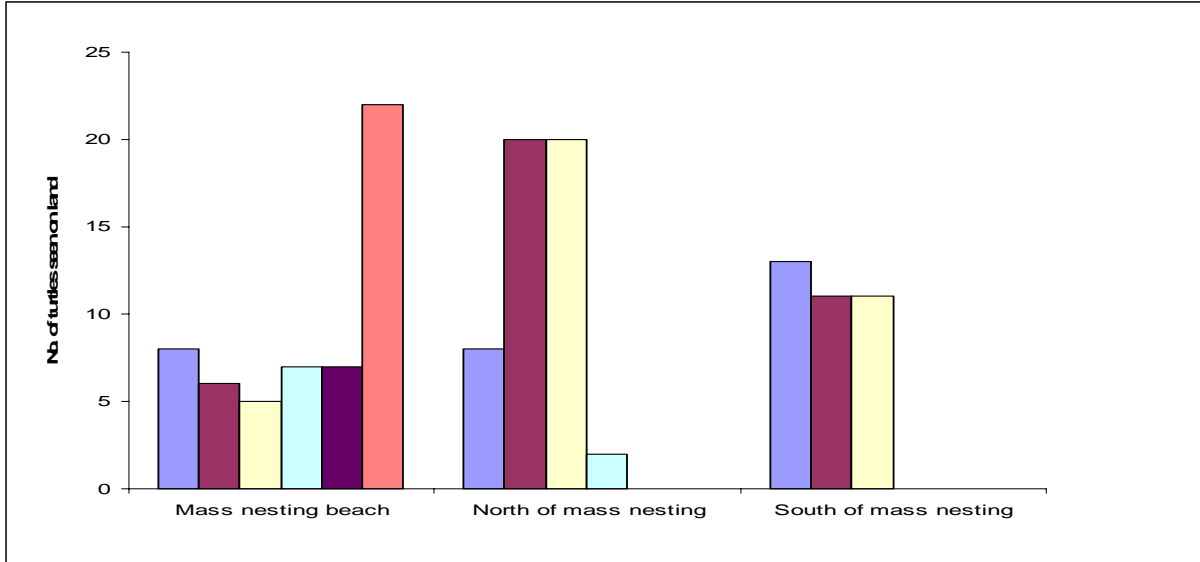


Figure 1: Knowledge of turtles on land in relation to the villages.

Figure 2 Frequency of distribution of turtles on land



Blue: 1-10, Magenta: 10-100, Yellow: 100-1000, Cyan: 1000-10,000, Purple: 10,000-100,000, Orange: > 100,000

For the number of turtles seen on land, the responses of turtles seen on a single day were extrapolated to a period of three months. We then binned in a logarithmic scale ( $\log_{10}$ ) 554 and plotted a frequency distribution (Figure 2).

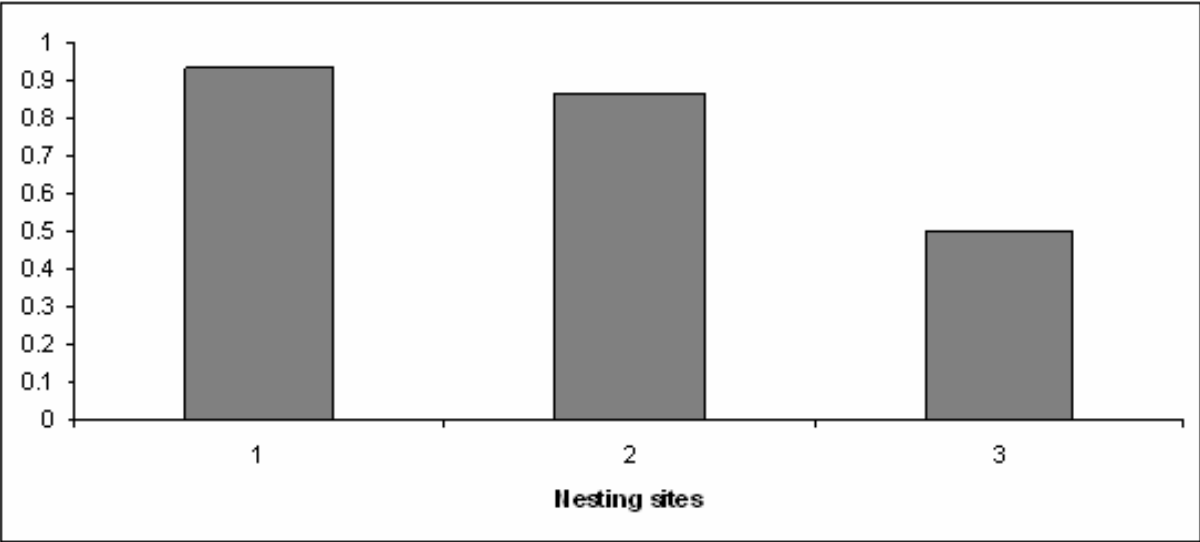


Figure 3 Proportion of people who have seen a nesting turtle  
\*1, 2 & 3 – mass nesting, north of mass nesting & south of mass nesting villages

b) However, answers varied on the type of turtles seen with 4 species being mentioned. Only the olive ridley is common in Orissa, with occasional report of green or hawksbill turtle. 35% of the respondents from the mass nesting sites had seen more than one species of sea turtles whereas in north and south 26.6% and 16.6% had seen more than one species, respectively.

c) The season when turtles are seen and how often did not vary much in the villages located away from the mass nesting site. Almost all stated that they had seen turtles during the same time in sea, but on land, there was some difference between the mass nesting, southern and northern villages.

d) The proportion of respondents who had seen a nesting turtle were 0.9 in mass nesting villages, 0.8 in northern villages, but only 0.5 in southern villages, which was significantly lower than the other two areas (Figure 3).

e) In describing the nesting process, the fishermen's responses were concordant with known nesting behaviour. However, there were interesting responses with regard to hatchling orientation towards the sea. Many were of the view that the female turtle comes ashore, and whistles during the hatching process, making the hatchlings move

in the direction of the sea following her. Some are of the opinion that the female turtles comes ashore daily to see her hatchlings, and finally takes them with her. Another set stated that when the female turtle comes ashore to lead the hatchlings into the water, if hatchlings come in the way of her mouth she eats them and those that climb her back safely reach the sea. We was found that 8.3% of the people in mass nesting villages subscribed to these views, followed by 13.3% and 30% in the northern and southern villages. However, most respondents even in mass nesting village were not aware that sea turtles are photo tactic; only 2 out of the 60 respondents from the mass nesting villages knew that sea turtle hatchlings are attracted towards light.

f) Similarly, the responses for the number of turtles seen in water was also extrapolated i.e. the number of turtles seen in the water in a single day was extrapolated to 3 months, binned in a logarithmic scale, and plotted as a frequency distribution (Figure 4). The figure reveals that, during mating, the turtles are spread over a larger area and almost equally.

g) None of the respondents had any idea where the hatchlings went after their emergence.

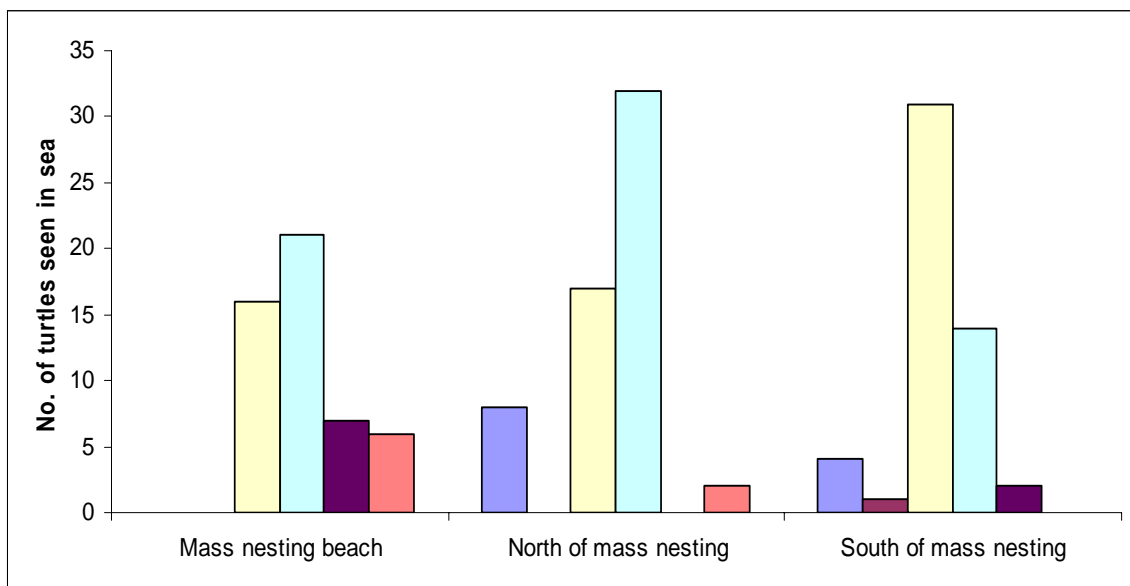


Figure 4: Frequency of distribution of turtles in sea

Blue: 1-10, Magenta: 10-100, Yellow: 100-1000, Cyan: 1000-10,000, Purple: 10,000-100,000, Orange: > 100,000

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h) 96.6% of respondents from mass nesting villages knew about mass nesting, as were 86.6% in the northern and 85% in southern villages. People in the mass nesting villages of Gokhurkuda, Podampetta and Prayagi seemed to have more knowledge about mass nesting than in the villages of north and south. As expected, the levels of knowledge or awareness of mass nesting decreases as one moves from the mass nesting villages to the southern and northern villages.

i) All the respondents questioned in the mass nesting villages knew details of what happens during a mass nesting, but this was not the case with the other villages. In southern villages, only 50% were aware of details, but 83.3% were aware in the northern villages.

In summary, knowledge of turtles on land as well as in the water appears to be quite similar across the nine villages with a few exceptions. As expected, the villages on the mass nesting sites are more aware about mass nesting and details of the processes involved than the rest of the villages.



## Attitude towards sea turtles

Knowledge and perceptions about processes and events leads to attitudes about the same. Prior experience or prejudice can also influence both perception and attitudes. To test the attitude of the respondents, a few questions regarding the importance of sea turtles, the necessity of laws, and benefits from sea turtles were asked. The results are summarised below:

a) In the mass nesting villages, only 20% said that sea turtles were important, while 60% said they were harmful. While in northern villages the number of positive responses were the same, only 20% responded negatively. In southern villages, about 33% were in favour of sea turtles and only 10% against them. Interestingly, the villagers in the mass nesting sites feel that turtles are harmful as they cut and tear their gear. On the other hand, most respondents in northern and southern village felt that sea turtles were neither harmful nor important.

b) With regard to the necessity of rules concerning sea turtles, the answers from each of the villages

were not significantly different. The proportion of affirmatives from each of the villages was more or less the same, 21.6% in the mass nesting, 26.6% in northern villages and 35% in southern villages. When asked if they followed the rules, 100% replied in the affirmative.

c) Similarly, when villagers were asked if the rules concerning fishing were necessary, the proportion of affirmatives in the three areas was significantly different from one another. While 40% in the mass nesting villages were of the view that it was necessary, only 6% and 16% in northern and southern villages felt that the rules were required. The general perception in the villages away from the mass nesting sites was there were no rules for them, but that there were rules for trawler operators.

In this context, it appears that the northern and southern villages are either in favour of the rules or, as is more likely, have very little idea of the rules.

Figure 5: Proportion stating turtle protection rules were necessary

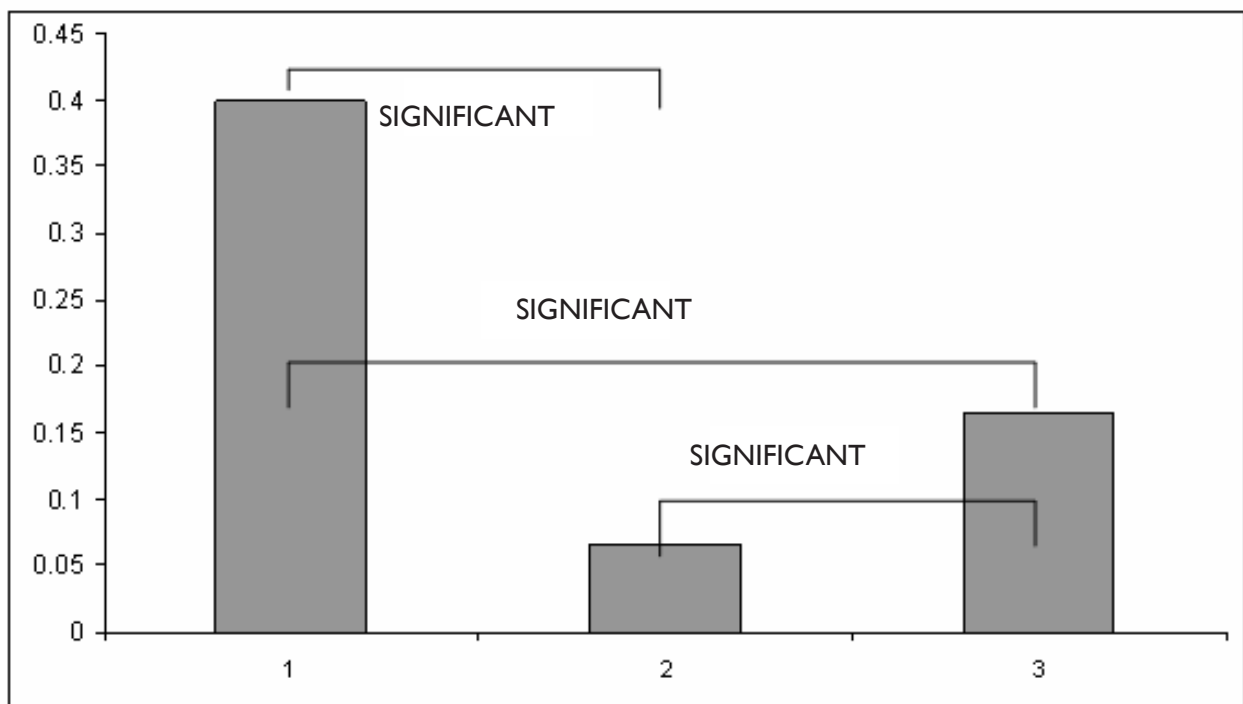
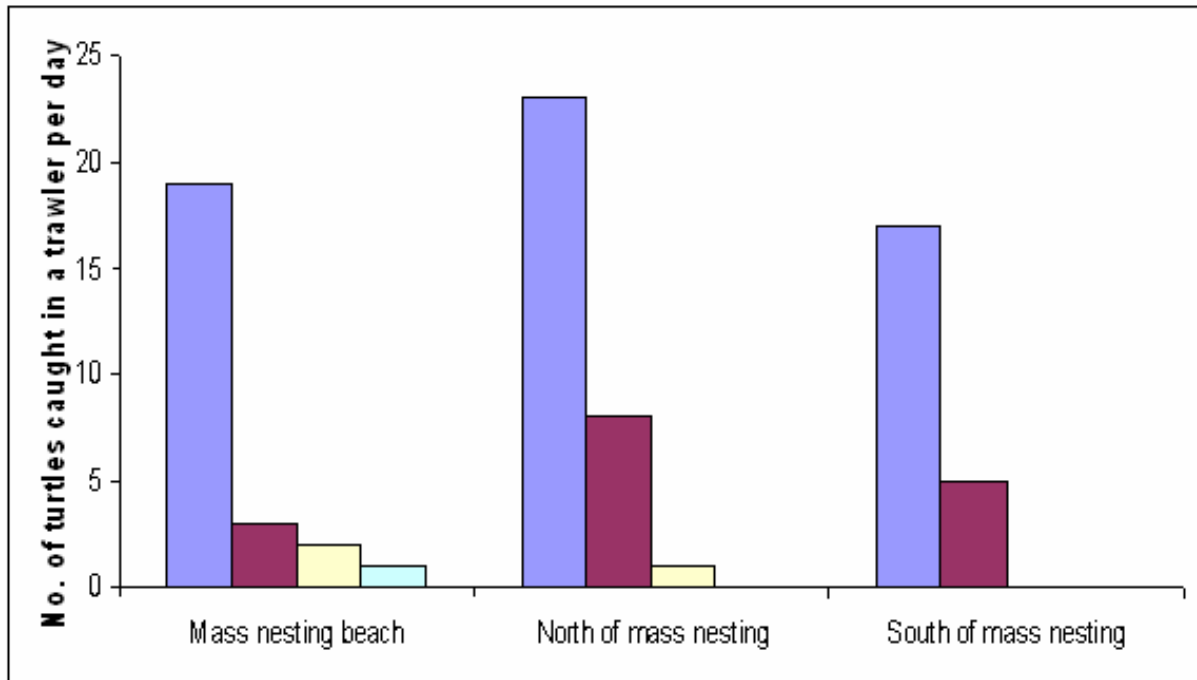




Figure 6: Turtles caught in trawler nets



Blue: 1–10, Magenta: 10–100, Yellow: 100–1000, Cyan: 1000–10,000, Purple: 10,000–100,000, Orange: > 100,000

### Awareness of fisheries law

The Wild Life Protection Act (WLPA) lists all five sea turtle species found in Indian waters in Schedule I. Hunting and trade of turtles is prohibited and is a punishable offence. To test the villagers' awareness towards these laws, they were asked a few questions regarding the fishing practices and turtle related conservation rules. The results were:

- 90% of the villagers questioned in the mass nesting villages and the southern villages seemed to be aware of the laws regarding turtles whereas only 60% were aware of laws in northern villages.
- 83.3% of respondents in mass nesting villages said they were aware of the existence of fisheries laws and 30% from northern villages and 60% from southern villages said they were aware of these laws. Thus there is a significant difference between northern, southern and mass nesting villages with regard to their knowledge of laws.

### Level of fisheries related interaction with sea turtles

Fishermen have high levels of interaction with sea turtles. As stated earlier, 99.3% of the population surveyed had encountered turtles either every day

or once in a while during the nesting season. Their interactions with turtles while fishing are summarised below:

- 100% of the respondents had seen turtles entangled in one net or the other. However 99.9% of the respondents said that turtles do not get entangled in all nets, but only in a few nets which are banned but still used in some villages. The banned nets are sankutchu jalo (ray net), and ring seine. During the documentation of the gear and craft, it was found that in the southernmost village of Pati Sonnapur, the fishing gear in use are banned by the government. They use ring seines and do not seem to possess any other gear.
- 100% of the respondents are of the view that turtles die in trawl nets. In spite of regulations, a number of fishing gear continue to be used in the congregation/restricted fishing areas. The ban on nearshore trawling is often violated, though Rushikulya has less trawl activity as there is no trawler base nearby.
- Some of the interviewees also said that turtles get entangled in their fishing nets, but they have little time to disentangle them, and hence cut the net with the turtles entangled and throw them back into the sea.

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### Role of the community in conservation

Conservation efforts are being carried out in the mass nesting villages by the government, NGOs, and various institutions over the last decade. However, most people in the mass nesting villages feel that turtles are harmful to them and their fishing gear.

All the respondents in the mass nesting villages and 99% and 95% in the northern and southern villages believe that communities can help in

conservation if provided employment by the government or if any sort of financial aid is provided. The same number of respondents believe that the government is responsible for the conservation of turtles. Only 16.6% of people in the mass nesting villages believe that fishermen benefit from conservation work, whereas 60% and 10% of villagers in northern and southern villages felt that they could benefit from conservation.

## Conclusion

There are visible differences between mass nesting, southern and northern villages with regard to their knowledge and awareness of and attitudes towards sea turtles. Mass nesting villages were surprisingly antagonistic towards sea turtles; whether this is due to physical interactions or a consequence of imposed conservation measures needs to be

investigated. There were also differences in levels of awareness of laws and attitudes towards conservation. These results point to the need for a closer examination of the impact of conservation programmes and activities on coastal communities and on achieving the larger goals of conservation.



## Marine fishing crafts and gears

Orissa's southern coastline has wide sandy beaches and surf-beaten shores, which are typical of south India. The continental shelf off the southern coast is narrow, similar to the shelf off the coast of Tamil Nadu and Andhra Pradesh. The marine environment of south Orissa varies widely from the rest of rest of Orissa and so do the fisherfolk and their fisheries.

Marine fishing activities in Orissa are dominated by Bengali speaking fishermen (located from Paradeep north till the West Bengal border) and Telugu speaking fisherfolk called Noliyas located from Paradeep till the southern Orissa border. Marine fishing by the native Oriya fishermen is minimal. Fishing nets in Orissa range from artisanal shore seines, entanglement nets (trammel nets), hook and line fishing, a wide variety of gill nets and trawl nets. During the early 1990s as part of the Bay of Bengal Programme, most of the traditional crafts were replaced with fibre glass boats with inboard motors. Mechanised fishing along the Orissa coast is characterised by trawl and gill net fishing. The northern part of the Orissa coast is subjected to heavy mechanised fishing activities. Some of the major fishing bases such as Kashaphala, Balaramgadi,

Dhamra, and Paradeep are located along this part. Mechanised gill-netters from neighbouring West Bengal also fish in Orissa's waters. Traditional Noliya fishers carry out most of the fishing activities in the coastal waters south of Konark. Trawlers from Andhra Pradesh often come and fish along the southern Orissa coast. These incursions from the fisherfolk of neighbouring states has led to a fair amount of tension not just related to fisheries and is often stated as a reason for turtle mortality in the state.

The major artisanal fish catch in the south is for sardines, anchovies, mackerels, seer fish and prawns, while in the north it is concentrated on the hilsa and pomfret. In Puri and Ganjam districts the operation of beach seines, lift nets and boat seines is predominant. Gill nets are used all along the coast of Orissa. The kinds of gillnets used in the south are Jagavala, Kilumala and Katlala. In the southern coast the catamarans/ teppa, bar-boat and the nava are used. According to the Fisheries Department, the total number of boats operated in the Ganjam district is about 2959 and the number of gear about 5271.



# Marine Fishing Gear

The various fishing gears used by the southern coastal villages in Orissa are:

## Kabala jalo/ Sardine net

This is the most popular net in all of the villages surveyed during the study period. It has plastic floats and lead sinkers and is made only of nylon. All the villages surveyed had mostly 5 varieties except for Podampetta and Bada Arjipalli, which had 7 of its kind.

This net is mostly used in the months of November to March. While the size of the fish is small during the winter months, it starts to improve from January onwards. But as the size of the fish improves, the catch decreases from February and towards the end of March, it ceases almost completely. During the peak season, when fishing is very active the fishermen can set the net several times in the sea. Many respondents stated that they go fishing almost all through the day or 3-4 times a day during the peak season, when kabala (sardine) is available in greater numbers. After each haul they return to the shore to dispose off their catch and go back again. During the peak season they are known to set for the sea by 3 a.m. However, this is not the case during this season (March-April) when the catch had reduced considerably. The fishermen set out at 5 in the morning and are back by 10 or 11 a.m. During this season they venture into the sea 2-3 times a week, depending on the conditions of availability of fish. Sometimes there's not even enough catch for the fishermen themselves. It costs 1000-1200 rupees of fuel in a single day to venture into the sea. That aspect is also kept in mind before heading into the sea.

The kabala jalo is normally operated from a motorised teppa, but in villages of Siandi and Prayagi, where there's no single motorised teppa or a fibre glass teppa, it is operated from *pota teppa / kattumarams*. The length of the net used in water varies from 200m to 400m and 500m. The fishermen measure nets in terms of number of meshes, say 1000 meshes long. The depth of the net varies from 12m to 25m. Fishing with this jalo is done in the range of 1-7 km. During winter months when the size of the fish is small, it is operated upto 3km offshore. Usually a single piece is operated at a time, but depending on the size of the catch 2-3 pieces can be used together.

Kabala jalo is a monofilament gill net. The size of the mesh available are 10mm, 15mm, 20mm, 22mm, 25mm, 30mm and 35mm. Mesh wise they are divided into sana kabala jalo (small mesh), majhian kabala jalo (middle sized mesh) and bada kabala jalo (large sized mesh). The length of the jalo varies accordingly, greater the length larger the size of mesh. This gear catches 10 species of fish namely chungdi (prawn), kabala (sardine), sabla (ribbon fish), khonduballu, banigiri, golora (croaker), gullbinda (goat fish) and crab. The most common mesh sizes of kabala jalo used from March-April is 25mm to 35mm. The price of kabala jalo varies with the mesh size, the smaller the mesh size the greater the cost of the net. As the mesh size gets bigger the cost of the net goes down. Thus kabala jalo is very important for the livelihood of fishermen.



Kabala jalo being made by joining net pieces together

### Chungdi jalo / disco jalo

This net is also called a trammel net. It is mainly used by the fishermen of Orissa to catch chungdi (prawn). This net consists of 3 layers. Two outer layers are called dubi and the middle layer called disco. The dubi has a much larger mesh in comparison to the middle layer. The Dubi is also wider in size than the middle layer of Disco. This net is operated mostly in winter. It takes long to fish for prawns than other fishes. This net is operated from early in the morning, 4:00 am to 12:00pm; it takes longer to fish for prawns than other fish. Sometimes this net is taken for fishing at 3:00 pm in the afternoon.

The net is made of mono nylon also called fisery in Oriya, the floats are made of plastic and the sinkers of Seesa (lead pellets). The length of this net varies from 60m to 30m and depth from 1.5m to 3m. The dubi has a much wider mesh of 60mm to 130mm and the disco has a smaller mesh size from 40mm

to 45mm. In all the villages surveyed the mesh sizes vary between the above mentioned sizes. While fishing, 4 to 5 pieces are joined, even though the boat will be carrying about 20 pieces at a time. This is done probably because the net tends to get easily damaged and the fishermen had to replace it there itself in sea on the boat. Fishing with this net was not carried out in any of the villages during the period of study. In Gokhurkuda, fishermen catch other fish with this net such as golora (croaker), patua (sole fish), chandi (pomfret), jagil, kontia, and dalo. In Gopalpur and Pati Sonnapur the fishermen used chungdi jalo to catch crabs near the shore.

This net can be operated from both motorised fibre glass teppa and pota teppa. This net requires two crafts to operate. Five pieces of net from either craft are joined together and then both the craft move parallel in unison, with the jalo between them, either along the coast or into the sea. As they move ahead in water the moving shoals of prawn get trapped in the 3 layers of dubi and disco.



### Bada jalo/ shore seine

Bada jalo is also known as beach seine. Along the wide beaches of Ganjam and Puri districts, beach seines, locally called Bada Jalo, are operated to catch shoaling fish which enter the beach area during certain seasons. Fishing with this net is very different compared to the other nets used by the fishermen of southern Orissa.

The beach seine has a detachable bag portion and 2 wings. To each wing a towing warp is attached. This net is made of four different nets with varying mesh sizes and during fishing the smallest net is thrown in first then the nets with the larger mesh sizes. It is a multifilament net with a length of 1 km approx and depth of 18m approx. It has plastic floats and sinkers of lead pellets and cement stones. The mesh sizes of the 4 different nets that comprise the bada jalo are 10mm, 67mm, 110mm and 4ft 5 inches. These mesh sizes are for the village of Prayagi. The mesh size differs from village to village.

Bada jalo is operated from a large non-motorised boat called the *Padua* which is exclusively meant for this net. The net is loaded on the boat which takes the net out to sea. One towing warp is left on the shore. The shore side wing of the net is laid out, and after the bag of the net is released, the boat moves in a semi circle and, laying out the other wing, brings the second towing warp back to the shore. Which means the net with the smallest mesh size is thrown in first and then the nets with increasing order of mesh size. The smallest is made of cotton or 'fisery', the next two are made of nylon, and the biggest is made of rope. The biggest net made from rope gives support to the entire Bada jalo. The two towing warps are then pulled in by 10 or 12 persons on each side, moving closer together as the net comes nearer the shore. Two or three fishermen remain in the water to guide the net

onto the beach. Before reaching the shore the bag portion is detached from the net. 30 to 35 people, including the boat crew, are engaged in the operation.

Beach seines are operated from October to April, whenever shoals of fish come close to the shore and weather conditions are favourable. The fishermen are exceptionally careful with this net as the cost of a single net with the padua works out to Rs. 35,000. It is tremendous effort to fish with this net and requires a lot of man power. There are 10 fishermen that operate the net from the padua and 40 person on the shore (this sometimes includes even women) who hold the rope of the net. The fishermen on the Padua spread the net in the water and after approx 5 hours of fishing the 40 people on the shore pull the net. It takes 4 hours to collect the net, but the hard work pays off. This is because this net is very important for the livelihood of fishermen during winter as they can earn as much in 3 or 4 months with this net as compared to a whole year with any other net. Fishing with the Bada jalo takes place only 1 or 2 km from the shore, as the rope of the net held by the fisherfolk on the shore does not extend further.

The number of Bada jalo in the different villages is much less compared to other nets, this is probably because of the cost and the effort required to fish with it. Normally in a village 5 to 6 families have a share in the net. The net is not cheap enough for a single family to possess. The number of Paduas will be equivalent to the number of Bada jalos, as a single Padua operates a single net. There is no Bada jalo in Gokhurkuda. In Prayagi there are 3 of them, similar to Pati Sonnapur.

The Bada jalo is a very important net for fishermen. The catch consists mainly of Kukuli (anchovies), Kabala (sardines) and Soringa (silver bellies).



### Kangurta jalo/jaagi jalo

The Jagi jalo are used to catch different types of fish depending on their mesh size. It is also known as Kangurta jalo or maccha jalo, as all kinds of fish is caught using this net. The Jagi jalo is very common to see in the fishing villages.

The Jagi jalo generally has a filament thickness of 0.23mm and mesh sizes are approx 20, 50 and 52mm. The length of this net varies from 350m to 750m and the depth from 4 to 6ft. The Jagi jalo when operated is thrown much further than the kabla jalo, but the catch from these nets is not as good as the catch from the kabla jalo. During the study period this net was not in use as it was the peak season for kabla. The species of fish caught by this net are sabla (ribbon fish), kangurta (Indian mackerel), golora (croaker). The Jagi jalo has thermocol floats and cement sinkers.

### Chahara / Megi jalo

Chahara jalo is operated in the winter months. This net is also used to catch fish of all kinds. Chahara jalo is not common in all of the villages. The Chahara jalo is used to catch species like Chahara (grey mullet): 14.7cm, Soringa (silver sillago): 21.2 cm, Gonia: 47.4cm, Gullbinda: goat fish, Kanabodhua: 37.5cm and Para (leather skin): 26.4 cm

The kabla, jagi and chahara jalo are easily mistaken as one gear, but their main difference lies in the kind of species they catch. Chahara jalo is mainly

used to catch Chahara/Megi (Grey Mullet). In Gokhurkuda, Chahara jalo has two mesh sizes 23mm and 35mm, length is 540m and the depth is 6.3m. Chahara jalo has plastic floats and seesa (lead pellets) as sinkers. The Chahara jalo is not used by fishermen of Podempetta.

### Betish jalo, Chandi and Illish Jalo

Betish jalo was not used during the study period as it used only in November. Chandi and the illish jalo are used from the month of February. The illish jalo is used to catch the Hilsa or the Indian Shad, the chandi jalo is meant for white and black pomfret. All the three nets are monofilament and made of nylon, they have thermocol floats and rounded cement stones as sinkers.

#### i. Betish jalo

Length: 360m to 450m

Depth: 22 ft

Mesh size: 65mm, 70mm

#### ii. Illish jalo

Length: 720m, Depth: 22.5 ft, mesh size: 95mm, 69mm (Gokhurkuda)

Length: 1080m, Depth: 7.2m, mesh size: 60mm (Prayagi)

Length: 540m, mesh sizes: 61 to 62mm (Arjipali)

#### iii. Chandi jalo

Filament thickness: 0.23mm

The mesh sizes of this net are generally: 92mm, 95mm, 140mm and 149mm.



Betish Jalo





## Hooks

This method commonly known as the hook and line method of fishing is very popular in the winter along with the Kabla jalo, Chungdi jalo and Bada jalo. The hooks are sold as No.4, No.5, No.6, No.7, No.8, No.9, No.10, No.11, No.12 and so on. The larger the number the smaller the hook and the smaller fish it catches, for example hook No.11 catches the Manjili (grey mullet) and hook No.7 catches the Koni (seer fish). There are different ways of fishing with the hook, like in Arjipali it is called the *Nattikonta Jalo* where a single hook is attached to a 25 cm steel wire which in turn is attached to a 10m nylon fishing line. This fishing line is wound around a thermocol float, this hook is operated from a motorised or non motorised boat. This method of fishing catches fish like the para (leather skin): 19 inches, tenki (Javanese cow ray): 2.56m and other fish like the magar (shark), Koni (seer), thumuda (tuna).

Another method of fishing with hooks is called Daodi; this can be practiced from the shore as well as from a teppa. In the Daodi method of fishing from the shore, there are small hooks tied to a fishing line (No.11) and at the end of the line there are a group of lead sinkers. It is thrown from the shore and pulled quickly; it is used generally to catch the Manjili (grey mullet). This is only used to catch smaller fish.

With another type of Daodi, the fishermen travel 30 to 40 km by boat and they start fishing at 3:00am till 3:00 pm. Here each steel wire has 3 hooks and there are about 100 steel wires attached to a single rope. Therefore, each rope will have about 300 hooks. The length of this rope is 1800m and this method is generally used for catching the Koni fish (seer fish).

There are different hooks based on their sizes but the most commonly used hook is No.7, in the village of Prayagi there is only one hook in the entire village of size No.7. In Noliya Nua Gaon there are two hooks one to catch big Kontia and one for the Koni. Even though there is a Koni jalo to catch the seer fish, it is not used and instead the Koni is caught by the hook. In the village of Gokhurkuda the hook and line is only used from Jan and Feb, and they do not catch rays and shark.

In Kantiagada it is very interesting the way the fishermen catch bait for the hooks to catch big fish like the Soringa (silver sillago). They use the legs of fiddler crabs and as the tide comes in they brush the legs against the water and the worms attach themselves to the flesh on the legs of the crab. At the end of their fishing at around 3:00 pm a lot of fishermen can be seen on the shore catching bait in this manner.



Fishing Hook

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# Marine Fishing Crafts

The three crafts that are used for fishing in the villages surveyed, i.e. Arjipali, Noliya Nua Gaon, Gokhurkuda, Kantiagada and Prayagi are as follows- the fibre teppa, the Pota teppa and the Padua. A teppa is a boat made of wood or fibre but is not hollow as it has thermocol fitted inside. There are no boats with an in board engine only out board engine like the fibre teppa.

## **Fibre teppa**

This is a motorised boat and all of them in every village are fitted with a 9h.p engine. This boat can go a maximum to 30 – 40 km and it operates nets like the kabla jalo, chungdi jalo, Ilish and Chandi jalo.

Length: 10m approx

Depth: 2 to 2.27m approx

The length of the motor rod in water is 6 ft and 10 inches

Length of a blade of the fan is 5.5 inches



## Pota teppa

This is the non- motorised wooden boat that operates the hooks and the Chehra jalo. Most Pota teppas have sails, but some of them at sea don't use their sails.

Length: 7m approx

Depth: 1.60 to 1.94 m approx

The fishermen were making their own large Pota teppas and attaching motors to them as it works out cheaper than the fibre teppa. Since this boat is made from wood, fishermen buy the wood and make their own boats (Aarthi Sridhar, 2004 and Neha Saigal, 2006). In the case of the fibre teppas the entire boat was bought from the market and that was an expensive affair.



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## Padua

This is a wooden hollow boat that only operates the Bada jalo, this is also made by the fisherfolk itself and it is non- motorised.

Length: 8 to 9m approx

Depth of the boat in the centre: 85 cm to 1.9m

Depth: 2.40m



# Through Looking Glasses and Rabbit Holes

## An Enquiry Into Agents' Perceptions On Sea Turtle Conservation In Orissa

**Aarthi Sridhar and Kartik Shanker**

### **The arena of conservation**

Coastal Orissa has been an area of many scientific, conservation, fisheries development and industrial development efforts since the 1960s and 1970s. In earlier sections of this report, we discussed research on sea turtle biology and habitats in Orissa. We also traced the shift from direct take of sea turtles to incidental capture in fishing nets.

The international, national and local concern over the years regarding reports of high turtle mortality and conservationists' demands for protection led to a number of laws. A large majority of these laws pertain to fishing by various categories of fisherfolk. This gave rise to the formation of India's largest marine protected area – the Gahirmatha Marine Sanctuary, fishing regulations in the other two known mass nesting sites in Devi and Rushikulya, and various gear regulations such as the compulsory requirement for the use of Turtle Excluder Devices (TEDs) in trawl fishing nets. The involvement of the Supreme Court's Central Empowered Committee (CEC) in arbitrating over a complaint related to the poor implementation of conservation laws resulted in another layer of restrictions (Sridhar et al 2005). The reactions of fishing communities to each of these restrictions has varied over the years and has been discussed in the earlier chapters.

Over the last couple of decades, various actors have assisted in the formation of an arena of conservation. They have each transformed the context of coastal Orissa, seeking in different ways to influence ideas and actions towards their objectives. The arena of conservation in coastal Orissa features a number of actors engaged in the discourse of sea turtle conservation in the state. There have been varied responses to conservation legislations from these groups such as officials of

the forest and fisheries departments, local, national and international conservation groups, fishworker unions (both traditional and mechanised), fishworker support NGOs and scientists. Each of these groups or 'entities' are in effect claimants to the Orissa coast, each nursing their ideas about what has led to its present social and ecological condition as also ideas of its future. In this study, we chose to focus on the interactions between various entities in the state and how they viewed the problem of sea turtle conservation in Orissa. We classified these groups as a) the state and its representatives, b) conservationists (local, state level and international) c) scientists and d) fishing community (both traditional and mechanised) and their support groups (NGOs).

A number of social-political situations and relationships exist between the various entities engaged in the subject of coastal resource use and many of these relationships are marked by disagreement or conflict. The research framework sought to explore the perceptions of these entities about the numerous legal regulations formed for turtle conservation in the state, and also their perceptions of each other's roles and responsibilities in the present as well as in the future. This was explored through a qualitative research endeavour over the period 2009-2011. The central questions that we sought to explore through this qualitative study were:

- What are the perceptions of each of the entities related to sea turtle conservation of the fishing regulations and conservation laws and measures?
- What are the perceptions of each of the entities towards the problem of conservation and each other's role in conservation?

# Methodology

The focus of this component was on perceptions related to conservation and fishing regulations that concerned the three known mass nesting sites in Orissa, namely Gahirmatha, Devi and Rushikulya. Therefore, although sea turtles nest all along the Orissa coast, we focused on information from the villages adjacent to these mass nesting sites. Since these have been sites of maximum interaction with sea turtles for all entities - local conservationists, local fisherfolk groups (both traditional and mechanised) and government agencies- our enquiries were concentrated on events related to the villages adjacent to the mass nesting sites and their offshore waters. Therefore our selection of particular key informants (especially from the categories of government officials, conservation groups and fisher community representatives) was determined by their engagement and knowledge of those particular areas.

Our initial study design incorporated both quantitative and qualitative approaches to gain an understanding of stakeholder perceptions regarding sea turtle conservation measures in Orissa. In preliminary field work, we conducted a brief survey and focus group discussions in select villages at the mass nesting sites. However, upon testing some of the survey based questionnaires and after an initial round of interaction in the villages, it became clear that in order to arrive at a reliable sampling technique to administer the quantitative study, baseline information was required on the breadth of villages that actually were affected by sea turtle related fishing restrictions. Particularly in areas such as Gahirmatha and Rushikulya, this would require a detailed survey of the kinds of boats and craft, categories of fisherfolk and areas of fishing. Although data collection on baseline information has been initiated in this project, the surveys of the entire coast are not yet complete.

In order to answer the broad questions of this study, we adopted a qualitative research approach where we identified key informants belonging to the various categories of entities mentioned above and conducted detailed interviews on the subject of human-wildlife conflict in Orissa. We explored in

depth the responses and opinions of key informants who were representatives of each of the broad groups that we have been interacting with since 2003. This approach provided a series of narratives which were analysed to understand the responses to various expected and emerging themes.

The interviews: Interviews were conducted by a research team of three researchers who have been following the subject of conservation closely in this region. We interviewed 22 informants during 2009 and 2010. We conducted focus group discussions with two groups of fishworkers including a group of gill netters and trawler owner association members. It was not possible to conduct detailed interviews with trawl owners due to a lack of cooperation from the Paradip trawler base. However brief notes from meetings held with trawl owners have been incorporated in the study.

In addition, we conducted 4 stakeholder consultation meetings in Orissa for the Orissa Traditional Fishworker's Union to elicit their opinions on various legislations governing their area. These were conducted in Chatrapur (Rushikulya mass nesting site), Kaliakon (Devi mass nesting site) and Rajnagar and Kharnasi (Gahirmatha mass nesting site).

Secondary data was also gathered on the following aspects:

- The matrix of legislations pertaining to each of the sites
- Statements and reports of the NGOs (conservation groups and fishworker support groups)
- Minutes of meetings of the Orissa Marine Resources Conservation Consortium
- Letters, petitions, official documents, legal documents from various NGOs, fishworker unions, government departments and courts

Interview guide: Based on a review of the literature on conflict in Orissa and based on our familiarity with the region and the various entities, we put down broad questions related to specific themes

such as perceptions on legislations, perceptions on government, scientists and scientific studies, on conservation measures and conservationists and finally on ways to resolve the conflict. This was modified for each of the groups slightly and during the course of the interview, the sequence of topics was kept fluid. Attempts were made to cover as much of the subject as the context of the interview permitted. Often many topics were sacrificed in order to accommodate topics that the researcher felt was important to cover, or was an area that merited more elucidation and deliberation by the particular interviewee.

### **Quality of the interviews**

Certain aspects of the interviews contributed to the quality and nature of the individual narrative as it was produced within the setting of an interview.

1. Almost all interviews were conducted in one sitting with each of the key informants due to time constraints and overall availability of each of the interviewees for long and detailed discussions on the subject.
2. All interviews were recorded using a dictaphone since the interview length and setting did not permit extensive note-taking. In some interviews this did not appear to create any inhibitions but in most instances, this did contribute to 'correct' responses. It may also may have led the interviewee to adopt a public positioning rather than respond in the manner that an informal and 'un-official' interview may have had. Again this was observed in varying degrees between groups.
3. Not all aspects were covered in single sittings of interviews and only a part of the narrative appears to have been covered in some cases.
4. Importantly, all the interviewees were well known to the interviewees. Both parties have interacted over these issues for the past 5 years very closely. Therefore the limited time of the interview became

an opportunity for many of the respondents to a) provide feedback on past actions and ideas (both subtle and direct), b) highlight their concerns with some stakeholders over others and c) share information. This information has been useful and has contributed to addressing the questions in this study.

### **Qualitative Analysis**

- All interviews were transcribed.
- Each of the interviews were listened to carefully and transcripts were read multiple times, to identify broad topics in the narratives.
- In addition to a priori themes, Additional ideas or themes that emerged from each of the interviews were identified
- Within each interview, statements were assigned to various topics and themes. This was carried out in an iterative manner.
- Each fresh interview was carefully examined identify known and emerging themes. Previous interviews were then re-examined to assign / re-assign some of the statements to the newer themes from the subsequent interview. A final set of themes was thus identified, and statements in each of the interviews assigned to these themes.
- Narratives were examined for consistency and differences within actors.



## Discussion

The analysis of the narratives gave rise to a number of themes, some of which were expected, while others emerged. While interesting themes and issues emerged, further research is required to explore and analyse the full range of themes from deeper and richer narratives. Here, we discuss a few of the themes to illustrate the initial findings.

### The value of wildlife and sea turtles

Attitudes towards wildlife in general varied between the broad typology of entities interviewed. Many scientists and conservationists stated that wildlife should have inherent survival rights. The status of sea turtles in particular – on the schedules of the WLPA also contributed to it being viewed as an item having high value among conservation groups and scientists. Subtle differences are noted between sea turtles and other species on the protected lists of the WLPA - such as turtles' ability to co-exist with human presence in close proximity. However, such subtle observations were not shared by all. The value of the animal and the need for its protection was deemed unchallengeable by virtue of its status on a legal scheduled list. Statements like '*everyone knows they have to save the turtles*' are indicative of this. Both scientists and conservationists even suggested that sea turtles needed to be conserved for their own sake, with any questions regarding benefits to humans being secondary. The need to conserve sea turtles is bolstered by ecological ('*they are scavengers of the sea*') and cultural arguments ('*Hindus regard them as religious embodiment of lord Vishnu and they worship them*'). Fishers along the coast often mention the religious and cultural significance of sea turtles as a reason for not directly consuming them. Fisher representatives agreed with the need to protect turtles, but apart from emphasising the taboo associated with sea turtle consumption, they did not share the reverence for wildlife that conservationists or scientists exhibited. They made a distinction between incidental and direct take especially in terms of culpability – a measure of the degree to which a person can be held morally or legally responsible for an act. Both trawlers and traditional fishers state that the irony in Orissa's

fisheries is that turtles are found where fish are found. This non-culpability of both the mechanised and the traditional as far as entanglement in nets is concerned, is asserted in the statement '*we go there for the fish*'. An important variable in the narratives on conflict appears to be the value that is accorded by each respondent towards sea turtles or wildlife in general. This value will have to compete with other values such as the freedoms of pursuing fishing as either a profitable or even a subsistence economic activity.

The legal position of sea turtles as protected species colours the formal positions that respondents adopt. This tentative acceptance of sea turtle protection as a value is seen among representatives of fishworker support organisations. While expressing both values as important, they do accord livelihoods a higher position than turtle protection. This fundamental distinction drives several of the other differences between various actors; however it is difficult to determine whether the high value of sea turtles is a starting point or if other psychosocial factors are responsible for determining this in the first place.

### Who's turtles are these?

The importance of the olive ridley turtles that visit Orissa is supported on grounds other than its ecological importance. The fact that ridley turtles nest *en masse* only in Orissa along the Indian coast was important to all the conservationists and scientists interviewed. They describe conservation actions as a '*duty*' of the people of Orissa. This rather popular conservation message is even mentioned by government officials of the forest and fisheries department from time to time. This implies a strong positive sanction towards conservation as a 'good' action and simultaneously suggests that those who do not share this concern for 'Orissa's turtles' do no good. This colours people's attitude towards others who do not share their sentiment. A fisheries official stated that Oriya people do not kill or eat turtles, and if this did happen it was by '*other people*'. None of the fisherfolk we spoke with mentioned even once the significance of the sea turtles on

these shores and their consequent high status. On the contrary, sea turtles are viewed by some as being of a nuisance value; of belonging to foreign countries and whose protection was in fact somebody else's responsibility. Scientific studies highlight sea turtles' ability to migrate across oceans and across countries. This knowledge coupled with the fact that several restrictions are imposed on fishing to conserve these turtles who only seasonally visit the country probably contributes to a counter statement from fishers that turtles are the bane of the state rather than Orissa's pride as stated by conservationists and scientists.

### Threats to sea turtles

It might seem like a practical and a rational sequence that if all actors agreed on how olive ridley turtles die in Orissa, there would be consensus on how they can be saved. However, not only is there diversity of opinion on this question, but the responses are indicative of several other dimensions of conflict. Firstly, this question is often misconstrued as a technical one but it elicits responses that are deeply political in nature. There are many accounts about who and what is responsible for the death of sea turtles. Scientists and conservationists have long blamed and continue to point to fisheries (mainly trawlers) as the main cause of sea turtle mortality in Orissa. Responses from the fishing community representatives and leaders however are not this unambiguous. Representatives from the traditional and the mechanised sector and even the fisheries department offer a range of causes other than fisheries including climatic reasons, fatigue due to migration, death during nesting and a number of causes that are dismissed by scientists and conservationists as unscientific. Leaders of the association of mechanised trawl fishers identified trawlers from the neighbouring southern state of Andhra Pradesh and foreign fishing vessels as the culprits. Traditional fisherfolk from areas like the Devi river mouth said that trawlers from the nearby Nuagad trawl base as well as Andhra trawlers as responsible for turtle mortality. The gill netters from northern Orissa said that trawlers from Paradip and Andhra Pradesh often come and destroy both the fisheries as well as turtles in the region. Each

fisher group is keen to depict its sectoral competitor as responsible for turtle deaths. Rarely are members of one's own economic or professional interest group blamed for turtle deaths.

Fisheries officials did not identify one clear cause of mortality perhaps on account of the fact that they are supposed to serve as guardians of all categories of fishers. Traditional fishers attribute this inability of the fisheries department to proactively and unequivocally safeguard traditional fishers' interests or even turtle protection (through the implementation of the OMRFA law) to their proclivity to favour richer interest groups amongst them.

Very serious concerns have been raised by conservation organisations regarding the implications of coastal development on sea turtle habitats (refs IOTN Issue No 8). At various points different scientists and conservationists and members of the only multi-stakeholder platform in the state – the OMRCC (Orissa Marine Resources Conservation Consortium) have voiced these concerns. Yet, the discourse on sea turtles and discussions on direct and immediate threats is heavily centred around the impacts of fisheries.

### The status of turtles

It is assumed that the endangered status of the sea turtles that visit Orissa is based on scientific information. However, doubts are expressed about the quality of scientific information collected in this region by virtually all categories. The responses regarding data collection on nesting turtles by the State is unambiguously labelled as unscientific, falsified or 'fugded'. Scientists also say that no reliable numbers exist on the turtle populations because of poor quality monitoring by the State. Yet all the scientists stated that sea turtles were endangered and threatened if not globally, then at least in Orissa. The terms 'threatened' and 'endangered' are interchangeably used to describe the precarious condition of sea turtles in the light of future threats to their habitats and present trends of turtle mortality. These terms do not necessarily correspond to the categories defined by the IUCN

Red listing process. Most such statements are corroborated with personal experience and knowledge of impending threats to habitats. None of these threats or the precarious status of sea turtles was discussed by fisherfolk who instead asked for proof of the threatened status of sea turtles, questioning whether such stringent conservation regulations were warranted.

### **The place and purpose of science in problem solving**

Exploring views on conservation of marine resources often leads to discussions on the value of science in identifying the problem and its solution. Interestingly, none of the entities involved in conservation, including fisherfolk, questioned the value of the science per se. However it is given a ranking or a value by each entity just as its subject of study – sea turtles - are ranked. Scientists tend to place the highest premium on science. They see all decisions, particularly management decisions, or legal decisions on conservation as having to be science-based (*‘the entire process of governance should be purely based on science’*). However, there are many limits and prescriptions that sea turtle scientists in Orissa themselves impose on the nature of science or scientists. Often, the concern with science is the fact that scientific studies take a long time to result in action on the ground. Another complaint is that scientists are not concerned enough with saving the species. Statements like *‘science alone is not going to save the species but all scientists should have a passion to save sea turtles’* and *‘of course science should be in the front, but it has to be backed by moral issues’* provide an illustration of this sentiment.

Conservationists and scientists perhaps share the greatest amount of interaction. There is a fair amount of appreciation of scientific work by conservationists but they too believe that science in Orissa should be guided by other considerations, including the nature of studies (*‘need to prioritise and do work on monitoring and need to work more in the offshore waters than on hatching studies’*). It is not enough only if scientific reports identify problems and solutions accurately or provide information that is useful in understanding turtle conservation issues better. What use various

scientific studies are put to is a matter of concern since they ostensibly contain answers. A common complaint across the board is that scientists do not share their data or their findings with other entities and often not even amongst themselves. There are both flattering as well as negative perceptions of scientists. On one hand, they are regarded (even in descriptions by other scientists) as being an individualistic, self-serving, calculating and secretive without any desire to collaborate or work with others. On the other, the scientist is also regarded as having an enviable degree of expertise regarding sea turtle biology or the coastal and marine environment (*‘we are spokespersons for sea turtles’*; *‘no one knows turtles better than we do’s’*).

While it is stated that scientific information is required to inform conservation or legislation, it is not certain if all entities are willing to readily apply the findings of science regarding specific actions. In much of the narratives on conservation, it appears that the application of the scientific method is used as a measure of the correctness of a particular action - whether in fishing practices, in fishing restrictions or in the overall planning process. However, depending on the value of a particular endeavour (whether sea turtle protection or livelihoods) different groups perceive limits to the utility of such scientific methods. For instance, speaking about the nature of fishing regulations a representative of a fisheries support NGO stated *‘...the scientific basis (of the laws) can not be questioned. But the thing is it is not appropriate and community friendly.’*

### **Perceptions on legislations and conservation measures**

Those concerned about the livelihoods of fishing communities state that they are not opposed to conservation actions as long as they do not impact livelihoods. Clearly, for them, the value of human economic activity far outweighs any inherent value of wildlife preservation.

Each of the entities believes that they need to be involved in the process of conservation planning and rule making. Each of the actors believes that the right approach to conservation must be

characterised by certain philosophical approaches. For instance, one respondent (categorised as a scientist) stated that conservation must be based on ethics. He explained ‘*every animal has the right to survive. And next it is the benefit to the human being. First it is benefit to the animal, next it is benefit to the human being.*’ Similarly, another approach to conservation is to follow the word of law. This approach involves ensuring implementation of legal provisions, policing and enforcement.

This is closely linked to the idea of indisputable legitimacy of the laws in operation. When an agent views a particular law as being legitimate (for a range of reasons) then he or she tends to demand its implementation vigorously. The legitimacy of each law in turn related to which values it protected – for instance traditional fisherfolk representatives and conservationists call for proper implementation of the OMFRA – because they believe that it prohibits mechanised fishing which can a) protect the interest of traditional fisherfolk and / or b) prevent incidental catch of turtles (inhabiting near shore waters) in trawl nets.

### **The fluid typology of actors**

We set out to examine the narratives of the range of agents involved in sea turtle conservation categorising them loosely as scientists, conservationists, fisherfolk representatives, fisherfolk support NGOs and so on. However, the interviews we conducted which explored a range of subjects provided an opportunity to understand how each of these agents approached ideas of conservation, science and fisheries. While the constituents of these categories believe in a particular philosophy behind work or vocation (scientists’ beliefs about science or conservationists’ beliefs about conservation), their beliefs can transcend their own category and influence other agents and categories in the course of their interactions. For example, it is possible that a scientist sounds more like a conservationist, or that fisheries NGOs and fishworker organisations demand better science in fisheries management. This is an area that requires further exploration and the present narratives we examined indicate the operation of this dynamic.

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# Reccomendations

## 1. Unravelling the anatomy of conflict

The problem of human-wildlife conflict is not a simple dichotomy between environmental protection and livelihood issues. Nor is it necessarily manifested in direct forms – such as hunting (illegal) or crop depredation or even loss of human lives. Human-wildlife conflicts can encompass various other social, political and cultural dimensions which drive and direct conflict. In many instances such as in Orissa, conflicts are of an indirect nature and are precipitated and mediated by the factors listed earlier. Very often, indirect factors are least investigated and hence continue to exercise their influence unaddressed. It is necessary that efforts are invested in understanding the social, political and cultural anatomy of human-wildlife conflicts through detailed social science studies. This alone will expose and reveal perspectives about conflict to researchers and enable them to provide policy recommendations that are enriched by a thorough understanding of the historical, political, psychological and cultural view points that control the dynamics between actors.

## 2. Recognising opportunities in cycles of conflict

Due to their inherent nature, several situations of conflict around issues of wildlife protection are intensified at various stages in time. Recognising these stages and identifying internal and external drivers can help assuage volatile situations. At the same time, it must be recognised that neglecting conflicts for longer durations can have detrimental effects in that all actors are not equally involved at all times. Taking advantage of peak moments of conflict to press for changes could yield maximum benefits.

## 3. Supporting dialogue through appropriate fora

An attempt to facilitate dialogue among the various entities in Orissa began in 2004 with the formation of the Orissa Marine Resources Conservation Consortium. Platforms for collaborative planning are even mandated legally (refer recommendations of the Supreme Court's Central Empowered

Committee) allowing for a space for fishworkers and conservationists to express their ideas. However, these legally mandated spaces are already restricted by pre-determined rules and constraints of membership which might inhibit more effective forms of collaboration. Platforms like the OMRCC, which are non-official in nature but which have their own systems of functioning, can be more effective than government mandated platforms.

## 4. Rationalisation of laws

Our study shows a diversity of opinions among scientists, conservationists and fisherfolk over the laws that currently apply to Orissa coastal waters. However, these entities are not entirely uncompromising in their views on the present laws. Modifications are suggested with a scientific rationale or with a view to mitigating conflicts through 'give and take'. A well planned and detailed exercise of eliciting this opinion from each of these groups will offer potential solutions in mitigating conflicts.

During this project, the members of the OMRCC took some steps towards this and assisted in conducting meetings of fishworker representatives with the Orissa Traditional Fish Workers Unions regarding each of the fishing regulations that apply to the three mass nesting beaches. The final meeting held in the April, 2011 has consolidated the position of the union on the various rules. This enables the union in their own negotiations with other actors such as the State or conservationists. Future meetings are planned with the state government to call for modifications in the regulations. The government should call for consultations with such platforms and take into consideration the decisions taken after internal consultations by various entities.

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