

Community Attitude towards Conserving the Gangetic Dolphins (*Platanistagangeticaganetica*, Roxburgh, 1801) in the Kulsi River, Assam, India

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Abstract: *Gangetic river dolphin (Platanistagangeticaganetica) is an endangered species and is found mainly in three parts (tributary) of Brahmaputra river. Kulsi river is the southern tributary of the Brahmaputra river. The river passes mainly through Chaygaon area of Kamrup district of Assam and supports a significant population of Gangetic dolphins. An assessment of human attitudes particularly towards Gangetic dolphins is foremost for formulating appropriate conservation policies of this endangered species. Hence, this study was undertaken with aims to evaluate community attitude towards conservation of the Gangetic dolphins in the Kulsi River, Assam. The study was carried out selecting three villages in this area and data was collected through direct interviews using questionnaire composed of both open and closed ended questions and from field observations. From the study it was found that peoples of the study area have no problem with dolphins of this area. Rather they think dolphins help them in fishing (as expressed during discussions) and they use dolphin oil as medicine or fish bait or both. According to them dolphin mortality is not common in the area though most of them agreed that there is some sort of threats to dolphins in the study area. They responded shortage of water is the major threat to dolphins of this area followed by sand mining. Though in last 10 years the number of fish and fisherman has been in declining trend in this area, dolphin population is in increasing trend which may be due to the management strategies undertaken by conservationists working in this area in last few years. In spite of most people being poor and illiterate, they had a good sense of environmental awareness and most of them wanted dolphins should be conserved for their ecological values. Most of them wanted areas in and around Kulsi river should be declared as a Protected Area and majority supported ecotourism as alternative source of livelihood.*

Keywords: Community, attitudes, Gangetic, river, dolphin, fishermen, communities, threat, mortality, ecotourism, livelihood

1. Introduction

Mutually supportive relationships between communities and nearby protected areas are critical to the long-term success of any conservation efforts. (Tessema, *et al.*, 2007). Protecting biodiversity is a global imperative and the responsibility for this commitment begins with every country that should be shared by all people on this planet (Abdullahi, *et al.*, 2007). Though in the colonial era, forest and game reserves were established largely without considering the local people (McNeely, 1994), at present ethical and management issues over reserve land and forest areas have become a more diverse and complex issue (Blench, 1997). This necessitates conservation agencies to realize that Protected Area management must consider both conservation and developmental needs, thus integrating local peoples into conservation programs (IUCN, 1994), often referred to as the 'integrated conservation and development' or 'community based conservation' (Bond *et al.*, 2001).

Gangetic dolphin (*Platanistagangeticaganetica*) is a freshwater, charismatic mega-fauna of the Indian subcontinent, which is recently declared as India's National Aquatic Animal. Due to continuous anthropogenic pressure and other environmental factors global population of these species is in declining trend (Klinowska, 1991) and there is only 2500 individuals of this endangered animal so far left in the world (Sinha and Sharma, 2003). Hence, the species is declared as endangered species globally (IUCN, 1996) and there is an urgent need to identify the potential threats to this species and take immediate conservation measures to save the remaining population of this species worldwide.

Brahmaputra river system of India supports about 8% of total global population of dolphins out of which Kulsi river, Assam, India, a small tributary of this river system alone supports about 14% population (Wakid, 2009). Keeping this mind this research problem was undertaken to assess the community attitude of local people living in and around Kulsi River, Assam, India towards conservation of dolphins of this region. This will no doubt help to formulate successful community based conservation measures for this endangered species in future.

1.1. Objectives

- Assess the socio-economic condition of local communities in and around identified Dolphin habitat of the Kulsi River.
- Envisage the degree of threats due to socioeconomic activities of local people towards survival of dolphins in this region and propose feasible mitigation plans.
- Understand the level of environmental awareness of targeted communities and to assess their interest towards conservation of Gangetic dolphins in Kulsi River.
- Investigate people's attitude towards declaration of areas in and around Kulsi River, Assam as protected area.
- Formulation of conservation action plan/strategy to develop the identified dolphin habitats as protected area (community conservation area).

2. Review of Literature

The Gangetic river dolphin is found in Ganges-Brahmaputra-Meghna and Karnaphuli river systems of

India, Nepal and Bangladesh (Anderson, 1878, Kasuya and Haque, 1972, Jones, 1982, Mohan, 1989, Reeves and Brownell, 1989, Shrestha, 1989 and Reeves et. al. 1993). It is the only exclusively aquatic mammalian predator in the Ganges which plays a vital role in maintaining the essential balance of the ecosystem, occupying the apex of the food chain (Behera, 1995). Like the tiger is to the forest, the dolphin is to the river because both are important indicator species and have significant roles to play in their respective ecosystems (Singh, 2001). The distributional ranges and abundance of this species has been sharply declined in its entire distributional ranges (Reeves and Leatherwood, 1995) due to various natural and anthropogenic pressures in India and Bangladesh, and for which the IUCN revised its threatened status from vulnerable (Klinowska, 1991) to endangered (IUCN, 1996). However, due to habitat degradation and other anthropogenic factors, at present dolphins are found only in two tributaries of Brahmaputra in Assam- one in Kulsi river of Kamrup district and another in the Subansiri river of Lakhimpur district (Wakid, 2005). Now a days the species is facing a series of threats for its survival due to poaching, construction of dams and barrages, contamination of river water, sand mining, and fishing (Reeves and Leatherwood, 1994; Smith and Reeves, 2000; Smith et al., 2000 and Nair, 2009). The concept of Community Based Conservation (CBC) originated for conservation and ecological balance at international levels such as the UNESCO's Man and Biosphere Program, 1971 and the World Conservation Strategy-1980 (Redclift, 1984). According to Barrett and Arcase, 1995 Community Based Conservation (CBC), is an integrated approach of conservation and development. A number of conservationists believe that communities in control of natural resource management are better managers than state institutions, and through conservation practices, they will be able to improve their economic well being (Wells, 1994). Moreover, the intensive use of natural resources and the pursue of unbalanced socioeconomic development during the last century has negatively affected the different components of the environment despite of its realization to significant economic growth and as a result the concept of sustainable development has become more important (Nasron, 1420, Warner, 1997). The agenda of receiving communities involved in conservation is to make nature and natural resource conservation beneficial and meaningful to rural communities. (Rwabitetera Mugisha, 2002).

3. Materials and Method

3.1 Study area

The Kulsi River is the southern tributary of the Brahmaputra River, with a width of 19 m. Kulsi River originates from Meghalaya (25°38' N, 91°38' E) and passes through Borpita and Malibari areas in the Kamrup district of western Assam where it is known as the Kihri River. In Assam the local people prefer to call it Kolohi, a southern tributary of the Brahmaputra River, 40 km away from the Guwahati. Being part of Brahmaputra River it supports good fertile land throughout its length and hence also supports dense human

population on its bank. It is vibrantly active with massive human intercourse every moment. The river provides sufficient livelihood opportunities to over 10,000 families living on both banks of the river in the Kamrup district of lower Assam through activities like sand mining, fisheries and commercial boating. These activities are free from fuel emission and thus the river water remains fresh and uncontaminated and yet remains a fresh and unique hotspot for freshwater river dolphins (locally known as Xihu) in spite of continued anthropogenic pressure. (<http://www.easternpanorama.in>).

3.2 Methodology

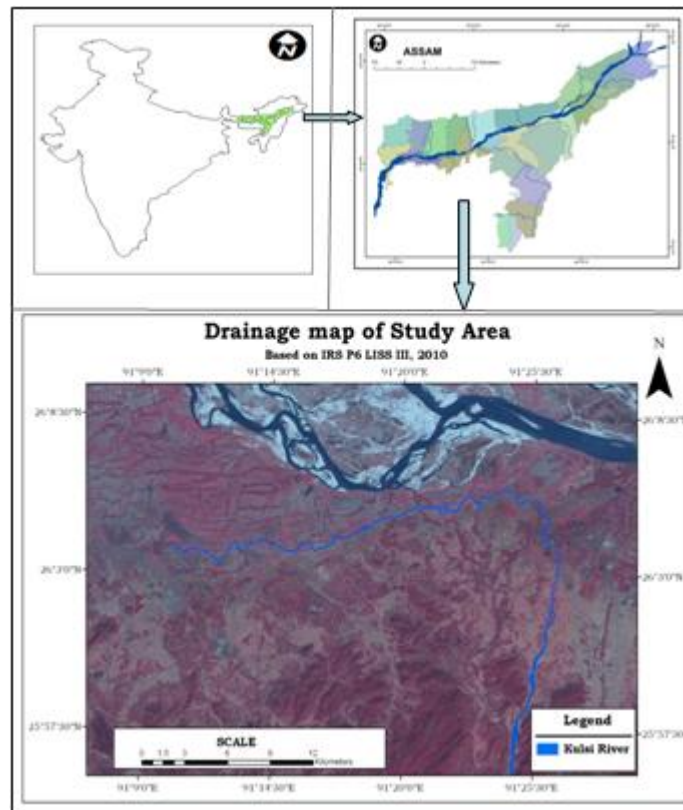
3.2.1 Field survey and data collection

A mixed –methods approach was examined community perceptions in and around the Kulsi River in Assam. Socio-economic assessments of local communities have been carried out based on primary data collection, both qualitative and quantitative in the villages through household survey. The qualitative approaches involved data collection. Kulsi River represents a wide range of ecological, social, economic, and policy conditions. The information gathered was subsequently used to develop an interview questionnaire to gauge broader community perceptions of dolphin conservation in and around the Kulsi river. Heads-of-households were randomly selected for interview on a first-come, first-served basis. In total, 150 fishery households were interviewed—50-50 households from each of the villages. The survey included both closed and open ended questions across four broad categories. (1)-Views towards dolphin and dolphin conservation; (2) views towards conservation impact & protected area declarations of the Kulsi River (3) lease holder society details for historical knowledge & (4) A single questionnaire for a series of household demographic questions, including age, education, family size, source of income, per day income information about each household's have been used.

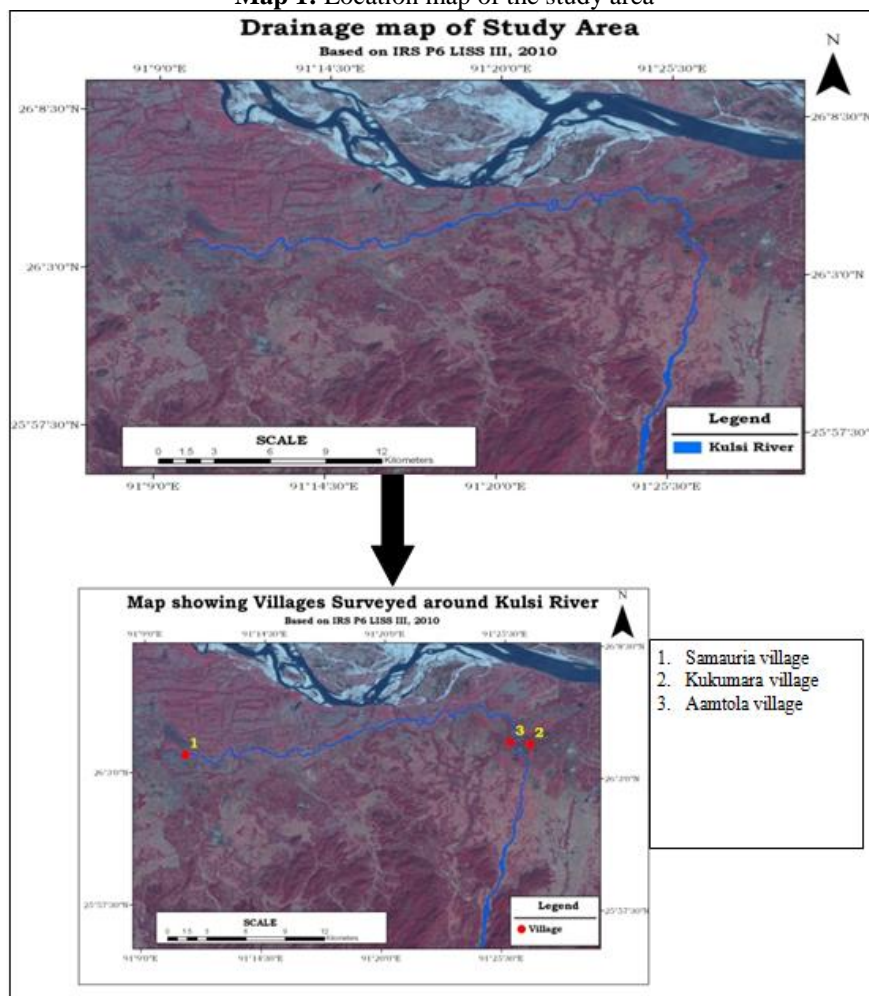
Local people's attitude towards conservation of Gangetic dolphins also assessed during these activities through questionnaires if they are aware of the fact that their areas support dolphins, ever they interested for this species, if interested for what purpose?, ever they will support conservation of this species.

3.3 Data analysis

Data collected through these activities will be analyzed to know the role of socioeconomic conditions of people of this region which are actually eroding biodiversity of this region and threatening survival of dolphins. The data have been analyzed and interpreted with the help of MS Excel (Microsoft excel spread data sheet). Software like 'SPSS' has been used wherever necessary. Accordingly conservation measures have been taken focusing on community based conservation strategy to save dolphins of this region in future.



Map 1: Location map of the study area



Map 2: Location map of villages where socioeconomic survey was carried out

4. Results and Discussions

4.1 Results

The Kulsi River stretch about 78m*19m. During monsoon season the river is full fill with water and during summer the water level of river is decrease. The river provides ample lively hood opportunities to local people living on the both side of the river.

4.1.1 Assessment of the socio-economic conditions of local communities

In and around of the Kulsi river many villages were found but randomly I selected total 3 villages *i.e.* 50 fisheries house hold from Aamtola and Kukumara village (upper region of Kulsiriver) each and 50 fisheries house hold from Samauria village (down stream) respectively.

Table 1: Average Age and average year of fishing experience of fishermen.

S.No.	Age of fishermen and year of fishing experience of fishermen				
1	Range of age	Frequency	Average of age	Average year of fishing experience	Correlation (r)
2	15-25	8	19.25	7.75	0.94744596
3	25-35	19	28.05	20.26	
4	35-45	39	38.76	24.74	
5	45-55	35	47.51	31.34	
6	55-65	32	57.40	38.18	
7	65-75	15	67.13	39.66	
8	75-85	2	80.50	72.50	

Table 2: Family size and income of fishermen

Village Name	Family size		Per day income in Rs.		Monthly income in Rs.	
	Mean	SD	Mean	SD.	Mean	SD.
Aamtola	5.96	1.67	6777.45	4329.78	6777.45	4329.78
Kukumara	6.94	2.72	25417.80	41912.21	25417.80	41912.21
Samauria	6.14	2.60	35158.00	47087.40	35158.00	47087.40
Total average	6.34	2.33	266.56	169.69	Correlation (r)=-0.0415	

Table 3: Education status

Village Name	Education range					Total
	Illiterate	0-5 th	5-10 th	10-12 th	12 - +3	
Aamtola	24	15	7	1	3	50
Kukumara	27	9	12	1	1	50
Samauria	35	3	8	2	2	50
Total	86	27	27	4	6	150

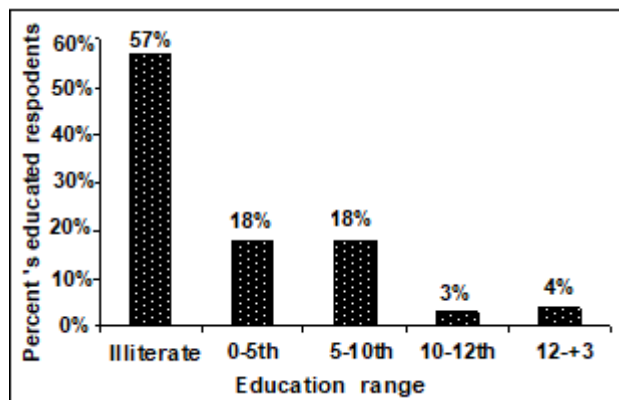


Figure 1: Education status

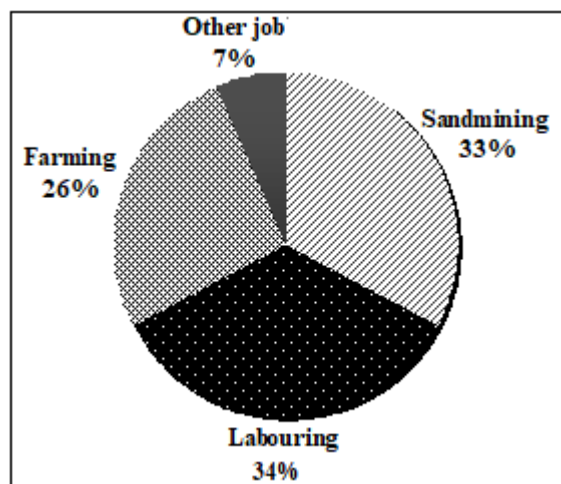


Figure 2: Other sources of livelihood

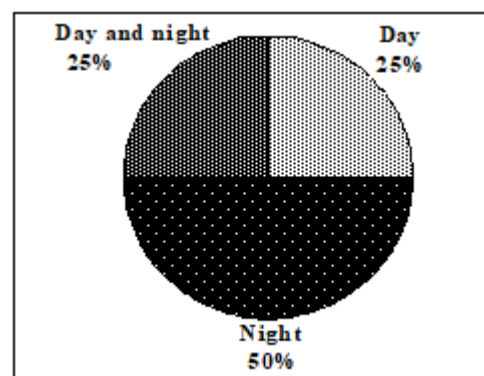


Figure 3: Fishing time

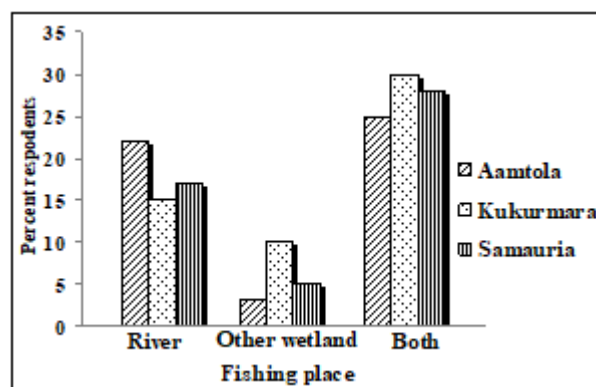


Figure 4: Fishing place

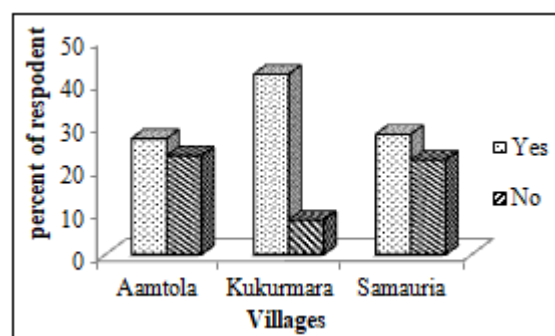


Figure 5: Fishermen having their own boat

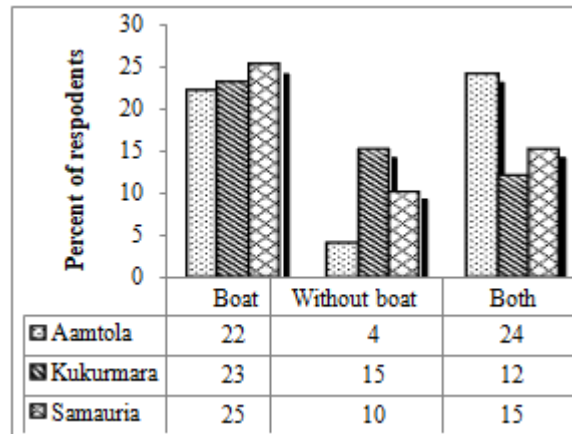


Figure 6: Mode of fishing

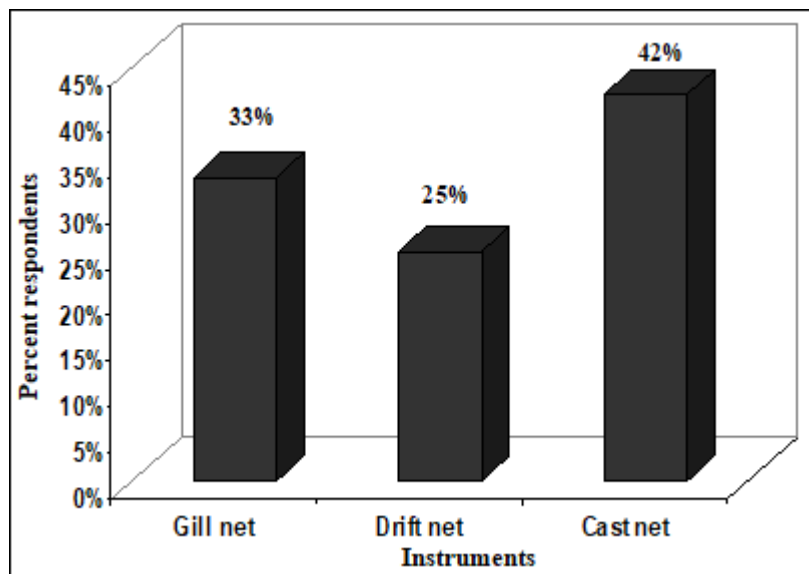


Figure 7: Use of fishing instruments

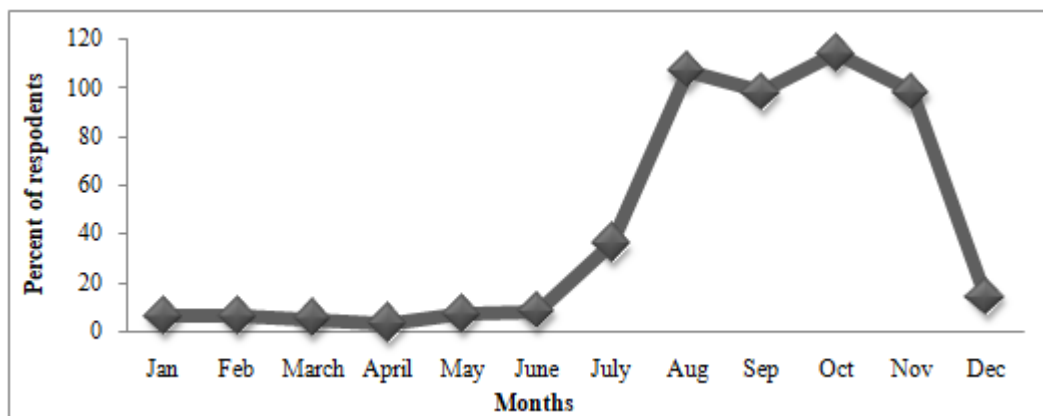


Figure 8: Fishing season

4.2 Discussions

From this study it was found that in the fisherman communities all age groups are involved for earning of their livelihood and there is a direct correlation between average age of fisherman and year of fishing experience (table-1). This indicates fishing is the primary source of income for these peoples.

Family size was found to be in between 6-7 with an overall average family size 6.34 and over all average of fishermen

per day income are 266.56. There is a negative correlation between average family size and per day income (table-2). Since all the age groups are involved for livelihood earning and there is no increase in per day income as average family size increases, it is clear these peoples are poor people.

Overall literacy rate was found to be 42.66 %. Peoples opting for higher education (after 10th) was found to be only 6%. Hence, most of the people are illiterate in these fisherman communities (overall illiteracy 57%) (Table-3 and fig-1).

After fishing, the other sources of lively hood sources was found to be highest for laboring (34%) followed by sand mining (33%), farming (26%) and other jobs (7%) (fig-2). Farming and other jobs together accounts for 33% only which indicates these people have less option for other alternative sources of livelihood after fishing due to poverty and illiteracy due to which they mostly opt for laboring and sand mining (which together accounts for 67%).

They generally prefer fishing during night time .Overall 50% peoples fishing in night, 25% fishermen in day time and 25% day and night time fishing (fig-2). River found to be the main place for fishing though they also do fishing in other wetlands of the area (fig-3). Most of the people of these fisherman communities have their own boat and they do fishing using their own boat although also go for fishing without boat wherever necessary. (Fig-5). They use all types of fishing instrument (net)*i.e.* cast nets (42%), gill nets (33%) and drift nets (25%) for fishing, among which use of cast net was found to be maximum followed by gill net and drift net (fig-7). Mostly Botia , Karoti , Ilish , Puthi ,Batasimas , Aarii , Tingorah , Barali, Magur, Garoi, Botatangaetc fishes are fishing by fishermen in Kulsri river and wetland/beel . Sol beel ,Colomybeel, Beldorabeel and Rampur beel, these are beels were found around the Kulsri River where fishermen fishing.From (fig-8) it is evident that fishing season is not consistent throughout the year. There is a peak fishing season from July to November and low fishing season from December-June. High peaking season from July to November is due to availability of sufficient water in river and other water bodies. Low fishing season from December to June is due to lack of sufficient water in river and other water bodies except the period from mid April to June when water is available but fishing is banned in this period by the Government since this period is breeding period for most of the fishes. Since fishing season is not consistent throughout the year, during off season these fisherman communities opt for other sources of livelihood.

Community characteristics

According to the fishermen interview both the qualitative and quantitative, Residents in communities located in and around of the Kulsri River depended exclusively on subsistence fishing that is primary source of lively hood. Except fishing sand mining, farming laboring etc are the other source of livelihood. Economic conditions of the fishermen communities are very poor. Resident living in the high region of the Kulsri river (Kukumara – majority of respondents interested in sand mining because income is more and Aamtola respondents - interested in fishing because physical labour is less instead of sand mining) are more rich in comparison to low region residents (Samauria village residents) because high region residents gain more income by sand mining and fishing activity where as low region majority of residents depends on farming and fishing and due to flooding farming is not succeed. Literacy rate is very low but environmental awareness is high.

4.2. Assessment of degree of threats to dolphins due to socioeconomic activities:

Table 4: Respondents' level of agreement concerning dolphin

Statement	Agreement	Total respondents agreement.	Total village respondents	Percentage (%)
Have you seen died dolphin	Yes	31	150	21%
	No	119	150	79%
Have you heard dead dolphin	Yes	46	150	31 %
	No	104	150	69%
Latest dolphin mortality?	Yes	19	150	13 %
	No	131	150	87%
Dolphin causesany problem in fishing	Yes	36	150	22%
	No	124	150	78 %
Fishing gear lost due to dolphins	Yes	31	150	21%
	No	119	150	79%
Dolphin died during fishing time	Yes	26	150	17%
	No	124	150	83%

Table 5: Population trend in fishermen, fishes and dolphin population in the Kulsri River

Statement	Agreements	Total respondents agreement.	Total Village respondents	Percentage (%)
Last 10 year fishermen in river	Increasing	34	150	22%
	Decreasing	109	150	69%
	Remain same	15	150	9%
Last 10 year fishes in river	Increasing	17	150	11%
	Decreasing	144	150	77%
	Remain same	18	150	12%
Last 10 year dolphin in river	Increasing	84	150	56%
	Decreasing	53	150	35%
	Remain same	13	150	9%

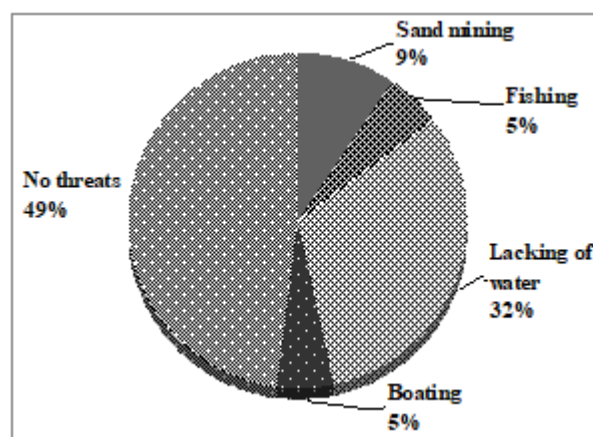


Figure 9: Threats to dolphins in the Kulsri River

Discussions

Maximum respondents conveyed they had neither seen dead dolphins (79%) nor heard about dead dolphins (69%) in their area (table-4). This shows dolphin mortality is not common in the study area.

Maximum respondents also answered dolphins don't cause any problem in fishing (78%), but it help in our fishing. they don't lose fishing gear due to dolphins (79%), and there is no mortality of dolphins during fishing time (83%) (table-4). From this it is evident that fisherman has no problem with dolphins and there is no threat to dolphins due to fishing activity in this area.

Maximum people responded that in last 10 years there is a decrease in fisherman in the study area (69%) and the same

time decrease in fish population (77%) but there is an increase in dolphin population (84%) (table-5). Decrease in fisherman must be due to decrease in fish population in the river, but in spite of this decline trend of fish population dolphin population is in increasing trend which may be due to the management strategies undertaken by conservationists working in this area in last few years. Maximum respondents answered there is some short of threats to dolphins in the study area (52 %) among which 32% respondents conveyed threat as lacking of water, 10% conveyed sand mining, while boating and fishing by 5% respondents each. (fig-9)

4.3. Environmental awareness and community interest towards conservation of Gangetic dolphins in Kulsi River

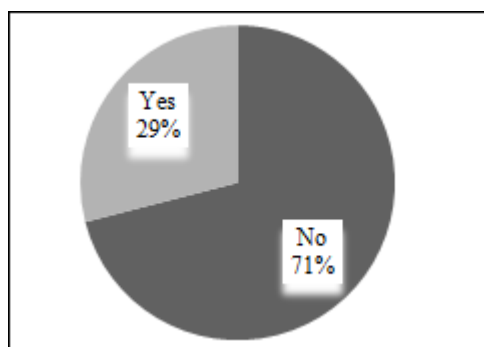


Figure 10: Agreement of respondent use of dolphin oil

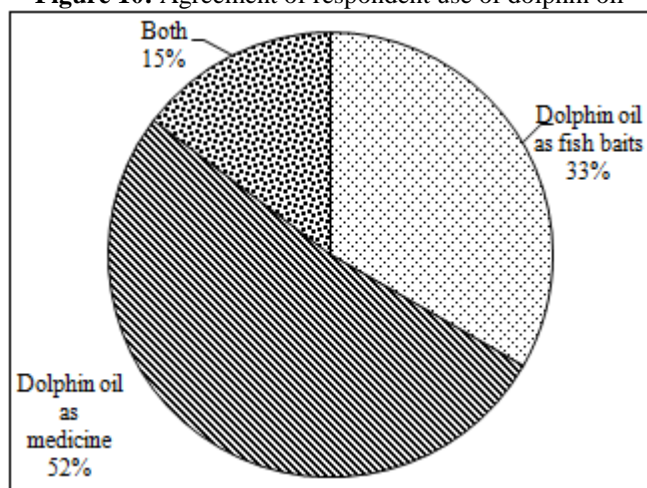


Figure 11: Purpose of use of dolphin oil

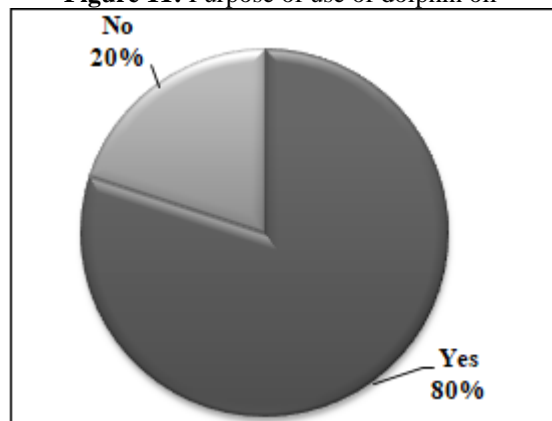


Figure 12: Agreement of respondents for dolphin conservation

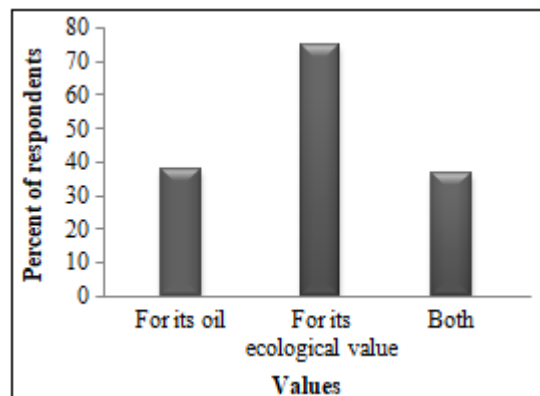


Figure 13: Peoples response towards need of dolphin conservation

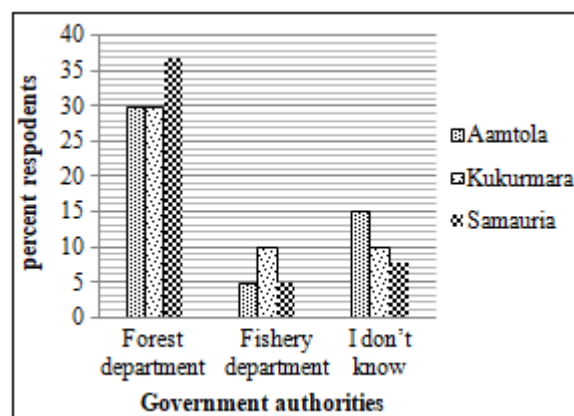


Figure 14: Government authorities for dolphin conservation

Discussions:

Maximum respondents (71%) agreed they don't use of dolphin oil while 29% agreed that they take use of dolphin oil. (fig-10). They use dolphin oil mostly for medicinal purpose (52%) followed by as fish bait (33%) or both (15%), while 19% respondents agreed they don't know any use of dolphin oil (fig-11). In spite of their poor economic condition and lack of literacy among them, maximum respondents (80 %) (fig-12) agreed dolphins should be conserved because of its ecological value (fig-13) and government authority for dolphin conservation is forest department (fig-14) which reveals there is a strong environmental awareness among peoples of this region. Environmental awareness may be due to the management strategies undertaken by conservationists working in this area in last few years.

Local people view towards dolphin conservation in the Kulsi River:

Open and closed ended questioners revealed that local resident (fishermen communities) generally held positive attitudes towards dolphin conservation. Reason mostly respondents say that Dolphin is helpful in fishing (**When the dolphin devises inside water, it pushes the fish upwards so it is easier, the fishermen cut net and catch them**). Its attraction to tourist, use full for family and ecological value. Other value of dolphin is for aesthetic reason and because of historic link b/w dolphin and traditional culture of local people. **Notes: (Dolphin is major fishing instrument)**. Very low percent of people is not interested in dolphin conservation.

4.4. Response towards declaration of areas in and around Kulsi river, Assam as a protected area

Table 6: Respondents' level of agreements to statements concerning Kulsi River as dolphin conservation area

Statement	Agreement	Village name			Total
		Aamtola	Kukumara	Samauria	
Kulsi river as dolphin protected area	Yes	45	35	40	120 (80%)
	No	5	15	10	30(20%)
Ecotourism as lively hood.	Yes	40	38	36	114(76%)
	No	10	12	14	36(24%)
People coming to see dolphin.	Yes	38	45	30	113(75%)
	No	12	5	20	37(25%)

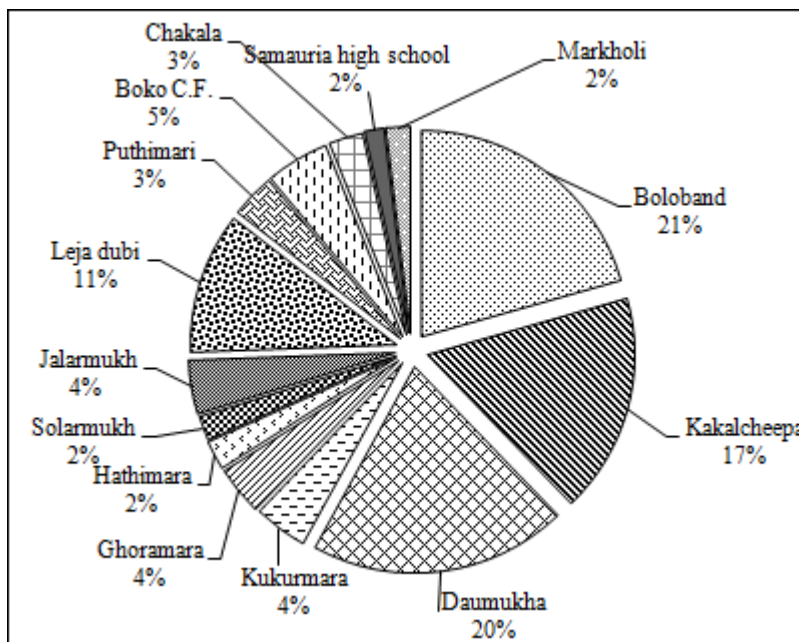
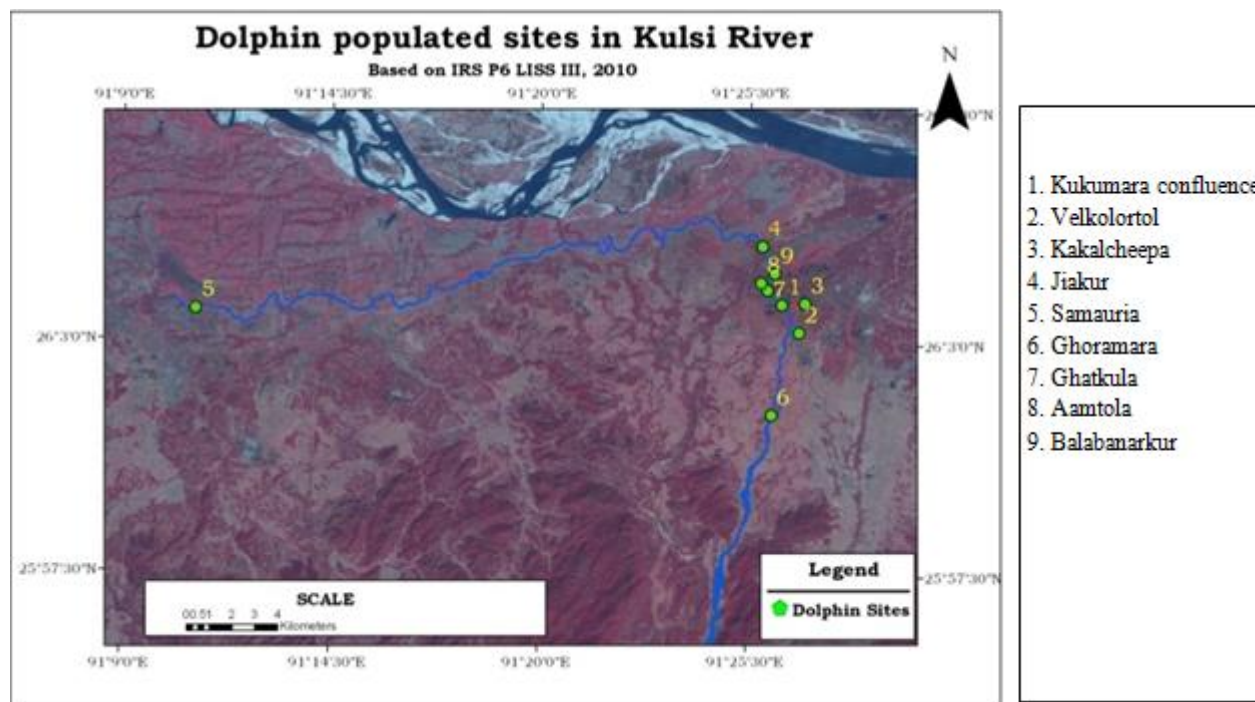


Figure 15: Perception of fishermen about dolphin distribution areas in and around Kulsi River, Assam



Map 3: Dolphin populated sites in the Kulsi River, Assam

Discussions

Most of the people (80%) supported towards declaration of and Kulsi River as a Protected Area and 20% respondents disagreed of this statement. They also supported ecotourism

as alternative livelihood (76%) because their economic conditions are poor. Most of the respondents said that foreign peoples visit to their area to see dolphins (75%) (Table-6). This shows people's interest towards community

based conservation programme in this area. According to peoples response common dolphin populated areas in and around Kulsi river is shown in fig-15 and Map-3 among which response towards Bololand was found to be highest (21%), followed by Dumukha (20%) and Kakalcheepa (17%) (fig-15 and Map-3). These areas further should be scientifically investigated for their dolphin abundance and immediate conservation action plans should be under taken to minimize any type of anthropogenic activities in these areas.

Local view towards Kulsi River as community conservation area/dolphin conservation area:

Kulsi River has both economic and ecological value. Many respondents valued these area potential for tourism review and resources use in times of need. (E.g. Source of sand mining, source of H₂O, source of fishes and the area cover major population of dolphin.) During survey majority of respondents agreed i.e. they have no problem if the government declared Kulsi River as dolphin conservation area because by ecotourism development they can earn their lively hood & in this way dolphin can be conserved i.e. helpful for us (by traditional view- dolphin is my family member & their ancestor worshiped it).

4.5. Conservation action plan/strategy

From this study it was found that peoples have no problem with dolphins. Rather they think dolphins help them in fishing (as expressed during discussions) and they use dolphin oil as medicine or fish bait or both. According to local community view dolphin mortality is not common in this area though most people agreed that there is some short of threats to dolphins in this area. According to them shortage of water is the major threat to dolphins of this area followed by sand mining. Though in last 10 years the number of fish and fisherman has been in declining trend in the area, dolphin population is in increasing trend which may be due to the management strategies undertaken by conservationists working in this area in last few years. In spite of most people being poor and illiterate, they had a good sense of environmental awareness and most of them wanted dolphins should be conserved for their ecological values. Most of the people wanted areas in and around Kulsi River should be declared as a Protected Area and majority of them supported ecotourism as alternative source of livelihood. Keeping these in mind and the area being one of the best habitats for dolphins, this area should be immediately declared as a Protected Area and peoples should be directly involved in conservation through community based conservation action in which there must be sufficient options for alternative livelihoods after fishing and sand mining.

5. Conclusion and Recommendation

5.1 Conclusion

Gangetic dolphin (*Platanistagangeticagangetica*) is an indicator of riverine health and now it is state aquatic animal of Assam and national aquatic animal of India but due to anthropogenic pressure it become endangered. Overall it was absorbed that people located in and around of

the Kulsi River is very poor, literacy rate is low but the Ganges river dolphin respected by all the people irrespective of their cast and religion. All the people respect to the Ganges river dolphin in their own way & due to this threat is very for dolphin survival in this region.

5.2 Recommendation

There is need for regular monitoring of the Kulsi River. Round the clock fishing and fishing during birthing season (Oct-March) especially during time of birthing (Dec-Jan) (Noawk 2003).we should prevent illegal dolphin oil extraction and government should be take action. A team of local conservation oriented volunteers should be designed to report any concern illegal activity in the river stretch so that immediate action should be taken. There should be need to provide suitable food material for dolphin survival.

6. Acknowledgments

I am grateful to Aaranyak, Assam, India for granting permission to carry out this dissertation under Dolphin Conservation Network project.

It is my great pleasure to thank my external supervisor Dr. Abdul Wakid, Programme Head, Gangetic Dolphin Research and Conservation Programme, Aaranyak, Assam, India for his able guidance, expertise and useful suggestions which helped me in completing this dissertation work successfully. I owe a debt of gratitude to Dr. Sanjay K. Das, and Dr. Sumitdookia Assistant Professor, GGS Indraprastha University, Delhi for his constant encouragement, valuable guidance and help for completion of this work.

Finally, I would like to express my heartfelt thanks to my beloved parents for their constant support and blessings, my family and all my classmates for their timely help and wishes for the successful completion of this work.

References

- [1] Abdullahi MB., Sanusi SS., Abdul SD. and Sawa FB (2007). Perception of support zone communities towards the conservation of Yankari Game Reserve, Bauchi State, Nigeria. *Int. Jor. P. App. Scs.*, **1**(2): 43 – 48.
- [2] Anonymous. (1994) *Guidelines for Protected Area Management Categories*. International Union for the Conservation of Nature (IUCN), Gland, Switzerland.
- [3] Anonymous (2009). "Kulsi River" India the pristine beauty (<http://www.india9.com>). As assessed on 26th April, 2011.
- [4] Anonymous (2009). The survival of a river (<http://www.easternpanorama.in>). As assessed on 27th April, 2011..
- [5] Barrett, B., and Arcase P. (1995). Are integrated conservation development projects sustainable? On the conservation of large mammals in Sub-Saharan Africa, *World Development* **23** (7):1073-1085.
- [6] Behera SK. (1995). *Studies on population dynamics, habitat utilization and conservation aspects of Gangetic dolphin (Platanistagangetica) in a stretch of*

- Ganga River from Rishekesh to Kanpur*. Ph.D. thesis, School of Studies in Zoology, Jiwaji University, Gwalior.
- [7] Bell H., (1987). Conservation with a human face: conflict and reconciliation in African land use planning. Pp 79-101. In: D. Anderson and R. Grove (eds). *Conservation in Africa: People, Policies and Practice*. Cambridge University Press, Cambridge, New York.
- [8] Blench R. (1997) *Aspects of Resource Conflict in Semi-arid Africa, Natural Resources Perspectives*. The Overseas Development Institute, Portland House, Stag place, London SW 1E 5DP, UK.
- [9] Bond R., Curran J., Kirkpatrick C., and Francis P. (2001) Integrated Impact Assessment for Sustainable Development: A case study approach. *World Development*, **29**(6): 1011-1024
- [10] Klinowska, M. (1991). Dolphins, Porpoises and Whales of the World: The IUCN Red Data Book. IUCN - The World Conservation Union, Gland, Switzerland. 429 pp.
- [11] McNeely J A. (1994). Lessons from the past: Forest and biodiversity. *Biodiversity and conservation***3**: 3–20.
- [12] Mohan RSL, Dey SC, BairagiSP , Roy S (1997). On a survey of the Ganges river dolphin, *Platanistagangetica* of the Brahmaputra river, Assam. *J.Bomb. Nat Hist. Soc.*, **94**(3): 483 - 495.
- [13] Nair A K., (2009). The status and distribution of major aquatic fauna in the National Chambal Gharial Sanctuary in Rajasthan with special reference to the Gangetic dolphin *Platanistagangeticagangetica* (Cetartiodactyla: Platanistidae). *Journal of Threatened Taxa*, **1**(3), 141-146.
- [14] Nasron, T. A. H. (1420). The importance of training and environment consciousness. The giant university lecture, College of agriculture, King Saud University, Al-Riyadh.
- [15] Newmark W D., Nancy, LL., Sariko HI., Gamassa DM. (1993). Conservation attitudes of local people living adjacent to five protected areas in Tanzania. *Biol. Cons.*, **63**: 177-183.
- [16] Nielsen E., Castro AP.(2001). Indigenous people and co-management: implication for conflict management. *Journal of Environmental Science and Policy*, (4) 229-239.
- [17] Redclift M., (1984). *Development and the Environmental Crisis: Red or Green Alternatives?* Routledge, London and New York.
- [18] Reeves RR. and Brownell RL Jr. (1989). *SusuPlatanistagangetica* (Roxburgh, 1801) and *Platanista minor* (Owen, 1853). Pp 69-99. In: Ridgway SH & Harrison R (Eds.), *Handbook of Marine Mammals*, Vol. **4**. Academic Press, London.
- [19] Singh S. (2001). The Gangetic dolphin. *Sanctuary Asia Magazine* (Dec, 2001), 56-58.
- [20] Sinha R K., and Sharma G. (2003) . Current status of the Ganges river dolphin, *Platanistagangetica* in the rivers Kosi and Son, Bihar, India. *J. Bombay nat. Hist. Soc.*, **100**(1): 27-37.
- [21] Sinha RK. (1997). Status and conservation of *Ganges River dolphin* in Bhagirathi-Hoogly River systems in India. *International Journal of Ecology and Environmental Sciences*, **23**, 343-355.
- [22] Tessema, M. E., Z. T. Ashenafi, R. J. Lilieholm and N. Leader-Williams. Community attitude towards wildlife conservation in Ethiopia. *Proceedings of the 2007 George Wright Society Conference*. Pp 287-292.
- [23] Wakid A. (2005). Ecology and conservation of residential populations *Gangetic dolphins* in Brahmaputra river system, India. Final technical report submitted to BP Conservation Programme and Rufford Small Grant. 82 Pp.
- [24] Wakid A. (2009). Status and distribution of the endangered Gangetic dolphin (*Platanistagangeticagangetica*) in the Brahmaputra river within India in 2005. *Current Science*: **97**(8), 1143-1151.
- [25] Warner K. (1997). The vision and role of community forestry in sustainable development. XI world Forestry Congress, Antakya, Turkey, 13-22 October.



Socioeconomic survey in Kukumara village



Socioeconomic survey in Samauria village



Dolphin oil is being extracted from the body parts of dolphin.



Dolphin oil used as fish baits by fishermen

Plate 4: Use of Dolphin oil



Plate 5: Wetland /Bell where fishermen fishing