Similipal Biosphere : Genesis of Historicity

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The countless interferences and thereby its consequent infringement on nature have been a habitual trend with the man, and this phenomenon knew no bounds during the last one and half centuries of the Darbar Administration in Mayurbhanj. The Similipal hill reserve 2,750 sqkms. compact patch of broad leaved tropical natural forest classified by Champion and Seth as type-3/C North Indian Tropical Moist Decidious forests with its sub-types at different elevations, clads the massif with varied flora and fauna with species of Temperate forests also. Its unique geological formation, typical ecosystems controls and regulates the ecology of the North-east region. The imbalanced ecology, could be restored with the help of scientific forest management and by devoted knowledgeable foresters, improving the level required. The protected area, 50% of the massif, under Tiger Project came under Sl. No.1 - Conservation Forestry, classified in 1976 by National Commission on Agriculture and balance area under production forestry, ranking 3rd in the list, 2nd being social forestry. This protected area with V.H.F. and telephone connections all over the project area keeps the staff alert and encouraged. The offenders and intruders are scared and keep away. The declaration of Similipal as Biosphere got international status and provided more security and protection to the core, the national park, and the buffer, the sanctuary, as there shall be transitional zone around these two existing concentric protected areas with more conservational activities for conservation of the typical ecosystem in its natural form for good.

From the hoary past till the present, through out the annals of history of Mayurbhanj, many a chronicle and document referred to Similipal extensively at its various forms. At the rise and fall of Mayurbhanj in its glories and glooms, Similipal always remained as epicenter of activities. It witnessed as a mute spectator to the political development of Mayurbhanj; it shaped and groomed the economy and the culture of the people. Similipal at its fullest version is no less than an organic whole. For common man of Mayurbhanj; Similipal is a symbol of reverence and awe to them. It has the appeal of the religious sanctity, a coherent bend of cultural assimilation and a perinnial source of livilihood. Hence, Similipal, is not only hills and valleys, streams and rivers, ravines and waterfalls, but a bewildering panaroma of many hundreds of millions of trees, depicting a huge and mammoth canopy bloomed in green veils; it is more than a wordly endeavour, as it represents the heart throb and the emotions of the people of Mayurbhanj.

SIMILIPAL RESERVE FOREST

History of Mayurbhanj

Mayurbhanj is a small spot on the surface of the earth where the man has lived over fifty thousand years. The stone axe(hewn) and left over hearth to melt iron for arrow-heads and ploughshares are the evidences, speak of the early man living in the area. The tribal people of the area namely : - the Santals, the Kols, the Mundas and the Savaras speak Austro-Asiatic language. From the discovery of Kusan coins in Mayurbhanj and in other districts of Orissa, Dr. A.S. Altekar believed that one Indo-Scythian tribe called Murandas were ruling over the area during 2nd. and 3rd century A.D. But a tribe called "Bhanna" who were the probable ancestors of the Bhunja tribes, inhabiting this region during 6th century A.D. Two ruling families i.e. Mayuras and Bhanjas ruled over Bonai and Khijinga Mandals respectively. The capital of the later was Khijinga Kotta, the present Khiching. These two ruling families had close social and cultural relations. During 1361 A.D. the capital, Khijinga Kotta was destroyed by Sultan Firoz Saha Toghluq. So it was shifted to Haripur on the bank of river Subernarekha during 1400 A.D. and the name of the kingdom was changed to Mayurbhanj in commemoration of the traditional relation of Mayuras and Bhanja families.

The Bhanja dynasty ruled the state continuously since 9th century A.D. in succession which was then known as Khijinga Mandala covering the present area of Mayurbhanj and Keonjhar Districts as well as parts of Singhbhum and Midinapur districts now in Bihar and West Bengal states. During the Moghul period, the Bhanjas extended their teritory as far as the sea with capital at Haripur. During the reign of Maharani Sumitra Devi the capital was shifted to Baripada during the last part of 18th century and on 25th November 1803, it came under British occupation.

The history of Mayurbhanj, part-I, compiled by late Ramprasad Chand basing on records of British regime, gives an early account of the extensive deep jungle of Mayurbhanj, describing the expedition of Aliverdi Khan against Raja Jagardhar Bhanj in 1741. The writer quotes the following from the contemporary history Raiz-us-Saltin.

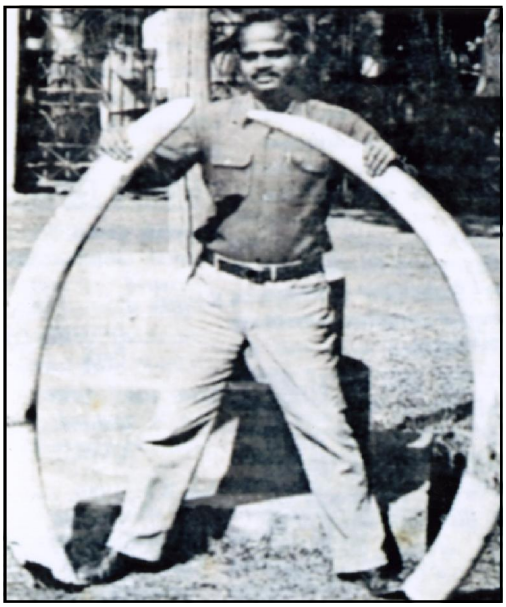
"The latter (Raja of Mayurbhanj) was at Haripur which contained his mansion and was at that time plunged in pleasures and amusements. His knowledge of the denseness of the forest that surrounded him coupled with his command of numerous hordes of Chawars and Khandaits made him feel insolent ... Raja seeing the superiority of the Aliverdi Khan's army, with his effects, followers and dependants fled to the top of the hill and hide himself in a secret fastness, beyond the keen of discovery. Similarly, cessation of Orissa by Marahattas in 1751 and during their struggle for independence, the Raja of Mayurbhanj had occasion to flee into the hills before the depredation of the Marahatta army. The author, therefore, records in his introduction to the above history. Thanks to the hills and jungles that spread across it and the indomitable spirit and political vision of the chief, it managed to survive the greed of either (British and Marahattas) powers. Later on, after the

annexation of Orissa in 1803 at the conclusion of the 2nd. Marahatta war, conditions continued to be the same and Mr. W.W. Hunter, the 1st. British Commissioner in his history of Orissa Vol.-II, page 113 writes :-

"Herds of elephants still roam through forests and mountains of Mayurbhanj and the English Officer in charge of the operation for catching them lately bagged upward a hundred fine animals during two seasons." (Senapati & Sahu-67).

Situation

The Similipal massif lies between 20^0-17' and 22^0-34' North latitudes and 85^0-40' and 87^0-40' and 87^0-10' East longitude comprising of nearly 2,750 Sqkms of compact forest, perhaps the largest single mass of natural forests, still left in this part of the country, This massif, not part of the Eastern Ghats or Gadjat hills, stands out in the north east corner of the Decan Plateau with its glory of varied tropical flora and fauna. The entire massif is separated from the Bengal Bay by a narrow strip of coastal plain. The monsoon and moisture laiden Bay wind have definite influence on the vegetation pattern. Nature has epitomised all her living resources in this massif.



Fully - Grown Tusks Capital & Bold

Topography

The hills rising very precipitiously from the plains of Baripada and Udala extend as far as Jashipur in North and Bisoi in the East and Thakurmunda in the West covering a total area of 2750 sqkms. with their innumerable crests and valleys and perinnial streams. Sir William Hunter describes Similipal Hills during 1872 as - "The hitherto almost unexplored mountains of Mayurbhanj heaped upon each other in noble masses of rock from 3,300 ft to 4,000 ft. high .... The peaks are densely wooded to the sumit, and except the regular passes, are inaccessable to the beasts of burden."

The Khairiburu, in south Similipal, amidst the group of hills is 1178 mtrs. whereas Meghasani is 1,165 mtrs. high. The elevation in the central region at Dhudurchampa is 1000.8 mtrs, that in the North at Chahala is 774.5 meters.

Drainage

The Similipal hills are drained eastward by a large number of perinnial streams and nalas flowing in all directions. They ultimately join with one of the main river systems such as - the Budhabalang, Baitarani and Subernarekha. The Khairi, Bhandan, Birol, West-Deo, Salandi, Khadkai and its tributaries flow into Subernarekha while the Budhabalang forms itself a river.

Geology, Rock, Soil

The sequence of rock of Similipal basin beginning with a well developed dark carbon phyllite as base and followed by a quartzite band which is conglomorate at places. Overlying this there is lower layer of spilitic lava with volcanic broceia. The three concentric cups of metamorphic rocks inter-beded with sub-metamorphic layer helps to increase the water

holding capacity. This geological formation is unique in the world. Out-crops of metamorphic sand stone and quartzites are to be found all over Similipal hills. They produce a redish and sandy soil in which Sal appears to be doing well. Most of the areas in Similipal have rich spread of red loam. Extensive pockets of laterite soil also come across on the plateau. Heavy clay is also found in the wide flat basin.

Climate

The climate of the massif is warm and humid. Summer is tolerable as the temperature hardly goes above 40^0C. Three distinct seasons are felt during the year. Rainy season starts from middle of June till October with rain fall of about 1250 mm in the monsonic leeward valleys, over 2000 mm is the general spread of the rainfall in the plateau. Frequent annual receiptal of 2500 mm is exprienced in some pockets and more in higher elevations inside Similipal. Winter creeps in gradually from October mid and becomes severe in December lowering temperature to 5^0C in many parts of the hill, with forest in valleys and open grass lands. The spring is pleasant. The southern and western aspects are cooler and north eastern aspects are warmer in Similipal is uncommon deviation due to its stategic situation. This geophysical condition influences floral and faunal distribution for microclimatic condition prevailing in this locality.

Barheipani Waterfall :Similipal

Similipal Forest during British Rule

What really has happened to the extensive and dense forests of Mayurbhanj between 1803 to the close of the last century is a matter of speculation and guess. With the advent of peace and settled conditions, agriculture flourished and new settlements came to exist. In this process lots of forest areas vanished, giving rise to new villages and cultivation. Mr. C.C. Hart at the time of his visit about the year 1895-1896 describes the forest of the state as follows :-

"The plain and accessable parts have already been denuded of mature Sal, except in one place in the plains of south west, where there is a little, which is three parts ruined by "Jhum" cultivation. The greater part of the mature Sal is to be found in the south western portions of the reserve forests and also in the central group of the hill forests. At a place called *Baraipani* for instance, there is as magnificent a Sal forest as it is possible to imagine, though certain areas which are situated in the more accessable localities have been partly denuded of their mature Sal."

Mr. Hart further describes that "All mature sal from the plain forests, which later comprised parts of Banahari, Muruda, Deoli and Udala ranges (of present Baripada Division) have disappeared by over exploitation except in the plains of south west i.e. in the present Panchpir and Thakurmunda ranges (of present Karanjia Division) where three quarter of the forests have been 'Jhumed'. About Similipal Hills he describes that except the accessable parts which was at the time very much limited, rest of the hill forests quite well preserved." (Mishra & Bose - 1975-74)

Forest Management during Darbar Administration

Beside the above, the annual administration report for 1885-86 of Mayurbhanj state gives an

idea of the forests of the state. The timber leases were granted to the contractors and traders from outside at nominal rates till 1885. The damage caused by the lessees of the forests was considerable as against the revenue realised. So the forests were worked departmentally till 1904 including Similipal and some other forests. The quantity exploited departmentally was less which used to be floated in shape of round logs in the river Budhabalang or by cart to Balasore depot for sale. In the year 1888 one Forest Ranger and a peon were oppointed for management of forests. The reserve forests of Mayurbhanj were under the management and control of the Forest Department whereas protected forests were under the charge of Revenue Department. The reserve forests were more or less stable and parmanent in nature but the protected forests maintained to meet the requirement of the royats and residents and were also subject to clearance for cultivation. The forest area being given under 'Amalanama' lease by the revenue authorities and leases for reclamation of reserve forests were being given under the special sanction of the ruling chief. Thus the extent of reserve forests and protected forests decreased.

In 1907 a State Forest Department was created with Mr. J.A. Martin, State Engineer as head of the Department. As the forest management intensified, the protective staff came under the jurisdiction of Mayurbhanj to manage :

1. Reserve Forests	1,152 sqml.
2. Protected Forests	675.5 sqml.
3. Cultivated area	1,944.5 sqml.
4. Waste Lands	471 sqml.

About 43% of the area of the state was covered by forests. The state followed the Indian Forest Act 1927 and had own Forest Manual. The forest settlement, survey and demarcation etc. used to be done in accordance with the Mannual and offences were punishable as provided under the Act. In 1906 a survey party demarcated the boundery line from Talabandh to Similipal Garh to form another working circle for giving lease to M/s B. Borooah & Co.

The history of long term leases for forest working to earn revenue for development of the state, is the past History of Mayurbhanj State Forests. The developmental activities like laying of roads, construction of buildings, rest houses were mainly confined to the Similipal only, besides, regular exploitation and intensification of the organisational set up for removal of contractual quantity of timber per annum. The terms and conditions for working Similipal forest under lease by several contractors shall speak how the forest became commercially less valuable, loosing trees below approach class. (Senapati & Sahu'86).

In 1904, the Mayurbhanj narrow guage line was built upto Baripada. This line was of immense use in transportation of timber in huge quantity extracted from plain forests, mainly reserves. For extension of the light railway line upto Bangiriposi and then to Talabandh M/s B. Borooah & Co. agreed to finance as a partner with condition that he should be given 30 (thirty) years monopoly lease of Similipal Reserve Forests on the existing terms and conditions of the 10 (ten) years lease granted to him during 1906. Further he wanted guarantee for a minimum of 5 to 7 lakh cft. of sawn timber annually under the proposed lease so as to make running of the railway profitable. He further wanted 30 (thirty) years lease of Myrobalans for collection and export and for other minor forest produces also. The following correspondances between the lessee and lessor shows the rigidity of each party to safe guard interest.

Mr. Borooah wanted 30 (thirty) years lease for Myroblans for collection and export and for

other forest produce of the state and prospecting licence for three years convertable to 30 (thirty) years mining lease for minerals of every description except those given to Tatas. The ruler in replay, wrote - "in the event of your guaranteeing goods trafic which will yeild a net profit of 3½% per annum on the capital expenditure on the railway, I shall have no objection to grant you lease of entire Similipal forests (subject to the limitation of the existing leases and termination) for timber operation for a period of 30 (thirty) years under similar terms and conditions as those attached to the one, you already hold, subject to such alternations as the British Government may propose. As regards to the additional clause you propose to add to the effect that the state will find sufficient trees to permit you being able to cut at least 5 to 7 lakh cft. of timber annually for 30 (thirty) years, I have to say that I can not accept the clause. I will alter the additional clause to the effect that in the event of your not being to secure 5 lakh cft. of timber in any year during 30 years, from timber of 6ft girth, the state will grant you permission to cut timber of any girth not below 5 ft. in girth for that year to make up the deficit. Excepting the monopoly of Mohua flowers and export of Lac, all other concessions including the prospecting licence are agreed to." To this the company wrote - "We beg to submit that it is only in anticipation of getting such guarantee from your Highness, that we accepted the undertaking (construction of railway and 3½ of annual profit on capital cost) we have therefore the honour to accept the alternative you have pleased to propose subject to the condition to the effect that if in any year we can not turn 5 lakh cft. of timber even by cutting trees upto 5 ft. in girth, our guarantee to your Highness to the extent of such deficit would stand cancelled." Although the company so writing wriggled out of the original undertaking regarding the construction

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of the railway the Chief in his letter 2nd. November 1907 accepted the modified proposal for 30 (thirty) years monopoly of Similipal forests. The proposed lease could not be executed immediately as 13 (thirteen) other contractors' leases were current in Similipal. The Maharaja died in 1912. The lease was finally executed during the Court of Wards management on 7th. February 1916, after further verification guaranteeing sufficient sal trees of 6 ft. and above girth to ensure a certain minimum return of sawn timber. This lease with further modification in 1936, guaranteeing a lower exploitable girth limit (4½ ft. girth) and permiting 8(eight) lakh cft. annually remained in force with all advantage to the lessee till February 1945.

In 1920-21 Mr. R.C. Ramsay, Poltical Agent of Orissa Feudatory States, during his visit observed that -" The forests contain many fine trees and there is a vast quantity of Sal timber available, at the same time, it is patent of any one that the state will sooner rather than later, be faced with a very long period when there will be no sal of merchantile size. The forests also contain numerous number of stag headed hallow, badly grown and dry rot is common. The younger trees which should form the drop 10 to 15 years hence, are exceptionally bad in this way and are utterly

valueless and only encumber the ground. True, we are in the 'Long period' referred to by the then political agent." Further wasteful conversion, recorded by Mr. Gagliardi (Additional Forest Officer) in his report in April 1929 is quoted here - "As the company do not extrect planks and scantlings, although according to lease, they were supposed to convert to the maximum, the wastage from log to sawn sleeper is 75%. I personally made a few measurements and found that this figure was correct. If the careful measurement were taken of a few thousand trees, the wastage I am convinced, would be over 80%". So the quantum of wastage was not given importance then. (Senapati & Sahu - 1967).

Worst of all, the sleeper conversion from round logs in Similipal by the lessee was done by portable sawmills, six in number, used to be shifted from place to place, depending on the number of logs stacked at the site. The sawers were recruited from Ranchi, Kolhan and Midinapur, of Bihar and West Bengal, mainly Santals, Kols and Mundas. These labourers were staying in temporary huts in camps in close proximity to work site. In north Similipal, Chahala, was one of the main active centers for execution and supervision of work with hundreds of recruited camp labourers. Sleepers used to be transported by wet slides from Baraghati to Talabandh. In transportation of timber, tractors were in use. The Eucallyptus villa, at Chahala near Forest Rest House, was constructed on the old plinth of the camp office of M/s B.B.T.T.Co. The Eucallyptus trees around the villa were planted by the company, which have witnessed all the ravages done to the flora and fauna of the massif and clearance of forests to begin the settlement and cultivation by the recruited camp labourers who were required to stay in camps round the year for extension of lease for 30 more years. So they resorted to stay in groups making clearances which paved path for gradual growth of villages inside Similipal from 1906. Added to this, Maharaja of Mayurbhanj gave 250 Acres. of Salami free 'Sardari-Jagiri to Sri Peter Dubraj, a labour contractor to establish permanent labour camp to facilitate sleeper operation. So he brought more Kols from Ranchi and settled them at Garh- Similipal, during 1922.

The major portion of Similipal massif was dense vergin natural forests infested with high density of wildlife. With the advancement of felling for sleeper conversion and clearance of forest growth for settlement at Garh-Similipal, Nawana etc. associated with indiscreminate hunting of herbivours, the tiger of Similipal started killing human-beings - the newly introduced timber workers to the valley. To stop the human killings and control the tigers, the timber contractor recruited one professional tiger killer from Ranchi. It is said, within one year this sikari eleminated more than 400 tigers to provide protection to the timber operators. The desendant of this tiger killer, one Sri Bhim Gunj alia Bhima Baghua and another Baghua are still practising the same methodology of killing tigers with poisoned bow-trap which is the full proof method to eleminate. The 30 year lease of Bholanath Borooah & Co. expired during 1946. There was no systematic working of the forests for which Similipal reserve during 36 years (1910-1946) lease, was worked twice and north Similipal three times. East Similipal which was withdrawn from the lease in the year 1922 was worked like the rest of the Similipal forests through several contractors. For this annual plans were drawn up fixing different areas to be exploited to keep engaged the recruited camp labourers of the contractor in timber operation round the year. Sri B.M. Dasgupta prepared the first working plan for whole of Similipal reserve forests for 20 years for working under Selection-cum-Improvement system. But after about six years Mr. Dasgupta's plan was replaced by the working plan of reserve

forest of Mayurbhanj district written by Mr. Sripal Jee during 1953-54, after integration of Mayurbhanj state to the Union of India on 6th November 1948 and became part of Orissa as a district on 1st January 1949 only. (Mishra & Bose' 75)

Introduction of Silviculture Management Systems

Similipal reserve and other forests of the district are being administered by Baripada and Karanjia Forest Divisions with the river Budhabalang as the natural boundary between the Divisions. In Similipal R.F. the scientific silvicultural management aimed at sustained yeild commenced from 1953-1954, on introduction of Jee's Plan which for the first time divided the Similipal reserve into felling series, Blocks and Compartments for working under selection-cum-improvement system with 20 years felling cycle and regular tending operations. Marking rule fixing exploitable girth area and species-wise with retaintion in 3 of exploitable size was prescribed only for Sal and 12" (30 cm.) dia was for improvement felling in Similipal R.F. But these prescriptions of the working plan were not followed properly and the marking done by un-trained staff was revenue oriented. The plan did not prescribe for retaintion of the non-sal species which resulted in removal of valuable spp. lime Pia-sal, Champa, Gambhari, Kurum, Sissoo, Bandhan etc., yeilding higher revenue but the Sal of exploitable size and approach class and below were of less quantity for removal during Darbar rule. The annual yeild is regulated by area. So annual coupes are marked and formed into lots notified in Gazettee for auction sale. The highest bidder takes the coupe on contract for specific time. After expiry of Jee's Plan it was revised during 1973-74 and separate plan for Baripada and Karanjia Divisions were compiled by Sri S.Bose and Sri R. Mishra, IFS respectively. The sample stock enumeration for first time was done and exploitable girth limit for different marketable spp. was fixed. The Selection-cum-Improvement system of working was prescribed with retaintion per cent calculated to prescribe yeild by Smythies' formula using the sample enumeration figures, was observed by the I.G. forest to be at higher side as the value of 't' the time taken by the approach class to attain exploitable size, was incorrect as a result more number of stems of exploitable were removed. The C.C.F., Orissa ordered for upward revision of the exploitable were removed. The C.C.F., Orissa ordered for upward revision of the exploitable girths of different species. The availability of non-sal exploitable size tree in Similipal R.F. Like the one mentioned here increased the revenue with low percent of sal attracted attention of many. That the then D.F.O. Sri, Trilochan Rath, I.F.S., Karanjia Division recorded -" Tree No.152, species - Champa (Michelia champaca), girth - 540 cm, marked during 1974-75 in coupe No.III, lot No.1 of Kendumundi Felling Series, Jamua Block, Telsim Compartment No.9 yeilded 33.4008 cum. of timber from 54 logs. Such trees still exist, though rare. The removal of such mature over size trees from top story created lasting gap in the canopy. The endemic species invaded the area and filled up the gap for favourable conditionals. Thus making good to replanish the volume of lost biomass and rebuild the lost/dislinked ecological systems of the massif's house hold.

Vegetation is the parameter of ecology. The vegetative cover of Similipal is of much importance as it contains rich tropical broad leaved forest types broadly classified by C.H.Champion and S.K. Seth as "3C- North Indian Tropical Moist Decidious", covers a large chunk of area in the massif. This forest comprising a compact block contains Semi-Evergreen forest,

Sal sheds leaf and becomes leafless for 10 to 15 days during summer. It gets preference over other species as the principal species in forestry management. Further it is a very good coppicer, drought resistant, tolarant to frost, fire and grazing. Though sal is common in Similipal valley, is able to servive with a few other frost resistant species found in Tinadhia, Jamua, Nawana, Similipal-Garh, Meghasani areas. (Mishra & Bose-1973).

Ecology of Similipal Hill Forest

The biodiversity of Similipal reserve forests with its typical ecosystems, is the benevolent gift of nature to living beings. The regulatory and functionary role of the massif in maintaining the ecological balance and regulating the ecosystems suffer from temporary set back and dislinks caused by the biotic factors specially by fire, grazing, poaching, clearfelling and frost. The nefty massif covered by forest growth stands as a barrier on the tropic of cancer on the north eastern edge of the Decan Plateau. The south west monsoon wind passing over the Bay of Bengal in nothernly direction hits the hill range and gets deflected inducing rain in coastal areas and in interiors of south west Orissa. The low pressure cyclonic storms created in the Bay of Bengal when passes over the sea coast near Balasore get obstruction from the massif causing heavy rain. The vegetative cover influence and regulate the rainfall, modulate atmospheric temperature, checks the velocity of wind flow, holds up water by rootsystem at high altitudes, provides shed, shelter and food to birds and animals, enriches atmosphere with moisture by transpiration. The purification of air by plant photosynthesis made by assimilation of Carbon Di-oxide from the atmospheric air and in the process Oxygen is released to the air for use by animal kingdom - the great inter dependant relation of plant and animal. Thus the quantum of Oxygen, so released

WATCH TOWER

to the atmosphere by the plant kingdom, is very huge and its correct estimation is difficult.

Hence, the availability of pure Oxygen to the organisms under the zone of influence of the hill reserve, shall reap the benefit of utilisation of Oxygen, till existance of the forest cover in the Similipal massif with the living ecosystems. Further, aspectual deviation is noticed only for the strategic situation of the massif, southern and western aspects being cooler. So the difference in vegetation pattern with forest types is met.

Besides the above, the forest cover of the Similipal hill reduces the velocity of the rain drops, speed of the run-off, prevent erosion of land from water and wind, reduces flood intensity, charges the ground water reserve by uptimum percolation of rain water which later serve as perinnial water supply source of nallas and streams throughout the year. The mode of perinnial water flow is the part of typical ecosystems of the Similipal-hill-forests which is sending down the following river-systems in all directions which poet Radha-nath Ray describes as under.

Salmali Sainlu tini sthane tini tatini jhare,
Langhi nana bane janapade mishe banga sagare.

Uttare balangi madhye gangahara shona dakshine,
Jala beni barne kurangi nayana nilima jine.

From different parts of the Similipal hills three rivers rise and flow through wooded and inhabited regions and fall into the Bay of Bengal in the east. The Budhabalang which forms itself into a river, flows in the north, Gangadhar in the middle and the Sone flows in the south. But the Kharkai, the Salandi and numerous other tributaries rising from the Similipal hills fall into Baitarani and Subernarekha. Other rivers originate from Similipal are - Deo, Khairi, Bhandan and Jamira. These water ways meet the requirement of the plains encircling the massif and central plains. The storms and cyclones cause immence damage to the forest cover, besides, occurance of dust storm in summer. It is stongly presumed by the ecologists that due to heavy storm in the past the vast stretches of forest cover were damaged and such patches have given rise to grass lands in higher altitudes, slopes and valleys of the massif, embracing a typical ecosystem with varied flora and fauna of Savanna forest. The Similipal gets good precepitation from dews, frost, mist etc., over and above, it receives from rains. The edaphi conditions are favourable to the soil organism namely - soil bactrias, fungii, actinomycetes, protozoas, soil arthopoda etc. for moist and humid condition suitable for them to grow and act. Thus the condition has catalitic action to accelarate the process of conversion leaf litters to soil by these soil organisms, with others present, to complete the process. The healthy condition of the soil is apparent from the fact that the biomas, of about 12 (twelve) tonnes / hacter / annum, is actively decomposed by the organisms to prepare the top soil layer and supplimenting the nutrients to maintain the fertility gradient. This ecosystem is more rapid and juvenile in the moist valleys of the Similipal hill forest. The moist and humid condition enables the Similipal to proudly embrace the leaches as the ecological parameter of Tropical Ever-Green Forest. In this ecosystem, about 90 species of epiphytic and teresterrial orchid flora with several colour and fragrance is found on stems, branches of trees and also on forest floor. This ecosystem provide healthy condition for growth of several variety of edible fungii inside the valley which is collected by the people and suppliment their protin requirement. Similipal produces tonnes of edible variety which has much demand as it is delicious and nutrient. Further this ecosystem bear the major honey production area in Similipal. The inhabitants at and around the massif depend very much on this hill reserve to collect several kinds of roots and tubers, flowers and fruits, leaves and barks, gums and resins, honey and ax lac and cucoons etc. to earn livilihood, which the ecosystem provides from time immemorial. The tender structer and function of natural systems are very fine and delicate which gets interupted if the interaction among the living and non-living organisims is disturbed which takes time for restoration.

Forest Types in Similipal

During 1958, the Botanical Survey of India made survey of vegetation and flora of the District of Mayurbhanj besides the floral survey of Dr. Mooney and Haines during 1950 and 1924 respectively. But the standard classification of the broad leaved tropical forest types and sub-types in the single compact block of Similipal has been made by Mr. C.H. Champion and S.K. Seth as "3C-North Indian Tropical Moist Decidious". This forest covers prominently a large area in the massif. (The types and sub-types met in Similipal hill range with crop composition are as follows :

Floral Diversity

The vegetation of Similipal comprises of Northern tropical semi-evergreen forest, Northern tropical moist deciduous forest, Dry deciduous hill forest, High level Sal forest, and grassland and Savannah. It is the abode of 94

species of orchids and 1076 species of other plants. These include 3 species of orchids, which are endemic, 8 plants which are endangered, 8 plants species whose status is vulnerable and there are 34 other rare species of plants. Endemism is high among tree ferns, orchids and medicinal plants. The endemic orchids are Eria meghasaniensis, tyna hookeriena and Bulbophyllum panigrahianum. The endemic paddy plants are Oryta officianalis and O. granulata. Similarly there is an endemic aquatic grass namely Coix aquatica.

Story Ranjan (Oougenia), Amla (Emblica officinalis; Sunari (Cassia fistula), Chara (Buchnania lanjan). Shurbs met are Carissa spinarum, Holarrhena antidysenterica, etc. Bamboo is absent. Climbers are - Eauhinia vahli, Butea superba, smilax zylanica,

(iii). Moist Peninsular Sal

Sub-type 3C/2e (iii)

This sub-type is found all over the area in Similipal hills up to an elevation of 800 meters above M.S.L.Sal comes up very well in fertiginous loams and loamy clays. The quality of Sal is good (QII/III) and natural regeneration is adequate. This sub-type constitute the major forest crop and is of economic value. The associates of Sal are :- Terminalia alata, (Asan), Terminalia belerica (Bahada), Adina cordifolia (Koima/Kuruma), Pterocarpus marsupium (Piasal/Bija), Schleichera oleosa (Kusum), Bombax malbarica, (Simul), Michelia champaca (champa), Alstonia scholaris (Chhatina) etc. The middle storey is represented by - Syzygium cumini (Jamu), Gugeinia cojeinesis (Panjan/Bandhan), Miliusa velutina (Dosal/Com-sal), Trema orientalis (Kakara, Rukuni), Emblica officinalis (Aonala), Cassia fistula (Sunari), Helicteres isora (Murmundi, Modimodika) etc. The shrub and under growth are - Indigofrapulchella (Gibri, Gira), Moghnia chapper, Ardisia solanacea, Flemingia chappar, Strobilanthes species, Clerodendron viscosum etc. and Wendlandia excerta (Zilam), Imperata arundinacea (Joon Grass) is very common. Cymbopogon martini (Rusa Grass), Eulaliopsis binata (Sabai Grass), Anthistiria gigantia are also found. Thysandelaenea (Phulajhadu/Flower Broom) occurs in small quantity near water courses. Among rhizomatous plants - Curcuma aromatica (Palua) are found more commonly near nalas. In very moist places orchids and farns are found. The common climbers are Bauhinia Valhi (Siali climber), Milletia auriculata (Gora), Smilax macrophylla (Muturi/Juchuri /Ram Dantan) Combretum decandrum (Atundi) on moist red soil and laterite and Dioscora bulbifera (Pita alu), Asparagus spp. is found.

(iv). Moist Sal Savannah

Type - 3c/DSI.

This type occurs in hill tops, dry hill slopes and high valleys above 800 meter elevation inside Similipal hills. The cause of these vast openings are presumed to be either the old village clearances or the cyclones in the past, frost and fire. In suitable river bank graziers set fire to the dry grass every year and maintain those in their own interest. These grass lands are excellent grazing grounds, devoid of tree cover, the frost and annual fire have completed the retrogation. Frost is problematic for sal to regenerate and establish. Factors like dying - back, frost lifting and blisters kill Sal sapling/poles up to 8 meters height. But it occurs scattered in the grassy land with species like Eugenia uperculata, Phoenix sylvestris, Simplocos racemosa and Dilliena pentagyna. In patches over these areas dense bushy seedlings of Sal with stunted growth, growth restricted by annual frosts are found around Nawana, Jamu, Tinadhia and upper Budhabalang basin.The common grasses

found are Imperata Arundinacea, Anthes tiria gigantea and Sacharum spontaneum. Fragmites karka are near water courses only.

(v). Orissa Tropical Semi-Evergreen Forest

Type - 2 B / 3C.

This type is confined to deep and damp valleys of the perennial streams and nalas found in small pockets inside Similipal hills having a number of decidious trees in the top storey. They are leafless for a short period, but the second storey is evergreen. The ground storey is covered with evergreen shrubs. Sal is absent/rare. No grass for the shade of the closed canopy. The species in the top canopy found are - Michelia Champaca, Artocarpas lacoocha (Jeota), Cedrela ciliata (Toon), Mangifera indica (Amba) Allanthaus excelsa (Magaki/Mahanim), Bridelia retusa (Kasi), Mesua ferrea (Nageswar), Xylia Xylocarpa (Bakhira/Kangada), Polyalthea cerasioides (Champati), Macaranga peltata (Manda), Litvala nitida, Anthocepalus indica, Amoora dohituka Bischophia javanica, Syzizium cuminii etc. Under storey is mainly with Leea crispa, Curcuma aromatica, Salix tetrasperma and Trewia nudiflora which are found on stream banks.

(vi). Very Moist Peninsular Sal

Type - 2 B / 3 C

This type occupies pockets in the deep and damp valleys like (2B/3C) type with difference that Sal is absent. According to Champion and Seth, much of the area occupied by this type is a stable Sub-Climax to Semi-Evergreen (2B/3C) conditioned by burning. On introduction of fire protection, progression rapidly starts with establishment of a dense evergreen under growth including tree species. This fact indicates that parts of Sal forest may be of secondary origin, an edaphic climax occurring only on well drained ridges and slopes. It gradually merges with the Moist Peninsular type.

The main associates of Sal in the top storey are :- Dillenia pentagy, Terminalla alata, Bridelia retusa, Adina cordifolia (Kaim/Kurum), Bombax ceiba (Simul), Alstonia scholaris (Chhatiana), Anthocephalus Indicus (Kadamba), Lagerstroemia parviflora (Sidha), Polyalthia spp., Litsea nitida, etc. Bamboo is absent. The common shrubs found are - Webera corymbosa, Ardisia solanacea, Leea spp, Macaranga peltata and Strobilanthes spp.. Grass such as Panicum and Imperata and climbers like - Bauhinia vahlii, and Butea superba. This type is of greater importance than the Semi-evergreen type because it contains rich percentage of good quality Sal.

(Vii). Moist Mixed Decidious Forests.

Type - 3C / 3C

This type is found in patches all over the hills having favourable edaphic conditions mainly drainage and moisture congenial for sustainance and growth of Sal. The deep damp valley with moisture and inadequate drainage is not suitable for Sal. Such tracks are occupied by the tropical semi-evergreen species whereas in moist mixed deciduous forests, Sal is rare or absent, appear to be seral with favourable condition can come up with dominance and characterize the climax formation. It is noteworthy that although south and east Similipal hills gets maximum rain, being first to intercept the monsoon winds, it supports a very dry mixed type of forests with many of its species, tending to be xerophytes due to poor water retaining capacity of the soil making stunted growth of Sal in vast stretch as it is not suitable for Sal. This type occuring in portions of several compartment of the massif namely - Khairi, Balang West, Khadkei, contains low per centage of Sal. The top canopy of the type is represented by - Xylia xylocarpa, pentagyna, Bridelia retusa,

Terminelia alata, Hymenodictyon excelsum, michelia champaca, etc. The middle storey is represented by kydia calycina, Anogeissus latifolia, Alangium lamerkii, Polyalthia Spp. The under storey comprises species like Nyctanthes arbortrut is, Helcteres isora, Colebrookia oppositifolia, etc., and common climbers are - Bauhinia vahlii, Millettia auriculata, Dioscorea spp. etc.

(viii). Dry Peninsular Sal Forests

Type - 5 B/ Cic.

This type of forest is confined to parts of hill blocks outside the Similipal reserves, where though the rainfall is high, the condition is not favourable for development of moist Sal due to edaphic factors. Blocks like Satakosia, Jari, Kanapat, Tunguru, Sarali, etc. receives good rainfall but the soil is shallow with laterite strata or is calcareous. It bears Sal in good proportion but of poor quality (QIV) and unsoundness is common even in low age. The steep slopes and ridges of the hills where the drainage and moisture condition becomes acute Sal give room to associate species.)

Scientific Management of Wildlife

The flora and fauna are inter-connected, inter-related and inter-dependant. Healthy forest cover embraces verieties of fauna depending on it, subject to limitation of its carrying capacity. Extinction of one species of plant kingdom causes elimination of 30 (thirty) faunal Spp. Government visualizing the trend of Biological depletion started the systematic and scientific management, to look after the wildlife of the Similipal reserve forests by creating a National Park during 1957 with Head quarters at Jashipur. A handful of staff headed by one Asst. Conservator of Forest were deployed to look after the protection of Similipal Forest and simultaneously engaged in collection of arrowroot, honey, wax, resin etc. During 5th Plan period the Similipal Tiger Reserve was created in 1973 under the scheme Project Tiger, launched by Government of India, with full central finance. But the central finance was reduced to 50 % and the rest of 50 % became the State share from 6th Plan period. On creation of the tiger reserve the national park Division with its infrastructure merged with tiger project, as the wildlife management remained with the Similipal Tiger Reserve.

Tiger Project

The Tiger Project had two demarcated zones namely- Core and Buffer. The management of wild life of the whole project and protection of the core area remained with the Director of Tiger Project. The habitat study and preparation of management plan was prepared by Late S.R.Chaudhury, I.F.S., the first Field Director of Similipal Tiger Project. The model of advanced strategy of management was coined for growth of wild life and improvement of the ecosystem of the Similipal Hill Reserve. The protective staff of the Project Tiger effectively controlled the poaching and improved the habitat by developing pasture grounds, salt licks and water bonds. The V.H.F. and net work of telephone connections to staff head-quarters all over the project area, to communicate the incident of poaching or illicit

Normal coloured Tiger

cutting could be curbed down the forest to the minimum. The supply of weapons to the staff for self-protection from wildlife and poachers/ offenders gives enough moral confidence to combat with the offenders and poachers. The roads developed over 360 kms out of 947 kms by the S.F.D.C. Ltd. facilitated for protection and patrolling in the interior areas of the massif round the year.

Similipal soon became familiar in and out side the country for the tigress reared and brought up by Late Saroj Raj Choudhury, the Field Director, The cub presented to him by the Kharias of Similipal was maintained for study of behaviour, habit and instinct as well as aspects of reproductive biology, senses and inter- specific intractions of the free-living tigress.

The conservative eco-conservation strategy augmented by the managers of the tiger project, resulted in the increase of the number of the highest predator of the biological pyramid, the Tiger, from 17 in 1973 to 99 in 2002. The increase in the population of Royal Bengal Tigers (Panthera tigris) amply speaks of the revived healthy ecological condition where the tiger and other carnivour and herbivour live. Any change in the ecosystem will adversely influence the biodiversity, causing loss or even extinction of the epecies. To reduce the man-animal conflict, proposal was mooted to evict and resettle the 62 villagers outside the project area as about 95% of the inhabitants are Adivasis. Most of the plain forests have been encroached for agriculture thus shrinking the wildlife habitate. When the animals stray in to their crop field, they kill those and even the elephants with poisoned arrow or bullet shots. More disappointing is that these villagers being directed or accompanied by Shikaries/poachers kill the male elephant for ivory, the tusk. The tusk hunting racket is operating all over the country. During crop season of October - November, the elephants are shot with poisoned arrows in the temple and under the ears as a result of which is grounded after a month or two and succumb to the injury. Till then the gang members of the arrow hitter keep track of the animal who in right moment extract the tusks and hand over those to the trader to get the balance dues. One 70 year old elephant, who met his last on 30th. December 1983 in Gorumahisani R.F. of Rairangpur Sub-division after being hit by the poachers. The Forest Officials were monitering the movement of the animal. After his death the D.F.O. and his staff salvaged the tusks measuring 6ft. 2" (R) and 5 ft. 8" (L) weighing 38.600 kg.

Project Elephant

The elephant is an Schedule - I animal under the Wildlife (Protection) Act. 1972. The Project Elephant was launched in February 1992 by Government of India for Conservation of Elephants. Since 1991 the ivory trade is completly banned. The impact of conservation and the security of their habitat is the primary necessity for survival of the elephants in our country. Their migration paths and the corridors need to be protected and poaching for tusks is to be prevented. The impact of conservation was on Similipal and 700 sq.kms. was covered under the Project Elephants. Initially the Project Tiger in

Tusker in sal habitat

Similipal extended over only 330 sq.kms which was latter extended to 2750 sq.kms with core zone of 845 sqkms and buffer zone of 1905 sqkms being overlapped by tourism zone. The elephant population in Similipal is an increasing trend because of the healthy ecological biodiversity. There are more than 512 elephants. the carrying capacity of the area under the prevailing ecosystem keeps the elephants and other fauna in healthy condition.

National Park, Sanctuary - Protected Area - The Indian Board of Wildlife defined National Park as "an area dedicated by the statute for all time to conserve scenery, national and historical objects of national significance and wildlife and where provision is made for enjoyment of the same by public." The project core area has been notified as National Park by Govt. on 6.8.80 and buffer as sanctuary, both under the Wildlife (Protection) Act. 1972 dated 13.12.79. The Indian Board of Wildlife had also defined Sanctuary as "an area where killing or capturing of any animal species of bird or animal is prohibitated except under orders of competent authority and whose boundaries and character should be sacrosant as far as possible." The Board has further clarified the position by stating that while the management of sanctuary does not involve suspension or restriction of normal forestry operation it is desirable to set aside a completely sacrosant area within a sanctuary to be known as "Abhayaranya." It is also indicated that the sanctuaries should be made accessible to the public ... (Stracey-63)

Thus the protected area of 2,750 kms. of Similipal Reserve Forests is the conglomeration of National Park, Project Tiger and Sanctuary. In wildlife management national parks are given high level of protection and, prohibitions and restrictions have been made under Clause (6 & 7) of Section 35 and provisions of Section 27, 28 and 30, 31 and 32 and Clause a, b, c, of Section 33 and 34 of Wildlife (Protection) Act 1972 is being applied in the protected area - Similipal, as required in the best interest of the management of the park.

Akhand Sikar

The tribal hunt on the day following Pana Sankranti in Mayurbhanj district is widely known as *Akhanda Sikar* which is in vogue since Darbar Rule and is observed for one day. But the *Akanda Sikar* now-a-days spreads over more than one month, with indiscriminate killings of all types of game without discrimination, followed by picnics and merry-makings. To resist and combat the mass killing operation of Adivasis the government mechinary remain very busy and alert even after deployment of Forest, Police and A.P.R. forces in large number all armed, to save the animals but little effect. Of course some offenders are used to be booked during this preventive operation. The killing and poaching inside protected area of Similipal has not been stopped completely for reasons earlier mentioned. The history of the State describes about the engagement and involvement of the local people in *Akhanda Paridhi*, *Haka* and *Kheda* operation besides Sikar which was sports for royal family and their guests. Elephant capturing though costly was also practised in Mayurbhanj. Such methods have been imprinted in the minds of the people of the area who usually never hesitate to eleminate even the species like elephants without fear. Such incidents are also not very uncommon in the other Protected areas. Such people are still in operation in the protected areas.

Similipal Development Corporation

During seventies, Similipal forest was considered suitable by the National Commission on Agriculture for aggressive man-made forestry

with tropical pine and other first growing hard wood species, for plantation project. It was suggested that the lower slopes of Similipal upto 300 meter elevation should be clearfelled and planted with teak which has high value and demand inside and outside the country and to plant up the upper slope with tropical pine. The yeild per hector was estimated as 10 cum. per hector per annum with annual yeild of more than 20 lakh of cubic meter as against the recorded annual yeild of about 50,000 cum. This proposal was strongly protested by Sri Sripal Jee, IFS, the Chief Conservator of Forests who put forth his views that the clearfelling of the natural forest and planting up with other species shall badly affect the ecosystem and environment. So, it was suggested to fully exploit the sal seed potential of Similipal forests by improving the infrastructural facility and to attract the institutional finance for all round development of Similipal. The Similipal Development Corporation was registered on 14.12.1979 with authorised capital of rupees two crores. Accordingly, production oriented management plan for the natural forests was prepared for saving Similipal from ecological disaster. The S.F.D.C. started its ecofriendly operation from 1st April 1980 for environmental upgradation and improvement of the ecology of the area as well as socio-economic condition of the people. For all round development of Similipal 2228 sqkms area, excluding protected area, was given on lease for 20 years. The S.F.D.C. undertook stock mapping and enumeration of the standing crop. According to enumeration figure there were as many as 3.41 crores of trees above 30 cm girth out of which 2.83 crores were sound and 0.58 crores were unsound. Of these, trees of 150 cm and up in girth were 14.77 lakh sound and 4.85 lakh unsound. Trees above 150 cm and above girth 73000 sound and 24000 unsound were available for exploitation with 20 years felling cycle, without affecting the future yeild. (Kanungo'85).

The objective of the corporation was to increase the timber and firewood production, maximisation of M.F.P. collection from the Similipal forests to develop and improve the road links inside the massif for all-weather communication and other need-based infrastructural developments. The Corporation aimed to improve the growing stock by silvicultural operations and compensatory planting, besides giving protection to forests from illegal felling, poaching and fire. As such the management and protection of Similipal Reserve Forest, except the core area of the Project Tiger, which covers the sanctuary, became the responsibility of the S.F.D.C. Ltd. For effective management of wildlife, the Project Managers of the S.F.D.C. were declared as Wildlife Wardens in their respective jurisdictions. Further, the Deputy Managers were also delegated with concurrant powers of forest officers under the Wildlife (protection) Act 1972. The road length inside Similipal is 947 kms out of which about 360 kms were developed by S.F.D.C. under the process of infrastructure development which facilitated amply for protection and patrolling. In persuance to the objectives, the corporation continued to maximise the collection of M.F.P., timber extraction, setting up M.F.P. processing, packing, bottling units, construction of culverts and bridges with widening and improvement of roads for extraction of forest produce and facilitate development of tourism. Necessary programme and plan was prepared by the corporation for economic development of the local people who are mainly Adivasis. To reduce pressure on the forest, schemes were made to provide alternative, to earn livilihood. During its working for three years only, generated 10, 18 and 23 lakh man days during 1980-81 to 1982-83, respectively

benefiting the local tribals and Adivasis, living below the proverty line. The eco-friendly and eco-development measures of the corporation with phased programme of socio-economic development of the local people to keep away from forest and gain support of the public for protection and conservation of the forests of Similipal could not be materilalised, as the tree felling in Similipal was stopped by Government, by issue of ban order from April 1982, basing on the recommendation of the House Committee of the State Assembly and at least it was merged with its libility and assets with the Forest Development Corporation Ltd. and functions as an unit only.

People in Similipal

The bulk of the people inside and in the periphery of Similipal are of aboriginal status. Some of them are in their authocathonal primitiveness as in the case of Eranga Kharias, the Mankidias and the Sabharas who mainly live in the forests. The Eranga Kharias consider Similipal as their primordial home and they live in the forest and depend entirely on it. Most of the minor forest produce like - honey, wax, resin, arrowroot etc. are collected by Kharias. Bhagatas, Bhumija, Dals, Desua Bhumija, Dharuas, Kisans, Kondhs, Matyas, Omantyas, Orangs, Parajas, Prengas, Rajuars and Saharas are not many and do not have any influance on Similipal. The Santals who constitute more than half the population of tribals of the district are the most advanced among the tribals. They are hard working, cleanly dressed agriculturists - with high sensitivity to environmental aesthetics. The Bhumijas, Bhuiyans, Hos and Gonds are major groups, who are settled agriculturists and are advanced. The Pauri Bhuiyans live near the forests and collects food from forest. The Mahalis are basket makers and the Sounties are mostly landless labourers who live on wage earning. Mankidias lead nomadic life, collect siali fiber, make ropes and keep monkey as pets, hence called Mankidias. The Saharas collect fire wood, herbal plants, roots, fruits, leaves, gums, resin and flowers and sell those in the local market to earn living. (Mishra & Bose'76).

Similipal Biosphere

After prolong deleberation and sincere efforts over the years, Similipal was declared as Biosphere, a concept of bigger protected area, on 22nd June 1992 by Government. The Biosphere is an international concept conceived by UNESCO and aims at conserving samples of ecosystems with genetic diversity for promotion of research and to ensure management of living resources, imparing knowledge for sustainable development and to promote international relation. The Man and Biosphere Committee examined and considered the following requisites to approve Similipal to function as Biosphere.

1. Presence of genetic diversity and potential for conservation of ecosystem in its totality.

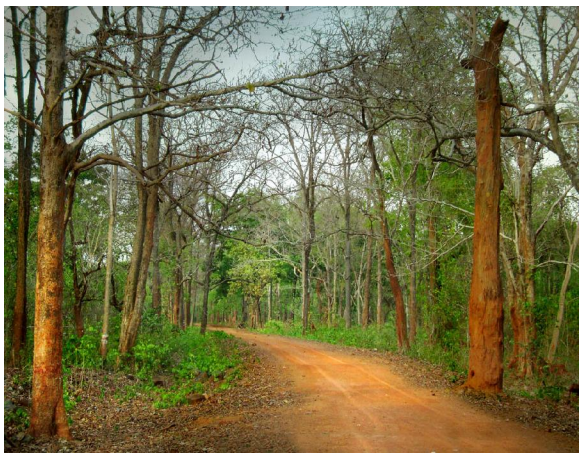
2. Effectiveness as conservation unit - availability of legal protection, freedom from human interference.

3. Representativeness.

4. Naturalness (least modified by man).

5. Importance - Unique richness in genetic resources; areas which need immediate attention due to continuing threat to species contained therein; preservation of accumulated knowledge by specific ethnic groups.

The level of management and management objectives of the biosphere shall be like other protected areas under the Wildlife (Protection) Act 1972, till it is covered under the Act. Unlike other protective areas, Biosphere is comprised



of three distinct zones namely - (a) core, (b) buffer and (c) manipulation / transition Zones, all with demarcated boundaries. These zones are set aside for specific function, such as : Core - the sacrosant area - fully protected. The Buffer - for research, environmental education and training, tourisim and recreation. The Transition zone should have research facility, sustainable eco-development and peoples participation, silvicultural operation, management of settlements etc.

The Similipal hillmass has status of 'Protected Area' since last four decades with well demarcated lines of Core and Buffer Zones of the Tiger Project (National Park & Sanctuary). For effective protection V.H.F. links are provided all over the massif. This helps in communicating information to check illegal entry for poaching or tree felling, thereby facilitating the project staff to take early action. Immediate attention on continuing threat of illicit felling, poaching, hunting and encroachment is needed. This instant problem can be met by deploying well trained protective personnels and motivators for interaction with the people in and around the biosphere limit. As the concept of protection of Biosphere is different from national park / sanctuaries, peoples' participation in protection is most essential as the area of 2750 sq.kms of Similipal Hill Reserve has legal protection by Forest Acts. The people of the core villages need to be taken out of the core early.

Fauna and its Natural Habitat

Animals guided by instinct, are territorial in habit, inhabit different altitudes of forest types having different kinds of habitat which sustain floras as under :

Dense Wood Land : It accomodates defused Sambar (Cervus unicolor), Kutra (Muntiacus Muntjack), wild boar (Sus scrofa cristatus), gaur (Bos gaurus), elephant (Elephas maximus), gurandi (Tragulus memina).

Open Wood Land : Though defused, but denser in this habitat, animals met are - Sambar, cheetal (Axix axis), kutra, wild boar, porcupine (Hystrix indica), refus tailed hare (Lepus nilgricollies) and along the long valleys to south, four-horned antelope (Tetraceros quadricornis), elephants are found in more nocturnal occupancy of these areas. Sloth bear (Melursus ursinus), hyena (Hyaena hyaena), ratel (Mellivora capensis) and the Indian pangolin (Manis crassicaudata) are also found here.

The Srubs : - These are diurnal grazing ground of Sambars. Wild boar is also found here during day time lying on grass.

Open Ground and Field : - This type covers the annual frost bitten grass lands of extensive patches bordering the woodlands, grass lands on nala and stream banks. Grass lands above 1000 meter and higher valleys are most suitable for all the gregarious successional species of deer and antilopes. Cheetal in small groups found near villages like Bakua, Garh-Similipal, Barheipani, Nawana and Chahala. Repeated tribal hunt and poaching have cleaned off the Cheetal from the area which had high density of the spp. earlier over the area. Four-horned antelope is found in

the grassy openings. Sambar and Kutura make use of the fringe at night. Elephant occasionally visits. Hares and porcupines are found here in high density. This is a good habitat for Wild Buffalo (Bubalus bubalis). Black buck (Antilope cervicapra) and blue bull (Boselaphus tragocamelus) are to be transplanted as are absent in the national park.

In general over lap on the terrestrial formation types are found in the primates like Rhesus macaque (Macaca mulatta) and the common langur (Presbytis entellus). The Indian pangolin (Manis crassicaudata) is dispersed in pockets all over the hills. The Indian giant squirrel (Ratufa indica) is found all over. The common giant flying squirrel (Petanrista petanrista) is also found in some areas.

Avifauna - Similipal has varied avifauna of peninsular and also of Himalayan region. The peafowl (Pavocristatus), red jungle fowl (Gallus gallus), red spurfowl (Galloperdix spadicea), painted spurfowl (G. iunulata) the black patridge (France linua francolinus), grey patridge (F. pondicerianus) and quails of all types. The famous mimic bird, Hill Mayna (Gracula religiosa) is plentiful.

Similipal forest covers and terrain and ideal habitat for tiger (Panthara tigris) and panther (P. paradus) with ample prey animals. This area is well dispersed having good ambush cover and is the ideal abode of big cats as stated earlier with dens over the area. Some dens are in use now.

Hyena (Hyeana hyeana) - are found in all the terrestrial types.

Wild Dogs occur in small groups.

Reptiles - the species met are - Python (Python molurus), Ring Cobra (Bungarus faciatus), Cobra (naja naja), Rat snake (Ptyas mucosus), Common Krait (Bungarus caerules), Russel's viper (Vipera russelli) etc.

Mugger (Crocodilus plugtris) is found in Khairi and Budhabalang rivers. (Chaudhury-'74)

Fish : A special type fish called *'Trout'* locally called *Khajara*, is found only in the rivers namely - Deo, Khairi and Bhandan of Similipal Hill Reserve. It is tasty but can not be kept long after catch as it gets decomposed soon.

Conclusion

There is one distasteful aspect that this developmental process has its appelling arrogance both towards nature as well as traditional culture. The main point is to be considered here is to find out the means of integral yoga of economic advancement together with environmental protection. With the development of civilisation, Justice as social goal has been fundamentally recognised.

To-day's society's interaction with nature is so intensive that the environmental question has

assumed proportions, affecting all humanity. Industrialisation, urbanisation, depletion of traditional resources of energy and raw-materials, the disruption of natural ecological balances, the species for economic reasons and sometimes for no good reason at all are factors which have contributed to the environmental deterioration. While the scientific and technological progress of man has invested him with immense power over nature, it has also resulted in the unthinking use of the power, encroaching endlessly on nature. If man is able to transform desert into oasis, he is also leaving behind the deserts in place of oasis.

What is needed is the general awareness and social consciousness to consider the problem at once. Environmental literacy on the part of the general masses is an imperative. This is the goal of to-day. Development is good, but it should not be at the cost of ravishing our natural resources. When water is pollutated air is obnoxious, food stuff are poisoned, what is the use of economic prosperity.

When every thing was in disarry, the shrinking of the forest cover in Similipal was in an increasing pace making its rare ecosystem in jeopardy. With the unfatigued effort of more than forty years, with sufficient caution and foresights various Governmental organisations like - Project Tiger, National Park, S.F.D.C. Ltd. and the concerned Forest Department have jointly undertaken the rescue operation and revival of the disturbed links of the ecology by ensuring effect protection. The timely declaration of the Biosphere Reserve comes as a harbinger of blessed hope. It is attributed to the nature's bounty a water-shed mark in the centuries old history of Similipal. History says the reality and the reality is always a shadeless sow. Can we save it; the onous is upon us, it needs a solemn pledge - "Live and Let Live".

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Dolphins of Chilika

Prof. Prafulla Kumar Mohanty
Dr. Sanjaya Narayan Otta

Chilika : A Ramsar Site

Orissa is proud of three lakes such as Chilika, Ansupa and Sara. Of these three, practically Chilika is a lagoon and, in fact, it is the largest brackish water lagoon of Asia situated on east coast of India. It is one of the important hot spots of biodiversity in India. Some rare, vulnerable and endangered animal species listed in the IUCN (International Union of Conservation of Nature and Natural Resources) Red list of threatened animals inhabit the lagoon area for the whole or at least part of their life cycle. Based on its highly productive ecosystem, rich biodiversity and socio-economic importance, Chilika was designated as a Ramsar site in 1981, under the convention of wetlands of international importance. It is also included in the list of wetlands selected for intensive conservation and management by the Ministry of Environment and Forests (MOEF), Government of India. The lagoon is also identified as a priority site for conservation and management by the National Wetlands, Mangrove, and Coral Reefs Committee of Ministry of Environment and Forest, Government of India.

The water spread area of the lagoon varies between 1165 sqkm and 906 sqkm during monsoon and summer respectively. The Nalaban Island within the lagoon is notified as a "bird sanctuary" under Wild Life (protection) Act in 1987. Chilika is situated between $19^0$28' and 19^0 54' North latitude and $85^0$05' and $85^0$38' East longitude (Table1). It supports the largest congregation of aquatic birds in the country, particularly during the winter. Flocks of migratory water - fowl arrive from as far as the Caspian sea, Lake Baikal, Aral sea, remote parts of Russia, Kirghiz steppes of Mangolia, central and south east Asia, Ladakh and the Himalayas to feed and breed in its fertile water. Satapada is a place of Chilika which hosts famous dolphins. The lagoon is of great value in preserving genetic diversity because of the variety of habitats, flora and fauna. It qualifies as a wetland of international importance and was included in the Montreux Record in 1993. To address research and development, Chilika Development Authority (CDA) was created in 1992.

Dolphins : The Unique Animal of Chilika

Dolphins are aquatic mammals like whales and porpoises seen in water bodies. They look exactly like big fishes. They are mammals like cows, tigers, lions, monkeys and human beings as they give birth to young ones and young ones

Table-1 Chilika at a glance

Sl. No.	Parameter	Fact
1.	Location	19^0 28' 19^0 54' North Latitude 85^0 05' 85^0 38' East Longitude
2.	Boundaries	East - Bay of Bengal West - Rocky hills of Easternghats North - Alluvial plain Mahanadi Delta South - Rocky hills of Eastern Ghats
3.	District coverage	Puri, Khurda and Ganjam
4.	Length and breadth	Maximum length - 64.30 km Maximum breadth - 18.00 km Minimum breadth - 5.00 km
5.	Water Spread area	Maximum - 1165 km^2 Minimum - 740 km^2
6.	No. of rivers and rivulets draining into it	35
7.	Total area of island	223 km^2
8.	Depth	0.38m - 4.2m
9.	Annual rainfall	1160 mm
10.	Lagoon mouth	One (near Moto village, previously near Arakhakuda)
11.	Catchment area	3560 km^2
12.	Fishermen village	132
13.	Area of Nalaban wildlife sanctuary	15.53 sqkm
14.	Declared as Ramsar site	First October, 1981
15.	Creation of CDA	1992

after birth suckle milk from the mother. They are very popular and have attracted the attention of people because of their graceful structure, harmless nature and playful feature. Dolphins, Whales and Porpoises are collectively known as cetaceans (order - cetacea). Dolphins are very familiar and animals of great discussion owing to their sociable nature and high intelligence. Dolphins are small gregarious toothed mammals which typically have a beak-like snout and a curved fin on the back. They come in variety of shapes and sizes, ranging from tiny dolphins just over 1 metre long to the large one of about 2.5m long. Whales and dolphins offer an excellent instance of convergent adaptations resulting from a similar mode of life. Chilika of Orissa, Asia's largest brackish water lagoon, now houses more number of endangered Irrawaddy dolphins than any other lagoons of the world. But lagoon population in other places are falling, including in the

Ayeyarwady river in Myanmar, which gave the species its name. That makes preserving the Chilika group especially important. In Chilika, Irrawaddy dolphin is locally known as Bhuasuni Magar. The Chilika lagoon spreads over Puri, Khurda and Ganjam districts of Orissa and also houses the largest congregation of migratory birds in the country. It was declared as one of the six wet lands of international importance at the Ramsar convention on migratory species of Arctic and central Asian water fowl. Lakes and rivers of Myanmar, Indonesia, Philippines, Thailand, Australia and cambodia are home to Irrawaddy dolphins but none of these places have more than 100 of them. Population census of dolphin of Chilika lagoon indicates, Chilika lagoon is an ideal habitat for the species, which prefers to the salinity of Chilika water. The scientific name of Irrawaddy dolphin is *Orcaella brevirostris* which is the flagship cetacean. In 2004, the convention on international trade of endangered species voted to prohibit commercial trade of Irrawaddy dolphin and placed it on Appendix-I where it joined big cats and great apes. It is highly an endangered species and the total population in the world is estimated to be less than 1000. In close cooperation with the wildlife wing, an enforcement team has been constituted for the protection of the dolphins under Wildlife (Protection) Act, 1972. As this mammal is a highly endangered mammalian species, it is important to study, conserve and protect in Chilika lagoon of Orissa.

Irrawaddy Dolphin (Orcaella brevirostris)

Dolphin is a group of small toothed whales with a pronounced beak. The best known dolphins are the common dolphin and the bottle - nosed dolphin. The common dolphin grows to about 2.5 metres in length. It is black above and white underneath. The common dolphins roam the oceans in schools travelling at speeds up to 40 kilometre per hour. But the irrawaddy dolphins are somehow different in colour. In fact, basing on the colour and structure different types of dolphins are distributed in the world and mostly in seas (Table 2). The light grey coloured mammals, Irrawaddy dolphins (Fig.1) which grow to just over 2 metre length rarely show themselves fully above the water a fin, flipper and nose all that usually emerges. Adult Irrawaddy dolphins are thought to reach sexual maturity at the age of three or four years. Adult females probably have only one calf in every two to three years. The range of length of male dolphin of adult size goes up to 2.5 meters and that to female is 2.3 meters. It is difficult to differentiate between a male and a female. They move in groups and are more active at night and do not sleep. They are modified fish-like mammals with a dorsal, a candal and a pair of pectoral fins. The fore-limbs are modified into flippers and help in swimming. The hind-limbs are absent.

Table-2 Different Types of Dolphins

Sl. No.	Common Name	Scientific Name
1.	Common dolphin	*Delphinus delphis*
2.	Bottle nose dolphin	*Tursiops truncatus*
3.	White-nosed dolphin	*Lagenorhynchus albirostris*
4.	White-scaled dolphin	*L. acutus*
5.	Striped dolphin	*Stenella dubia*
6.	Rough-toothed dolphin	*Steno rostratus*
7.	Risso's dolphin	*Grampus griseus*
8.	Irrawaddy dolphin	*Orcaella brevirostris*
9.	Plumbeous dolphin	*Sotalia plumbea*
10.	Indian broad beaked dolphin	*Lagenorhynchus electra*
11.	Gangetic dolphin	*Platanista gangetica*
12.	Indus dolphin	*Platanista indi*
13.	Amazonian dolphin	*Inia geoffroyensis*
14.	China lake dolphin	*Lipotes vexillifer*
15.	La plata dolphin	*Pontoporia blainville*

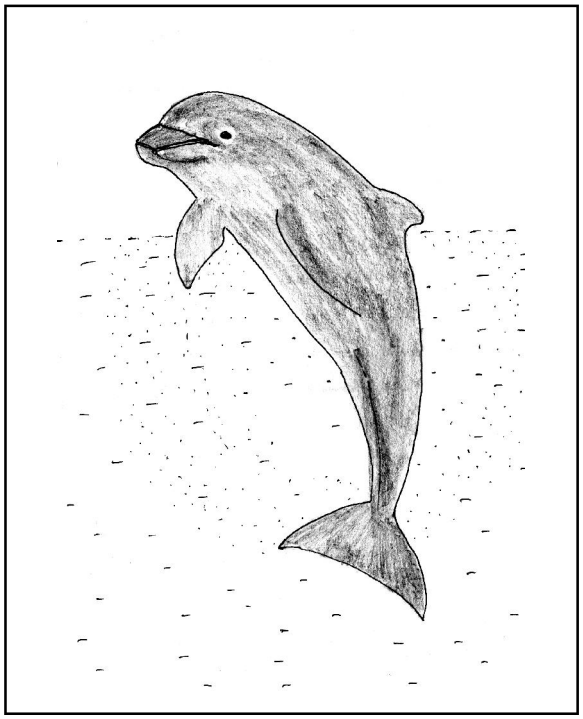

Fig.1 Irrawaddy dolphin (*Orcaella brevirostris)* in Chilika lagoon of Orissa.

Nostrils are vulvular aperatures. The tail is with a tail fluke or tail fin, which acts as a steering organ during swimming. External ears or pinnal are absent although these are characteristics of all mammals. The skin is without hairs and glands but with thick layer of subcutaneous fat or blubber.

Population of Irrawaddy Dolphin in Chilika Lagoon

Irrawaddy dolphins were first recorded in Chilika lagoon in 1915. But their numbers, movements between coastal and lagoon waters and mortality rates have remained non-documented. A marine assessment in 1992 found, around 20 dolphins in the lake, but the first systematic survey conducted in 2002 showed a population of 98. In 2006, the lake had 131 Irrawaddy dolphins, in 2007 it had 135 and now it has 138. The annual dolphin census-2008 conducted by Chilika Development Authority (CDA) revealed that there are 115 adults, 17 sub-adults and six calves in the lagoon. While total population of this highly endangered mammal is estimated to be around 1,000 in the world, the Chilika lagoon, alone has 138 Irawaddy dolphins, making it the world's largest habitat, among the lagoons for the highly endangered mammals (Table 3). This indicates that the number of the Irrawaddy dolphins in Chilika lagoon is steadily increasing.

Table 3 Irrawaddy dolphin population of the world

Place	Population	Mortality(%)
Myanmar	72	8
Indonesia	70	6-8
Cambodia-(Vietnam)	95	15
Philippines	77	6
Thailand	24	8
Australia	less than 100	-

A special method of dolphin count was conducted for the first time in the world at Chilika this year using electronic sensors and global positioning system (GPS) along with visual counting method (Fig.2). The acoustic study, conducted by CDA in association with the university of Tokeyo and Indian Institute of Technology (IIT), Delhi, made use of a specially designed hydrophone array to monitor underwater movements and behaviour of dolphins by observing echo-location clicks.

Certain factors have been observed to be responsible for affecting the life of Irrawaddy dolphins. These are as follows :

1. Mechanised fishing trawlers and tourist boats with large propellers often affect this mammals.

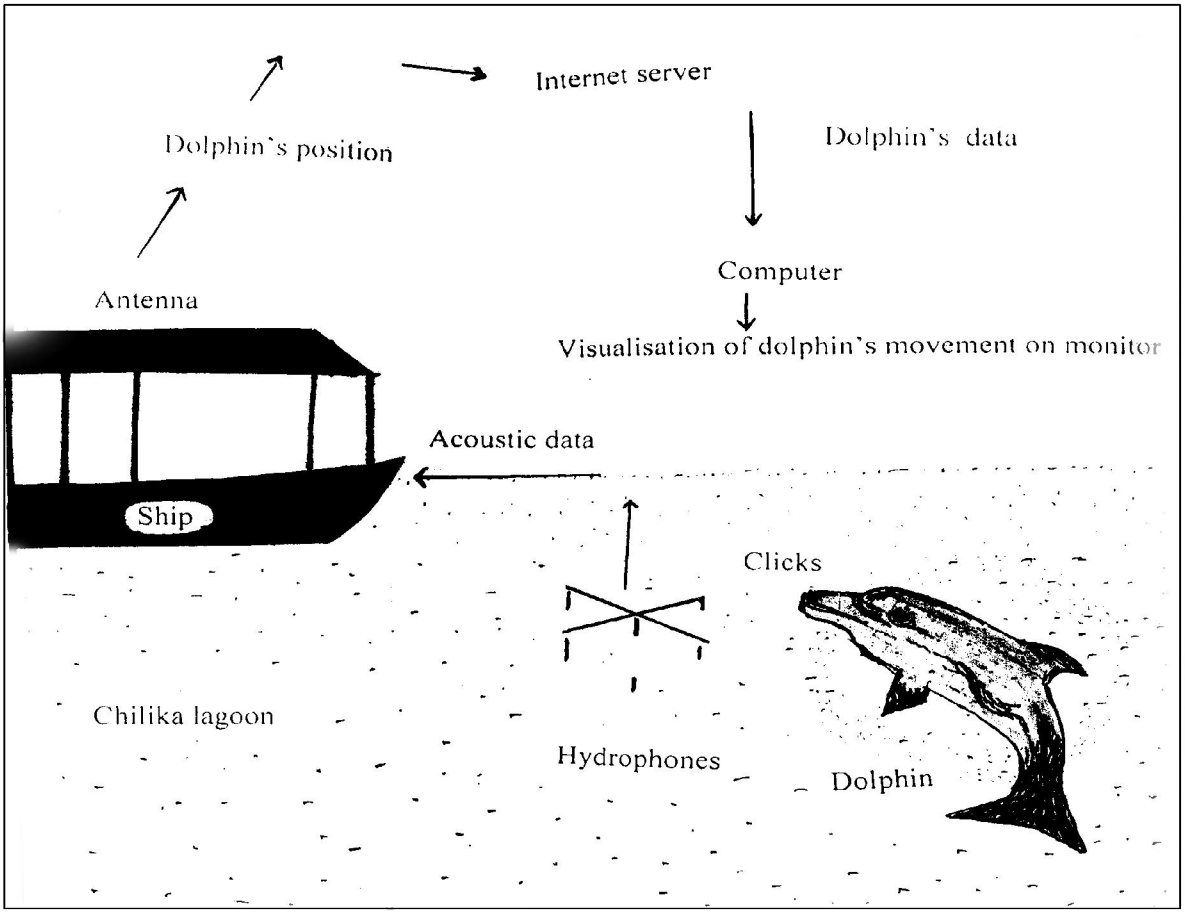

Fig.2. Method of dolphin counting at Chilika lagoon.

2. Sometimes fishing nets become a threat to the life of dolphins by entangling in the fishing nets.

3. Widespread commercial shrimp farming along the lake shores promoted by the world bank in the 1960s is disrupting water flows, encouraging siltation and taking up valuable fish hatching sites and ultimately disturbing the habitat of dolphins.

4. Polythene bags, plastic bottles and snacks which are thrown to the water by the tourists to see the dolphins by enticing them towards these matter are becoming a threat to their survival.

5. Gradual accumulation of garbage at the bottom of the lake causes their habitat disturbed.

Conservation Measures

The conservation of the dolphins is essential for following reasons such as (i) restoration of biodiversity, (ii) ensuring ecological balance, (iii) to attract tourist (ecotourism) and generate government revenue, (iv) the sake of daily livelihood of local people, (v) to analyse and study the behaviour, reproduction, development, determination of sex and gene pool of the dolphins and (vi) to enjoy this natural beauty by the people. Following measures are suggested to conserve, restore and enhance the population of this species.

1. Promoting alternative income generating activities for the local people to reduce pressure of over-fishing.

2. Fishermen communities and boat operators are to be made aware of their own activities which is affecting life of this endangered species. The boat operators should attach propeller guards to prevent injury to dolphins.

3. Massive awareness programmes for the tourists as well as villagers regarding the protection and conservation of dolphins is to be created.

4. There should be plantation programmes near the lake to check erosion of soil which will cause sedimentation and gradual shrinkage of lake.

5. Awareness programme on environmental friendly disposal of polythenes is highly essential in and around aquatic habitats of Orissa and particularly in Chilika lagoon where tourist inflow is high.

6. Visiting the lagoon by the tourists during breeding period of dolphins must be restricted.

7. Continuous and regular fishing by the local fishermen must be checked at least during breeding period of fishes.

Conclusion

People should not ignore the common awareness for the protection and conservation of dolphins in Chilika lagoon. Human beings should be careful to avoid even a single death of dolphin since their population is very low. The marginal increase in the dolphin population has been possible due to various activities of Chilika Development Authority, close cooperation of local fishermen community and tourist boat operators. Now we are hopeful of extinction of such endangered species can be prevented, checked, saved and conserved in India by active participation and cooperation of local inhabitants and the state government in particular.

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Growth and Development of Chhau Dance in Orissa

Basanta Kumar Mohanta

The 'Chhow', 'Chho' or 'Chhau' is a type of dance form performed by the people living in a contiguous area of Saraikela, (Jharkhand), Mayurbhanj (Orissa) and Purulia (West Bengal). In Orissa, the evolution and growth of the Chhau dance of Mayurbhanj has gone through a lot of ups and downs. The different kings of Bhanja dynasty were great patrons of art and culture. The Chhau dance was flourished into a better form under the sponsorship of the Bhanja rulers of Mayurbhanj state. Prior to the rule of Maharaja Jadunath Bhanja (1823-1 863) the Chhau dance in Mayurbhanj was not popular as it is today. At the time of Maharaja Jadunath Bhanja, the Rama Leela dance was performed for the first time during the Rama Navami festival in the month of Chaitra. After few years later Madan Singh Babu came to Baripada from Dhalbhum who added Chhau music in this Rama Leela dance. In this way the Mayurbhanj Chhau Dance started growing under the royal patronage. The musical instruments of Chhau dance came into existence accordingly. Most probably in this way the Rama Leela dance was changed into the Chhau dance during that period. At that time the performers of Rama Leela dance were covering their faces with various types of masks related to the character. Although now a days the artists of Mayurbhanj Chhau dance are giving much more emphasis on the facial expression but initially the masks were used for various characters.

The Mayurbhanj Chhau dance became very popular during the reign of Maharaja Krushna Chandra Bhanja Deo (1868-1882). Mr. Ramahari Bebarta Babu, a faithful aid of Maharaja witnessed the Chhau dance of Saraikela and requested to Maharaja Krushna Chandra Bhanja for the development of Mayurbhanj Chhau dance accordingly. Then Maharaja Krushna Chandra Bhanja brought Mr. Upendra Biswal, a Chhau Ustad from Saraikela and appointed him to teach the Chhau dancers of Uttarsahi. After two or three years Mr. Banamali Das, another Chhau Ustad from Saraikela was appointed to train the Chhau dancers of Dakshinsahi. For that Maharaja gave them a rent free (Lakharaj) land grant. These Lakharaj lands are still being enjoyed by the successors of these two Ustads and they claimed themselves as successors of the Adi Gurus (first preceptors) of the Mayurbhanj Chhau dance. At that time Mr. Brundaban Chandra Bhanj Deo, the then Chhotrai Saheb and Mr. Gokul Chandra Bhanj Deo, the then Routrai Saheb were in-charge of Uttarsahi and Dakshinsahi Chhau dance parties respectively. In this way the Mayurbhanj Chhau dance was developed to some extent during the reign of Krushna Chandra Bhanja Deo. He laid the foundation on which his son Maharaja Sriram

Chandra Bhanja Deo raised the Chhau edifice of the State. After the death of Maharaj Krushna Chandra Bhanja Deo in 1882 the Chhau dance was performed in the palace at the time of Chaitra Parva for two days only to keep the festival alive. Maharaja Sriram Chandra Bhanj Deo took over the charge of the administration of the State in 1892. The annual performance of Chhau dance was presented inside the Palace of the Maharaja of Mayurbhanj for three days prior to the Chaitra Sankranti i.e. roughly from 11th April to 13th April. At that time these two prominent parties were competing with each other and the winning party was being awarded a running cup known as Talcher Cup. At that time Chhotrai Saheb Shyam Chandra Bhanja, the younger brother of Maharaja Sriram Chandra Bhanja Deo and Routrai Saheb Sreedam Chandra Bhanja took charge of the training and performance of the Uttarsahi and Dakshinsahi Chhau dances respectively, with an annual grant of Rs.2, 000/- for each Sahi. Apart from this amount, each brother was to spend as much as Rs.15, 000/- every year for the training and development of the Chhau dance. Both of these brothers were not only personally participating in the actual dance performances but also supervising the daily food of the Chhau dancers. The training and practice of Chhau dance was going on all over the year and at that time many new artists were introduced. At that time the Uphuli, Basipaiti, Dhana Pachuda, Jhuntiamaja, Govara Gala, Bidya Sundara, Tamulia Krishna, Hindustani, etc. were practiced by the Uttarsahi and Dakshinsahi Chhau dance parties. In this way the Chhau dance was developed and occupied an unique place among the people of Mayurbhanj during the period of Maharaja Sriram Chandra Bhanja Deo.

In 1912 the Maharaja took special attention for development of the Chhau dance. With the help of his brother Routrai, Maharaja introduced a new dance form, which was famous as 'War Dance'. Maharaja had spent a lot of money for the creation of this special dance. The dance was for the first time performed at Calcutta to welcome the British Emperor George-V and Queen Mary in 1912. This 'War Dance' is essentially a mock-fight between two opposite groups holding swords and spears in their hands. The dancers are dressed in red or blue dhotis, turbans along with feather-garlands round the arms and waists. They painted their faces and bodies with ochre or red colour. The beautiful presentation of the Chhau artists was very much appreciated by the Emperor George-V and Queen Mary. Maharaja Sriram Chandra Bhanja died in 1912. The appreciation of Chhau dance by the Emperor George-V and Queen Mary was reflected in his condolence letter, which he had sent after the death of the Maharaja Sriram Chandra Bhanja Deo. In this appreciation letter he wrote,

"The Queen and I are grieved to hear the death of Maharaja of Mayurbhanj. Please convey to Maharani our sincere condolences in her sorrow. We remember of course the important part taken by the Maharaja in connection with the pageant on the maidan and our pleasure in seeing him on that occasion".

After the death of Maharaja Sriram Chandra Bhanja the Chhau dance faced different types of problems. During that period Maharaja Purna Chandra Bhanja Deo had given only an annual grant of Rs.250/- to each Sahi for the purpose of keeping up the ceremony. Because of the financial scarcity the artists reduced the duration of practice. They practiced only one or two months in place of practicing the whole year. Because of that reason Maharaja Purna Chandra Bhanja gave special attention to revive the Chhau dance. But as a result of some internal conflict with the dance teachers the dance was stopped

practicing. Maharaja Purna Chandra Bhanja Deo had no offspring. He died in 1928. After his death his younger brother Pratapa Chandra Bhanja Deo became Maharaja of Mayurbhanj. He was very much interested in the Chhau dance and gave special attention to develop the Chhau dance of Mayurbhanj. He increased the annual grant to Rs.5, 000/- for each Sahi.

He formed a committee for each Sahi and a manager was appointed to look in to the activities. The committee was taking special attention for the training of the artists and their presentation at the time of the Chaitra Parva. Number of new dance themes were composed and introduced in the Chhau dance. During this period a new era of Chhau dance was started. The dance teachers were sent to different parts of the country to see the performances of the top exponents of Indian dances like, Udayasankar, Amalanandi, Simike etc. Several features from such dances were included in the Chhau dance to improve its range and quality. Because of these the Chhau dance of Mayurbhanj became more attractive than the Chhau dance of Saraikela.

The dance performance at the time of the Chaitra Parva restarted. During this time the classical Hindustani music was introduced in the Chhau dance. Maharaja Pratap Chandra Bhanja Deo appointed Sri Keshab Das, the Kathakali dance teacher, to train the Chhau dancers. Foreign musical instruments were also added with the traditional musical instruments to develop the quality of music in Chhau dance. But the English style of dance and music was not last for a long time and was abolished from the Chhau dance of Mayurbhanj. (Senapati 1967; Mohapatra 1993:13-15; Lenka 2001; Mohanty n.d.).

During this period some selected elements of Talas, music and dances of the Oddisi or Gotipua School of dance were also taken and included in the Chhau dance. Inclusion of Jhumar music in the Chhau dance helps to popularize the dance. Maharaja also instructed the Ustads to compose the dance items in Desi form and emphasized the music in the style of the local inhabitants like, the Kolha, Mahanta, Santal, Bengali, and Oriya etc. Maharaja Pratap Chandra Bhanja Deo was directly involved with these dance parties for their development and because of that the Mayurbhanj Chhau dance flourished and attained high standard during his period. Under the direct supervision of Maharaja number of new group dance themes were introduced and some were developed by both Uttarsahi and Dakshinsahi Chhau parties. At that time the Uttarsahi Chhau team composed these following dances like; Kaliya Dalan, Matru Puja, Premika-Premika, Megha Duta, Samudra Manthan, Kela Keluni, Garuda Vahana, Nataraja, etc. In the same way the Dakshinsahi Chhau team composed these below mentioned dances like; Giri Gobardhan, Maya Sabari, Holi, Niladree Bije, Bastra Chori, Ras Leela, Kirat Arjuna and Banshi Chori, etc. That was the glorious era of the Mayurbhanj Chhau dance, when that reached its peak.

After the merger of Mayurbhanj in Orissa in 1949 the Mayurbhanj Chhau dance started decreasing its quality and it was Sri Bhabani Kumar Das, a former member of the Dakshinsahi Chhau dance group, formed the 'Mayurbhanj Chhau Dance Organisation' with the help of some old Ustads and artists. This organisation could somehow manage to alive the Mayurbhanj Chhau dance till the official patronage and grants made it possible to be revived to its present shape. They presented special shows of Mayurbhanj Chhau dance before Sri Rajgopalachari, the first Governor General of India and Pandit Jawaharlal Nehru, the first Prime Minister of India. Dr. H.K. Mahatab became the Chief Minister of Orissa

gave special attention for the development of Mayurbhanj Chhau dance. He extended the support of State Government in 1951-52, and gave an annual grant of Rs.5,000/- to reorganise the Chhau dance. Later in 1954-55 the grant was increased to Rs.10,000/- to support the various Chhau parties of the district. To encourage the Chhau dancers of rural area a competition of rural Chhau dance was started in 1955 by the Mayurbhanj Chhau Dance Organisation where the Chhau dance parties from Kuliana, Kostha and Chitroda participated.

The 'Mayurbhanj Chhau Nrutya Pratisthan', an organized body, was established in 1960 and it was registered under the Societies Act in 1961. This Mayurbhanj Chhau Nrutya Pratisthan was made for the growth and proper function of the dance. It consists an Ex-Officio President, Vice-president, Secretary and other important persons from both of the Chhau dance parties. The Mayurbhanj District Collector, A.D.M., and an O.A.S. officer are appointed as the Ex-Officio President, Vice-President and Secretary respectively of this organized body. The Pratisthan is getting financial support both from the Central Government and the Sangeet Natak Academy and celebrates the Chaitra Parva for three days each year at Baripada where the Chhau dance is performed. Both the Eastern Zone Cultural Centre of India and the Cultural Department of Orissa are now encouraging to the Chhau dancers to improve the quality of the dance. Now a day the financial assistance is given through the Sangeet Natak Academy of Orissa to 'Mayurbhanj Chhau Nrutya Pratisthan', an organised body to bring up the art. Some of the important achievements of this Mayurbhanj Chhau Nrutya Pratisthan, are (1) Construction of a building (Chhau Bhawan) at Baripada, (2) Sub-divisional level Chhau dance competition to meet the growing number of Chhau dance organizations in rural area, (3) Celebrating 'Chaitra Parva' for three days, (4) Giving award and certificates to Chhau Guru and artists, (5) Publishing a journal on Chhau Dance every year at the time of "Chaitra Parva', (6) An organized Syllabus to be published very soon, and (7) Performing Chhau dance both inside the country and abroad.

In 1980 the Chhau Dance-Training Centre was established at Baripada by Orissa Sangeet Natak Academy to train the interested young artists. There are seven staff appointed in this organization, which includes Mr. Ramesh Chandra Mohapatra, an Administrative Officer, Sangeet Natak adored Sri Ananta Charan Sai, Sri Lalmohan Patra, two musicians, a peon and a night watchman. There were 10 young artists taking admission in that institution in six-year course. They were getting Rs. 60/- as a monthly stipend. Initially this Training Centre was started at Mayurbhanj Chhau Nrutya Pratisthan Bhawan and later shifted it to a rented house near the present Baripada Municipality office. Because of some unavoidable circumstance this institution was closed after three years i.e. in 1983. Then it was restarted in 1989 with two years course. The monthly stipend was initially increased to Rs.125/- and then to Rs.250/- in 1994. The District Cultural Officer, Mayurbhanj is looking the work of the Administrative Officer. Presently the dance and music (Dhol, Mahuri) is taught to the students by these faculty members like, Sri Ajoy Baitha- a young dance Guru, Sri Bighnoraj Dhoda and Bideshi Baitha. The role of these Training Centre and Pratisthan is quite significant for the growth and development of the Mayurbhanj Chhau Dance (Biswal 1995:109-112).

There are almost 200 Chhau Nrutya Pratisthan present in different parts of the Mayurbhanj district. Some of the important Pratisthans are as follows :

1. Arun Chhau Nrutya Pratisthan, Sansimala, Rairangpur
2. Arun Rashmi Chhau Nrutya Pratisthan, Kantabani, Rairangpur
3. Badara Chhau Nrutya Pratisthan, Badara, Rairangpur
4. Badjamboni Chhau Nrutya Pratisthan, Badjamboni
5. Bamanghaty Chhau Nrutya Pratisthan, Rairangpur
6. Bharmargola Chhau Nrutya Pratisthan, Bharmargola
7. Chachinapoda Dakshinsahi Chhau Nrutya Pratisthan, Chachinapoda, Muktapur
8. Chandrachuda Chhau Nrutya Pratisthan, Nehrusahi, Sirakud
9. Dakshinsahi Chatrapati Chhau Nrutya Pratisthan, Raghabpur, Totapoda
10. Dakshinsahi Chhau Nrutya Pratisthan, Baripada
11. Dakshinsahi Chhau Nrutya Pratisthan, Bhurukundi, Purinda
12. Dakshinsahi Chhau Nrutya Pratisthan, Chitrada
13. Dakshinsahi Chhau Nrutya Pratisthan, Sarda, Aunla
14. Deuleswar Chhau Nrutya Pratisthan, Badsole, Pothania
15. Dhenkia Chhau Nrutya Pratisthan, Dhenkia, Baddhenkia
16. Gokul Chandra Chhau Nrutya Pratisthan, Darudihi, Singoda
17. Janta Chhau Nrutya Pratisthan, Singoda
18. Jitendra Pattnaik Memorial Chhau Nrutya Pratisthan, Deolasahi, Rairangpur
19. Kapoi Chhau Nrutya Pratisthan, Kapoi
20. Kedar Chhau Nrutya Pratisthan, Bhurusa, Gambharia
21. Maa Bhairabi Chhau Nrutya Samojsobhya Pratisthan, Bhalia
22. Maa Binapani Chhau Nrutya Pratisthan, Hatimundi
23. Maa Kichakeswari Chhau Nrutya Pratisthan, Kiapanposhi, Bola
24. Mayurbhanj Chhau Nrutya Pratisthan, Baripada
25. Mundalia Chhau Nrutya Pratisthan, Mundalia, Baddhenkia
26. Musamari Chhau Nrutya Pratisthan, Musamari, Bisoi
27. Pallipuspa Chhau Nrutya Kolaparishad, Charupani, Sanpurunapani
28. Panchameswar Mahadev Chhau Nrutya Pratisthan, Bola
29. Panchbhaiya Dakshinsahi Chhau Nrutya Pratisthan, Panchbhaiya
30. Panchbhaya Uttarsahi Chhau Nrutya Pratisthan, Panchbhaya
31. Pareswar Chhaukola Vikash Pratisthan, Mundhakota, Baddhenkia
32. Paromanu Chhau Nrutya Pratisthan, Sanpakhana
33. Phulbadia Chhau Nrutya Pratisthan, Phulbadia, Gadigaon
34. Pinaki Chhau Nrutya Pratisthan, Singoda
35. Purunapani Chhau Nrutya Pratisthan, Purunapani, Kuradhika
36. Radhakrushna Chhau Nrutya Pratisthan, Gadigaon

37. Rengalbeda Chhau Nrutya Pratisthan, Rengalbeda, Rairangpur
38. Rudanga Uttarsahi Chhau Nrutya Parisada, Rudanga, Kuliposhi
39. SidhuKanhu Dildar Chhau Nrutya Club, Bhaleipur, Joshi
40. Tikarbati Chhau Nrutya Pratisthan, Tikarbati, Betnoti
41. Uttarsahi Chhau Dance Organisation, Chitrada
42. Uttarsahi Chhau Nrutya Pratisthan, Baripada
43. Uttarsahi Chhau Nrutya Pratisthan, Chachinapoda, Muktapur
44. Uttarsahi Chhau Nrutya Pratisthan, Mugusiria, Kuradhika
45. Uttarsahi Maa Bhairabi Samajsebi Chhau Nrutya Parisoda, Polasbandha, Moroda

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On-Farm Water Management in Orissa

D. Panigrahi
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The Command Area Development and Water Management (CADWM) Programme, a Centrally Sponsored Plan Scheme, aims at effective utilization of available irrigation potential through execution of on-farm development work like construction of field channel, field drain and enforcement of rotational water supply system with adoption of diversified cropping system for augmentation of agricultural production and productivity. The programme has been launched in Orissa since the year 1976-77 and is in operation in the commands of the 8 major and 5 medium irrigation projects covering a CCA of 7,86,449 ha. of 94 blocks in 19 districts of the State.

Construction of field channel is the main item under CADWM Programme. The field channels facilitate in carrying water from outlets of minors. distributaries or main canals upto the tail end at very short time, preventing loss of seepage in agricultural land. Water reaches conveniently to each plot independently by avoiding flooding at the head reach and scarcity at the tail end. This also helps in rotational water supply in judicious manner to each field to achieve higher production. The Field Drains is a small drain executed along the valley linking to the existing link drain or trunk drain which removes excess water from the crop field providing a situation for intermittent submergence and drying which in turn helps the farmers to go for diversification

Process of Construction

The Topographical Survey is carried out in the entire gross command area (GCA) of the related canal system to determine the contour for providing proper alignment of the Field Channels to be constructed in the agricultural land maintaining the contour interval at 150 mm (6 inches). The field channel alignment is usually given on the ridges, whereas the field drain is laid at the valley line, depending upon the topography. The alignment plan is superimposed on the village cadastral map and is placed before the village committee for possible modification and acceptance by the farmers. Final plan, prepared as per the discussion with the farmers during reconnaissance survey in the field is submitted to the appropriate authority to reserve land for construction.

The Field Channel network starts below the outlet, leading to the tail end of the outlet command consisting of earthen field channels, laterals, lined channels and required hydraulic structures like turn out, drop structures, delivery and distribution tanks, road crossing, division boxes etc. Construction of Field Channels to the last field / each holding is to be ensured under the

programme. The next priority is to provide lining at least 20 per cent of the main field channels, where irrigation water flows for longer duration. Wherever possible, more lining is provided as per field requirement.

It is the prerequisite that the outlets are in position before any field channels are constructed. As far as possible, field channels are so designed to run on full supply discharge to ensure lower seepage losses. The Section of the Field Channels are designed on the basis of designed discharge of feeding outlet, normally between 1 to 1.5 Cusec to irrigate about 40 ha. of land. The field channels network is designed in such a way that almost all the field channels drain water into the field drain Mostly field drains in Orissa are surface drains with carrying capacity varying from 10 to 12 Cusec.

Case Study of Field Channel Work

A case study was taken up to find out the impacts of the construction of field channels in Achutpur village of Raghunathpur Block in the district of Jagatsinghpur (Orissa). The village is situated at 38 kilometres east from Cuttack on the Cuttack Paradeep road. The village gets water from outlet No 2R of Taladanda Main Canal and tail of Distributary 9C and 10 of Taladanda Main Canal under the command of Mahanadi Delta Stage I. The total cultivable area of the village is 44 hectares of 206 beneficiaries. Field channel network was constructed in the village during 1993-94 with a cost of Rs.1315/- per hectare.

Pre-Project Problems

The Distributary 9C of Taladanda Main Canal was non-functional and practically no flow was there, whereas distributary 10 of Taladanda Main Canal had optimum flow. The command under Distributary 9C is faced with water constraints and the area under the command of distributary 10 are waterlogged. In total 25 hectares of land was under water constraints, patch of 7 hectares was under partial irrigation and 12 hectares of land was under conditions of water logging.

Solutions

It was decided to link Distributary 9C with Distributary 10 of Taladanda Main Canal to get sufficient water for quick and easy distribution and also to remove water congestion at outlet 2R 'U' shaped R.C.C channel for a length of 199 metres was constructed over brick masonry pillars. Then hume pipes of 250 mm dia were laid down for a length of 78 metres. 'U' shaped lined channel was constructed for 39 metres. Earthen channel for 940 mtr length was constructed at tail end. Required numbers of hydraulic structures were provided in between the channels to stabilize the grade.

Benefits derived

After completion of field channel works in the village, water is distributed uniformly in the entire cultivable command area of 44 hectares. Drainage congestion has been removed from an area of 12 hectares and irrigation constraints have been removed from an area of 32 hectares. The cropping pattern and cropping intensity has also undergone drastic changes in the command area due to assured irrigation in desired quantity. The cropping intensity was increased from 111 per cent to 218 per cent. The productivity of rice increased to 3 tonnes per hectare in Kharif and productivity of green gram was increased to 6 tonnes per hectare in rabi. Vegetables were introduced in 10 hectares of land in both rabi and summer seasons.

Case Study of Field Drain Work

A case study was taken up to find out the impacts of the construction of field drains in

Nadhana and Panchumali villages of Nimapara Block in the district of Puri, situated at 5 kilometres from Nimapara on the Nimapara-Kakatpur road. Excess water from villages of Villigram'. 'Nadhana' and Panchumali and seepage from Khadirpur Sub-Minor was the main cause of water stagnation in the area. The project was constructed during 2003-04 benefiting 116.34 hectares of 237 beneficiaries at the cost estimate of Rs 1000 per hectare.

Pre-Project Problems

The area was affected with drainage congestion in 116.34 hectares out of which 39.50 hectares was under severely waterlogged conditions. No crop was possible in the severely waterlogged area because of standing water.

Solutions

It was decided to construct a Main Field Drain along with a lateral Drain in the affected areas connecting to the existing natural drain "Sailo Jora. A main Drainage Channel for 2170 m and a lateral drain for 640 m were constructed for easy release of arrested water. 25 mts of Drain was protected with lining-cum-guardwall and 4 hydraulic structures were provided for stabilisation of grade.

Benefits derived

After completion of field drain works in the area, drainage congestion has been removed from an area of 116.34 ha and supplementary irrigation during Rabi has been generated for 46 Ha. The cropping intensity was increased from 100 per cent to 190 per cent. The productivity of rice increased to 3.5 tonnes per hectare in Kharif and productivity of green gram was increased to 6 tonnes per hectare in rabi. Vegetables were introduced in 15 hectares of land in both rabi and summer seasons.

Conclusion

The Field Channel networks constructed in the farmers' field below the canal outlet have immensely benefited the farmers to provide available irrigation water uniformly throughout the command area of the outlet. During drought situation, the presence of Field Channels has helped the farmers to a great extent to avoid crop loss at the tail end. The social disputes arising out of non-uniform distribution of available water during peak period and also during the period of scarcity have been reduced to a great extent. The impact of the Field Drain by the farmers is also very much encouraging. It has been observed that due to construction of Field Drains, the prevalent water logging condition has been substantially removed and the average yield of the affected area has been encouragingly increased. The need of Field Channels and field drains are so felt by the farmers that they are now coming forward for donating the required land from their own field for construction of Field Channel and Field Drains.

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Elephants in Art, Architecture and History of Orissa

Debabrata Swain

Since time immemorial the elephant has been an integral part of Indian culture and heritage. The Vedic 'King of Gods' (Indra) assumed a distinctly Indian character after localization in the land of the 'Five Rivers'. He ultimately stepped from his chariot, drawn by the steeds of the Aryan horse tamers and mounted an elephant. Sen (1972) states that it is indeed curious that Indra who was conceived as being borne on a golden chariot drawn by two or many tawny steeds, abandoned his old vehicle and preferred an elephant as his *vahana* or carrier. Craven (1976) observes that hymns in Rigveda, the first and chief book of the Vedas compiled sometime between 1500 and 500 BC, were especially directed towards Indra, the God of the heavens and the warrior king, who rode a white elephant and used the thunder bolt, *Vajra*, as his principal weapon.

INDUS VALLEY CIVILIZATION

The Indus Valley Civilization (c.2500 to 1500 BC) of which impressive remains have been discovered at Mahenjodaro in Sindh and Harappa in Western Punjab (Pakistan) provides the earliest picture that we have of India's past. Excavations at these places have revolutionised the knowledge of lndia's historical beginnings. A very careful representation of elephant on seals and on copper plates makes us believe that the living species of the mastodon either attracted the admiration of the people of the valley for its gigantic structure and strength or where depictions of elephants appear on amulets they were propitiatory in nature (Sen, 1972). An outstanding icon in Indian art appears in the Harappan culture for the first time on a famous seal from Mahenjodaro. The seal shows a central figure seated on a low throne in a yogic position, along with which appear the elephant, tiger, rhinoceros, buffalo and deer and two exceedingly stylized human figures (Craven, 1976).

ASHOKA AND THE KALINGA WAR

The history of Indian Art and Architecture is obscure between the Indus Valley period and the 5th century BC i.e., between the period of Aryan conquest (c. 1500 BC) and the advent of the historical Buddha (c. 566-486 BC). The Greek diplomat Meghasthenes (4th Century BC) has left an account of the architectural design of the city of Pataliputra, the capital of the Mauryan Empire. The architecture of the Ashokan period (c. 273-237 BC) gains in magnificence, as for the first time stone was used instead of wood (Ministry of Information and Broadcasting, 1969). Little is known of the early part of Ashoka's reign,

Plate-1 Elephant motif half hewn from a huge stone near Dhauli, Bhubaneswar-- the earliest sculpture of Orissa, 3rd century B.C.

Plate-2 Infuriated wild elephants attacking a party of one man and ten women (partly shown in the picture) in a lotus lake in Rani gumpha- Udayagiri caves, Bhubaneswar, Orissa, 1st century B.C.

Plate-3 The Story of Udayana and Vasandatta in the *Ganesh gumpha*—Udayagiri caves, Bhubaneswar, Orissa, 1st century B.C.

Plate-4 Two elephant guards in front of Ganesh gumpha-Udayagiri caves, Bhubaneswar, Orissa.

Plate-6 Elephant and giraffe in the royal court— Sun temple, Konarka, Orissa, 13th century AD.

Plate-7 Free standing elephant in the northern courtyard of the Sun temple, Konarka, Orissa, 13th Century A.D.

Plate-8 Sexual union of elephants— Sun temple, Konarka, Orissa, 13th century AD.

Plate-9 Elephants being driven into stockade for elephant catching— Sun temple, Konarka, Orissa, 13th century AD.

Plate-10 An elephant in the stockade— Sun temple, Konarka, Orissa, 13th century AD.

Plate-11 Folded movement of elephant legs— Sun temple,Konarka, Orissa, 13th century AD.

Plate-12 Warriors on an elephant— Daksha Prajapati temple, Banapur, Orissa, 13th century AD.

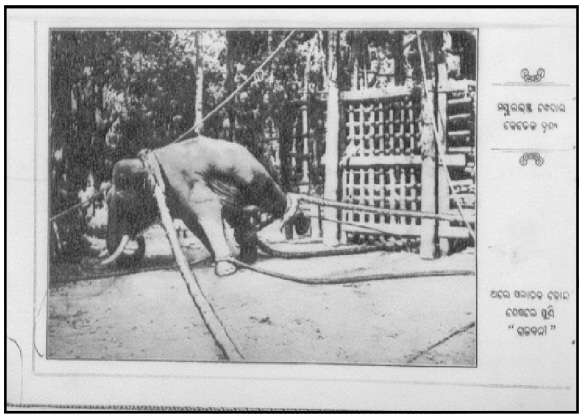

Plate-13 An elephant caught in *Kheda* in Mayurbhanj ex-state, Orissa.

except that of the eighth year, which was the turning point. In one of his edicts it is said: 'Kalinga was conquered by his Sacred and Gracious Majesty when he had been consecrated eight years. One hundred and fifty thousand persons were thence carried away as captive, one hundred thousand were there slain, and many times that number died' (Nehru, 1946). The horrors of the Kalinga war changed the course of human history and the message of Buddhism reverberated in the ears of the emperor who gave up his ambition of *Digvijaya* in favour of *Dharma Vijaya* and became Dharmashoka from Chandashoka.

EARLIEST SCULPTURAL ART OF ORISSA

There is a sculpture of an elephant half hewn from a huge stone near which Ashoka wrote his Fourteenth Rock Edict at Dhauli near Bhubaneswar (the present Capital city of Orissa), the site of the great Kalinga War (Plate-I). This is the earliest specimen of sculptural art in Orissa (4th century B.C). One edict there (3rd century BC) documents not only Ashoka's conversion, but also his missionary zeal for the nonviolence of Buddhism. The bell capital discovered at Ashokajhara (Bhubaneswar) has a winged elephant along with other decorative figures on the frieze. Panigrahi (1986) argues the bell capital to be of Ashoka's period (c. 273- 237 BC).

ELEPHANT SYMBOL

There are several myths relating to elephants in Indian literature. The most popular belief indicating the sign of conception in womanhood by the visit of a snake in her dream (traceable not only in India but also in different parts of the world with slight variations) was directly transferred to the elephant (Zimmer, 1962). Thus, in the Buddhist legend the future Buddha is said to have left Tusita heaven and was conceived by his mother Maya or Mahamaya in a dream who saw him descending from the heaven in the form of a white elephant. Sen (1972) observes that a similar type of legend is also connected with the birth of Mahavira whose mother, Trisala, is reported to have had a dream of a four-tusked elephant when she conceived the said saviour. But, as the elephant ultimately became the symbol of Buddha who is said to have descended to the earth in the form of an elephant- a saddanta according to tradition, it ceased to be a sign of conception for the common woman although it still remained the symbol of fecundation for the divine female. The elephant figures at Dhauli and Ashokajhara were intended to remind the people of the birth story of Gautama Buddha. In fact, the great stupa built at Dhauli by Buddhist monks from Japan in the early nineteen seventies depicts on its wall the dream of Mayadevi and the birth of Gautama Buddha.

Thus, the elephant has been represented as raining clouds, the *Vahana* of Indra, fertility of crops, the conception of womanhood, the sign of fecundation of mother goddess and her *Vahana*, the guardian of quarters, the symbol of the Sun and also of the Buddha and Mahavira.

KHANDAGIRI AND UDAYAGIRI CAVES

It is in the caves of Khandagiri and Udayagiri (near Bhubaneswar), that the rock-cut mode found its supreme expression. As known from the Hatigumpha (a cave named after the elephant; Hati elephant and Gumpha = cave) inscription (Udayagiri), most of these caves belong to the 1st century BC and were excavated during the reign of Emperor Kharavela, the greatest ruler of ancient Kalinga. All the caves, locally called *Gumphas*, were intended as dwelling apartments for Jaina monks. In keeping with the rigorous asceticism of the Jaina faith, these dwelling cells are quite simple. In some caves the ceiling is so low that one can hardly stand erect and the

entrances are so small that one has to crawl to enter the cave. The rear end of the floor inside the cell is slightly raised to serve the purpose of a pillow.

Out of about eighteen excavations in the Udayagiri and fifteen excavations in the Khandagiri, important elephant friezes are seen in Rani Gumpha, Manchapuri Gumpha and Ganesh Gumpha in the Udayagiri series and Ananta Gumpha in the Khandagiri series. The facade of the Rani Gumpha, the most beautiful of the caves, depicts infuriated wild elephants attacking a party of one man and ten women in a lotus lake. The relief delineates with remarkable success (Plate-2) the feelings and action of the panic-stricken group.

An interesting panel in the Manchapuri cave depicts a royal procession towards an object of worship. The king, as evident from his turreted crown, is on an elephant. He is proceeding with folded hands along with three other persons. Two flying Gandharvas above provide heavenly music and a flying Vidyadhara is seen carrying a tray of flowers in his left hand. It is possible that the scene represents the worship of Kalinga-Jina by Kharavela (Behera. 1991) who, as per the Hatigumpha Inscription, brought back Kalinga-Jina after defeating King Bruhasatimitra of Magadha.

The story of Udayana and Vasandatta is depicted in the Ganesh Gumpha (Plate-3). The artist has chosen the crucial moment of the dramatic flight of King Udayana with princess Vasandatta on an elephant. A party of soldiers is chasing the elephant from behind. On the back of the elephant are three persons of whom one is a woman, perhaps Vasandatta. The central figure is shooting arrows at the soldiers while the figure behind him is throwing coins from a bag to dissuade the soldiers from pursuing. A soldier is seen prostrate on the ground apparently to collect coins. The next sequence shows the persons alighting from a kneeling elephant. Thereafter, they are proceeding to the right. Finally, the chief man with folded hands seems to be consoling the woman who is shown in a half-reclining posture. The entrance of the Ganesh Gumpha is flanked by two elephants placed in a later period (Behera, supra) (Plate-4).

The Ananta Gumpha, the most beautiful cave of Khandagiri, depicts auspicious motifs such as a four-tusked elephant (Chaturdanta Gaja) and Shri anointed by elephants (Sabhisekha Shri), all related to the dreams of Trisala before giving birth to Mahavira, the famous Jain-Tirthankara (Behera, supra).

All these motifs of elephants carved on the tympana of the caves indicate the possible use of elephants by the royalties in wars, processions etc., and the religious significance attached to the elephant and the elephant symbol. The preponderance of elephant motifs indicates the availability of quite a large number of elephants in the wild as well as in captivity. The sporting of elephants in the lotus lake is indicative of people-elephant conflict that existed even in the 1st century BC of Orissa's history.

MOTIFS IN THE 7TH TO 13TH CENTURY AD

It is difficult to give a coherent history of sculpture after Kharavela till about the 7th century AD. It seems that during this period Bhuabaneswar retained its role as an artistic centre. A few railing posts were discovered near the Bhaskareswar temple in Bhubaneswar and are kept in the Orissa State Museum, Bhubaneswar and the Ashutosh Museum, Kolkata. The sculpture on these railings is limited to decorative male or female figures. Between the 7th and 13th centuries AD, innumerable temples

were erected in Orissa. The sculptures of the earliest group of extant temples, such as, Satrughneswar, Parsurameswar and Swarnajaleswar, all in Bhubaneswar and the Shiva temple in Badgaon, Ganjam, are quite simple and being done in low relief seem encrusted on the temple surface. A few elephant figures depicted on these temples are important from the natural history point of view. An elephant frieze on the relief of the Parsurameswar temple (650 AD) depicts the catching of an elephant possibly by noosing and its training. In the 11th century the art of sculpture was highly developed. Some of the finest temple sculptures of Orissa are found in the Rajarani, Brahmeswar and Lingaraj temples of Bhubaneswar.

Large numbers of elephants are depicted on the walls of these temples, the most important being that of the Lingaraj temple (c. 1000 AD). The elephant figures commonly denote royal processions while sculptures of elephants in singles and twos are occasional. In the 12th and 13th centuries, the standard decorative details became magnificently more luxurious which is evident from an analysis of the details of the temple culture of Bhubaneswar and of the other parts of Orissa state. The decoration of the outer walls of the Jagannath temple (12th century AD) of Puri closely follows that of the Lingaraj temple (Behera, supra). It is also true in the case of elephant motifs on the Jagannath temple. A series of elephant processions are seen on its outer wall.

KONARKA TEMPLE OF THE 13TH CENTURY AD

It is the sculptures of the 13th century on the Sun temple (Plate-5) at Konarka (40 km from Bhubaneswar) on the coast of the Bay of Bengal) that represent the epitome of Orissan sculptural art. The temple is lavishly ornamented from the bottom to the top. Percy Brown (Behera, 1991; 1996) aptly remarked: "Few buildings can boast of such an unrestrained abundance of plastic decoration as this vast structure, every portion of the exterior being moulded and chiselled either in the form of abstract geometrical ornament, conventional foliage, mythical animals, fabulous beings - half human and half serpent coils, figures satanic and figures divine, of every conceivable motif and subject known to the Indian mind and in a technique which ranges from pattern cut with minute precision of cameo to powerfully modelled groups of colossal size".

The richness and exuberance of animal carvings that we notice at Konarka represent an extraordinary achievement. All types of animals have been depicted both known and unknown e.g., horse, lion, snake, bull, camel, deer, crocodile, monkey, varieties of birds, elephants and their various combinations. Even a giraffe has been shown in the royal courts (Plate-6) probably that of King Narasingha Deva I (AD 1238-1264), the builder of this great monument. Though this animal was not known to have existed in India, it might have been imported from Africa, showing the trading links of Orissa far and wide. However, out of all the animal motifs, that of the elephant requires special mention in this context. Of course, it will not be out of place to mention here that the number of elephants shown on friezes surpasses all other animals. Hence, the elephant motifs both from the religious and artistic point with special reference to its natural history need to be discussed.

The selection of a symbol to represent a particular theme in art depends on the taste and knowledge of the artist and its relevancy to the subject matter (Sen 1972). Of all the implications of the elephant symbol, the animal as the *Vahana* of Indra took a distinctive role in the religio-mythical tales of India and also in art, making its

role as carrier of the mother-goddess a secondary one. That is why, Sen (supra) states that artists preferred to associate the elephant with the mother goddess, not primarily as her *Vahana*, but as the symbolic source of fecundation by representing two or more elephants flanked on either side of the mother- goddess and bathing her with the waters of life. This is exemplified in the Gajalakshmi motif seen in different temples, the earliest in Orissa being in the Parshurameswar temple (7th century AD), Bhubaneswar. But the common Gajalakshmi motif is found to have been altered in a decorative panel of the Sun Temple (13th century AD) at Konarka into that of a sitting female figure with legs wide apart accompanied by an elephant pouring waters of life' into her sex organ with its trunk- a highly suggestive symbol of the fecundation of womanhood by an elephant though a rather unconventional one (Behera, 1996; Sen, 1972). Neither does this woman look like a goddess, nor is the elephant represented equal in size to her.

The Gaja-Simha or the "Lion standing on elephant" motif is another interesting device, which is notably alike for its symbolic significance and imaginative handling. The gigantic pair in front of the Natamandira of the Sun temple shows this motif at its best. The rampant lion, with open mouth, lolling tongue, flamboyant manes, protruding eyes, stands over the recumbent elephant that in turn keeps a human beneath its trunk. The majesty and vigour of the lion in contrast to the attitude of helplessness of the elephant are well expressed by the sculpture. The motif symbolizes the pious human being fighting for liberation from the bonds of Nature. Such motifs in different forms are common in different temples of Orissa.

The great sculptors of Orissa had observed the gait, movements and the anatomical features of animals very minutely and produced innumerable superb animal figures. The free-standing elephants in the northern courtyard of the Sun temple are distinguished by the dignified bearing and large volume (Plate-7). Elephants appear in a number of situations, e.g., they move in military processions, carry their masters, trot in the jungle, their sexual union and being driven into the stockade for elephant catching (Plates-8 to 10). In all these situations they have been copied from nature. It is interesting to note here that elephant behaviour was so minutely observed by the artists that in depictions of elephant processions one can easily mark lefty and righty (like left handed and right handed human beings) from the folded movement of the legs (Plate-11).

OTHER TEMPLES OF THE 13TH CENTURY AD

The richness and exuberance of carvings that we notice at Konarka are also seen in other temples of the 13th century, e.g., Dakshaprajapati (Plate-12). The important elephant motif of the Dakshaprajapati temple of Banapur (Khurda district, Orissa) from the natural history point of view is the exchange of greetings between the members of a pair of elephants. There is the popular Simha-Vyala figure standing over a recumbent elephant. It appears that the artists took fancy in combining features of large cats with other animals (locally called vyala or vidala). Various types of vyalas occur in the Jangha of the temples of later periods. The popular devices include Simha-vyala, Gaja-vyala, Aswa-vyala etc. The Gaja-vyala is an imaginative combination of lion and elephant. The body, tail and paws are of the lion but the face is that of an elephant.

One interesting sculpture, now preserved in the Ashutosh Museum of the Kolkata University and another discovered by Dr. K. C.Panigrahi (Panigrahi, 1986) and now exhibited

in the Orissa State Museum, Bhubaneswar, belonging to the medieval temples of Orissa, depicts a series of boats in which elephants are being carried apparently to a distant land. Only a part of this frieze has been preserved. Zigzag lines with half-shown fishes, crabs and crocodiles indicate the waves of the sea.

SYMBOL 'GANESHA'

The motif of Vighna Binashaka, Ganesha or Ganapati, is an ingenious composition in conjoining the head of an elephant with the body of a human and it occupies the foremost position among all the hybrid representations, not only in Indian art but in the art of the whole world. Sen (1972) suggests that the worship of Ganesha was originally a practice of worshipping the elephant, which probably arose in regions populated with many wild elephants. But when due to deforestation, climatic changes and other factors, such danger was no more, devotees had to attribute other qualities to the deity for retention in their pantheon. The earliest representation of Ganesha seems to be that of the Amaravati coping (Maharashtra) and it is, therefore, highly probable that sometime about the 1st century AD the figure of Ganesha was improvised by some artist in the south (Sen, supra).

The extant reliefs and single sculptures of Ganesha give us an idea about the iconography and typical Orissan mode of representation (Behera, 1983). Ganesha usually appears as a *Parswadevata* in Siva temples and his depiction without the carrier- mouse seems to be an earlier convention. Panigrahi (1961) states that the mouse as the distinctive feature of Ganesha first occurred in the Mukteswara temple of Bhubaneswar, which was probably, constructed not later than the first half of the 11th century AD. But mouse had not been associated with the South Indian images of Ganesha before the 12th century AD (Sen, 1972).

ORISSAN HISTORY

Kharavela, the mighty ruler of Kalinga (1st century BC), had a large army, consisting of cavalry and elephants. With his mighty forces, Kharavela could extend the territory of Kalinga from the River Ganga to River Godavari as evident from the Hatigumpha (elephant cave) inscription in the Udaygiri hill near Bhubaneswar. The monarchs of Kalinga, on account of their large elephant army, were styled in their inscriptions as 'Gajapati' or Lord of Elephants'. Das (1986) states that Chodaganga Deva (1078-1150 AD), the founder father of the imperial Ganga dynasty of Kalinga, is styled as *Nava navati sahasra kunjaradhiswara* (Lord of ninety nine thousand elephants) and Kapilendra Deva (1435-1467 AD), the founder of the Gajapati dynasty, inherited two hundred thousand elephants at the time of his accession to the throne.

In the Arthashastra of Kautilya (c. 300 BC) the elephants of Kalinga are admired as the best of the type in India. For at least seven centuries after Kharavela there is no account of the historical events of Orissa. Yuan Chwang, the Chinese pilgrim, visited Orissa and the neighbouring countries in AD 639. It appears from his account that Kalinga produced large dark elephants, which were prized in the neighbouring countries (Panigrahi, 1986). The Muslim geographers of the ninth and tenth century AD also testify that large elephants were one of the chief commodities of trade in Orissa of the Bhauma period (AD 736-940). The geographical work of Ibn Khurdahbih (9th century AD) mentions that elephants were carried in fresh water (evidently the rivers) to the *Samudra* or sea from places 15 - 20 days distant from the latter. Ibn Rusta, another Arab geographer who completed his geography in AD

920, also speaks of Orissan elephants as the tallest elephants of the region. The latest Muslim geographer, the anonymous writer of Hudud-al-alam, who began his work in AD 982-983 for Abul Harith Muhamad Iban Ahmad, prince of the province Guzgan or Guzganan which lies in the North - Western part of present day Afghanistan, mentions about Orissa, "Extremely large elephants are found there, such as in no other place of India" (Panigrahi, supra).

Elephants of Orissa were so much prized that in AD 1353 Shamsud'-din llyas Shah invaded Orissa and he retreated only after obtaining a few elephants. In AD 1361 Sultan Firuz Shah Tughluq invaded the Ganga Kingdom during the reign of Bhanudeva III. The Sultan concluded his victorious campaign by an elephant hunt at Padmatola in old Baramba State. Bhanudeva III made a treaty with the Sultan by offering twenty big elephants and agreeing to supply annually to the Sultan a number of elephants as an annual tribute (Panigrahi, supra). During the reign of Bhanudeva IV (AD 1414-1434), the son of Bhanudeva III, Orissa was raided many times by outsiders to obtain elephants. Citing Muslim chronicles Panigrahi (supra) states that Hushang Shah, the Sultan of Malwa, was in need of elephants for his war with Gujarat and since Orissa was the fabled country of the best elephants, he led an expedition to it in the guise of a dealer in horses. The Sultan brought with him horses of different colours which the king of Orissa prized most. When Bhanudeva IV with a small band of followers wanted to examine the horses brought by Hushang Shah, the King of Orissa was treacherously seized and made captive and was not released till he promised to give the Sultan some of his best elephants.

A rough survey indicates that about 50% of the people of Orissa still bear military titles. The title 'Sahani was given to the commander of the elephant force and is in vogue to this day (Panigrahi, supra). Another interesting fact we find from history (Trautmann, 1982) is that Orissa was importing elephants from Sri Lanka during the Mauryan period (3rd century BC). At the same time, we learn from the records of various historical events that elephants were being exported from Orissa. The import of elephants in the third century BC can be explained by the fact that the demand of elephants by the Orissan army was so large that it could not be met from local sources.

ELEPHANTRY AND ELEPHANTOLOGY

There are two war literatures in Orissa, one of Sarala Dasa and the other of Godavara Mishra, which furnish information on the military system of the Gajapati kings. Sarala Dasa, a contemporary of Kapilendra Deva (AD 1435-1467), has sincerely attempted to depict the role of elephantry and other wings of the military in his Oriya war literature named the 'Mahabharata'. The 'Harihara Chaturanga' of Godavara Mishra is more explicit and systematic than the earlier text of Sarala Dasa. The author was a minister under Prataprudra Deva (AD 1497-1540). In the first chapter the author stresses the importance of elephants in a battle. The poet writes in Sanskrit:

"Sahi raja yasya chambah sa tamuryatra hastinah,
Tasmattam vibhriydraja yuddhyogya guna vatah."

(He is verily the king who has an army and that indeed the army which comprises elephants. Hence the King with qualitative disposition should possess an army capable of encounter.)

"Rastriyatha sasankena youvanena yatha striyah,
Tatha sena gajendrana taya raja cha sobhate."

(A king shines forth with the army, comprising elephants, as the night is pleasant with the moon and as the women in youth.)

The poet also went further to prescribe the methods of capturing, taming and maintaining elephants for the purpose of war. The entire chapter containing 813 hymns is devoted discussing elephants and their use in the army.

Brundabana Nathasharma, a renowned writer of Deogarh in Western Orissa, wrote a series of essays on elephants and elephantology in a weekly 'Sambalpur Hitaisini' published from 1889 to 1923. Nathasharma's article on Hastitatwa (Elephantology) was published in different issues of the above weekly in 1908. He has cited lucidly in Oriya about the names given to the elephant in Indian literature, the categories of war elephants, elephant riding techniques, white elephants, foreign names of elephants, size of elephants, musth in elephants etc. He also said that twice the circumference of a front foot gives the height of an elephant (Nathasharma, 1908a,b,c; 1909a,b,c).

KHEDA

Sanskrit literature describes five methods of capturing elephants in the following order of desirability from most to least (Stracey, 1963):

(i) Stockades or kheda;

(ii) by means of female decoys;

(iii) mela-shikars or noosing from the back of a trained elephant;

(iv) by nooses concealed on the ground; and

(v) by the pit method.

These methods were developed over a period of time and became peculiar to particular geographical regions of the country.

All forms of capturing elephants were practised in Orissa, as per available records. The stockade or kheda used to be the most widely used method to capture elephants. Stracey (Supra) reports that Meghasthenes (400 BC) was the first to record a clear account of the kheda method of capturing elephants as practised in northern India in those days, probably in what is now South Bihar(Jharkhand) and neighbouring Orissa. Capturing elephants in a kheda was once a royal sport in India and this ancient game of the kings is mentioned in the Ramayana and Mahabharata. Kheda scenes are graphically depicted in the carvings on the walls of the Konarka temple. In one scene men mounted on horses and tame elephants and on foot are driving a herd of wild elephants by beating drums, blowing trumpets and shouting. The herd consists mostly of elephant female with calves. The herd has been driven into a large enclosure. This shows King Narasingha Deva, the Ganga ruler of Orissa, who built the temple of Konarka, used to have khedas conducted in the 13th century AD.

The kheda method of capturing wild elephants was practised in different parts of the Indian subcontinent to avoid heavy expenditure on hiring or keeping tame elephants. This led to the method of tying the legs of the captive elephant to the walls of the stockade and the use of training devices, like the Karen stocks, the Upper Assam, hal of the Morans and the South Indian Kraal. Stracey (supra) observes that the Karen method of tying elephants' legs to the walls of the stockade suggests connections with the systems of Orissa and Chittagong (Bangladesh). In both of these areas they also used vertically dropping or 'flap' gates, a feature which was introduced in Mysore by Sanderson too (Sanderson, 1878). The small roping stockade is also a common feature of Orissa and Mysore, but it is absent in Assam and Myanmar (Burma). A peculiar feature of the Orissa, Chittagong and Mysore stockades is the nature of the walls, which are openworked affairs of very heavy timber, whereas in Assam and Myanmar (Burma) these are close-knit structures

of much lighter posts. So many resemblances in capturing and training methods in countries separated widely by seas and mountains cannot be explained as a mere coincidence. The ancient Kalinga waves of colonization of the eastern lands, which spread from the shores of modern Orissa, could have been responsible for the Chittagong (Bangladesh) - Tenasserim (Myanmar) coasts receiving the basic Aryan methods developed in northern India. Bihar was apparently the centre of early elephant trade and certainly a key area for the exchange of information. Migration routes from Myanmar (Burma) must have brought both the Karen and the Shan techniques into Assam.

Kheda operations (Plate-13) were such a regular part of the activities of Mayurbhanj, the largest of the feudatory states of Orissa that there used to be a paragraph on it in the annual report, even though for consecutive years the paragraph may have remained blank. Remnants of old stockades can still be found in different parts of Similipal and its neighbourhood. Till 1932 ruins of large stockades existed at Arpata Chilma and Similipal and small stockades existed at Puruna Baripada, Orachandabila and Ban. These are older than a century. Maharaja Krushna Chandra Bhanja Deo (1867-1882) caught elephants in the Ahari jungle in Banahari Pragana and his successor Maharaja Srirama Chandra (1890-1912) of Mayurbhanj caught a large number in the Denga-amba, Jaypur, Pithabata, Chekamara and Mangargh jungles. The next in succession, Maharaja Puma Chandra (1920-1928), caught elephants at Dukura (Senapati and Sahu, 1967). In 1932, Maharaja Pratap Chandra caught elephants at Champagarh. Out of 18 elephants caught, one old cow elephant was left free. One large tusker and one makhna (tusk less male) died. Out of the remaining 15 elephants, five were tuskers, one a Ganesh (single tusked) and nine cow elephants (Das, 1932). The speciality of this kheda operation of 1932 was that no tamed elephants were used to tie the elephants like earlier khedas. Rather tying of elephants was accomplished by two trained 'mahunts' without any difficulty. Das (supra) describes the methodology of such operations. Kheda operations used to be in the nature of festivities to which dignitaries were invited (Plate-14). In the 1932 kheda there were dignitaries like the Prince of Bikaneer, Maharaja of Puri and Maharaja of Nilgiri. The last kheda of Mayurbhanj was held in 1938 (Senapati and Sahu, 1967).

Das (1932) points out that in Mayurbhanj state elephants used to be caught by means of Kheda, by nooses concealed on the ground, by the pit method and by female decoys. Later, all methods except catching elephants by Kheda were banned in the state as it was found difficult to catch elephants both by female decoys and noosing, and elephants were severely injured and sometimes died when captured by the pit method. However, the last elephant caught in the State was in 1943, when a single elephant walked into a trap. Strong ropes were laid and a man sat on top of a tree. As the elephant touched the trap a light went up and the man pulled the ropes. The elephant was caught and since then there has been no catching of elephants as the operations were too expensive and there was no market for the elephants (Senapati and Sahu, 1967).

Cobden Ramsay (1910) reports that in the South - East of the Athmallik feudatory state, a tract of forest was reserved for elephant catching operations. The chief of the state conducted elephant catching operations generally about every third year. The catches did not usually average more than ten to fifteen animals. The tract is still called the Hatidhara (meaning elephant catching) reserved forest, which adjoins the Satkosia -

Baisipalli wildlife sanctuary and still harbours a few elephants.

IVORY

In Africa, both bulls and cows bear tusk, the source of ivory. The females of the Asian elephant do not have tusks; sometimes old-ones bear short spikes or tushes, projecting a few inches from the lips-line. The proportion of Asian bull elephants with tusks varies from country to country. In Orissa over 90% of the bulls are tuskers.

A group of rings and combs worked in Egypt about six thousand years ago is usually considered the earliest confirmed use of elephant ivory in carvings (Lawley, 1994). Specimens of ivory work discovered at Harappa and Mahenjodaro show that ivory craftwork was already well developed in India as early as five thousand years ago (Bedi, 1969). Two ivory carvings discovered outside India are a mirror handle, recovered from the volcanic ash of Pompeii, Italy, and a plaque, discovered in a cache at Begram, Afghanisthan (Craven, 1976). Both these carvings are traced to the Andhran sculpture of the 1st century BC to 1st century AD. These discoveries indicate a sea trade route flowing from India through Alexandria in Egypt and ultimately to Rome on the one hand and on the other to a land based trade route to Central Asia, which joined the Chinese Silk Road with Indian trade centres and seaports in the Deccan.

Orissan art had reached a very high level of excellence in its ivory work and according to Sukumar (1989) the best quality of ivory is reported to have come from the elephants of Orissa. It is said that the Kalinga (Orissa) King had presented a large quantity of high quality ivory to the Pandavas (Acharya, 1925). In 1953, the then ruler of Talcher killed a rogue elephant in the Dhenkanal forest, which measured 3.3m (11 feet) in height at the shoulder (Behura, 1990; Stracey, 1963). Each of its tusks weighed 41.73 kg and measured 2.59m in length outside the curve. In 1903, the then ruler of Kaptipada had presented two pieces of tusks to his lawyer at Cuttack, Ray Hariballabh Bose, weighing 111 kg (3 maunds), one being 2.4m (8') and the other 2.36m (7'9") outside the curve, the girth at the base being 45.72 cm (18") for both. It was estimated to be worth 40 to 50 thousand rupees in England at that time when gold per Tola (11 gm) was Rs.24.69 (Rs.24 and eleven annas) and the rate of rice was 13 seers (12 kg) per rupee (Anonymous, 1903). In ancient times craftsmen working in ivory were employed in royal palaces to inlay thrones, couches and other furniture with ivory. In the first year of his reign emperor Purusottam Deva (AD 1467-1497) of Orissa had presented ivory couches along with other articles of luxury to the temple of Lord Jagannath (Panigrahi, 1986). Cobden Ramsay (1910) observes that one or two families in Dhenkanal and Nayagarh made ivory work of high quality. They manufactured chains, buttons, sticks and statues of fine-workmanship -all of ivory.

EPILOGUE

Orissa was also earlier named Utkal, besides being variously known as Kalinga, Tosali, Koshala etc, and was a place where art and architecture had reached the epitome of its glory. In dealing with the aesthetic side of visual art, it has been noticed that the finer quality of plastic or pictorial representations of any period solely depends on the inborn faculties of a genius or a group of talented people concerned, who might not have come in contact with other cultural developments. Sen (1972) opines that the surprising representations of animals in the cave paintings of Europe and other parts of the world

belonging to the prehistoric age testify to this statement. The minute observations of, and love for nature are the essential qualities of an artist, which guide his creative faculties. The great sculptors of Orissa, the then Kalinga, had observed animals in nature and applied their technical knowledge achieved through the centuries to the animal motifs depicted on the walls of caves and temples.

The preponderance of elephant motifs on the railings of caves and temples shows a cultural association of people with the animal and their availability in plenty both in the wild and in captivity. It is really surprising that while Kapilendra Deva (15th century AD) had two hundred thousand tamed elephants, the present wild elephant population of Orissa has come down to less than two thousand only. According to an elephant census of 2002, 1841 elephants of Orissa are now confined to the rugged hilly terrain of the Mayurbhanj, Baleswar, Kendujhar, Jajpur, Sundargarh, Deogarh, Sambalpur, Angul, Nayagarh, Boudh, Cuttack, Dhenkanal, Khurda, Kalahandi, Kandhamala, Rayagada, Gajapati and Ganjam districts where human land development is slow and tardy. The elephant habitats are subject to human pressure, monoculture plantations, annual fires, mining, encroachments, shifting cultivations, poaching and processes of developmental activities (Swain, 2004). Because of the gap in demand and supply of forest resources and suitability of elephant lands for shifting cultivation, mining and other developmental activities we are destined to lose the elephants in a few years' time if no tangible actions are taken now to save the elephant habitats. Reserves are being created and developed for these majestic creatures, which have played such an important role in the art, architecture and history of India.

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A Lotus Blossomed in a Compost Pit

Ishwar Chandra Mohapatra

Pabitra Mohan Pradhan was an uncommon man who emerged like a lotus from a cow-dung compost-pit with fragrance of Godly qualities on 8th February 1908. His native village Poipal, mostly a village of farmers in Talcher Sub-division in the erstwhile Dhenkanal (now in Angul district) has been glorified for having such a great leader on its lap.

Poipal, a nondescript village away from roads and communication was neglected during the Rule of the then Garhajata Rule of Talcher. Now it is remarkably known for Pabitra Mohan Pradhan's signal contribution to the Freedom movement. Pabitra Babu has left behind his foot prints on the sands of time. He has become a legend for his formidable agitation against the repressive regime of the then ruler of Talcher.

That was Wednesday, Bharat Pradhan, his father and Shanti Devi the affectionate mother were very happy having such a good looking baby on their lap. Unfortunately his father Bharat Pradhan died of Cholera when the little boy was only three months and 15 days. Adversity never comes alone. To his bad luck his mother Shanti Devi breathed her last. From his very tender age the orphan child was brought up with much hardships.

Pathetic were his child-hood days. He started his lower primary education under a Pathasala teacher as there was no govt. school in his village. A lower primary school has been set up in his village but the school was closed in 1918 due to severe drought in the village. He had to go for High School Education to Talcher Govt. School which was 26 miles away from his village. After completing Entrance Examination he got him admitted in Ravenshaw College, Cuttack and passed Intermediate Examination obtaining a scholarship. He graduated amid financial hardship earning only RS.7.00 per month from private tuition.

After graduation he was appointed as an Asst. teacher in Govt. High School, Talcher and after one year he was admitted in D. Ed. Training course and qualified as a trained graduate. He was an efficient and ideal teacher for which he was admired by all. Even the then ruler of Talcher engaged him as his home tutor.

Not only orphan Pabitramohan strived had to earn his livelihood, but also his other two brothers two brothers and two sisters went through poverty and passed a miserable period with no one to fall back upon in their dark days. The ample landed property they had of little use to them. Hence the brothers and sisters had to be

victimized with frequent fasting. In spite of poor living and clothing Pabitramohan did not lose heart. He did not care for it, rather diverted his attention for the upliftment of others.

Pabitramohan, a sweet name to all, remained a life-long bacheror. His Brahmacharya Brata affirmed a strong will power to fight against injustice. Though his paternal occupation was peasantry, his forefather would join war frequently. Perseverance was in his blood. He was endowed with a style of living catering to Hindu culture and tradition. He was a Khandayat by birth but a rushi (saint) in living. He was mostly a worshipper of humanity.

He was one of the very few freedom fighters who dedicated their lives for the motherland. Nobody had instigated him to fight against the autocracy of the native rules, nor he himself had been wretchedly ill treated to react against the oppressive ruler, but his sensitive soul urged him to protest and fight against the tyranny of the king. Fired by a patriotic fervour he resolved to fight unto the last against exploitation of the poor villagers.

The outrageous behaviour, scandalous and nefarious activities of the ruler were pinching and unbearable to the innocent public. Pabitramohan Pradhan felt it was his responsibility to unite the victimized people to raise the banner of revolt against the ruler. Thousands of people responded to the clarion call of Pabitramohan Pradhan. To know more about the agitational works of Pabitramohan Pradhan we have to go through a brief account of the monarchical administration of Talcher, Orissa came under the British Rule in 1803. At that time there were 26 feudatory States in Orissa which were called Tributary States. The kings were controlled by the British Government. The rulers paid annual taxes to the British and enjoyed immense power. The British Officers were utterly callous to the tyranny of the local rulers, as a result of which the rulers imposed exorbitant taxes and tormented the subjects with impunity.

The political Agents, in charge of the tributary states, were living luxuriously in the towns and hence did not take the risk by coming to the headquarters of the Garhjatas which were neglected in roads and communication facilities. Taking the advantages of long absence of the dignified British officers the local rulers became autocrat and exploited the innocent people by imposing heavy taxes, Bethi, Begary, Magan and Rasad. They were involved in raping the virgin beautiful ladies. Likewise the ruler of Talcher tormented and exploited the people.

The atrocious activities of the king of Talcher reached its peak. Pabitra Mohan Pradhan was shocked by the inhuman torture of the king. His conscience galvanized a sense of patriotism in him for which he came forward to protest against the nefarious and devil's administration of the king. The tremulous people got heart to join in hands with Pabitra Babu. The men of same spirit were congregated under the stern leadership of Pabitra Babu. Pabitra Babu quitting teachership from a Govt. High School started agitation against the totalitarian state policy of the king. He made him an example in accentuating the Andolan in 1938-39. Near about 1400 revolutionaries joined the Praja Andolan under the stern leadership of Pabitramohan Pradhan. The agitations expressed their reaction through demonstrations and remonstrations for which some of them were beaten black and blue. They were both physically and mentally tortured. Pabitramohan Pradhan was also beaten mercilessly and treated inhumanly by the British Policemen.

On November 8th 1938 under the burning leadership of Pabitra Mohan Pradhan agitated people from near about 25 villages joined the axidous Andolan. It was called the Hizarath Andolan. The agitators were driven out from Talcher and took shelter in Hizarat camp at Angul. In spite of his of his domestic tribulation he preferred it better to entangle him in the local and national crisis.

Leaders like Mahatma Gandhi, Dr. Herekrishna Mahatab, A.V. Thakkar Bapa, Dr. Radhanath Rath thankfully appreciated and admired the firing leadership of Pabitra Mohan Pradhan.

Under the inspiring leadership of Pabitra Mohan Pradhan the Hizarat Andolan was tremendously successful. But he was made the victim of Rajadroha and sent to jail in 1940 with his co-workers Mr. Madan Mohan Pradhan, Maguni Pradhan, Dasarathi Pani, Dayanidhi Rath, Pabitra Behera and Chandra Sekhar Raja Ballav etc.

In the year 1942 Quit India Movement spread its flame throughout the country. He actively took part in it and flamed the fire of Praja andolan in Talcher.

When Mahatma Gandhi was arrested in August Movement (Quit India Movement) he fired a call, 'do or die'. This call stimulated enthusiasm in Pabitra Mohan Pradhan while he was in Talcher jail.

That was 30th August 1942. In the dark midnight when others had a sound sleep in the jail, Pabitra Babu consulted with his eminent followers to escape from the jail. It was last part of the cool rainy night, Pabitra Babu climbing on the body of the co-prisoners came up to the prison wall and jumped down, The British police guards gun with hands were parading nearby. They could not know the adventurous escape of Pabitra Babu. Only one rupee was on him at that time.

The hero of the Talcher Praja Andolan in disguise of a milk man with a cap (Jhampi) on head went through Dhenkanal. He crossed Orissa Border in disguise of a *cooli* and reached in Tata Nagar. He took shelter in a hotel named Santiniketan. On 17th January 1943 he cunningly left the hotel as the British soldiers gherowed the hotel to enquire his shelter there.

The king of Talcher proclaimed red alert throughout and declared thousands of rupees as reward to him who will bring Pabitra Mohan dead or alive. But no one could dare to do so. The name of Pabitra Babu headed the news bulletin. His escape from jail created a thunder in the mind of the king.

Pabitra Babu tried to meet Jaya Prakash Narayan but in vain. Then he tried to keep contact with Subas Chandra Bose, the stern Nationalist. He had to serve as a servant in a disguise name 'Ramu' to reach at his destination. The present political situation did not favour him to meet Subash Chandra Bose.

He, in disguise, went up to Imphal taking message from Calcutta to S.Bose but the time was so turbulent that he returned to Calcutta.

In the first week of April 1944, Pabitra Babu met Thakkar Bapa and Gyana Ranjan Niyogi, the associate of Kiran Sankar Roy, eminent freedom fighter of Calcutta.

He was such a political worker who at the risk of his life cunningly escaped from the eyes of the detectives. In disguise of a Muslim he reached at Ghorahat of Brahmadesh and gave the message of the High command to Mr. Bharuka, the Principal of Commercial College, who was a secret revolutionary.

Subas Chandra Bose had well been informed about Pabitra Babu's striving and agitational sagacity. He called upon Pabitra Babu and accordingly Pabitra Babu ventured a slap dash attempt to meet Subas Chandra Bose in 3rd phase. He started from Calcutta with a friend Mukund Pradhan and met Mr. Satyendranath Deb, an old Congess leader of Assam. But the political hazards did not permit him to reach at Subas Chandra Bose.

On 21st April, 1946 Mr. Surendranath Dwibedy, the first rate leader of Samajbadi Andolan, introduced Pabitra Babu to Jaya Prakash Narayan. Mr. Jaya Prakash Narayan was highly impressed upon the revolutionary activities and efficiency of Pabitra Babu and asked him to take the sole charge of Mukti Sangram in Orissa.

After some hazardous demonstrations, picketing, strike, bloodshed, massacre, communal riots, Satyagraha in way of non-violence launched by Mahatma Gandhi, India achieved her long cherished Independence on 15th August 1947. This Red Letter Day' shed tears of joy from the eyes of Pabitra Mohan Pradhan who always dreamt of it. Notoriety of the rulers was vanquished, fear of torture was relinquished. Pabitra Babu was overwhelmed with joy at this.

Pabitra Mohan Pradhan remained away from his native place in disguise for a period of 4 years and 7 months and returned to Orissa on 12th May 1947. He did a lot for the unification of the Garhjatas under the Indian National Govt. but his name has been deemed out in the list of leaders who made this tremendous achievement.

Basically He was a true Congressman but being disgusted he formed a new political party known as Jana Congress in which Dr. H.K. Mahatab was the head and remote controller.

Pabitra Mohan Pradhan paraded his efficiency ascending the chair of vital portfolio in different ministries. He was a Minister in 1948 headed by Dr. H.K. Mahtab. He pleaded for amalgamation of Sareikala and Kharasuan with Orissa which were subjugated under Bihar for which he had a controversy with Dr.H.K. Mahatab.

After the implementation of our own Constitution on 26th January 1950, Nabakrishna Choudhury was the Chief Minister. In his ministry, Pabitra Babu was the Minister of Labour, Commerce, Public Relation and Broadcasting Department.

In 1952, First General Election was held. Controversy with Dr. H.K. Mahatab and N.Choudhury was raised on the issue of Land Reform, Gramodyoga and Cottage industry for which he was not offered minister-ship.

Second General Election was held in 1957 and a ministry was formed under Dr. H.K. Mahatab in which Pabitra Babu was the Minister of Commerce, Welfare and Rural Development.

In 1961 3rd Mid-term Election was held and Pabitra Babu defeated the Talcher and Dhenkanal kings with keen contest. He was the Minister of Education, Agriculture, Scheduled Caste and Rural Development in the ministry of Mr. Biju Pattanaik. He was the Minister of Education during 1961-1963 during which he stressed upon Basic Education and did some reforms on traditional education in the State. As an ideal teacher he had experienced the problems in he field of Education and hence brought some remedies.

Being disgruntled with the ways and ideology of the Congress Leaders Pabitra Babu quitted Congress Party and constituted a new

Political Party known as Jana congress with the supporters of his ideology and a coalition ministry was formed headed by Rajendra Narayan Sing Deo, the leader of 'Swatantra' party in which Pabitra Babu was the Deputy Chief Minister. This was the fruit of his efficient and incorruptible ideology.

Not only Pabitra Mohan Pradhan was a political leader, a Freedom Fighter but also a writer, a poet and a lover of Nature. He has immensely, contributed to Oriya Bani Bhandar. His books 'Mukti Pathe Sainik' Part-I, II, 'Brahmani', 'Malyagiri', Bharat Abhisap', 'Millan', 'Chandra', 'Neta Nirvachan', Mahaprayan', 'Devi Danda', 'Bhaat Gourab', 'Pita Debata', 'Bichhuati', 'Lajakuli Lata', etc. His literary brilliancy needs special discussion. But no one has come forward to excavate his literary genius.

Pabitra Mohan Pradhan was un-compromised in his decision. His steadfast nature sometimes created mis-understanding among his political rivals. He fought for the enhance of coal royalty in order to suffice the state finance.

He was mostly a religious man. He was a lover of humanity, philosopher of self-sacrifice, worshipper of labour and dignity, fighter against nepotism, turpitude and poverty. He was a helper, a guide to the poor and needy students. He was a democrat by heart and soul. He was sedulous painstaking and advised others to be self-sufficient by hard labour. Any one, who went to his residence was served meals mostly Rice and Dalma, which he himself took daily, whenever one went to his residence must saw a huge number of guests to whom he welcomed and greeted heartily. We rarely find such humanity in the so called leaders of high rank. Pabitra Babu was a host in whose hospitability even a beggar ate with hearts content.

He was the epitome of selflessness. He did not show self aggrandizement for his deeds. He was loved by all for his simplicity, honesty, saintly life, equanimity, hospitality, charity and straight-forwardness. He was not a sycophant and so did not allow flattery in official and private life for which he was encrowned with dignified positions. He did not live with affluence, dream of luxury rather he deliberately invited affliction for the dwelling, fooding and clothing of others who were ill-fed, ill-treated, ill-clad and ill-nourished.

Pabitra Mohan Pradhan, a legend of pre-independence and post independence period, left the material world for good on 13th June 1988. Being struck down by his cruel fate he won the tears of millions of people. His death consecrates the dust on which they fell. Thunders of cry, ocean of tears, warm tribute can not suffice to his love, affection, godly behavior, sociability, dedication and contribution. Really he was a lotus emerged from a cow-dung compost pit who glorified the State of Orissa by heroic adventure and multifarious deeds.

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Is Water Divining A Science ?

Prabhu Kalyan Mohapatra

Is water divining an ancient science or that is purely a guess work ? Can it be practiced by anybody or one need to acquire divine blessings to master over these tricks ? Whether it is merely a sound understanding of the local geology and geo-hydrology that enables a few to predict the occurrence of ground water in a particular site or it is altogether a different science the contours of which man has not been able to fathom so far ? These are some of the questions that need to be answered as that agitates in the minds of the common people for a long time.

Deepak Kumar Jena (13), a student of Class VIII, is a water diviner by hobby. This young boy of Hatisahi village in tribal dominated Keonjhar district, feels a current passing through his veins when he walks around the selected area with a 'Y' shaped neem stick close to his chest. Deepak learnt this trick of water divining from a Baba belonging to Mahima cult two years ago and has identified more than 100 water sources in different villages of Keonjhar district without a single failure.

Gouri Mahanta (60), a daily labourer, can predict the existence of water from a site after carefully observing the water-level of a tumbler for the whole day. This woman water diviner collects a lump of soil from the proposed site for identification of water source and then worships the family deity of the land owner with a small portion of collected soil which is dropped into a tumbler containing water. A resident of Padiabeda village in Mayurbhanj district, Gouri has identified 30 to 40 water sources in Mayurbhanj and Keonjhar districts during last 12 years. Her tricks of water divining can not be shared with anybody as she claims to have learnt that by divine blessings through a dream.

Bidyadhara Nath (56) employs different tricks to trace the under-ground water source. He observes the direction of flame of a candle in one method and in another method he fills the hole dug over the proposed site with water. If the hole retains more than half water volume after five minutes, then water source is close to the ground level. Similarly Bidyadhara puts a candle inside a two feet deep hole dug at the selected site. By observing the direction of the flame he forecasts the presence of ground water. A resident of Haladigadia village in Jajpur district, Bidyadhara has identified more than 1000 water sources in areas like Bhubaneswar, Cuttack, Dhenkanal, Balasore, Baripada, Anandapur, Joda, Barbil, Jajpur Road etc.

These are few examples out of the large number of water diviners operating in Orissa at present. Water divining as a body of knowledge flourished and gained importance throughout the State. Not only the illiterates, ignorants and supposedly by superstitious villagers rely on water diviners but also the big farmers, NGOs, industrial houses and even in certain cases the water supply

department of the government repose confidence in water divining to-day. Because the cost of water exploration through modern methods is invariably unaffordable for the average man, traditional knowledge of exploring water sources known as "water divining" is still in vogue among many rural and urban communities.

Search for water is as old as human civilisation. In the early stage of civilisation, people met their water requirement from surface water sources like streams, lakes, ponds, rivers. After they failed to get water from the surface sources exploration of water from below the ground became a constant pursuit for human beings.

The knowledge of tapping ground water has been built and refined from time to time over thousand of years. At present, finding of ground water has become a difficult task due to changes in the water-cycle, enhanced requirement of water by mankind and setting up of habitation in new locations. On the other hand, the body of knowledge to identify ground water has been expanded and up-graded to meet the new challenges through modern science. In recent past, science and technology have taken long strides in exploring ground water as a result of which many technologies are available now to identify the ground water. But this scientific knowledge is accessible only to a handful of people of the urban area leaving the vast multitude of rural popultion outside its reach.

Water divining is a process to detect ground water by applying a natural quality inherent only in some persons or the native wisdom acquired by a handful of people. This knowledge is commercially used for ground water detection in many parts of the globe. Water divining is also an ancient method through which the diviner identifies under ground water sources with a set of divining rules/laws. Although thousands of diviners are practicing this art or science everyday in all parts of the world still this knowledge is gradually marginalised due to its substitution with scientific tools, mindset of disbelieving everything not validated by modern science. This category of people dismiss this water divining contemptuously as pure guess work and brand it as 'fake'. But on the otherhand, a large number of people consider it as a form of ancient science the secret of which is not easy to comprehend. However, modern science does not accept water divining as a form of science.

The methods used or adopted by water diviners vary widely from place to place. A plethora of methods such as soil testing, coconut, L-shaped rods, Y-shaped rods, pendulums, gold-chains etc. is employed to identify under-ground water sources in water divining. But, in the absence of any systematic study or survey one finds it almost difficult to have a comprehensive knowledge about it. Fortunately, of late, team members of RCDS Centre for water for life, working in the field of drinking water in rural Orissa come across a couple of water diviners which aroused their interest for the proper documentation. As a humble beginning in this direction, RCDC (Regional Centre for Development Co-operation) members with the co-operation of fellow NGOs have identified more than 50 water diviners of the state within a span of one year.

These water diviners constitute a diverse cross-section of the society starting from daily labourer to school-going teenager, from blind men to women and they belong to nine districts of Orissa such as Bolangir, Angul, Dhenkanal, Mayurbhanj, Keonjhar, Deogarh, Sundergarh, Ganjam and Raygada.

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Global Warming : A Threat to Future Generation

Shashank Shekhar Panigrahi

The global environmental debate is discussed on certain specific environmental problems that are facing humanity. Think, there is hardly a society or country today which is not involved in any way or another in this debate. From small, local, grass root organizations to National Govt. and global and International bodies, this debate is becoming among the strident of the century.

The triggering of the global ecological crisis[1] has raised nagging questions regarding "developmental" paths mankind has hitherto followed and also man's role as the sole arbiter for destinies of all the species on the earth.

Chief among these are the rapid destruction of numerous eco-systems, the relentless degradation of many others and the consequent loss of genetic diversity.[2] The long-term consequences of the disproportionate impact of the world's rich nations on global resource consumption, particularly fossil fuels.

During the 1970's growth pessimists warned that the exhaustion of global resources was inevitable. "Rising levels of carbon dioxide in the atmosphere make it unlikely the world will run out of oil before the environmental cost of its use in the form of global warming-becomes prohibitive". These developments have posed a challenge for international law. Scientific uncertainties have forced new ways of law making through varied international environment agreements (IEAs).

In this article an attempt has been made to address the role of law in confronting the challenge of global warming and the policy issues involved in meeting this challenge.

1st the problems of Global Warming and Green house effect, the evidence of its existence and its possible effects upon the eco-systems and human beings, 2nd the development of international environment laws principles and its applicability and evaluation, Paper presented at the 3rd International Conference on Environmental Laws on dt - 24th Feb 2008 organised by the Global Institute of Legal Studies, Calcutta, India. 3rd directions for the further developments of international environmental law as well as domestic policies and legislation.

Global Warming

"Global Warming" is shorthand for the prospective climate changes that the insulating effect of the earth's atmosphere from the sun to penetrate to the earth, but gas molecules from the equivalent of a green house roof by trapping heat remitted from earth that would otherwise escape into outer space. Carbon dioxide (CO_2) accounts for about half of the green house gases. Methane (natural gas) nitrous oxide, ozone and

chlorofluorocarbons (CFCs) make up the rest. (CFCs) are artificial chemicals widely used in refrigerators and air conditioners as refrigerants in Styrofoam Cups, in cleansers for computer components and as aerosol propellants for such things as deodorants).

In all cases consumption patterns are the chief cause of the volume of green house gases (GHG) released into the atmosphere. Thus the developed counties of the North are the chief perpetrators of the growing amount of GHG in the atmosphere. The developed nations who make up about a quarter of the world's population are responsible for 54% of the heating effect caused by GHG emissions. In contrast, developing nations, who make up nearly 80% of the world's population account for less than half.

Among the developed nations the United States stands out accounting for nearly 18% of the heating effect of GHG emitted but less than 5% of world population. Brazil is the main culprit among the developing nations because of the adverse consequences of deforestation of the Amazon Basin.[3]

There is widespread agreement on the theory underlying global warming and on the fact that the gases that cause heat to be trapped in the atmosphere are increasing on unprecedented rates. Dispute is, whether continued high rates of GHG emission will lead to global warming, as many determinants of climate change are inadequately understood. Not surprisingly, therefore, global warming is a contentious issue on the global agenda.

To note, researchers have indicated that from 1860 to the early 1980's carbon dioxide levels grew from a concentration of about 280 parts per million (PPM) to about 350 PPM and are currently increasing at a yearly rate of about one PPM.[4]

Causes

Deforstation is one of the human activities that accelerate global warming. Green plants routinely remove carbon dioxide from the atmosphere during photosynthesis. The natural processes that removes GHG are destroyed when forests are cut down, decay on burned.

For many years it was believed that an area the size of Austria was deforested every year, but evidence indicates that the magnitude of the destruction of the world's forests may be even greater.[5] Tropical deforestation is notably acute in places like Indonesia, Myanmar (formerly Burma), Cameroon, Costa Rica and especially Brazil, where vast tracts of rain forests have been cleared and burned to make room for farms and ranches (cattle, incidentally, add to the staggering volume of methane released into atmosphere).

Burning of Fossil Fuels greater than deforestation accounts for three quarters of the excess carbon released into the atmosphere or roughly a ton of atmospheric CO_2 for every man, woman and child on earth.[6]

Rapid Industrialisation often believed especially responsible for atmospheric pollution as it produces atmospheric sulfur and nitrogen oxides. These pollutants return to earth typically after travelling long distances in the form of "acid rain" which adds to the acidification of lakes and the impairment of eco-system.[7]

Burning of coals widespread among utilities, release more CO_2 than does the burning of other fossil fuels.

Automobiles emit large quantities of GHG. Consider, the average American car driven an average 10,000 miles a year releases its own weight in carbon into the atmosphere every year.[8]

Energy, the engine of economic growth improves living standard throughout the world.

Today, the industrial nations consume over 70% of the world energy. Imagine, their access to the world's energy supplies has materially benefited their societies. Even now the greatest increases in the rate of energy consumption occur in the developing nations of the South. Consider, how the atmospheric pollution increases due to fossil fuel combustion resulted from Third World policies and achievements.

Population Growth i.e. expected doubling of the world's present population will require an enormous increase in fossil fuel consumption simply to maintain living standards. The unfolding demographic patterns may seriously disrupt the world's climate and delicate eco-systems, which will make process of global warming.

Consequences

Is the temprareture of the world's atmosphere rising inexorably ? The 1980s witnessed the six warmest years on record and global warmth in 1988 increased at as record setting rate.[9] During the same period the amount of CO_2 in the atmosphere increased by 25% and the amount of methane doubled.[10]

Whether the heat wave of the 1980's was itself a consequence of the green house effect ? Through scientists do not agree, still it may provide a glimpse of the future.

Think, if the GHGs in the atmosphere mount, global temperature will rise. By 2050 global temperatures will reach an average level four-degree (Celsius) higher than now. Though consequences are not easily predicted,[11] some include a melting of the polar ice caps which will raise ocean level significantly and lead to the destruction of coastal areas and wetlands,[12] an increase in the frequency and severity of droughts, dust storm, forest fires and hurricanes and a marked alteration of rainfall and other traditional weather patterns critical to economic process.

According to Inter governmental Panel on Climate Change (IPCC) predictions a 30-50cm sea level rise projected by 2050 will threaten low Islands and coastal zones. A 1-meter rise by 2100 would render some island countries uninhabitable, displace tens of millions of people, seriously threaten low-lying urban areas, food productive land, contaminate fresh water supplies and change coastlines.

Truly though all projected changes will not be detrimental, collectively they will lead of dramatic changes in global patterns of production, trade, capital flows and migration. Changes in the world's climate promise may lead to alter world politics profoundly.

Global warming may be the ultimate tragedy of the commons. It was intended by none yet is seemingly beyond the control of all who will bear its costs.

II. INTERNATIONAL ENVIRONMENT LAWS.

As the world has become increasingly inter dependent ecologically as well as economically, there is greater awarness that what is in the best interest of all may also be in the best interest of each.[13]

Sustainable Development, the central concept in our Common Future, the report of the World Commission on Environment and Development (1987) popularly known as the Brundtland Commission emphasized sustainability means, learning to live off the earth's interest without encroaching on its capital. The commission emphasised the maxim, "the growth of limits" rather than "limits of growth" (popular among the pessimists during the 1970s).

The marathon work of the Brundtland Commission underscored the "inter locking" of crises of the global economy as well as the global

ecology, since "ecological stress" hamper economic prospects in the same way that rampant economic growth causes environmental harm. As a result, the developing countries required a "Safety Net" which can ensure their economic development, along with long-term protection of their natural resource base and the environment.

The Brundtland report, an important landmark in the rapid emergence of environmental concerns as a central issue on the global political agenda emphasized to promote international co-operation in dealing with both national and transnational problems within their jurisdictions with the goal of preserving the global habitat for future generation.

If one reads carefully the broad contours laid down in Our Common Future, Sustainable Development may well be regarded as a harbinger of a New International Ecological Order (NIEO). It has led to incorporation of specific provision for recognizing "special situation and needs" of the developing countries as well as "economic and social development and poverty eradication" as their overriding priorities.

Environmental Law comprises both 'hard law' (norms creating precise legal rights and obligations) such as national legislation and international treaties, and 'soft law' such as standards and regulations. 'Soft law[14] has, in fact, played an important role in the evolution of international environmental law. Several international declarations (e.g. the Stockholm Declaration 1972, the Nairobi Declaration 1982, the World Charter for Nature 1982, the Hague Declaration on the Protection of the Ozone Layer 1989, the Ministerial Declaration of the Second World Climate Conference 1990, the Rio Declaration 1992 etc.) have acted as catalysts in the development of International Environmental Agreements (IEAs). The emerging regime of legal norms proves to be of great help in fixing responsibility for causing environmental harm.

Principle 21 of the Stockholm Conference 1972 on the Human Environment reads;

"States have …….. the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other states or of areas beyond the limits of natural jurisdiction."

This principle of state responsibility is emerging as a doctrine of Customary International Law.[15] State responsibility is likely, however, to be an inadequate remedy for global warming, since, in several ways, state responsibility does not respond to the complex scientific and political issue at stake.

1st, sources of emissions lead to global warming are widespread, a combined effect from many nations.

2nd, time lag between the emissions and their adverse effects make the application of state responsibility principles is very difficult.

3rd, alternatives to excessive emissions are not always readily available, particularly for developing countries.

International environmental law seeks to balance a nation right to exploit its environment with its responsibility to avoid harm to other states and the world community.

In the Corfu Channel Case[16] (1948) International Court of Justice stated "every states (has an) obligation not to allow knowingly its territory to be used for acts contrary to the rights of other states". The private law principle "sic utere tuo ut alienum non leadas" prohibits the use of one's own property in such a way as to injure another's property and correlary in international environmental law. This principle has been applied

to international watercourses, transfrontier pollution and marine pollution.

The Earth Summit held in Rio de Janeiro, Brazil, in 1992 marked another milestone to promote a sustainable future for all of human kind.

III. DIRECTIONS COPING WITH GLOBAL WARMING

The ever-ringing question is the global character of climate change and its anticipated consequences and who will affect by policy choices designed to slow it. Consensus on how to cope with global warming is elusive, since scientific uncertainties on the precise nature of global warming continue.

The expected consequences of reducing carbon emission could be especially severe in the USA, the world's largest consumer of fossil fuel energy. The Bush administration-characterized as "wed to the gloomiest economic predictions" estimated that the US-GNP would decline by 3% (roughly $ 150 billion) as a result of effort to halt global warming through increased energy efficiency. Until the surprising discovery of significant ozone depletion over North America, US talked more than of positive steps to halt it.

When United States waxed uncertain about the future, nation in western Europe and even Japan began to formulate national policies designed to reduce carbon dioxide emissions, Thus, Europe has assumed the mantle of international leadership on this central environmental issue, leaving the US isolated.

Developing nations are wary about efforts by the rich nations to solve environmental problems they did not cause. Leaders struggling with the hand-to-mouth survival of millions find that 'Sacrifice today to save tomorrow' is bitter medicine, especially when those administering it have already reaped the benefits of unlimited greenhouse effusions.[17]

Strategies under discussion to cope with global warming includes adaptive as well as preventive strategies.

Adaptive Strategies would call upon society to adjust to climate change, e.g. Societies could explore

1. planting alternative crop strains, which way could withstand a broad range of climate changes.

2. ways to provide increased flexibility in managing existing water supplies.

Difficulties in adoption-

1. to predict accurately given the limitations of current global envtl. Models.

2. to disrupt existing social pattern e.g. cultivation, removal of population from low lying areas for other alternatives (weather patterns tend to change gradually, people are unlikely to be convinced until a disaster occurs).

3. to be expensive for developing countries.

Preventive Strategies include a host of measures ranging from energy conservation to the development of new fuels (these may not for apparent effect for future directions). However, it will likely entail major economic costs but delay may result more costly, dangerous and possibly irreversible consequences for the global environment.

The central theme is a "shared responsibility" for some of our "common concerns" and the primary responsibility for mitigating environmental imbalance is fixed on the developed countries. The standard argument of the developing countries has been that they do not want to pay for environmental sins they did not commit.

Besides these there should be:

1. Expression of willingness to consider voluntary reductions in their carbon dioxide emissions.

2. Developing nations to adopt/acquire the technology to reduce their own pollutants.

3. An agreement on creation of a special fund (to be administered through World Bank) to finance the developing countries for products and technologies that substitute the cause of depletion of the ozone.

4. International convention to provide for the establishment of institutional channels of consultation, information exchange and monitoring the concept of intergenerational rights and obligations.[18]

CONCLUSION

Concern about global warming has reached a high pitch, as discussion of the green house effect has spread from scholarly journals to popular press. Global warming is an inherently transnational policy problem. As Maurice Strong, organizer of 1992 Earth Summit lamented, "I believe, we are on the road to tragedy." [19]

The global commons must recognize the issue of global warming which involves "the interaction of two vast and complex systems, the planet's eco-system and the human socio-economic system."

The unilateral emission reduction plans by the developed countries are encouraging , the acid test of their sincerity, however, lies in enforcement of the main commitments -financial and technological transfers.

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The Need for a World Environment

Anirudha Choudhury
Shagun Mehta

If we look at society from a historical perspective, we realize that protection and preservation of the environment has been integral to the cultural and religious ethos of most human communities. Ancient Hindus, Greeks, Native Americans and other religions around the world have venerated nature. They worshipped all forms of nature, believing that it emanated the spirit of God. Hinduism declared in its dictum that "(t)he Earth is our mother and we are all her children." The ancient Greeks worshipped Gaea or the Earth Goddess. Islamic law regarded man as having inherited "all the resources of life and nature" and having certain religious duties to God in using them. In the Judeo-Christian tradition, God gave the earth to his people and their offspring as an everlasting possession, to be cared for and passed on to each generation.

But in today's highly industrialized world, the protection of environment has been given the least priority, the available natural resources have been mercilessly exploited by everyone to fulfill and quench their own clandestine and subterfuge demands. Added to this the conventional environmental wisdom holds that environmental degradation continues largely unchecked even though environmental agreements and organizations have proliferated in the last thirty years. The new international environmental organizations are criticized for having failed to develop coherent environmental norms and having failed to devise effective mechanisms to induce their observance. Commentators variously attribute the inability to improve international environmental conditions to a "weak institutional structure ," poor international governance, a lack of "transformational leadership," and even an element of "management shortcomings and bureaucratic entanglements." Most commentators, in fact, would opt for "all of the above" as descriptive of the causes of international environmental governance failure. Eventhough UNEP(United Nations Environmental Programme has been functioning as a nodal body in this regard, but till now it has largely disappointed.

The concept of upgrading or replacing UNEP with a stronger body, as discussed in this issue, is in itself not new. However, the substantial support the idea has mustered in recent years has added a new dimension to earlier debates. Several academics and expert commissions, too, have advocated a World Environment Organization.

A WEO is needed for two reasons: First, many ecosystems continue to deteriorate and the human environment is under serious, uncontrolled threats. Second, the processes of international environmental governance need better coordination.

While human stewardship over the earth's environment may not be disastrous, serious environmental problems exist that are not being adequately managed under current institutions. In GEO-2000, UNEP concluded, "if present trends in population growth, economic growth and consumption patterns continue, the natural environment will be increasingly stressed ." The most serious problems include a massive loss of biodiversity, over-fishing, depleted freshwater supplies, and global warming.

Before critiquing the current environmental regime, one should first note that environmental governance is far from being fully dysfunctional. UNEP has achieved a number of successes over the years, particularly in catalyzing new MEAs. The systems for implementation review of environmental treaties are complex, yet the results are often positive . In recent years, important new MEAs were negotiated on bio-safety, persistent organic pollutants, prior informed consent on trade in chemicals and pesticides, liability and compensation regarding hazardous wastes, and on the implementation of the Kyoto Protocol on climate change.

Nevertheless, environmental governance does not function as well as it needs to. The environmental treaties are often too weak to address the problem they were set up to correct. Among the MEAs, there is a lack of coordination and missed opportunities for policy integration. At a recent meeting of the Open-Ended Intergovernmental Group of Ministers, the President of the UNEP Governing Council reported, "The proliferation of institutional arrangements, meetings and agendas is weakening policy coherence and synergy and increasing the negative impact of limited resources ." These financial resources are not only limited but are also diminishing, and the cuts in UNEP's budget are, to some extent, emblematic of the lack of confidence by governments in the current management structure.

One longtime observer, Konrad von Moltke, reminds us that at no time has the entire structure of international environmental management ever been reviewed with the goal of developing optimum architecture . The U.N. Task Force on Environment and Human Settlements reported that environmental activities in the U.N. "are characterized by substantial overlaps, [and] unrecognized linkages and gaps" which are "basic and pervasive." If this is true even within the U.N., it is probably much worse externally.

The Task Force reported further that environmental ministers are frustrated at having to attend so many different meetings, and that it was difficult for them to get the big picture. The current scattered organization of environmental governance is confusing to experts and incomprehensible to the public. If an organization chart of world environmental governance existed, its hydra-like nature would be "Exhibit A" for reformers.

Joy Hyvarinen and Duncan Brack have keenly observed one symptom of governance failure: the tendency to "recycle" decisions by having each new forum call for implementation of what the previous forum proposed. All organizations do this to some extent, but it is particularly prevalent in the environmental regime. The current lack of coherence in environmental organization provides reason enough for reform, yet an even stronger reason exists--namely, that the trend is for more proliferation. The question of whether environmental governance should be centralized was discussed extensively in the run-up to the Stockholm Conference. For example, in 1972 a special committee of the Commission to Study the Organization of Peace noted that "a

new intergovernmental environmental organization" would provide "the best possible coordination" and would "adequately centralize all efforts." Yet the committee rejected that approach because "it would be difficult to persuade organizations to transfer their environmental functions to the new entity . . . ." Thirty years later, the same conundrum exists, yet the number of environmental functions that would need to be transferred to a WEO has multiplied ten-fold. Back in 1970, when George Kennan recommended the creation of an "International Environmental Agency," he hypothesized that a single entity with great prestige and authority stood the best chance of overcoming the formidable resistance from individual governments and powerful interests. As he analyzed it: "One can conceive of a single organization's possessing such prestige and authority. It is harder to conceive of the purpose being served by some fifty to a hundred organizations, each active in a different field, all of them together presenting a pattern too complicated even to be understood or borne in mind by the world public ."

In the Rio Summit in 1992, the governments had an opportunity to restructure environmental governance, but instead of doing so, they bypassed UNEP in the new climate change convention and created the Commission on Sustainable Development (CSD). At a meeting of experts held in Cambridge in May 2001, there was a consensus that on the whole, the CSD adds little value to the debate on sustainable development. Yet no one predicts that the CSD will be abolished anytime soon.

The problem is that the current platform of environmental governance cannot correct itself and all of the trends point to continued proliferation, with little appetite by governments to thin out the ineffective institutions. The tendency toward expansion can be seen in recent reformist actions. Concerned about the fragmentation of environmental institutions, governments created three new ones to deal with the problem--the Global Ministerial Environmental Forum (GMEF), the Environmental Management Group, and the Open-Ended Intergovernmental Group of Ministers or their Representatives on International Environmental Governance. Of course, each of these institutions can be justified and they appear to be serving a useful purpose. But it is hard to escape the conclusion that unless governments take a big step toward creating a holistic WEO, the current governance architecture will get worse and the time-consuming dialogue on governance will remain open-ended rather than conclusive.

2. Global or Non-Global Scope

Esty and Maria Ivanova have suggested that the GEO be limited to "global-scale pollution control and natural resource management issues." They contrast "global" problems, such as the protection of the global commons, which should be controlled by a "GEO," with "world" problems, such as drinking water, air pollution, and land management excluded from its jurisdiction. Their global versus world terminology is a bit ambiguous but one can distinguish between global problems, which require widespread participation to solve, and shared problems, which all countries have but some can solve even if others do not. For example, a heavy reliance on government revenue from taxes on trade is a shared problem in many developing countries that makes them resistant to trade liberalization and its concomitant environmental benefits, but unsustainable taxation is not a global problem.

This aspect of the Esty/Ivanova conception of a WEO/GEO differs from that of other analysts. For example, Runge does not limit the scope of his WEO to global issues. He suggests that it

looks at irrigation schemes involving the international transfer of water . One problem with a WEO for just the global commons is that any decision about what is or is not global commons is somewhat arbitrary. Is biodiversity to be included ? Are ocean fisheries ? How about nuclear waste or other toxic waste ? Are forests global because of their services to combat climate change, or non-global because they root within national boundaries ? Is the Antarctic a regional or global concern ? Lines can be drawn but they will remain debatable.

The Esty/Ivanova approach would seem to preclude a WEO mandate for regional issues like the regional seas programmes. Yet it is interesting to note that the Task Force on Environment and Human Settlements suggested that attention by the global environmental Ministers to regional issues would be a good thing. Indeed, the Task Force suggested that the Ministers shift the venue of their meetings from region to region and that regional issues should feature prominently on their agenda. One wonders whether there would be enough of a constituency for a GEO that worked exclusively on global problems.

This conundrum about scope has no easy answer. Ideally, the WEO should be given duties that distinguish it from the national environmental agencies that exist in each country in order to avoid duplication. That is an almost impossible standard to meet, however, since all existing international agencies overlay national agencies. The Esty/ Ivanova approach may do the best job of avoiding the conundrum because national governments could, in principle, delegate global problems to a global agency. Yet it should be noted that no existing major international agency looks only at global problems. The mandates of the WTO, the ILO, the WHO, the FAO, etc. are to work on problems that each country shares.

WEO Functions

A WEO might have a matrix of functions including: standards and policy setting, market facilitation, dispute settlement, evaluation, planning, data gathering and assessment, information dissemination, scientific research, and compliance.

1. Standards and Policy Setting

Some advocates of a WEO emphasize its legislative role in developing norms and setting standards. In that regard, advocates point to the WTO, the ILO, or the new WHO Framework Convention for Tobacco Control . While these are useful models, the environmental regime is not lacking in policy-setting experience and would probably do better to build on the extensive experience it has developed. Indeed, the environmental regime has been perhaps the most innovative of any regime in using soft law and in building upon it .

2. Market Facilitation

The idea that the environmental regime could help countries exchange economic and environmental commitments is not a new one but it deserves greater attention. In 1991, David Victor proposed that a General Agreement on Climate Change be modeled on the GATT and, in recent work, Whalley & Zissimos have proposed a bargaining-based WEO to facilitate deals struck between parties with interests in particular aspects of the global environment on both the "custody" and "demand" sides. These ideas should be elaborated and expanded upon in developing strategies for a new WEO.

3. Dispute Settlement

It is sometimes suggested that the environmental regime would benefit from having a dispute settlement system like that of the WTO.

Since this WTO-envy is fairly common, let us point out a few reasons why the WTO model would not be right for a WEO. First, the WTO system relies on dispute settlement rather than compliance review. This may be appropriate for a regime in which reciprocity is the central value, but it would not be appropriate for the environmental regime that has substantive, measurable objectives. A more effective approach would be to expand the compliance review procedures of the MEAs which are more effective because they are not as confrontational as those in the WTO and because they can be directly linked to technical assistance, which is largely absent from the WTO.

Second, the WTO system is considered strong because there is a possibility of a trade sanction in the event of non-compliance. Such trade sanctions are counterproductive, however, and injure innocent parties. They are counterproductive because they restrict trade in the name of opening it further. The sanctions injure innocent parties because in realty it is people who yearn to trade with each other; states or Members of the WTO do not themselves trade with each other. Third, the WTO model provides for dispute settlement within the WTO.

While this internal adjudication model is not used in MEAs, it is used in the U.N. Convention on the Law of the Sea, which has its own International Tribunal. The MEAs that do provide for dispute settlement typically utilize ad hoc arbitration or adjudication in a forum outside of the MEA. This includes the International Court of Justice, which has an unused environment chamber. Recently, the Permanent Court of Arbitration established a set of rules for the arbitration of disputes relating to natural resources and the environment. These arbitral procedures are available to states, intergovernmental organizations, non-governmental organizations, and private entities.

Conclusion

The WEO would improve environmental governance by making it more coherent both internally and externally. Internal coherence can be achieved by better coordination among UNEP, MEA clusters, and other agencies. External coherence involves the interface between the environment and other regimes, such as the WTO (trade and environment), the WHO (health and environment), the ILO (workplace environment), and the Security Council (biological and chemical warfare). On trade and environment, it is clear that both the WTO and the environmental regime have gained from their interaction. For example, the term "MEAs" arose out of the trade and environment debate of the 1990s.

While a WEO would not be guaranteed to have better external coherence than UNEP, it might help if the WEO constitution focused on this goal. Not all governments will want to see such coherence however. For example, in the run-up to the WTO Doha Ministerial Conference, the G-77 and China issued a statement which, among various points, warned that "Developing concepts such as global coherence with other intergovernmental organizations like ILO and UNEP should be cautioned against as it may be used to link trade with social and environmental issues for protectionist purposes."

Since the environmental regime comprises not only international organizations but also national environmental agencies, the WEO must interpenetrate national government to increase its influence over policy. For trans-border environmental problems (which are a large share of the totality of environmental problems), all

agencies must be pulling in the same direction. If national agencies are ineffective, then those failures will be felt outside of the country as well as inside of it. The WEO should respond to this challenge by working to improve environmental law and enforcement, particularly in developing countries.

Another priority should be the relationship between economic and environmental policy at the national and international levels. The WEO needs to have a much greater effectiveness in influencing economic policy than UNEP has had, so that the raging questions about the effective protection of environment can be put at rest, and the establishment of WEO becomes a pleasant reality in protecting the Environment at all costs.

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Riddles : An Informal Method of Tribal Education

Anuja Mohan Pradhan

In traditional tribal societies there was no formal system of education. The knowledge cultivated up to that generation was to be handed over to the upcoming next generation. The necessity of transfer of knowledge has led them to invent some novel methods of education. For acquiring technical knowledge the youngsters had to do the same work under supervision of an elder or elders through participation. The art of ploughing, weaving, making of tools and weapons, works of art, house building, cooking etc. can be categorised as under. Human feelings and literary knowledge is more of a subtle nature. The feelings need a smoother media for expression. The songs, may be the songs of planting, harvesting, childbirth, love and marriage which are examples of this genre. To catch the young minds and to train them for a better understanding of surrounding environment, art and other essential riddles were a modest method of education. Riddles are integral part of almost all the tribal languages.

Kui is a dialect spoken in Kandhamal and its adjoining districts in Orissa. The Kandha tribe and other people residing in the district speak this dialect. From the time immemorial people have spun various riddles in Kui dialect and use them for amusement, game and tutoring. The ongoing discussion is based on a study of the riddles taken from Kui language.

Structure of a riddle:

A riddle has no specific given structure. It can be of a single line prose or a rhyming couplet or few more lines. The most significant character of a riddle is , the question has some clues which leads towards the answer or the most probable resemblance. The clues may be symbolic or descriptive. Riddle is a blend of poetic lucidity and physic-technical trivia. What makes the riddle more attractive is the touch of humour. The humour multiplies with the tone, gesture, and style of the speaker. It is an interactive method of education. Any one who knows a riddle will be on command to put a hurdle to jump and the counterpart will feel the pressure. The questioner and the replier can very often interchange their positions. This two parties can be two individuals or two groups of people or any one in the group irrespective of age and sex.

Scope of Riddles:

As stated earlier, the riddles are the application of lucidity of poetry for education about essentials. Education can incorporate any field or matter. In other words the scope of riddles is unbound. It touches the aspects like parts of body to open sky, the plants, animals, house making, food, drink and what not. The wide range covered by riddles can be briefly discussed with following examples:

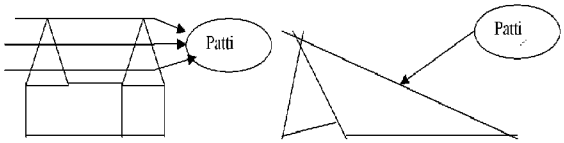
Of Human body:

Badigara tani kradi Dosamane.

It can be translated as A tiger is sleeping inside the cave. Here the replier has to think first that what can be comparable to a cave, but it should not be empty. It is live, important and also can be active. But now(normally) it is sleeping i. e. taking rest. Is it within his body or outside ? The answer is tongue. Inside the cave of mouth tongue sleeps and springs into action when needed. Is not it a funny observation of a part of human body? When explained, the child gets a permanent imprint of knowledge of what a cave, a tiger, role of a tongue is and its nature.

Rondene patti joreka daranga.

It can be translated as-" There is only a single beam but has two doors (in the house)". The beam in a house is a long sized wood, which is placed touching two opposite walls. A sketch of tribal house structure can be more explaining.



Pic. A Pic. B

In the picture A the long beams are called *patti* (*pattinga* in plural). More than one beam is used touching two opposite side walls, normally three, five or seven in number for a bigger house. Picture B has only one beam in slanting position. It is a temporary hut or crop watching house. Hence, a small house with single beam has no place for two doors. This makes the riddle more difficult. The replier has to narrow his possible answers to a slanting object with two openings. The answer is nose, a slanting nose with two nostrils. Some similar riddles in this category will be :

As you cut so it grows. (Ans-Hair)

A coconut with seven eyes. (Ans-Head).

Of Plants:

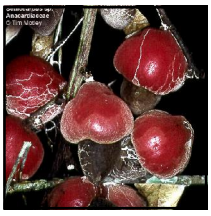
Tadi Pimpikadi, mida batakadi.

It is translated as ' A thin mother has a fat child'. Is it possible that a mother is thinner than her baby ? Is there anything near by ? The answer is "Tuber". A child in this area often sees his mother following a thin creeper to its root and digs out a fat tuber.

Kali kodi noka mane, rata kodi beoti sajine.

Translated as - Two little cows go in a row, the black one leads, red one doth follow. The riddle makes it clear that there are two objects or an object in two parts with black and red colour back to back. They are approximately of same size. The black one is always ahead of red. The answer is the Marking nut (Semicarpus Anacardium), locally known as *gonju* and called *bhalia* in Oriya. It is a fruit like cashew nut. The seed is outside the pulp of the fruit. A child in rural area of Kandhamal must have seen his mother bringing ripe *bhalia* for him along with seeds. Seeds are kept in home as they have a good medicinal use. The riddle can be seen through the following sketch.

Cashew Nut



Marking Nut (Bhalia)

Meedai koditake tadiri mane.

Translated as-"The mother weeps when her child is picked up". It sounds natural. Yet it is a riddle to solve. The answer is the whitish fluid oozes from the stem when a mango is plucked from tree. This riddle not only shows that the tree is the mother, but also potrays an affectionate heart of a mother. Taught from childhood, a child of this area will restrain to cut a fruit-bearing tree.

Of Tools and Weapons:

The tools and weapons are so closly associated with Kui people. Thus, how riddle makers can ignore these useful objects? The youngsters have to be made acquainted with their shape, nature and use. The axe, agricultural tools, pots for fetching water etc. are well explained in through riddles.

Ijoti sajine jainjain na, Oreti baine maasi aajana.

Translated as, "It goes out very shinning, but returns home dirty". Is it a shoe? No. A note book? No. Because both of the things have little use among tribal people, at least previously. The answer is axe. Before going to work it is sharpened to shinning by polishing on a smooth stone. While cutting trees, especially a Saal tree, the lactation makes it black.

Dukuli buda ketanga gaadi trebinenju.

Translated as - " An old man with hunch back, makes round of paddy fields. " The answer is hand spade, a most useful agricultural tool. The riddle describes its physical structure and its intended place of use. Thus the riddle gives a practical insight of the implement which a child has to use in future to earn his livelihood.

Gotodi bejutani tihti potanga sekeseke na koksamanu.

Translated as " A wood so bend like a bow, hundreds of sparrows sit in a row. " The answer is a sickle, an implement use for cutting grass, weeds and crops.

Ijoti sajine RitiRitina na, Oreti baine tuutu panjana.

Translated as - " It goes out empty stomach, but returns belly full. " The answer is pot fetching water.

Ijoti sajine tuutu panjana, Oreti baine Riti Ritina na.

Translated as - " It goes out belly full , returns empty stomach". Is it a contrast of previous one? The reply is the bamboo basket used for carrying cow-dung to the fields.

The riddles were the most interesting and effective methods of informal education in all the tribal societies. The older generation- grand parents who could not go to work functioned as a sort of modern day play schools, told riddles to the street children along with stories and songs. The humour element in riddle keeps the children in captive attention. A similar picture of informal method of education can be seen in the book- *Freedom in Exile*, autobiography of His Holiness, Dalai Lama. He describes, "the teachers of a Lama were not only classroom teachers, they acted as sweepers of house, cook etc. whom the child holds in low esteem. Failure to give reply to such person will affect the self-image or ego of the child. Lama and he will put his effort to down the ridiculing cook. Riddles were also used as amusing pass time in community house, while taking rest on the way. During social occasions, festival times the young boys and girls were engaged in such conversation. The riddles or the format can be used in primary education. Some riddles from Kui dialect are given below for an amusement reading.

A tick on the elephant's hip. Unless it yawns, Jumbo can't beep.

Ans. - Lock of the house.

Little policemen, red turban on their heads, Camp in every house, One gets up, when you call.

Ans. - matchbox.

It never changes its place, yet, Travels across the horizons.

Ans. - Eyes.

White little children make a wall, Can you climb it, without a fall ?

Ans. -White ants making ant hill.

Fair little damsel with a slim waist line, Garments she wears, above ninty-nine.

Ans. - Trunk of Banana tree.

Baby starts crying when you take to your arms, Leave it on ground, sleeps in silence.

Ans. -Cattle Dong bell.

A child born with grey hair.

Ans. -Maize.

Two buttocks upon a single leg.

Ans. -Siali (Bauhinia vahili) leaf.

A child rolls on mother's chest.

Ans. -Mortar of pestle.

There are ropes filled in the drum.

Ans. - Intestines of human being

Neither by kick, nor by whip,

Just put your step,

To make it hop.

Ans. - Leg Pound (*Dhenki*)

Two little brothers so quarrelsome,

Beat each other till they sleep.

Ans- Eye lids

Ten little men out on a hunt,

Only two hit,

Rest beat the bush.

Ans. : Search and killing of louse by pressing between two thumbnails.

Dry hard wood at the bottom,

with a stream at the top.

Ans. -Sago palm tree.

It never softens when you boil, Just bake in fire, You can't take it out.

Ans. -Hair.

An old lady looks so dark, Is an expert to make parched rice.

Ans. -A kendu wood with black bark. It makes sparkling sound when put into fire.

An old man, sitting with an umbrella on.

Ans. -Mushroom.

Hairy mother, bald child, Bald mother, hairy child.

Ans. -Hen-Egg-Chick.

Mother looks dark and dirty, Her children, So variety, so tasty.

Ans. -Cooking pot.

Single ear of the corn, Weighs a ton.

Ans. - The stem bearing berries of a sago palm tree.

King's carpets, None can roll up.

Ans. -Road.

None can scratch king's pimples.

Ans. -Jack fruit

Monkeys dance in a red cocoon.

Ans. -The flies inside a ripen fig.

No door in the white house.

Ans. -Egg.

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Eco-Tourism in Satakosia - A Means of Livelihood

Harsha Bardhan Udgata

Satkosia Gorge Sanctuary is the second largest and the 2nd Tiger Reserve of Orissa. It has tremendous genetic and ecological importance as it is the wet portion of Decan Biogeographic zone. It has a significant elephant population in deciduous forests. The sanctuary is also important for being the natural habitat of two endangered species of fresh water crocodiles viz. Gharial and Mugger and a sizeable population of Tiger, Leopard, Gaur, Sambar, Chowsingha and barking deer. Large population of Giant squirrel is sighted on the canopy cover of the forest. Rare and endangered birds and butterflies are very common. 22.4 Km. long stretch of Satkosia Gorge of Mahanadi river harbours a large population of varied fishes and aquatic fauna.

Being located at the heart of Orissa, it is surrounded by hundreds of villages and numerous industries like NALCO, NTPC, TTPS, Bhusan Steels & Straps, Jindal steels, besides the coal mines of Talcher and other small industries. It acts as a carbon sink for them and hence is essential to protect the environment.

This sanctuary is vulnerable to heavy biotic pressure from surrounding villages such as tree felling, poaching, grazing of live stock, fishing and fire, which are against its sustenance. People living in and around the sanctuary in more than 200 villages depend on it for their livelihood and day to day requirements. They collect fuel wood, timber, bamboo for their bonafide use. But they also collect Mahu flower, Sal seed, Kenduleaves, Mushroom, Honey and other forest produce to sell in nearest towns. Commercial extraction of forest produce and peoples dependency on them will threat the conservation of biodiversity in the sanctuary.

Satkosia Gorge of river Mahanadi is the habitat of endangered Gharial and Mugger as the

gorge is also home of 183 species of fishes and prawn, which are the main food material for them. But nearly 800 traditional fishermen of 20 villagers on river bank depend on river for fishing for their means of livelihood. Tikarpada, Majhipada, Beherasahi, Kuturi, Marada are the few villages among them. Unregulated fishing activity not only disturbs the breeding biology of the crocodiles, but also limits the food availability for them. Crocodiles die of strangulation in forbidden gill nets used for fishing in the darkness of night. It is again a question of livelihood going against conservation of endangered fauna.

Now it has become a challenge for the sanctuary authority how to go for conservation without disturbing the livelihood of the dependent people. Conservation and livelihood should go side by side to gain the support of local people for existence of the sanctuary.

Non forestry based livelihood options like fishing in pond, poultry, apiculture, tailoring and mushroom cultivation are beneficial, hence these are promoted by the sanctuary authority through ecodevelopment activities. But livelihood based on ecotourism is a different type of forest based activity which can be carried out not at the cost of the forest. It sells the aesthetic value of the forest and wildlife only.

Eco tourism is defined as a responsible travel to natural areas that conserves the environment and improves the welfare of local people (The International Ecotourism Society 1990). Responsible tourism is that tourism which maximizes the benefits to local communities, minimizes negative social or environmental impacts and helps local people conserve fragile cultures, habitats and species.

Tikarpada, a place on the bank of river Mahanadi in Satkosia Gorge Sanctuary is famous in Orissa for its Crocodile Research Center and has been attracting tourists form different corner of the country. During winter especially from October to February every year the flow of tourists as well as Picnickers reaches to maximum for visiting the sanctuary to experience wilderness and see wild animals. The climate during the season is very much congenial to spend time within it. Nearly 15000 tourists visit the sanctuary in a year. But the facilities and infrastructure at Tikarpada are not sufficient to provide adequate services to them.

During 2006, the then Principal Secretary to Govt. of Orissa in Forest & Environment Department Sri S.P.Nanda,IAS and the then Principal Chief Conservator of Forests (Wildlife), Orissa Sri S.C.Mohanty,IFS thought to start community based ecotourism at Tikarpada to provide visitor facilities like accommodation, fooding, trekking, boating etc. Then a core team consisting of Sri A.K.Mohapatra,IFS, the then Conservator of Forests, Angul, Sri Susanta Nanda,IFS, the then Divisional Forest Officer, Satkosia Wildlife Division and myself selected a site 2 km down to Tikarpada in the sand dune

inside river Mahanadi to pitch 10 swiss cottage tents there.

During January, 2007 an ecotourism complex was developed there in the name of Gorge Retreat. Ten tents were pitched on the sand enclosed with chain link fence around the complex to prevent unwanted entry of visitors as well as wild animals. Solar street lights were installed in side the complex. All the tents were attached with tent toilets which were fitted with 24 hours running water supply. All the tents were well furnished with facilities of a star hotel and solar house lighting system. Large size umbrella of appliqué work were fixed in front of each tent with chairs underneath for the visitors to sit and enjoy the beauty of the gorge. A restaurant attached to a common dinning hall made up of tent was established within the complex to cater food to the visitors as per their demand out of menu chart.

Two fibre power boats were purchased and placed in the water of gorge to facilitate boating by the visitors. Initially the establishment cost of nearly fifteen lakh of rupees was borne by the State Forest Department and the created assets were handed over to the community to utilize them for their livelihood.

The young boys of Tikarpada village who were either sitting idle as unemployed or involved in traditional fishing in the river were organized to run the ecotourism complex. 64 such boys were grouped to form a registered society in the name Tikarpada Parivesh Paryatan Samiti (TIPPS). They were asked to manage the tent, restaurant and boats and provide necessary services to the ecotourists. Selected 22 members of the society

were taken into confidence and various activities starting from reception to food supply and boating were distributed among them. The ecotourism complex was formally inaugurated on dated 20.01.2007 by Sri S.P.Nanda,IAS, Principal Secretary to Govt. of Orissa in Forest & Environment Department. During 2006-07 the occupancy in tents was not upto the mark. But the demand for the complex noticeably increased during Nov, 2007 to April, 2008. The visitors were rushing to office of the DFO, Satkosia Wildlife Division for booking of the tents.

The visitors have enjoyed pleasant nights in the tent, beauty of the Satkosia gorge surrounded by thick forest, trekking into forest tracks accompanied by guides, Tikarpada brand fish in their dish, chirping of birds and crowing of the peacock, call of giant squirrel and sighting of Muggers and Gharials on the sand near to water line of the river.

The members of TIPPS were given several trainings on Hotel Management by various institutions of Bhubaneswar to build their capacity. They have learnt to be well dressed, polite in dealings and cordial in rendering services. They were arranging camp fire to every group of

visitors in the night and taking them on boating to show them crocodiles. Since the facility was seasonal the complex has been temporarily closed since April, 08 last due to summer. It will again revive in November.

It has been observed that about 750 state tourists, 300 outside state tourists have stayed in tents. 1260 tourists have enjoyed boat riding. The society has earned income from rent of tents, boating fees and restaurant and Rs. 2, 97,125/- as their profit after deducting all working costs incurred during the period.

The 22 members of the community have shared 65% of net profit i.e. Rs. 1, 93,131 among themselves as their remuneration. They have kept balance 35% of the profit i.e. Rs.1,03,994 in their saving account, which will be utilized for their welfare activities, maintenance and further development of the infrastructures. The remuneration has been shared as per the degree of responsibilities they shouldered. For example, the Manager got 10% share, Security Guards got 6% share, Room Boy got 4.25% share, Clerk got 3% share and so on.

The community which was competing with the crocodile for their livelihood by way of fishing, could be diverted to such an option which is forest based but not at its cost. The pressure on river due to fishing could be reduced to some extent. The sanctuary as well as forest department have gained the support of local community so far as protection of wild life is concerned. The community is providing secret information about the smuggling and poaching and helping the staff in protection of forest and wildlife. They are ready to accept the proposal of the forest department for regulatory fishing in the gorge to protect the habitat of the Gharials.

Now the local community is interested to promote the ecotourism activity further out of their savings in the coming season. They are planning to construct tribal huts made up of bamboo mat and mud with its holistic cultural look for accommodation of tourists besides the existing tent facilities for even extended period. They will open one souvenir shop to sell traditional small crafts to the visitors. They have also planned to purchase one petrol driven vehicle to use it in carrying tourists to forest areas to show them wild animals and birds.

TIPPS is an example for successful ecotourism in true spirit. They have proved that ecotourism can be adopted as an alternate livelihood for them which in turn will protect the forest and wildlife. Their endeavour will definitely encourage people of adjoining villages like Purunakote, Labangi, Pampasar and Baliput of the sanctuary to go in for ecotourism as a means of livelihood.

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The Need for Biodiversity Conservation and Forest Biodiversity of Kalahandi District of Orissa

Manoranjan Pattanayak

Bio means life and diversity means variations. So in general term biodiversity means range of variations among all form of life whether plants and animals. It is very complex in nature. Till today we do not know how many species of plants and animals exist in this living world .Some Scientists say that it is in between 10 to 80 millions. Out of that only 1.7 millions have been identified and given scientific names. So from this it can be imagined how complex is the biodiversity of the world. Biodiversity can be expressed in terms of genetic and species diversity. The genetic diversity leads to formation of new species in the process of natural selection through chromosomal mutation in the process of Sexual Reproduction. The species diversity may be within the species (Intra-specific) or in between the species(Inter-specific). Lot of variations are observed in any biological ecosystems.

Loss of Biodiversity

Any biological system or ecosystem is dynamic in nature. It is never static. It changes continuously. So at any point of time there may be continuous growth. After some time the system reaches its peak and then vanishes. It is the law of the nature. Darwin's theory of evolution of species says that one species is lost when it can not cope up with the new surroundings. Another species is created. But this process is very slow

Forest Biodiversity Sal Forest, Kalahandi

and takes millions of years. But due to excessive action of the human being this process is exaggerated now. For example according to a survey from tropical forest 5 plant species are lost in each hour. The species extinction has grown to such an extent that the survival of human being is at risk.

Due to excessive exploitation of the natural resources, loss of biodiversity is taking place at an alarming rate. Some of the major reason of loss of biodiversity are:

1. Deforestation is the major cause of loss of biodiversity.
2. Shifting cultivation in Forest area leads to destruction of Forest biodiversity.

Dry deciduous Forest Biodiversity

3. Increase in livestock population.

4. Destruction of mangrove forest for shrimp cultivation.

5. Diversion of forest land for industry.

6. Loss of evergreen forest area for conversion to tea cultivation.

7. Illicit removal of trees from forests.

Biodiversity Conservation:

The World Conservation Strategy gives three basic objectives for natural resources conservation. They are:

a. Preservation of genetic diversity

b. Maintenance of essential ecological process

c. Sustainable use of natural resources

The United Nations' Organization (U.N.O.) conference on environment and development was held at Rio, Brazil in 1992. It emphasized the conservation of rich biodiversity of the world. The biodiversity of plant species maintains the rainfall level. It regulates climate and environment stability. Broadly the biodiversity conservation may be categorized into two types:

1. In-situ Conservation:- This method emphasizes that the biodiversity is conserved in its natural state. So that there is healthy competition among the species.

2. Ex-situ Conservation:- This method says that the conservation process is done outside the natural habitat of the plant or animal population. Some population of animals or group of plants are maintained in captivity or in cultivation. The establishment of different Botanical Garden and Zoological Parks are examples of this method. The biggest ex-situ conservation of animals is the Nandankanan Zoological Park at Barang near Bhubaneswar. This method is very cost effective and constant monitoring is necessary for its maintenance. Some of the major points of biodiversity conservation are:

l. Sustainable use of Biodiversity

2. Conservation of Medicinal Plants

3. Restoration of damaged ecosystem

4. Motivation of Local people

5. Utilisation of waste land for indigenous species.

6. Awareness among school children through Eco-club

Forest Biodiversity of Kalahandi district

Let us come to the forest biodiversity of Kalahandi district. The district of Kalahandi occupies the south-west portion of Orissa. It is bounded on the north by Bolangir, south by Nowrangpur and east by Kandhamal district and on west Chhatisgarh State.

Forest are renewable resources covering millions of living organisms of both plants and animals living in perfect harmony with nature. The tropical forest are considered as the most biodiversity rich vegetation of the world. These constitute only 7% of total land surface of the world. The Forest of Kalahandi displays a great

floristic diversity due to wide variation of topography, altitude, climate and soil. Mostly it belongs to Tropical forest both dry and moist. During Summer season, forest become leafless. The presence of 'Sal' in this district is very remarkable. The natural occurrence of both 'Sal' and teak known as ecotone is special characteristic of this district.

According to Champion and Seth classification of Forest type of India, following forest types are seen. Besides there are numerous subtypes also.

(a) Tropical Moist deciduous Forest:

This forest type is seen in M.Rampur, Thuamul Rampur and Narla area. Some plant species are Xylia xylocarpa, Alstonia scholaris, Adina cordifolia, Terminalia tomentosa Pterocarpus marsupium Syzygium cumini, Terminalia Arjuna Terminalia hellerica etc.

(b) Southern dry deciduous forest: -

This type of forest is seen in Kegaon, Kesinga area. Some plant species are Boswellia serrata, Acacia catechu, Cassia fistula, Lagerstroemia parvifolia, Anogeissus latifolia, Aegle marmelos, Delbergia paniculata etc.

(c) Dry bamboo breaks:

It is found in Th.Rampur part of Karlapat Kegaon area. The bamboos are found forming a pure crop in steep and dry hills which were subjected to shifting cultivation in the past. The common species is Dendrocalamus strictus.

Mixed dry deciduous Forest at Kesinga

The Forest of Kalahandi has got South Indian affinity. The rare type of flora and fauna are unique in its habitat. So proper steps may be taken for safeguard of these unique biodiversity to save it from further degradation.

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