

**BIODIVERSITY CONSERVATION
PRIORITISATION PROJECT**

**SITE REPORT OF
BHITARKANIKA WILDLIFE SANCTUARY**

**DOCUMENTING PEOPLES' KNOWLEDGE &
PRIORITIES FOR BIODIVERSITY CONSERVATION**

**VASUNDHARA
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ORISSA**

Site Report for the Core village of
Bhitarkanika Wildlife Sanctuary

Bankual, Dangamal & Khamarsahi
Kendrapada
Orissa

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ABBREVIATIONS

ACF	Assistant Conservator of Forest
BCPP	Biodiversity Conservation Prioritisation Project
CP	Contact Person
DFO	Divisional Forest Officer
FD	Forest Department
FAO	Food and Agriculture organisation
Govt	Government
HH	Household
KI	Knowledgeable Individual
LSE	Landscape Element
NGO	Non Government Organisation
NTFP	Non Timber Forest Produce
PIL	Public Interest Litigation
RD	Revenue Department
RO	Range Officer

Glossary

MAHANA	One Mahana is equal to 40 kg.
GANDA	One ganda is of 4 pieces.
PAN	One pan is of 20 Ganda or 80 pieces.
KAHANA	One Kahana is 16 Pan.
SERA	Measuring pan equal to 800 grams.
GAUNI	One Gauni is equal to two and half Sera.
MANA	Measuring units.
SABARA	Sabara are known to be the indigenous tribal community of Orissa.
PINCHHA	Pinchha means branches of Hental (Phoenix paludosa)

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INTRODUCTION

Background and Objectives

The Biodiversity Conservation Prioritization Project (BCPP) was undertaken by WWF-India in association with NGOs and Government at various levels with the support and collaboration of Biodiversity Support Program. BCPP seeks to aid the conservation of Biodiversity through recognising local interests and stakes on biotic natural resources. The Biodiversity Conservation Prioritization exercise is geared to find out peoples' conservation priorities and use them for enhancing the success and acceptability of conservation measures as well as generate local conservation initiatives.

There are three subgroups working under the BCPP, namely the **Species Subgroup**, the **Sites Subgroup** and the **Strategies Subgroup**. The first two subgroups thus worked respectively on the issues of **what** species to conserve and **where** to undertake conservation programmes. The **Strategies** subgroup addressed the issue of **how** to conserve with due regard to local priorities and conservation initiatives. The sub-group worked in more than 50 sites in seven states in India i.e. Bihar, Orissa, Andamans, Assam, Rajasthan, Karnataka and Himachal Pradesh and initiated local level discussion on strategies. The perceptions of various sections and interest groups on bio-diversity conservation, were recorded with a view to discuss at different levels a range of viable strategies for bio-diversity conservation.

As a part of the strategies sub-group Vasundhara worked towards developing an understanding of how to conserve by exploring the concept of Bio-diversity Conservation at five sites in Orissa, viz. Simlipal National Park, Mayurbhanj; Dhani (South) R.F, Nayagarh; Bhitarkanika National Park, Kendrapada; Chilika Lake, Puri and Chandaka Elephant Reserve, Khurda-Cuttack.

The project had two main components:

- I. Documenting knowledge and perception of the different sections within the local community regarding biodiversity and its conservation at the village/Panchayat level using the Community Bio-diversity Register (CBR) methodology.
- II. Facilitating discussions on the perceptions and opinions among various sections and interest groups at different levels, viz. Village/Panchayat/Cluster level to district and state level, with a view to enable them to harmonize differing interest group priorities and come up with common strategies for bio-diversity conservation.

Method of study

Steps followed:

1. Preliminary visits to the area for identification & selection of sample villages for the study. Three core villages were selected for the study namely Bankual, Dangmal and Khamarsahi. Villages were selected on the basis of their proximity to the forest.

2. Knowledgeable individuals and resource persons were identified from the area. Common meetings were organised in individual villages where the purpose and objectives of the study was made clear. Tentative planning for the field days was chalked out combinedly with the villagers and the resource persons.

3. Information collection

Interviews

⇒ Personal interviews of User groups, Knowledgeable individuals, FD staff and local NGO staff.

⇒ Household interviews of user groups, non-user groups(indirect forest dependents) and with women members.

4. Meetings

Meetings in small and large groups were organised to understand the differing perceptions and interests of different groups to protect and conserve natural resources in their locality. Meetings were mostly held in night time as people throughout the day remained busy in livelihood activities.

⇒ Small group meetings with user groups, youth club members, Mahila samiti(women association).

⇒ Combined large group meetings/Gram sabha of different user groups, non-user groups, village leaders, Knowledgeable individuals and resource persons.

5. Mapping

Social maps, forest resource map, water resource map, saline embankment map were prepared by the villagers.

6. PRA Exercise

Different field exercises were conducted to gather information like ranking of species, timeline of ecological events, prioritisation exercise of LSEs etc.

7. Compilation and Analysis of collected information

The team members maintained field notes to record the information. Everyday after the field visits information were compiled for further analysis.

8. Validating the data

Repeated meetings and interviews were conducted to validate the collected data.

9. Presentation of the findings

On the last day of the study a combined meeting was arranged , people from three villages discussed different bio-diversity related issues and the emerging strategies on protection & sustainable utilization of the resources.

SITE OVERVIEW

The word Bhitarkanika is an amalgamation of two Oriya words “*Bhitar*” meaning interior & inaccessible and “*Kanika*” meaning a place of extraordinary scenic beauty. There could have been hardly a more appropriate name for “*Bhitarkanika*” justifying its unique beauty. Bhitarkanika Wildlife Sanctuary is situated between 20° 8’ and 20° 8’ N latitude and 86° 45’ & 87° 9’ longitude. It spreads over 800 sq. km., out of which, 380 sq. km. area is being covered by forests and the rest by estuarine waters. The core area spreads over an area of 141.44 sq. km. approximately. Of this about 115 sq. km. is covered by mangrove forests. The core covers the area from Dangamala to Thakurdia river mouth near Satavaya and Gahiramatha coastal region. The confluence of Brahmin, Baitarani and Patasala rivers form the estuary of Bhitarkanika. It spreads over 35 km. along the coast of Bay of Bengal. Administratively, the sanctuary consists of 4 ranges viz., Chandabali, Dangamala, Rajanagar and Mahakalapada which comes under the Kendrapada and Bhadrak districts of Orissa.

Bhitarkanika is remote. The nearest point on the mainland is roughly one and half hour journey by motor operated country boat or launch. *Bhitarkanika is the second largest mangrove forest area in India.* It has the ideal environment for the estuarine / salt water crocodile, locally known as *Baula*- one of the important reptiles found in the rivers and creeks of Bhitarkanika. It has been reported that in 1926 the world’s largest crocodile was killed in Bhitarkanika. According to a survey report prepared by Dr. H. R. Bustard, FAO, there had been a tremendous decline in crocodile population. In the year 1974 only twenty five crocodiles were found in the area. It was felt that unless the wild population is strengthened by captive reared crocodiles into wild, the depleted population would not recover. To increase the saltwater/estuarine crocodile population, Crocodile project at Dangamala was started in 1975 with the basic objective of “Rearing and release”. The programme has been very successful in conservation and increasing the population of crocodiles. Around 1654 number of young crocodiles have been released into creeks and river systems of the Bhitarkanika sanctuary since 1977 upto 1995.

The Gahiramatha beach of Bhitarkanika is one of the most ecologically sensitive areas in the World. Lakhs of Olive Ridley sea turtles, an endangered species, come here every year for mass nesting during the month of November to April. The rookery, one of the only four in the world, recently replaced the Mexico coast as the largest extant nesting site of Olive Ridley sea turtles. In 1976 Gahiramatha was declared as “*World Heritage Site*”. There have been largescale killing of the sea turtle by **fishing trawlers** in recent years. Intense light in the wheeler island - *a defence establishment near to Gahiramatha*, largescale fishing, construction of the **Talachua jetty** etc. have also disturbed the nesting place. Largest number of sea turtle (8.4 lakhs) came for mass nesting during 1995 nesting season.

This year the turn out of turtles for massnesting reduced considerably. In 1997, the Orissa Govt. formed an expert committee to oversee conservation of the Olive ridley sea turtles. This expert committee is headed by chief minister and includes minister of forest and fisheries, director general of Coast Guards, commandant of the eastern naval command,

scientific advisor to the defence ministry, vice- chancellor of the Sambalpur University and collectors of Kendrapara, Jagatasinghpur and Puri districts.

In the meantime the state Govt. has declared *Gahiramatha as a marine wildlife sanctuary* and fishing within 20 km radius of the sea shore has been banned. Forest department has reintroduced mungi pass system for entry of boat in this area. Fishery department is also taking licence fee. Till very recently (May, 1997) nearly 50 trawlers have been seized by the coast guards and handed over to forest department and fishery department. According to Orissa Sea Fishing (Regulation) Act, the offending fishermen are sent to court and seized fishes are auctioned. And the convicts are fined with five times of the amount of the auctioned price.

*Bagagahan*¹ an unique place in Bhitarkanika sanctuary spreading in around 22 acres is an ideal roosting place of birds for its calm and quite location surrounded by rivers and abundance of sea foods. According to a famous Scottish Ornithologist every year more than 170 varieties of bird both from inside and outside of country visit this spot for breeding during the month of September to January. So far only 166 varieties of birds have been identified. Prominent among them are Gendalia, Kaparakhai, Panikua, Anjana, Khaira, Dabentia, Ranibaga, Kantibaga. Besides, cranes and other central Asian birds too visit this place. They build nest mainly on the Sundari, Guan, Bani and Singada trees. In each tree there are 3-6 nests and each nest contains five to six eggs or fledging during the season.

One more attraction during the season is congregation of reptiles like crocodiles and snakes in this area. They come in large numbers in quest of their favorite meal- birds eggs. In 1981 famous ornithologist late Dr. Salim Ali had visited the spot. Overwhelmed by its beauty, he had suggested the then government to declare it "biosphere reserve". Bhitarkanika is a home to more than 76 varieties of plants which is more than the species found in Sunderban, the largest mangrove forest in India. All these unique characteristics make Bhitarkanika an environmentalists' paradise.

Other aquatic fauna found are Water monitor lizards, Mud skippers, Limulus crab, Grey pelicans, Barheaded goose, Bramhery. Spotted Deers, Wild boar, Chital, Jackal, Hyena, Porcupine and Fishing cat are mostly found in this sanctuary.

Realizing the ecological significance of the area, the Govt. of Orissa declared all the areas coming under the Kanika forest in Ali, Rajkanika, Rajnagar, Pattamundai and Mahakalapada civil sub- division in the district of Cuttack as Bhitarkanika wildlife sanctuary in the year 1975. In 1988 this sanctuary was proposed to be upgraded to the status of a National park. On 25th Feb. 1997 a notification was issued as per the Wild- life protection Act 1972 under sections 18 and 20 by the Kendrapara district collector to strengthen the boundary line of the proposed National park. The declaration clearly states the imposition of Govt. authority over the land surrounding the sanctuary excepting lands which had been registered under the property will which led to rise of a tense situation in the area. People possessing landed property within the revised border limit of the sanctuary were directed to submit their claims to the district collector by March 31, 1997. It may be mentioned here that the identified National park area includes 401 revenue villages, 137 primary Schools, 25 high schools, 6

¹ Bagagahan in Oriya implies a place of congregation of heron.

colleges and number of State and Central govt. offices. If the notification is put into effect 50,000 villagers from more than 401 populous villages are likely to be displaced.

This notification has sparked off peoples' movement in the area. The villagers have started organising themselves to initiate mass movement against the **reconstituted boundary line**. People have become very apprehensive of the Govt. motive behind the re-demarcation of the Sanctuary boundary line. They are being further alienated for the environmental cause. In this region peoples' organisation are coming up to fight for their rights. Inclusion of the entire ex-kanika zamindari area within the new proposed

The identified National Park area covers 401 revenue villages, 137 primary schools, 25 high schools, 6 colleges and number of Banks, Govt. offices. If the notification is put into effect more than 50,000 villagers from 401 villages are likely to be displaced. 50,000 villagers are likely to lose their landed property which are coming under the jurisdiction of the proposed limit of the sanctuary.

Sanctuary boundary has generated a lot of resentment among the people of Rajkanika. In this regard they express their views that '*Chhamukha*' - area from Righagada to Chhadesh, which has been included in the recently declared Sanctuary boundary line had no trace of forest since the king's time and so there lies no justification in including this area. Meanwhile in Rajkanika block a mass movement is spearheaded by *Nagarika Adhikar Surakhya Samiti* (Human Rights Protection Forum) consisting of around 105 villages. They intend to form "*Avayaranya Samprasaran Birodha Committee*" in all these 105 villages. In eleven villages the committees has been already formed. People have also started raising voice against the declaration of Bhitarkanika as National park and on issues of rehabilitation and relocation under the leadership of *Rajanagar Bikash Sangram Samiti* in Rajnagar block..

Village Profile

Village	Bankual	Dangamal	Khamarasahi
Panchayat	Dangamal	Dangamal	Dangamal
Block	Rajnagar	Rajnagar	Rajnagar
District	Kendrapara	Kendrapara	Kendrapara
Post office	-	Sub post office	-
No of HHs	53	204	82
Population	421	2500	1000
Castewise livelihood activities	<i>General Caste:</i> Agriculture/ Sharecropper, Agriculture labour <i>Schedule Tribe:</i> Fuelwood collection, Honey collection, Agriculture labour.	<i>General Caste:</i> Agriculture/ Share cropper, Agriculture labour, Service holders, Migration <i>Schedule Tribe:</i> Fuelwood collection, Agriculture labour, Share-cropping, Honey collection, Wagalabour	<i>General Caste:</i> Agriculture/Share cropper, Agriculture labour, Business, Service holders, <i>Schedule Caste:</i> Share cropping, Nalia grass weaving, Agriculture labour
Castewise household distribution	<i>General Caste:</i> Khandayat-48 Brahmin-2 <i>Schedule Tribe:</i> Dalai/Sabar -3	<i>General Caste:</i> Khandayat- 14 , Kesari-101 Brahmin- 7, Gouda- 2, Radhi- 2, Jyotish-1, Bengali- 3 <i>Schedule Tribe:</i> Dalai/Sabar - 54	<i>General Caste:</i> Khandayat, Barika, Gudia Brahmin- 30 Bengali- 20 <i>Schedule Caste:</i> Harijan- 32
Health	-	Primary health centre	-
Drinking water	Tubewell	Tubewell	Tubewell
Landscape elements	<i>Private resources</i> Homestead land (except 4 HHs all are encroached lands) Agricultural land, Pond	<i>Private resources</i> Homestead land, Agricultural land	<i>Private resources</i> Homestead land, Agricultural land
	<i>Common resources</i> Temple land, School field, Forest, Rivers and Nalas	<i>Common resources</i> Anabadi, Gochar land (encroached), Forest, Rivers, Nalas and Ponds	<i>Common resources</i> Ponds, Forest, Rivers, Nalas, Pathas(Sand - dunes)
School	M.E. School (Upto Class-VII)	High School (standard VIII to X) common for three villages	-
Forest	Bhitarkanika forest	Bhitarkanika forest	Bhitarkanika forest
Status of forest	Wildlife Sanctuary	Wildlife Sanctuary	Wildlife Sanctuary
Forest range	Kanika	Kanika	Kanika
Absentee Villagers ²	8		

² Persons having land/house in the village but staying elsewhere

PEOPLEScape

The core of Bhitarkanika sanctuary is closely surrounded by five panchayats namely, Dangmal, Talchua, Rangani, Satbhaya and Ishwarpur.

Dangmal is said to be the oldest panchayat inhabited by Oriya and Bengali people. The agricultural lands are largely in possession of outsiders while most of the indigenous residents are landless.

Talchua and Rangani are Bengali dominated panchayats. About 90 % of the total population are Bengalis. These people have traditional skills and expertise in deep sea fishing. They possess good land holdings and are well off compared to the indigenous Oriya people.

Satbhaya is the smallest of the panchayats and inhabited by Oriya people only. All of them are agriculturists with land holdings of varying sizes. About *Iswarpur* panchayat informations could not be collected.

For the purpose of study the researchers have taken 3 villages in Dangamala panchayat namely, Bankual, Dangamal and Khamarasahi.

Climatic Condition

Three seasons are prominently felt in the area i. e., summer, rainy and winter. During April summer is at its peak and the highest temperature rises to 45° Celsius. Towards the end of summer weather become erratic. Sometimes mild cyclone occur during these days. Winter is comparatively cold here, the lowest temperature comes down to 10° Celsius. Dangerous oceanic cyclones with heavy rainfall occur at the end of the rainy season and beginning of winter. The mangrove forest act as protective cover to human settlement against these natural calamities and also acts as shore level stabilizers.

Bankual village

Bankual village is relatively new compared to other two villages. Only four households in the village have got patta³ of their lands and are believed to be the first settlers who have come from Talchua panchayat. In subsequent years people from the nearby villages, Dangamal, Khamarsahi, Baradia and Rajnagar migrated and got settled clearing forest lands. These villagers encroached the forest lands for their settlements and so till now pay encroachment fines to the Revenue department. A majority of the population are from Khandayat caste. Only five families possess good land holdings. Others are more dependent on labor work. They mostly go for share cropping with the landed farmers of the neighbouring villages.

Khamarsahi village

³ Legal document showing the ownership of the individual on the land.

Khamarsahi is believed to be 200 years old. In earlier days this village was used by the king to store paddy and thus the village was named after it as Khamarsahi⁴. The village was surrounded with dense forest. Later on when the area got accessible people started migrating from Jajpur, Bhadrak, Balasore, Rajkanika and settled down. Besides, oriya people a large population of Bengalis have also moved into the village.

Khamarsahi is a mixed caste village. Agriculture is the prime source of livelihood for all castes. People cultivate only one crop of local paddy variety throughout the year. Migration to nearby cities and towns in search of labor is a regular phenomena especially during lean season. Harijans of the village manage to earn income for some months from their traditional occupation weaving different products of nalia grass. Salt making was in vogue till 80's. People bartered salt with their basic requirements. After a saline embankment was constructed to check inundation of the saline water into the field production of salt in the area went down.

Dangamal village

Dangamal is the oldest village of the panchayat. Primary occupation of the people is agriculture. Majority of the farmers are share croppers. The *Sabar*⁵/tribal families are dependent on fuelwood gathering and its sale. Fuelwood collection is a round the year activity performed by the tribal women. Honey collection forms a seasonal activity performed by the male members of the tribal families.

Communication

The only communication mode to these villages is through water. Mechanised country boat and launch services are accessible in Rajnagar(block headquarters, Kendrapara district) and Chandbali(block headquarter, Bhadrak district) to travel to these areas . It takes around one hour to reach the Nalitapatia Ghat, the disembarking point for the villages. Fair weather road connect Nalitapatia to these villages.

Market Place

The local daily market places of this area are at Badadia, Nalitapatia, Khamarasahi, Nuagoan and Talachua. Except Talachua which is the largest market place in the area all others are in Dangamal panchayat. Small grocery shops exist in all the villages to cater to day to day needs. The village shopkeepers purchase merchandise commodities from Chandabali, Rajanagar and Dhamara. The nearest market centres are located in Chandbali and Rajnagar.

Education facility

The first primary school was set up in Khamarsahi in the year 1948. Because of the increasing number of students one more primary school was opened in Bankual village. Also a middle education school was set up in Bankual. In the year 1970-71 a high school was constructed in Dangmal village.

Health facility

People in earlier times were more dependent on herbal and home remedies. A primary health centre was opened in the year 1968 in Dangmal village for the entire Dangmal panchayat. Veterinary hospital also started for the panchayat afterwards. Except tribal and harijan people dependence on forest for medicinal purposes have reduced to great extent.

⁴ Khamar is the place where paddy is stored.

⁵ Sabara traditionally known as hewers of woods, regarded as an indogenous tribe of Orissa.

Drinking water facility

Drinking water people get from the tubewells. Presently, the 3 villages do not have shortage of drinking water after implementation of Danida Project under which tubewells were provided to every villages.

Village level institutions

Different socio- cultural institutions exist to enrich village life. Institutions existing in these three villages are - a Community Hall(known as Kotha ghara) at Khamarasahi, Youth club(known as Satyanarayan Yuvak Sangathan for 3 villages) and Nilamadhab Yubak Sangha(of Tribals) in Dangamal, one Anganwadi Centres for 3 villages, Mahila Samiti(Womens' association) at Dangamala, a grass root NGO(Sahara) working for Nalia grass weavers in Khamarasahi. Village committees in each village and school committee.

Bankual is supplied with Solar light (Forest Deptt. has provided solar light connection to all the households at Rs. 5/ per bulb/month) and Khamarsahi with electricity. Dangamal people had made effort to get either electricity or solar light. In spite of their efforts much headway has not been made in this direction.

Festivals

Steeped in tradition and spirituality, Orissa has the proverbial 'Bara Masa re tera parba'(13 festivals in 12 months). Coastal Orissa has the long tradition of celebrating all the festivals with gaiety and fervour. These three villages have all the peculiarities of coastal society. Every season has a rich array of festivals, each with a special character. Being an agrarian society , most of festivals flow from agriculture cycle round the seasons. Though inextricably linked with religion, these festivals have a symbolism rooted in agricultural operation, festivity, myth and seasonal phases of the sun and moon. These festivals promote a sense of kinship, fellow feeling and solidarity.

Raja Sankranti (June) is a unique festival. It marks the advent of the agricultural year and has a biological symbolism. There is popular belief that mother earth menstruates during this period. The first shower moisten the earth and prepare it for sowing. All agricultural activity remains suspended during this period. Its a joyous occasion with much swinging, singing and merry making for girls.

Kumarpurnima(Oct.- Nov.) another popular Oriya festival is birth day of the handsome lord Kartikeya. Maidens fast and offer prayers to the moon to get a handsome groom. They decorate the tulsi altar with water lilies. Merrymaking starts about a month before the festival and right up to the day of the festival the nights resound with the merry singing and dancing of maidens playing country games.

Prathamastami(Nov. - Dec.) is another unique festival. The eldest child is honoured as he/ she would head the family in the time to come.

Savitri Vrata(May-June) is a vow observed by Oriya women for long life of their spouse. The festival celebrates the power of women as exemplified by Savitri who brought back her cohort Satyavan from Yama, the God of death.

Community Festival

Yagyan: A nine days Yagyan is held during the month of Chaitra. Puja is offered to the village Goddess known as Bana Durga Devi. Rice and money(Rs 2/ HH) are collected from each and every household and offerings are made to the Goddess.

Agni Utsav / Agira purnima(Jan-Feb.) is celebrated in the last seven days of Magha. Girls of the village clean their village every day early in the morning. On the seventh day they collect bundles of straw from each and every family and gather it at a particular place. All the people from small children to old people and men and women get actively involved in organizing this event. A puja is offered by the village priest and fire put into the heaps of the straw bundles. Lots of myths and beliefs is associated with this utsava. People put the auspicious ashes in their houses and cattle sheds as to keep away from the evils. Another striking belief associated with the utsava is that people make certain predictions about the coming years' crops from tilt of the straw heap(while burning).

A Eastward tilt bodes high tides and entry of saline water into the agricultural fields. A Westward tilt omens flood. A tilt towards North East augurs Good crops.

Agricultural festivals

Among the agricultural festivals, Akshaya Trutiya and Manabasa Gurubar have significant importance for farmers families. *Akshayatruitiya*(May) falls in the third day of the Hindu year. When the farmers start sowing seeds goddess Lakshmi is propitiated for a bumper crop. *Manabasa Gurubara* (Nov.- Dec.) is a post harvest celebration and offers prayer to goddess of wealth (Lakshmi).

Other festivals like Bhalukuni Osa, Mangala osa, Durga puja, Kali puja, Kartika purnima, Makar sankranti are celebrated with fervour as in other parts of the state.

Following temples exist in the three villages- Mahadev Temple, Budhi Thakurani Temple, Jagganath Temple and Jai Durga Temple.

Food pattern

Rice being the principal crop of this region, it forms the staple diet of almost all people. People prefer to eat parboiled rice. Wheat though not grown in this area forms the second important staple diet. People mainly purchase wheat from the market. Side dishes are prepared from variety of pulses and vegetables, leafy vegetable and roots.

The people of this area are primarily non- vegetarian. Fresh water fish, sea fish, crabs, prawns, mutton, chicken and eggs are available in plenty. During some festive occasions involving puja non-vegetarian food is prohibited. *Pakhala*(watered rice) with dried salted fish is one of the most favorite meals of rural people. Simple water rice with Badi(dried paste of black gram alone or with pulp of pumpkins or gourds) is preferred during summer. *Khichudi*(rice and dal cooked together with vegetables) is also popular. A simple Oriya meal has a number of side dishes such as dal, mixed vegetable(ghanta), one or two fried vegetables, one leafy vegetable(Sag), one sour dishes made of tamarind or curd or fermented rice gruel (*kanji*).

USER GROUPS

The total households of the three villages may be divided into following user groups on the basis of livelihood sources viz. Agriculturist(including Share croppers), Agricultural labourers, Fuelwood collectors(tribals of Dangamal), Honey collectors(tribals) and Nalia grass weavers(of Khamarasahi). All the people depend upon agriculture directly or indirectly to a great extent.

Agriculture

Agriculture is primary source of livelihood for almost all user groups. People earn their livelihood either from cultivation or by working as agricultural labourer. In this area there is no wage employment avenues except agriculture. In the lack of irrigation only one crop of rainfed paddy is grown. Local tall varieties of paddy are cultivated. The traditional varieties were- *Jatia, Shola, Dasaharagati, Dhusara, Siletpatni, Neelabati, Panguda, Henda, Rangi, Pateni, Pindagara, Bholanath*. Presently, they are cultivating both traditional and new varieties like *Parijat, Lalata, Jaganath, Pateni, Shola, Bhaluki, Henda, Dhudasara and Neelabati*.

Nalia Grass Collection

Harijan households of Khamarasahi are involved in Nalia grass collection and processing for making various products. At least 3 months in a year, they are engaged in this activity. Generally, collection of nalia grass starts from Sept.- October and sometimes extends upto Jan.-February. The grass is collected from the river banks and deltas, viz. Bhitarkanika, Kalibhanjadia, Baguliadia, Mainsianmunda, Pataparia and Kochiacharipal. Usually, male members collect nalia grass. Often women go for collection in the area close to their village. Both men and women work together and weave various nalia products. After collection, the grasses are washed properly, then dipped in mud and dried in sun for 4-5 days. Then the dried muddy grasses are brushed for smoothness and shinning to get processed nalia grass fit for weaving. At the different stages of processing both men and women are equally involved.

Each nalia weaver family gets an average income of nearly Rs.1000 to 1200 per month in these period. Nalia products either being sold in village to traders or in nearby markets- Chandabali, Bhadrak, Pattamundai, Kendrapara and other places. A list of Products made is given in the annexure.

Activity Profile of Nalia Grass Weavers

No. of HH	30
Community	Harijan (Schedule Caste)
Participation of Men and Women	Collection: Nalia grass collection mainly by male members. Women collect from the areas near to the village & easily accessible. Processing: Men and women are equally involved in processing of the nalia grass. Weaving: Predominantly, women are involved in weaving. Male members support in this activity whenever they do not get labour work.
Collection Period	The collection period is for 3 months from Bhadrab to Kartik.
Places of Collection	Manhisianmunda, Bhitarkanika, Pattaparia, Kalibhanjadia, Bagulidia and Kichiacharipal.
Products	Basket, Mat, Chauladhua, Maan, Gauni, Dandipala, Phulatata/ Changuda, Pasara.
Market	Sold to traders from :- Balasore, Bhadrak, Chandikhola, Chandabali, Pattamundai, Kendrapara and Ali.
Income	Rs. 1000-1500 per month / family during these 3 months.

Honey Collection

Honey collection is a major livelihood source of the Adivasis(Dalai) people. Thirty five (70% of total Dalai families) Dalai families mostly depend on this activity. However, other people also collect and consume honey. Honey collection is not a free activity. Unlike firewood collection which has been banned outright, honey collection is regulated through a system of passes. The Forest Department issues collection pass on the guarantee that all the honey collected would be sold to them at a price fixed by them. This price is much less than the prevailing market price. In the year 1995-96 the price was Rs. 25/- per kg. of honey. The price offered by private traders was about Rs. 40 to 50 per kg.

In spite of departmental restrictions collectors sometimes manage to sell a part of collection to private traders. The villagers put this amount around 10% of the total collection. In 1996 the amount of honey supplied to the FD from Dangamal panchayat was about 17 quintals. The total quantity sold to private traders was approximately 12 quintals in 1996. In average Dangamal supplies around 20 quintals of honey. Total collection of honey from Bhitarkanika is nearly 50 quintals per annum. The long association of the people with honey collection is apparent from the knowledge they have about the entire process of honey making. They can identify the flower from which the honey has been prepared just from the taste and colour of the honey. In the discussion they came up with 16 flowering plant species of which bees collect nectar. Three types of bees were identified by them.

Apart from honey, the yield of wax is about 4.5 kg for every quintals of honey. The income from the honey collection is roughly Rs. 80/- per family per day. The Dalai people are engaged in honey collection over a period of three to four months and get an average income

of more than 1500 rupees through the season. Collection take place in the months of March to July.

Fuelwood Collection

Most of the households of Bankuala and Dangamala collect fuelwood from forest for their own consumption. But, the tribal households of both the villages earn their livelihood from the fuelwood collection as well. They sell it in nearby market places and also in the village. One family earn Rs. 25 to 30 from fuelwood activity in a day.

Domestic animals

Very few families have domestic animals due to scarcity of grazing land and sufficient fodder. Cultivator families in general keep bullocks and cows. The landless people do not prefer to keep cattle. Only few families are keeping goats as they have to stall feed. Generally, landless people collect stumps left after harvesting of paddy fields for fodder purposes.

Seasonal Activities

Agricultural activities extend from the mid of May to the end of December. Ploughing of land starts from the month of May. Sowing starts from the month of June after a few pre-monsoon showers. Harvesting of paddy starts from the middle of October and last till the end of December. People get sufficient agricultural labor work in May- June and then during Oct.- December. After sowing paddy, people migrate to towns and cities for labor work and then start coming back in the month of Oct.- November. Again towards the end of December and upto April they migrate out. The landless people who are not able to migrate outside face difficulties to earn living. These people often depend upon the forest(as headloaders) to eke out their living.

LIFESCAPE

Landscape Elements

The major landscape elements identified by the people are agricultural land, forest, rivers and nalas. Agriculture forms one of the most important livelihood activities for the people of Dangmal panchayat. Most of the land of this panchayat belong to outsiders, the villagers go for share cropping with the landed farmers. The other important landscape elements are forest from where they get pinchha (branches of *Phoenix paludosa*) for thatching, fuelwood, house construction materials, honey & other medicinal species etc. and nalas and rivers from where people get fishes and crabs and Nalia grass.

Land ownership, Use and Composition

Most people have no agricultural land and very little homestead land. The causative factors for this may be attributed to exorbitant rent charged during the Kings' period, frequent crop failure, and easy access to abundant natural resources in the past. People unable to pay the high rents charged during Kings' period had to surrender land to the King. Repeated crop failures impoverished the poor farmers and they had to ultimately sell out their lands for sustenance. In all the 3 study villages there are Anabadi and grazing land either encroached by the people or under the possession of FD.

Past Tenurial System

Bhitarkanika had a distinct tenurial system in the past which had great impact on the present system. Its worthwhile to go through the past system to have a clear understanding of the present condition.

Before 1897

At the time of British conquest, the actual cultivators of the soil were found to be divided into two classes, viz., **Thani** or resident raiyats and **Pahi** or non- resident raiyats. The term *Thani* is a corruption of the Oriya term *Sihani* or *sthaniya*, i.e. local. The Thani raiyat had a hereditary right on his lands, while the Pahi raiyat was a mere tenant at the will of the King. The advantages enjoyed by the Thani tenant were that he held his homestead and garden land free of rent; generally his land was of better quality, and he got the preference in reclamation of new lands. He had communal rights to pasture, firewood and thatching grass, he had hereditary rights of occupancy and he could not be ousted so long as he paid his rent. The possession of these advantages increased his importance in the eyes of his neighbours and strengthened his credit worthiness with his money lenders. On the other hand his rent was much higher than that paid by the non- resident raiyat. He was crushed under the extra burden and impositions put on him by his landlord. The demand were often so exploitative and excessive as to swallow all the profits of cultivation and the Thani raiyat, reduced to despair, was often compelled to abandon his home. Pahi raiyat paid much lower rent but on the other hand was liable to be turned out of his holding at any moment.

Species Distribution

◆ Flora

More than 76 varieties of native plants are found in Bhitarkanika, more than the number of species found in Sunderban. The vegetation of Bhitarkanika can be divided into two categories viz., Mangrove vegetation near the estuarine banks and Salt bush formation in the littoral tracts of Satavaya and Gahiramatha sea shore.

Mangrove taxa is arranged in a two storeyed system, as top storey and middle storey. Ground vegetation is rarely found. Among the important top storey species are Kerua (*Sonneratia*), Bani(*Anicennia officinalis*), Dhala Bani (*A. alba*), Sundari(*Heritiera fomes*), Pitamari(*Xylocarpus moluccensis*), Guan(*Excoecaria agallocha*) etc. of which *Sonneratia apetala* is the dominant species.

Among the dominant species of second storey, some notable plants are Rai (*Rhizophora apiculata*), Bani(*Hibiscus tinacess*), Hental(*Phoenix paludosa*), Sinduka (*Kandekia candel*), Rai(*Rhizophora mucronata*) etc. Of these Hental is most dominant. *Rhizophora* community is centre of attraction due too their position of knee roots which is seen partially inside water during tide.

Dominant Ground species are Nalia Grass(*Myiostachya wightiana* / *Urochondra setulosa*), Tiansiorkeutia Grass and Dhandidhan are gregarious in muddy flats enjoying full inundation .

Some vulnerable and rare species like Pani Amba, Kanaka Sundari, Dhala Sundari, Pitamari, Pitakarua and Bana Lembu require special steps for propagation. **An important plant species of ecological significance is Kharkhari leaves which are used by crocodiles for making nests wherein they lay eggs. The nests made of Kharkhari leaves maintain temperature balance for the natural process of hatching.**

The people of Bhitarkanika have traditional knowledge over the great variety of flora and fauna. *Hental*(*Phoneix paludosa*) is the most important useful plant species and serves multiple role in house construction. The Trunk/Stem of Hental is used for *rua*(wattle) of house, roofing etc; leaves(*pinchha*) are used for thatching, fencing, brooms and ropes etc.; the fibre extracted from the pith is used for weaving baskets and for rope making; tender shoots and fruits are eaten. There is a proverbial saying in Oriya that houses made of Hental *rua*(wattle made of *Phoneix paludosa*) last for ages.

Nalia Grass(*Myiostachya wightiana* / *Urochondra setulosa*) has great economic value for Harijan(SC) of this area. Making various products of Nalia grass is a major income source during the agricultural lean season. These grasses are mainly found in the banks of Rivers, Nalas and Jores of the Bhitarkanika sanctuary. The grass grows even in more then a feet of standing water.

Kharakhari(*Acrostichum*) leaves are used for hatching crocodiles eggs. Since long days back local people knew that crocodiles lays egg on the leaves of Kharakhari tree. *Bani*(*Avicennia officinalis*) and *Sundari*(*Heritiera fomes*) are good timber species mainly used for furniture and as house construction materials.

Jagula (*Tamarix indica*), *Khalisi* (*Aegiceras corniculatum*), *Harakancha* (*Pongamia pinnata*), *Bahni* and *Hengula* are abundant. Honey bees collect nectar from the flower of these trees. The bees migrate to this area from other parts of Orissa during summer months of March to May to get rid of the heat and forest fires. It is believed that these bees mostly migrate from the Similipal forest. The climate in this region is favourable for the bees due to a comparatively low temperature and availability sufficient food due to flowering of quite a good number of trees during the period.

Fruits available in the forest are Ragidi, Pinchha Koli, Singada, Jammu Koli, Massu and Asadhua. Mushroom and edible roots and tubers are collected by the people from the forest. In the Bhitarkanika forest block there are good number of fruit bearing trees like coconut, palm, mango etc. Dependence of the people on forest for herbal medicine reduced to a great extent due to restriction on collection and decline in traditional knowledge.

◆ **Fauna**

Bhitarkanika harbours a number of reptiles, birds and mammals, some of whom are amphibious. Its compact vegetation with innumerable hiding places, number of water bodies, abundance of foods and its overall climatic suitability provide a favourable habitat for wildlife.

◆ **Aquatic species**

Though fishing is prohibited in the rivers, nalas, creeks situated within the sanctuary boundary line, people continue fishing illegally from water sources flowing inside the forest. The types of fish generally caught are Bhekta (*Lates calcarifer*), Tuadi, Khasal, Kantia (*Macrones gulio*), Khurant (*Argyrops spiniper*), Jalanga (*Silonia silondia*), Kanda, Bhatei, Balikira, Sulapatia, Kou (*Anabas testudineus*), Toori etc. There are varieties of *Prawn* i.e. Tatra, Bagada (*Penacus monodon*), Sakra, Bhudei, Ghoda, Pateli, Lanja etc. *Crabs* are available in good quantity from the sanctuary area. Crab business used to be a highly profitable business but after declaration of sanctuary it has been difficult for people to get crabs even for household consumption. The varieties of crab usually available are *Madhua*, *Gunthia* and *Chitua*. Now a days people have to catch fish, prawns and crabs surreptitiously, without the knowledge of FD and often this puts them in difficult situation.

Almost all the households have ponds in their backyards in addition to the common village ponds. Fish farming of useful fish species like Catla, Rohu, Silver carp etc. is done on commercial basis.

ECOLOGICAL HISTORY

Pre-Independence period

Forest arrangement

Bhitarkanika was part of Kanika Zamindary till the year 1952. There existed certain rules to regulate forest management which was for the first time recorded in *Kanika Jungle Mahal Niyambali-1935*. For better utilisation and management of forest the king had developed an elaborate access and control system. The entire Kanika range was divided into 28 forest blocks, out of which 6 were designated as reserve forest blocks viz., *Kalibhanjadia, Bhitarkanika, Thakurdia, Banipahi, Sana and Bada Haguri and Gahirmatha*. These reserve forest blocks were maintained as protected areas where no felling of trees and hunting of wild animals were allowed. Entry without permission into these areas was prohibited. Remaining forest blocks were declared as Protected forests and were kept open to meet peoples' bonafide requirements. The forest types not included in the above category were recorded as open forest including the forest on village anabadi(revenue lands).

Rights & Concessions

People met their basic requirements from the protected forests with certain restrictions. Every year the forests was kept open in blocks for extraction of forest produces. People had to obtain forest permit for collecting forest materials. A certain amount had to be paid as forest fees/taxes to obtain permit.

For extracting timber, fuelwood, thatching materials, wood for agricultural implements, people had to apply to Anchal Adhikari for permit during a fixed period in September-December every year. A fixed amount of forest fees of Rs. 16/- was collected per household for the permit. People collected required materials twice in a year. For extraction beyond the fixed time period the tenants had to pay two rupees fine. *The permit holders were neither permitted to sell or barter the forest materials nor were they allowed to carry the forest products outside the Zamindari's jurisdiction. Even the boatmen who accompanied the permit holders to forests for transportation of forest produce in the river were not allowed any share in the forest produce in lieu of their wages.*

Forest produces allowed for collection :

Leaves	Fruits
Charcoal	Tree bark
Ash	Feathers
Bee wax	Skin
Horns	Honey
Bones	Wild animals
Dry, fallen & decayed trees	
Grass(juna, nalia, keuti & bahumurga)	

Different kinds of pass issued to the people included:

Thana pass

Thana pass was given for extraction of forest produces from the forest blocks. Every year each family obtained pass which was valid for three months. The produces and quantity allowed to each thana pass were:

Forest Produce	Quantity	Forest Produce	Quantity
Fuelwood	50 mahan	Langal(plough)	2 pieces
Pinchha	1/4 kahan bundles	Kanti(plough handle)	2 pieces
Lai(Creeper)	25 kera(bundles)	Isa	2 pieces
Bamboo splits(bata)	50 pieces	Juali	1 piece
Patagari	1 piece	Maigara	1 piece

Pahi Pass

Major portion of agricultural land in this area have traditionally been owned by outsiders. Such people were known as Pahi cultivators. The Pahi cultivators had to get Pahi pass to meet the requirements of fuelwood, wood for temporary home and farming tools from the forest during their stay in Bhitarkanika. People coming from within the Kanika Zamindari area paid eighty paisa and those who came from outside the Zamindari jurisdiction paid two rupees annually to receive pass from Anchal Adhikari. The time period of receiving pass extended from January to June every year and beyond which one had to give an extra amount of Rs 1.50 as

1922 Prajameli in Kanika

The first Gandhian non-cooperation movement against autocratic revenue administration extracting maximum revenue from praja(citizen) during British rule started in Kanika. That uprising was more directly related with the mixing of forest tax with the general tax. The factors which triggered peoples' movement in Kanika may be ascribed to following:

1. In 1916, King had added Ban kar (forest tax) to the general tax. Previously, people obtained pass from the king to collect forest resources in lieu of which they paid a token amount accordingly.
2. The King raised the land tax under Orissa Tenancy Act, 1913. Under the Act there was a provision to raise the land tax in consultation with people mainly farmers. But King arbitrarily raised the tax amount consulting only with the big farmers neglecting the interest of the small farmers. The dissenting small farmers were threatened and at times severely punished.
3. People were overburdened with tax (sixty four types of tax were existent during king's time).

late fee. The Pahi cultivators were allowed to take home the used forest materials by paying an extra amount of Rs 0.75. Pahi pass permit holders could collect following the materials:

Forest Produce	Quantity	Forest Produce	Quantity
Khunta(pole)	2 pieces	Gogi	50
Mathan(Cross beam)	1 piece	Pinchha	1/8 kahan
Paria	6 pieces	Creeper	25 kera
Nahari	6 pieces	Bata	50 pieces
Rua	50 pieces	Patagari	15 pieces

Traders, blacksmiths and potters residing in Kanika estate took permission of king to collect fuelwood and charcoal from the forest. The fishermen also paid forest fees and collected their requirements to prepare net and boat used for fishing.

Munga pass

The only means of communication to Bhitarkanika is by boat. People had to get Munga pass/boat pass to ply boats in the rivers. The local people (within Bhitarkanika area) had to pay Rs. 3.15 whereas the outsiders paid Rs 4.20 for boat pass.

Trade pass

The traders coming outside of Kanika Zamindari into Bhitarkanika for trade purposes had to pay Rs 4.00 to obtain permit for using forest products during their stay. Under the permit they were allowed to collect fuelwood, Mangdhara (1 piece), Halsas (3 pieces), Mangdhara and Halsas plates (4 pieces). Similarly, the people coming from the same zamindari jurisdiction for the said purpose had to obtain a forest permit paying Rs 3.00.

Hunting pass

Hunting, capture of wild animals and fishing was the prerogative of the Kanika Zamindar. Hunting permits are issued to the people on payment of certain fees that differed for different animals:

⇒ For hunting birds Rs 7.00

⇒ For hunting wild boar Rs 15.00

(Only local people were allowed to hunt wild boar and birds).

⇒ For hunting kalrapatria bagha (leopards), crocodiles, singal deer, singal bautia hunting fee was Rs 7.50. Local population as well as the outsiders were allowed to hunt the animals through a permit valid only for seven days.

The permitted hunters had the right to hunt birds from the river bed and crop fields but hunting in the forest was strictly restricted. The wild boar permit holders could hunt the animal from the forest and the reclamation area but did not have the right to take the prey without permission.

A separate permit system to hunt birds from the forest was introduced for people not belonging to Kanika Zamindari. The hunting permit was given only for seven days on collection of one rupee fee.

Local tenants were allowed to fish in rivers. Local fishermen used the traditional methods for exploiting the vast marine / estuarine fishery resources.

Forest rules and regulations

The King regulated system of access and control through permit system. No one was allowed to extract any produce from the forest without permit. If anybody contravened rules, permits were cancelled. They were also prevented from such reservations in future and prosecuted.

Certain trees which were specified for specific use included the followings:

a) **Fuelwood trees:**

Guan, Bani, Karanja, Keruan, Singada, Rai, Bania, Jagula, Mahasitha, Pitamari, Sisumar, Sindhuguan, Bhyanr, Bhujinjamu, Bhuinnatia sundari, Bhui barkoli, Kachinda, Phooljhata, Mundisahada, Jhumjumka, Dhalanga, Paldhua, Aeiduchi, Kankoli, Bainchakoli, Khirakoli, Guakoli, Kukurchelia, Phirik kanta, Nentei kanta, Tundapoda, Gila, Hadabhanga, Kumbaria, Kiadhandi, Sukhilabania, Hawali.

b) **Thatching materials:** *Pinchha, Banisundari and Guan, Chelua lai(creeper).*

c) **Agricultural implements:** *Khira and Sundari.*

d) **Timber**(for making cow shed): *Bani, Karua, Guan.*

Tree species not mentioned in the above were declared as reserve trees and closed for felling. It is significant to be noted that a depot was opened at Chandbali from where the local population received forest produces at a subsidised price.

Permission from the king was needed for grazing cattle in reserves forests. Grazing in protected forests and anabadi fields were allowed free to the tenants.

Hunting restrictions

Strict restriction existed against hunting female deer, peacock, deer in velvet, jungle fowl and titiri. Hunting of spotted deer and Bali deer was prohibited especially during the period May to September. Hunting rules prevented the transfer of hunting permits. Putting forest fire, cutting trees or any other activities detrimental to the forest was considered as an offence. People trying to enter into forest area not prescribed in the permit, their permit was cancelled and the individual was punished.

Species diversity

Bhitarkanika used to be rich in flora and fauna. The mangrove ecosystem was strictly protected. The forest was dense and full of wild animals, birds, reptiles and river system with aquatic species.

Wildlife

There used to be a large population of estuarine crocodiles. King Cobras, Pythons, Water monitor lizards, Spotted deer, Wild pigs, Fishing cats, Rhesus monkeys were in abundance. Partial albino specimen were also found. Sambar and Black Bucks were introduced to these coastal mangroves by the ruler of Kanika zamindary to add to their sports. The marine fauna including the sea turtles were much more abundant. People used to auction the turtle eggs in boat loads after obtaining permit from the King. This practice of auctioning the eggs continued till the implementation of Wild Life Protection Act, 1972 in the state.

Mammalian fauna: Fishing cat, hyena, jackal, chital, sambar, wild pig, rhesus monkey, porcupine, small Indian mongoose, smooth Indian otter, dolphins were found in large numbers.

Avian fauna: Dense mangrove vegetation, large mass of waterbody, abundant fish population and tranquil environment relatively free of human interference provided an ideal

habitat for a wide variety of birds. The population of birds was many times that of what is today. Migratory birds from Europe and Siberia like ducks and geese were regular visitors during winter and two main rivers such as *Hansua* and *Hansina* have been named after these birds. Bare headed geese, Brahminy duck, spoon bills, painted stork, flamingoes were some of the prominent migratory birds. And other important water birds found here are painted stork, open billed stork, darter, cormorant, herons, egrets, plovers, sand pipers, curlew, kingfisher, stink, stilt and while ibis, etc. Wetlands and meadows were named as *bagapatia*, meaning 'wetland for birds'. About 166 bird species were known to be inhabiting the nesting site *bagagahan* of this wetland.

Fish: Bhekti, khasal, jalanga, tuadi and hilsa were the important fishes found abundantly in creeks and nalas of Bhitarkanika.

Post-Independence Period

Forest arrangement

The Orissa Zamindari Abolition Act, 1951 brought an end to the rule of the king. The forests came under the control of Revenue administration. In the year 1957 the control was transferred to Forest department. The pass system continued but with significant changes. Anchal adhikari issued pass to collect fuelwood, pinchha, house construction materials, nalia and bahumurga grasses etc. Permit system for hunting of wild animals like wild boar and deer continued, but hunting of tigers was prohibited by the govt. People paid an annual amount of Rs 15/- to obtain the hunting permit but this got stopped after few years of independence. The abundance of resources in Bhitarkanika attracted people from other area to settle here. Immediately after independence till the abolition of zamindari in 1952 the zamindar sold off large areas of forest land to influential outside individuals.

Relaxation was given on collection of forest produce such as *pinchha*(paludosa leaves) for thatching, nalia grass and honey. People paid an increased amount(Rs 20/- for each permit) annually for obtaining permit for *pinchha*. Since last 4-5 years these permits have been stopped. Honey pass is still given to local people especially the tribal people. In the early 50's forest was harvested through local contractors of Aul and Rajkanika. Most of the big trees were cut down. This added to further degradation of the forests. In 1961, the forest lands and the waste lands in Kanika ex- zamindari area was declared as protected forests. But this did not abridge the existing rights of the communities.

The situation took a critical turn with the large scale infiltration of Bengali migrants into the area. With the increasing population, dependence on the various natural resources increased, large chunks of mangrove lands were converted illegally for habitation and cultivation resulting in rapid depletion of the forest cover along with wildlife. During mid 70s' there was tremendous decline in wild life population. To provide protection to wide variety endangered species which were on the verge of extinction, Bhitarkanika was declared as Wildlife Sanctuary in the year 1975. All the existing rights of the communities were restricted. Permits for collection of forest products stopped except for *pinchha*(paludosa branches), nalia grass and honey. People paid an increased amount(Rs 20/- for each permit) for obtaining permit for *pinchha*. Honey pass is still given to local people especially to tribals. Hunting of wild animals was strictly prohibited. In the year 1988 Bhitarkanika forest was proposed to be declared as

National Park. In spite of enforcement of strict rules and regulations to protect the mangrove forest, exploitation of the resource at an alarming rate is continuing.

The forests underwent several ecological and social changes. These forces accelerated the pace of destruction. The factors which radically affected the socio-economic and ecological dimensions can be summarised as:

1. **Encroachment**

Influential persons with the help of ministers of king had grabbed large areas of forest land.

The rise in population and the growing demand for food resulted in the conversion of forest lands into agricultural lands. The process of grabbing lands by illegal methods for new villages or bustees by the fisherfolk and others continued.

2. **Immigration of Bengali people**

As far as people remember the earliest Bengali settlement in Bhitarkanika goes back to the year 1943, when a devastating flood and cyclone severely affected the people of Midnapur of West Bengal leaving thousands homeless. These people started moving in search for a suitable place and finally got settled in Bhitarkanika. Large scale influx of Bangladeshi refugees started after independence and became more pronounced after partition of Bangladesh. This has greatly changed the economic as well as the ecological dimensions of Bhitarkanika. It is pertinent to mention here that these people had exceptional skill in marine activities. In Bhitarkanika they got the opportunity to exploit the abundant aquatic resources found in the rivers, nalas, creeks the area and the sea. Marine activities fetched them great benefit. To the misfortune of the indigenous Bhitarkanika people, who were more dependent on agriculture, there were frequent crop failures because of inundation of salt water into the crop fields. The condition of the local people declined miserably while the immigrants and refugees got richer and flourished. Gradually the agricultural lands passed to the hands of Bengali settlers. On the other hand the landless as well as the refugees and the influential people started encroaching forest land and Govt. land. Presently thousand acres of forest and govt. land are under the possession of Bengali and the local influential people. In Pattaparia(Talchua panchayat) nearly 200 acres of forest land are under the encroachment of the Bengali refugee.

There are also instances of migration from adjoining district to this area which began in early nineteenth century. People from Balasore, Bhadrak, Jajpur and from nearby places like Rajanagar, Chandabli, Aul shifted to this area.

3. **Exploitation of Aquatic resources**

Fishing in the sea was not known to the local inhabitants. The mechanised commercial fishing was absent in the area before the advent of the Bengali people. Exploiting the tremendous fishing potential with sophisticated equipments, the new settlers became rich within a very short period. However, use of fine mesh nylon nets, motor boats and excessive exploitation adversely affected the natural balance of aquatic resources as well as regeneration of mangrove vegetation. The shrinkage in the mangrove habitat coupled with increased fishing activities threatened the existence of estuarine crocodiles which were abundantly found in the area. According to a survey in mid 70's the number of crocodiles had declined to a dangerously low figure.

4. Prawn culture

During 1970-80's, large scale prawn culture took root in this area. High profits involved in prawn culture induced people to expand the area under the same by encroaching mangrove forest lands. Interestingly the revenue department in Marsaghai Tahasil was collecting lease fees/fines from them which indirectly promoted encroachment.

5. Construction of saline embankments

Bhitarkanika faced frequent crop failures due to inundation of salt water in the fields. To arrest the flow of tidal water to agricultural fields and bustees, saline embankments or *luna gherry* were constructed, especially after 1971 cyclone. Forest cover gradually degenerated in the area where dykes were constructed halting the tidal inundation.(details in annexure)

6. Ports and fishing harbours

Mangrove forest growth was cleared to build ports, fishing harbours and jetties.

7. Poaching

There has been an increase in bird poaching, especially ducks and geese. There are professional bird poachers who set nets fixed to poles as night falls to trap ducks and geese in the swamps/crop fields. Hunting of deer, wild boar, and the winter birds by fixing nets has become a regular practice. Youths of the nearby villages with the help of boat go deep into the forest for hunting.

8. Exploitation of the aquatic resources

Uncontrolled exploitation of marine fauna which forms a part of food chain has strained the present status of flora and fauna.

MANAGEMENT OPTIONS

Protection

The dense mangrove eco-system with rich flora and fauna is under threat due to population growth, encroachments for prawn culture, paddy cultivation etc. Prawn ponds/gheri bandhas have resulted in depredation of a large portion of forest cover. Bangladeshi refugees' settlements in forest land, operation of motor boats, poaching of wild animals, unrestricted and unregulated fishing are some other factors which have arrested mangrove regeneration. Presently the forest cover is confined to approximately 115-130 sq. kms. including new mangroves, compared to 162 sq. kms. in 1957. *The forest along with river, nalas, creeks have to be protected and if not then Bhitarkanika, the second largest mangrove forest in India will become a history.*

Mass nesting of Olive ridley (*Lepidochelys olivacea*) turtles is affected by the operation of large number of trawlers and gill netters from Dhamra and Talchua fishing harbours. Many turtles get killed during mating season due to trawlers and gill netters. If this continues unchecked, it would not take a long time when the olive ridley turtles will stop visiting this place for nesting which might lead to serious ecological disaster the consequence of which is still unknown. *Gahirmatha beach, the nesting habitat needs protection with the active cooperation of people & the government.*

Towards Sustainable Utilisation**Fuelwood extraction**

Since the declaration of sanctuary, people have lost their traditional rights over the forest. However, having no alternative livelihood opportunities the tribal people continue to derive livelihood from the forest activities. For the tribal women of Dangmal village headloading is a major source of income. Fuelwood gathering is a daily activity of this community. Fuelwood is collected from the periphery of the forest close to village. The fear of being caught and fined by the department is a constant worry in the mind of the people and this prevents them from going into the interior of the forest for collection. The increasing pressure in the periphery results in gradual depletion of the forest cover. The fuelwood gatherers say that a huge amount of wood gets decayed and destroyed in the forest. If the Forest department can make suitable arrangements and allow them to collect the fallen and dry wood it would help the tribals to eke out a subsistence livelihood.

Nalia grass collection

The harijans of Khamarsahi meet major share of their annual upkeep from nalia grass. Although people have lost their customary rights to extract the produce but they still continue with the activity. In the absence of alternative life support system they find it difficult to give up their traditional occupation. Nalia weavers opined that harvesting of the produce do not have any negative impact on the growth of the species. Rather regular extraction helps in proper growth and regeneration of grass. So they should be allowed for sustainable extraction through Nalia permit. Some ex-situ conservation measures like *cultivation of these wild*

species at the scale of demand can be taken up in sand banks to meet the regular demand of the people.

Harvesting of hental pinchha(Paludosa leaves)

Almost all the villagers depend on hental *pinchha*(leaves of Phoenix paludosa) for thatching. Extraction of *hental pinchha* has been banned by the FD. According to the village elders if *pinchha* are reasonably cleaned annually, it would help in proper growth and ensure protection from pests and insects.

Hental Poles

Hental poles are largely used for fencing besides house construction. This is believed to be one of the major cause of its destruction. Building awareness towards use of hental only for house building and not for fencing is urgently required.

Regulation of Immigration

Immigration of Bangladeshi refugees and people from nearby districts and West Bengal to Bhitarkanika have disturbed the eco-system of thickly populated coastal regions. A large chunk of forest patch got cleared for the settlement of refugees. Further the refugees depended on forest and water resources to meet their basic requirements. *So to accord protection and have a check on the increasing pressure over the resource, immigration needs to be regulated.*

Motivation

Considering the complexities of situation and degree of pressure on the sanctuary, involvement of people in protection is essential. People suggested following measures which in addition to increasing the general prosperity of the area will also enhance economic options and reduce excessive dependence on the forest and wildlife.

- Deep well(Borewell) irrigation facilities.
- Repairing of sluice gates along the saline embankments and setting up of additional sluice gates.
- Fuelwood depot to supply wood at concessional rates which can reduce pressure on forest.
- Adequate compensation for crop damage by wild animals.
- Compensation for the victims of crocodile attack.

Restrictions

1. *Restrictions on Tourists movement* in and around the Bhitarkanika river(core of sanctuary). Motor operated country boat loaded with tourists ply on the creeks of Dangamala during the month of September to April which disturbs the natural environment of sanctuary. The sound of the motor boat affect the serenity of the environment, especially the habitat of birds. With noise pollution the avian fauna is pushed back to smaller areas. Now its greatly felt that the government should take necessary steps to limit the large number of tourists so as to avoid the crowdedness of the place.
2. There are two types of opinion with regard to *Fishing* within the sanctuary area. Some people are of the opinion that poor and needy people should be allowed to fish in the sanctuary area for fulfilling their household consumption needs. Some people oppose this idea as it may lead to scarcity of food for the crocodiles. All are of the unanimous opinion

that use of fishing nets of fine mesh popularly known as masari(mosquito net) nets which closes all out possibilities of future regeneration need to be banned.

3. Prawn ponds/Gherries to be demolished and prawn culture should be banned.
4. Strict restriction on operation of trawlers without turtle excluder device.
5. Number of motor operated boat needs to be limited.
6. Issuing of pass to the non traditional honey collectors has created problems. The traditional honey collecting communities like tribals/Dalai of Dangamala village have acquired skill and expertise over the years. They take special care not to kill bees while extracting honey. While the non-traditional collectors due to lack of experience and little concern for the long term livelihood source resort to unfriendly practices killing large number of bees. The department need to take special care and attention while issuing honey pass.

Incentives

1. *Reintroducing permit system* giving the dependent communities rights for sustainable extraction of forest produces such as dry twigs and branches for fuelwood, hental pinchha for thatching, nalia grass etc.
2. Hike in honey procurement price: People of Dangmal involved in honey collection suggested for raise in honey procurement price. People also emphasised on setting up of small scale honey processing units that can generate employment at local level.
3. Capability enhancement of nalia craftsmen by giving training and providing marketing support for the better pricing of their products.
4. Establishing coir processing units.
5. Net fencing to stop wild animals like deer and boars from entering into agricultural fields.

Alternatives

- Fuelwood plantations need to be raised to meet the growing demand of firewood.
- Creating avenues of employment for the local villagers especially during lean period of the year. They can be engaged in some cottage industries like weaving nalia products/honey collection/fresh water fish farming.
- During discussions the people of Dangmal, Bankual and Khamarsahi suggested for *establishing a wood depot in Dangmal*. In pre-independence time a depot was established in Chandbali to meet the forestry needs of people at subsidised rates. Similarly, fuelwood can be made available to the people at lower price by establishing a depot. The fuelwood gatherers can be engaged as wage labor in collection of dry, fallen twigs and branches. This will help in providing employment to the landless and the marginal farmers during lean period and prevent illicit fellings.

Institutional Mechanism:

Number of local community institutions have emerged in response to declaration of the new National Park boundary. These local institutions can mobilise people to protect the natural resources. Further people suggested that conservation committees mostly comprising of the youth should be formed in each village. In panchayat level an apex forum of these village committees should be formed. The prime responsibility of the apex forum would be to

coordinate the different village level committees to take up conservation and utilisation issues. The forum shall also take interest in creating alternatives for the forest dependent groups. Considering the complex multiple threat persisting there is a need to involve local people in the management of the resources. Efforts of all the actors, Government, NGOs, FD etc. need to be coordinated for launching any conservation or development schemes.

DEVELOPMENT ASPIRATIONS

Bhitarkanika is gifted with abundant natural resources - forest, rivers, nalas, creeks and fertile agricultural fields. However, people of Bhitarkanika are leading an impoverished life. A combination of factors which existed and are still existing deprive people to live a just humane life. A meeting was organized with identified knowledgeable individuals, village elders and different user groups to document the differing interests and developmental aspirations.

Unequal and inequitable land distribution System

In Dangmal Panchayat about 85 percent of agricultural land belong to people from Rajkanika, Aul, Chandabali. During king's period the palace was in Rajkanika and so people around Rajkanika managed to get large areas of land from king. Some families even possess more than hundred acres of land. Local people had tiny land holdings and at the time of crop failure, cyclone or other natural calamities were forced to sell out their land for sustenance. More than 85 % of the Bhitarkanika people are mainly engaged in agriculture as share cropper and agriculture labour. People get 2-3 months agricultural labour work in the area. People are able to grow only one crop due to inadequate irrigation facilities. Water can not be stored in nalas/ jore as all the sluice gates along the saline embankment are in run down condition. If irrigation facilities can be made available by constructing water reservoirs or deep tube wells or repairing the sluice gates, the farmers can go for second crop subsequently, creating greater number of mandays and minimising food scarcity.

Other Developmental Aspirations

Generation of employment opportunity: A typical household of this area has from 5 to 50 coconut trees. People supplement their family income by selling green coconuts and use the green coconut fibre as fuel. It needs appropriate support from Govt. as well as NGO to develop small scale coir industry as the area has the potentiality of producing large quantity of coir. A small scale coir industry can generate significant employment opportunities locally.

Engaging educated youth in the forest protection: People highly dislike outsiders being given the job of forest guard/ watcher instead of local people. They perceive that persons from this area can provide better protection as they have a sense of belongingness for the forest and are familiar with the local situation.

Hike in honey procurement price: The Forest Department issues pass for collecting honey from the forest but the collectors must sell the collected honey to the dept. at the price fixed by the dept. The departmental price has always been much lower than the market price. In 1996 the dept. fixed price was Rs.25 per kg. while the prevailing market price varied between Rs. 35- 55 per kg. People have already raised their voice for better pricing of honey and better marketing opportunity.

Withdrawal of old forest offence cases, specifically Mainsiamunda case: In 1976 the people of Dangamala under the instigation of political leaders cleared nearly 500 acres of forest land for converting it into agricultural land. The FD filed forest offence case against these people for destroying the forest land. This disturbed the social life of many and people still are not able to come out of the massive shock which they have received in the past. (Around 500 people are believed to be involved in the case).

Wood Depot : People suggested setting up of a fuelwood depot to cater to the needs of the local people. There is good quantity of dry and fallen wood/timber which can be collected by the FD employing local people who are presently involved in headloading. Some of the people expressed that firewood should be made available at concessional rates if it were to really have any impact on the illegal removal and to reduce pressure on forest for fuelwood.

Harvesting of Nalia Grass: For about 35 harijan families of Khamarsahi livelihood is inseparably linked with the collection and processing of Nalia grass. The traditional rights of these people to collect Nalia grass has now been stopped by the refusal of the forest department to issue pass. This has adversely affected their livelihood. The Nalia artisans aspire for sustenance of their traditional occupation and desire to cultivate nalia grass with the support and cooperation of the FD.

Communication: Chandbali is the major market place for the people of Dangamal panchayat. The villagers buy their major food stuff and other necessities from Chandbali by boat up to Nalitapatia. The kutcha road from Nalitapatia to the Dangamal poses difficulty in carrying goods, especially during rainy season. People keenly felt the necessity of constructing an all weather road from Nalitapatia to Bankual village. Also felt was the immediate necessity of completing the construction of Khola⁶ bridge which is in an unfinished stage. This bridge would help in communication with nearby areas.

Development of tourism: Bhitarkanika has tremendous tourism potential which should be properly utilised. Concerted effort should be made by Government to develop Bhitarkanika as a centre of tourist attraction. Required facilities for overnight stay, boating in the river and its creeks, construction of watch towers for viewing birds as well as forest should be provided to attract tourists. Recently, Central Government had sanctioned a project for the construction of the Yatrivas in Dangamala. Benefits from such activities should directly go to the local people. Local communities should have a share in the management of tourism and a share in the revenue.

Supply of electricity/ solar light: Its a long standing demand of the Dangamal people to get either electricity or solar light connection. At present only Bankual and Khamarasahi are supplied with solar light and electricity respectively.

⁶Completion of Khola bridge: Through this bridge only communication on land with outside can be possible. The bridge construction work is in unfinished stage due to an environmental PIL case filed in the High Court against the construction of the bridge. Only approach road in the both side of the bridge is to be made to operationalise it.

CONSERVATION CONFLICTS & CONSENSUS

Human beings - Wild life conflict

Problems of human-wildlife conflicts are disturbing and serious in Bhitarkanika. The increase in crocodile population has started creating problems for the local people. Before the establishment of crocodile project at Dangamal, the region had a very small number of crocodiles. A rough estimate by people put the figure around fifty. After the project was started, crocodile eggs were collected, hatched artificially, reared and then released in the river, nalas, creeks. Local people feel that the numbers of crocodile population has been far in excess of the capacity of the

Fatal Crocodile Attacks		
	Human	Livestock
1979-1983	2	12
1983-1987	4	7
1987-1991	6	6
1996-97	2	

reserve. On the other hand with the increasing human population, fishing in nalas, creeks increased causing scarcity food for the crocodiles and disturbing their habitat. Sometimes crocodiles enter into the nalas, jore and ponds near human settlements. Human life as well as livestock are under constant threat of attack from wild animals which has created a fear psychosis in the people. They are so scared that they hardly come out of their house in the dark. With the declaration of Bhitarkanika as wild life sanctuary, crocodile were declared as protected species. Compensation scheme for damage to and loss of human life and cattle by wild animals are not adequate. Compensation amount which is claimed against crocodile attack hardly meets treatment cost. The cases of death due to crocodile attack is increasing day by day. In cases of death the compensation amount is very inadequate. The process of availing compensation is also highly intricate and time consuming. Life has become miserable, as the people say. An old man of Bankual village said that *Bhitarkanika is suitable for crocodiles but its no more suitable for human beings*. Forest department should make provision for adequate compensation in case of loss of human life and domestic animals due to attack of crocodiles.

Crop-raid by wild animals

The village people very often suffer crop loss from the attack of wild animals. Bankual, Dangmal and Khamarsahi settlements (study villages) being in close proximity to the forest, raid of wild animals on crop lands is very frequent. Wild animals like deer, porcupine, sambar, wild boar attack the crop fields usually in dark and destroy the crops. This has become a serious problem for the people of this area. Moreover, because of strict rules & regulations of Wildlife Sanctuary, protection given to the wild animals, the people had no way to defend their crops. Sometimes, FD provides fire crackers to scare them away but that does not help much. People suggest that net fencing of the forest area can check the wild animals from entering in to agricultural fields.

Poaching

There is considerable trade in wild life. Hunting of deer and crocodiles for their skin has aggravated in recent days. Live snakes are caught from the forest area to be sold at lucrative prices. Crocodile skin has a good demand in the outside market. Its mostly outsiders who are involved in this activity. The skin is exported to big cities, towns and foreign countries.

Unfortunately these hunters have been able to motivate some of the local people to get involved with them. However, many people from the area have started raising their voice against their presence.

Encroachment

We need to recognise various significant factors which have led to the encroachment of forest area in the Bhitarkanika Sanctuary. Encroachments started right from the time when Bhitarkanika was a princely state. Sri Sailendranarayan Bhanjadeo, the then king of Bhitarkanika cleared large tracts of forest land for conversion into agricultural land. This might have been to increase revenue of king's exchequer, but his court poet puts the action as the benevolent king having given away land to the courtiers.

In 1942- 43, there was a devastating flood in Midnapur in which most of the people lost their habitation. Afterwards, these people started moving to Bhitarkanika. Bengalis got settled at Rangani and Talachua during those periods.

People of this area allege that between independence and the abolition of zamindari in 1952, the king made a last frantic attempt to amass money by giving away patta of large acres of forest land to Bengali people mainly from Balasore, Midnapore and Kanthi of West Bengal. Some old people say that there was mild resentment from the local people against such a move of the king.

Encroachment by big farmers

There are farmers having more than 100 acres of land. Some people have converted forest land into agricultural land and afterwards managed to get patta illegally.

Non classification of land

“There are vast area within Sanctuary are merely designated as Govt. land which leads to constant misunderstanding between Forest department and Revenue department which further complicate the situation,” one forest officer said. There are lands which have forest cover but belong to Revenue department. In case, people encroach these land FD find difficulty in taking any action. In such cases Revenue department file encroachment case and impose fine which is very flexible. In the long run it is not difficult for people to get permanent patta of the encroached land. People take undue advantage of the flexible land legislation.

Politics of Encroachment

Encroachers constitute a strong vote bank in Bhitarkanika sanctuary area. And no political party dare to take a stand against encroachment. There are instances of state level political leaders supporting and at times instigating local landless people to clear forest area for agricultural land.

Refugee Rehabilitation

During 1956-57, Govt. had rehabilitated 335 Bangladeshi refugee families along the coast of Orissa. Later on, there was large scale infiltration in to this area and the refugees managed to obtain land patta illegally. After 1956, in Satavaya and “Sunai and Rupai” forest block of Bhitarkanika Bengali refugee were settled by the then State Govt. After 1971 (Independence of Bangladesh), there was a flood of Bengali refugee in to this area and they settled mainly at Jambu.

Prawn Culture

There is large scale encroachment of forest land by mafia for prawn culture. In addition the tahasildar is leasing out forest land, which had mangrove vegetation., to local unemployed youth for prawn culture. A large scale modern aquaculture farm is being developed at Tantiapala converting more than 1200 acres of forest land supported by World Bank.

Fear of Eviction

The people are living in perpetual threat of eviction. Areas inhabited by people for generations have now been marked for the sanctuary and they have to make way for the wildlife. *The recent notification issued on 25th Feb. 1997 by the Kendrapara district collector as per the Wild life protection Act 1972 under sections 20 and 18 has further aggravated the already volatile relationship.* The declaration clearly states the imposition of Govt. authority over the land surrounding the sanctuary excepting those land which had been registered under the property wills. The notification has directed the owners possessing landed property within the revised border limit of the sanctuary to submit their claim over their rights to district collector by March 31.

A practical and realistic boundary demarcation on the basis of presence of forest cover can go a long way in reducing unnecessary harassment of large number of the villagers who are located at quite a distant from the nearest forest area. The issue of inclusion within the sanctuary boundary line has become more of a tool of political maneuvering for taking political advantage of the situation. Taking into confidence people of the villages closely surrounding the sanctuary will have positive impact on resource conservation.

Indifferent attitude of FD

The authorities maintain a stereotypic attitude, originating probably from traditional notions that people are the biggest foe of forests and wildlife. The department still plagues the villagers with old forest offence cases pending since more than 5-10 years.

Excessive Fishing

According to a survey more than 500 boats are operating in Bhitarkanika area. The daily harvest of fish goes beyond 50 tons. The sophisticated fishing boats exploit aquatic resources indiscriminately, leaving little scope for natural breeding.

Construction of Jetty

State Govt. during 1990-95 decided to construct a 10 km long jetty at Talachua, for trawlers. But the construction was stopped due to opposition from environmentalists. However similar jetties were made at Jambu, Kharanasi and Tantiapala.

Construction of Bridge

The Hasina bridge, planned to connect Dangamal to Rajnagar, block headquarter by land, has now been left half constructed. Bridges may be bad for the environment but they provide better transport facilities for men and material. Keeping the Bhitarkanika people remote from the rest of the world will only increase their dependency on the forest. On the other hand its feared that constructing a bridge will disable the forest department from keeping tight vigil over the forests and exacerbate the problem of poaching.

CHAPTER 10

CONSERVATION STRATEGY

Prioritised Landscape elements

Bhitarkanika is blessed with abundant natural resources. The basic livelihood of the people of Dangmal, Bankual and Khamarsahi villages are inextricably linked to subsistence and income provided by the mangrove forests, rivers, creeks and nalas. The protective role of the forests and the role of irrigation are probably even more important. But these resources have degenerated over time because of several factors.

Prioritised Landscape elements

Mangrove forest
River
Nalas
Creeks
Agricultural lands

Immediate protection measures are indeed needed badly, but there have to be a more intelligent process than the largely single track obsession with the crocodiles. Probably from the viewpoint of people the crocodile is not the most important species to be conserved. It is the mangrove vegetation as such that needs greater attention.

The mangrove play a key role in the local economy and environment. They protect the area from the ravages of the sea. They provide people a range of products and services spanning the entire gamut of basic human needs like food, fuelwood, shelter, medicines, irrigation and also direct financial returns. Of the numerous species unique to the mangrove areas, a few are extremely important from the point of livelihood. The following species have been accorded top priority for protection by the local people.

Prioritised Species

Species (local name)	Scientific Name	Use
Hental	Phoenix paludosa	rafter, fence post, leaves used for thatching roofs, ropes
Nalia grass	Phragmites karka	weaving grass products
Pitamari	Xylocarpus molucensis	useful timber
Sundari	Heritiera fomes	
Bani	Avicennia officinalis	
Bandari	Bruguiera spp	
Jagula	Tamarix indica	Flowering species important for honey
Kharasi	Aegiceras corniculatum	
Bahni		
Harakanch	Acanthus spp	

Strategy to Protect & Conserve

The strategy to protect and conserve the prioritised LSEs can be divided into broad categories:

Creating alternative livelihood

Since the declaration of Bhitarkanika Sanctuary in 1975 the rural populace living in & around the forest have lost their usufruct rights over the forest. Most of these people are landless. In the absence of alternative income sources the tribals and the harijans of the area continue to depend on natural fauna and flora for their subsistence. The Government & other development agencies needs to give immediate attention to create employment opportunities.

- ◆ Coir processing units can be set up at small scale in local areas.
- ◆ Sustainable extraction of the Nalia grass and enhancing the skill of Nalia weavers by imparting training on processing & help them to market their products at better price.
- ◆ The tribals can be trained to take up bee-keeping and given financial support for the same. Necessary steps have to be taken by the Govt. to help the tribals in processing and marketing the produce.
- ◆ People should be allowed to go for NTFP collection and sale like Karanj and other available NTFP's.

Development & enhancement of agricultural productivity

Agriculture is a major source of livelihood for the people. But agriculture in the area is very uncertain. Due to non-functioning of sluice gates the fields often get inundated with saline water resulting poor crops. Agricultural fields lie vacant during Rabi season. In the lack of irrigation facilities people can not grow second crops. Irrigation facilities through bore wells has the potentiality of bringing out sea change in the livelihood of the people.

Involvement of local people

Forest department should seek the involvement of local people in protection and management of the forest. People living in association with the forest for centuries develop a keen understanding of the forests. Their knowledge should be given due recognition while taking up any developmental activities and they should be involved in the planning and implementation process. Plantation of mangrove species can be taken up to restore the degraded habitats. The local people can be motivated to take up protection and management of these plantations with the help of FD.

Protection of river, nalas, creeks

The foremost step that needs to be taken to protect the forest and water resources is to evict the encroachers of forest lands for prawn ponds. Large area of mangrove forest were cleared and converted to prawn ponds. The influx Bengali migrants expert in marine activities overexploited the water resources by intensive fishing. Forest Department and other dept. need to make coordinated effort to control this. Meanwhile strong political will is necessary to implement strict laws against prawn culture which destroys the natural ecosystem.

Integrated management

Mangrove eco-system requires multiple use management system. Forestry and fishery cannot be treated in isolation. Any interference with one of the components will disturb the entire eco-system. But often the Fishery and Forestry departments are unaware of activities carried by each of the department. The different departments of Government need to link up and efforts of all the actors needs to be coordinated for launching any conservation or development schemes.

SUGGESTED MEASURES

- ◆ Re-demarcation of sanctuary boundary line to do away with confusion relating to the boundary.
- ◆ Undertaking mangrove plantations with the help of local people and involve them in protection and management.
- ◆ Building awareness among local people on ecological importance of mangrove forest.
- ◆ Rehabilitation of the migrants and poachers posing serious threat to mangrove vegetation by launching eco-development programmes.
- ◆ Implementation of income generation programme for the direct forest dependent groups.
- ◆ Undertaking energy plantation of suitable non-mangrove species to fulfill fuelwood needs, so as to reduce pressure on forest for firewood.
- ◆ Raising bamboo plantations for meeting the demands of fishing poles.
- ◆ Immediate remedial measures to release and check encroachment of forest lands for prawn culture.
- ◆ Redistribution of encroached common land among the landless.
- ◆ Plantation of *Amari (Ipomoea fistulosae)* needs to be promoted in the area. People have to be motivated to use *Ipomoea fistulosae* for fencing purpose to reduce excessive extraction of the Hental(*Phoneix paludosa*).
- ◆ Mobilising and involving the local community institutions to promote bio-diversity conservation.
- ◆ Ensuring benefits like higher prices honey and other benefits for motivating communities to initiate sanctuary protection and management.
- ◆ Revival of pass system ensuring sustainable extraction of forest materials to meet peoples' basic needs.
- ◆ Sharing of tourist revenue through direct or indirect means. Promoting eco- tourism.

Annexure - I. A

Knowledgeable Individuals

Villages	Knowledgeable Individuals	
Dangamal	Karunakar Behera Harihar Barik Gouranga Padhi Mahendra Behera Sarat Kumar Behera Umakanta Nayak	Agriculturist & Village leader Agriculturist Agriculturist Agriculturist Graduate Youth leader
Bankual	Minaketan Padhi Nrusingha Behera Anadi Behera	Ward member Agriculturist Plant species identification
Khamarasahi	Dharani Das Madhab Behera	Teacher Nalia Craftsman
Resource persons	Chaitanya Behera Dharanidhar Das Prafulla Das	Teacher Teacher Freedom fighter and renowned Oriya writer

Annexure -I. B

Nalia Crafts

Sl. No.	Weaved Products (Local name)	
1.	Tokai	Basket
2.	Chati	Mat
3.	Chauladhua	Small basket for washing food grains
4.	Mana	Measuring food grains
5.	Gauni	Measuring food grains
6.	Dandipala	For storing dry fishes
7.	Phulatata	For keeping flowers
8.	Changuda	Basket
9.	Pasara(puja purpose)	For carrying puja materials

Annexure - II. A

Saline Embankments of Rajnagar Block

Sl. no	Saline Gherry	Length in Km.
1	Uttikan Saline Gherry	7.00
2.	Keradagarh Altanga Saline Gherry	14.46
3.	Padini Padmanavpur Saline Gherry	4.00
4.	Rajnagar Gopalapur Saline Gherry	32.00
5.	Chasisava Saline Gherry	4.00
6.	Rajgarh Saline Gherry	5.00
7.	Rajnagar Gadadharpur Saline Gherry	22.00
8.	Buragoan Saline Gherry	10.00
9.	Satagoan Saline Gherry	32.00
10	Chakmohanpur	5.00
11	Abadhatia Bagapatia Saline Gherry	10.00
12	Debandra Narayanpur Saline Gherry	6.00
13	Baunsagarh Satavaya Saline Gherry	5.00
14.	Satavaya Saline Gherry	10.00
15	Dantipada Rabindrapalli Saline Gherry	4.00
16	Balarampur	9.00
17	Iswarpur Hasina Saline Gherry	9.70
18	Panchupalli Pantala Saline Gherry	6.70
19	Iswarpur- Gupti Saline Gherry	5.00
20	Righagarh Nalitapatia Saline Gherry	10.60
21	Righagada Dangamala Saline Gherry	9.00
22	Righagada Junsungarha Saline Gherry	10.60
23	Nalitapatia Talachua Saline Gherry	12.50
24	Nalitapatia Dangamala Saline Gherry	3.50
25	Dangamala Dalkhai Saline Gherry	8.50
26	Vekta Saline Gherry	3.00
27	Rangani Circuit Saline Gherry	27.50
28	Gothakhola Hasina Saline Gherry	2.30
29	Pataparia Saline Gherry	8.00
	Total	290.76

Annexure - II. B

Saline Embankments of Dangmal Area

Repairment of old sluice gates	Construction of new sluice gates
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Dhodhoya	Mangalapur	Thanapati	Kathua
Kanakanagar	Krushnanagar	Balijore	Subarnapur
Kathua	Nalitapatia	Etajore	Kanakanagar
Solakhia	Sailendranagar		
Kamalapur	Pinchhapatia		
Rajendranarayanpur			

Annexure - III

List of Plant Species

Sl.No	Local Name	Scientific Name	Uses
1.	Aira		AI
2.	Ajana jari	<i>Ficus spp.</i>	FW, OT
3.	Amba	<i>Mangifera indica</i>	Ed., HI
4.	Anachanra, Pitanachanra		HI
5.	Ankukoli	<i>A. Lamarckii</i> <i>A. Chinese</i> <i>A. Sal</i>	Edible
6.	Aou	<i>Dillenia indica</i>	
7.	Arakha	<i>Colotropis procera/</i> <i>Colotropis gigancia</i>	Medicine
8.	Arasa		Medicine
9.	Bahni(Singalia, Dhala, Kala)	<i>Anicenia alba</i>	AI, Hon
10.	Bahumuruga	<i>Flagellaria indica</i>	HI
11.	Baincha	<i>Flacourtia sepiaria</i>	Edible
12.	Bana koli	<i>Zizyphus mauritiana</i>	Edible
13.	Bana lembu	<i>Merope angulata</i>	Fuel wood
14.	Bana simila	<i>Bombax ceiba</i>	Medicine
15.	Banarua	<i>Aegialitus rotundifolia</i>	AI
16.	Bandiri	<i>Bruguiera gymnorrhiza</i>	Honey
17.	Bania	<i>Hibiscus tilisecus</i>	Fuel wood
18.	Bara(lotani, jhankada)	<i>Ficus glomerata</i>	Edible
19.	Batara	<i>Melia composita</i>	Edible
20.	Baula	<i>Mimusops elengi</i>	Ed., Med.
21.	Baunsa(sunari, dasumukhi, badia, belari)	<i>Bambusa spp.</i> , <i>Dendrocalamus Spps</i>	HI, HC, Ed.
22.	Bela	<i>Aegle marmelos</i>	Edible
23.	Bhuin kakharu	<i>Ipomopa diagvtata</i>	Med.
24.	Bhursunga	<i>Murraya koenigii</i>	Med., Ed.
25.	Champa	<i>Michelia champaca</i>	Flower
26.	Chhanchana dahi		Med.
27.	Chhatuari	<i>Alstonia scholaris</i>	
28.	Chiani	<i>Clerodendroninerme</i>	HM(lanja net), Med
29.	Choranda		
30.	Dhanachira ghasa	<i>Sesbania bispinosa</i>	Med (animals)
31.	Durdura	<i>Datura stramonium</i>	
32.	Gila	<i>Ceasalpinia decapetala</i>	Hon, Med.

33.	Gogina		AI.
34.	Gohira	<i>Acacia leucopholoea</i>	Ed.,OT(poisonous latex)
35.	Gokhara	<i>Trianthema terrestris</i>	
36.	Guan	<i>Excoecaria agollocha</i>	AI, FW, OT
37.	Harakancha	<i>Acanthus volubilis</i>	Hon., FW
38.	Hengula		Honey (non - edible)
39.	Hentala	<i>Phoneix paludosa</i>	HC
40.	Jagula	<i>Tamarix indica</i>	Ed, Hon
41.	Jagula	<i>Tamarix indica</i>	HM, Hon.
42.	Jammu	<i>Syzygium cumini</i>	
43.	Jhatanga		
44.	Jhaun	<i>Casurina equisetifolia</i>	
45.	Kaina / Tentuli	<i>Tamarindus indica</i>	Med.
46.	Kantei koli		Med.
47.	Kangada	<i>Xylia xylocarpa</i>	Ed.
48.	Kasimel		HI
49.	Katakala	<i>Pueraria tuberosa</i>	Ed.
50.	Kendu	<i>Diospyros embryopteris</i>	HI. OT.
51.	Keruan	<i>Sonneratia apetala</i>	AI, Ed.
52.	Khalisi	<i>Aegiceras corniculatum</i>	FW, Hon
53.	Khalisi	<i>Aegeceras corniculatum</i>	Honey(best quality)
54.	Khanda koli		HI
55.	Kharkhari	<i>Acrostichum aureum</i>	Corcodiles lay eggs in Kaharkhari leaves
56.	Kochila	<i>Strychnos nuxvomica</i>	Medicine
57.	Kukura chhelia	<i>Pavetta indica</i>	Medicine
58.	Kurum	<i>Adina cordifolia</i>	HI, AI
59.	Limba	<i>Azadirachta indica</i>	Medicine
60.	Luni kia	<i>Pandanus fascicularis</i>	Ed.
61.	Luni lunikia	<i>Pandanus fascicularis</i>	Med.
62.	Mahana		FW, OT
63.	Manjuati	<i>Lawsonia inermis</i>	Med.
64.	Masitha	<i>Intisia bijuga</i>	HI,
65.	Masu	<i>Glycosmis arborea</i>	Ed.
66.	Mehandi	<i>Cappaaris horrida</i>	Medicine
67.	Miriga	<i>Salvodora persica</i>	
68.	Mohula	<i>Madhuca longifolia</i>	Ed., HI
69.	Nadia	<i>Cocos nucifera</i>	Ed., HC, HI
70.	Nalu naluka	<i>Celastrus paniculatus</i>	Med.

71.	Nentai kanta	<i>Caesalpinia cristata</i>	OT (Fencing)
72.	Osta	<i>Ficus religiosa</i>	FW.
73.	Pana airi	<i>Asistolochia indica</i>	
74.	Pani kenduli	<i>Crinum defixum</i>	
75.	Patharta koria		HI, Med.
76.	Phulajhati		FW, OT
77.	Pijuli	<i>Psidium guava</i>	Ed.
78.	Pimpila tree		
79.	Pitamari	<i>Xylocarpus molluccensis</i>	AI, Hon, HI
80.	Rai	<i>Rhizophora mucrovata</i>	Hon, OT
81.	Rakta Sundari, Panisundari		Fuel wood
82.	Runja lata		
83.	Saanga		Edible
84.	Sahada	<i>Strellus asper</i>	Medicine
85.	Sinduka		Hon, Ed.
86.	Singada	<i>Cynomemetra ramiflora</i>	
87.	Sisu	<i>Dalbergia latifolia</i>	AI, HI
88.	Sisumara	<i>Xylocarpus grantatum</i>	AI, Med.
89.	Sundari Kanika Sundari Dhala Sundari Lati Sundari	<i>Heritera minor</i> <i>Heritiera kanikensis</i> <i>H. littoralis</i> <i>Brownlowia tersa</i>	AI, Hon, Med., Ed.
90.	Tala	<i>Barassus flabelifer</i>	Edible
91.	Torania		
92.	Tunda poda	<i>Toddalia asiatica</i>	Medicine.
93.	Uanra	<i>Amoora cucullta</i>	Edible

AI- Agricultural Implements, HC- House Construction Material, HI- Household Implements, Med- Medicinal, Ed- Edible, FW- Fuelwood, Hon- Honey, OT- Others (fencing, ornamental, rope making poisonous latex etc.)

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A poor man's house is built of Hental- Roof, Rua and door

This group deliberating on conservation strategies

An woman fishing small prawn in the pond for sale

